UL 62841-4-5

STANDARD FOR SAFETY

Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 4-5: Particular Requirements for Grass Shears

UL Standard for Safety for Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 4-5: Particular Requirements for Grass Shears, UL 62841-4-5

First Edition, Dated November 30, 2023

Summary of Topics

This revision of ANSI/UL 62841-4-5 dated December 20, 2024 includes adoption of IEC 62841-4-5 Corrigendum 1 issued by the IEC January 2024: L.20.301.1.

UL 62841-4-5 is an adoption of IEC 62841-4-5, First Edition, issued by the IEC August 2021 and its Corrigendum 1, issued by the IEC January 2024. Please note that the National Difference document incorporates all of the U.S. national differences for UL 62841-4-5.

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated September 20, 2024.

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First Edition
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First Edition

Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 4-5: Particular Requirements for Grass Shears

November 30, 2023

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This national standard is based on publication IEC 62841-4-5, First Edition (2021) and Corrigendum 1 (2024).

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ANSI/UL 62841-4-5-2024

Commitment for Amendments

This standard is issued jointly by Canadian Standards Association (operating as “CSA Group”) and ULSE Inc. (ULSE). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or ULSE at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and ULSE. CSA Group and ULSE will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. The technical content of IEC and ISO publications is kept under constant review by IEC and ISO. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the First Edition including revisions through December 20, 2024.

The most recent designation of ANSI/UL 62841-4-5 as an American National Standard (ANSI) occurred on December 20, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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Preface

This is the harmonized CSA Group and ULSE Standard for Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 4-5: Particular Requirements for Grass Shears. It is the First edition of CSA C22.2 No. 62841-4-5 and the First edition of UL 62841-4-5. This harmonized standard has been jointly revised on December 20, 2024. For this purpose, CSA Group and ULSE are issuing revision pages dated December 20, 2024.

This harmonized standard is based on IEC Publication 62841-4-5: First edition, Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 4-5: Particular Requirements for Grass Shears, issued August 2021 as revised by corrigendum 1 issued January 2024. IEC 62841-4-5 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group and ULSE. The efforts and support of the International Harmonization Committee (IHC) for the adoption of the IEC series of standards for Hand-Held, Motor-Operated, and Transportable Tools and Lawn and Garden Machinery, are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Subcommittee on Safety of Hand-Held Motor-Operated Electric Tools, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

CSA C22.2 No. 62841-4-5 is to be used in conjunction with the First edition of CAN/CSA-C22.2 No. 62841-1. The requirements for grass shears are contained in this Part 4 Standard and CAN/CSA-C22.2 No. 62841-1. Requirements of this Part 4 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 62841-1. Where a particular subclause of CAN/CSA-C22.2 No. 62841-1 is not mentioned in CSA C22.2 No. 62841-4-5, the CAN/CSA-C22.2 No. 62841-1 subclause applies.

UL 62841-4-5 is to be used in conjunction with the First edition of UL 62841-1. The requirements for grass shears are contained in this Part 4 Standard and UL 62841-1. Requirements of this Part 4 Standard, where stated, amend the requirements of UL 62841-1. Where a particular subclause of UL 62841-1 is not mentioned in 62841-4-5, the UL 62841-1 subclause applies.

Level of harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for CSA Group and ULSE.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the CSA Group and ULSE versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for Differences From IEC

National differences from the IEC are being added in order to address safety and regulatory situations present in the US and Canada.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

IEC Copyright

For CSA Group, the text, figures, and tables of International Electrotechnical Commission Publication 62841-4-5, Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 4-5: Particular requirements for grass shears, copyright 2023, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword and Introduction are not a part of the requirements of this standard but are included for information purposes only.

These materials are subject to copyright claims of IEC and ULSE. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of ULSE. All requests pertaining to the Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 4-5: Particular requirements for grass shears, UL 62841-4-5 Standard should be submitted to ULSE.

NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 62841-4-5, Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 4-5: Particular Requirements for Grass Shears, copyright 2024, are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

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FOREWORD

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – Part 4-5: Particular requirements for grass shears

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

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5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62841-4-5 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools. It is an International Standard.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
116/495/FDIS	116/502/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at

www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

This Part 4-5 is to be used in conjunction with the first edition of IEC 62841-1:2014.

This Part 4-5 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for grass shears.

Where a particular subclause of Part 1 is not mentioned in this Part 4-5, that subclause applies as far as relevant. Where this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type*;

– notes: in small roman type.

The terms defined in Clause 3 are printed in **bold typeface**.

Subclauses, notes, tables and figures which are additional to those in Part 1, except as described for Annex K and Annex L below, are numbered starting from 101.

Subclauses, notes, tables and figures in Annex K and Annex L which are additional to those in the main body of this Part 4-5 are numbered starting from 301.

A list of all parts of the IEC 62841 series, under the general title: *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety*, can be found on the IEC website.

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

• reconfirmed,

• withdrawn,

• replaced by a revised edition, or

• amended.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 36 months from the date of publication.

101DV DE *Modification: Add the following to the IEC Foreword:*

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

102DV DE *Modification: Add the following to the IEC Foreword:*

For this Standard, all references to "Part 1" refer to CAN/CSA-C22.2 No. 62841-1 and UL 62841-1.

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INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent. IEC takes no position concerning the evidence, validity, and scope of this patent right.

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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – Part 4-5: Particular requirements for grass shears

1 Scope

This clause of Part 1 is applicable, except as follows.

Addition:

This document applies to **grass shears** with a maximum **cutting width** of 200 mm designed primarily for cutting grass.

This document does not apply to hedge trimmers.

NOTE 101 Hedge trimmers are covered by IEC 62841-4-2.

2 Normative references

This clause of Part 1 is applicable, except as follows.

Addition:

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60664-4, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress*

ISO 354:2003, *Acoustics – Measurement of sound absorption in a reverberation room*

ISO 22868:2011[1], *Forestry and gardening machinery – Noise test code for portable hand-held machines with internal combustion engine – Engineering method (Grade 2 accuracy)*

[1] Withdrawn.

Replacement:

ISO 3744:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

3 Terms and definitions

This clause of Part 1 is applicable, except as follows.

3.101
blade tooth
part of the **cutter blade** which is sharpened to perform the shearing action

Note 101 to entry: See Figure 101 and Figure 102.

3.102
cutter blade
part of the **cutting device** having **blade teeth** which cut by shearing action either against other **blade teeth** or against a **shear plate**

Note 101 to entry: See Figure 101 and Figure 102.

3.103
cutting device
part of the assembly of **cutter blade** and **shear plate** or of two **cutter blades** together with any supporting part which performs the cutting action

Note 101 to entry: See Figure 101 and Figure 102.

3.104
cutting width
effective width of cut of the **cutting device** measured from the inside edge of the first **blade tooth** or **shear plate** tooth to the inside edge of the last **blade tooth** or **shear plate** tooth, whichever is the greater

Note 101 to entry: See Figure 101 and Figure 102.

3.105
extension shaft
shaft which enables the operator to cut grass while in a standing position, which is either permanently attached to or removable from the machine

3.106
grass shear
hand-held scissors type grass-cutting machine with either one or two **cutter blades** where either one or both **cutter blade(s)** reciprocate along a straight or curved path

Note 101 to entry: See Figure 103.

Note 102 to entry: These machines are intended to be held in the hand during **normal use**, including machines which will not maintain their operating position unless supported, possibly with an **extension shaft** and/or assisted by wheel(s), skid(s) or similar.

3.107
maximum speed
highest **cutting device** speed attainable under all conditions of **normal use**, including no-load

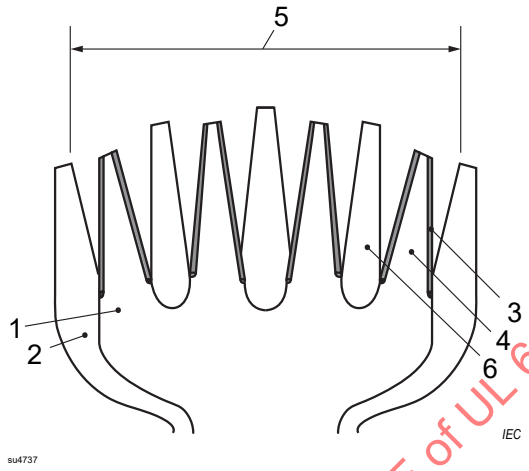
3.108
operator presence sensor
device to detect the presence of an operator's hand

3.109
projection
part of the **cutter blade** or **shear plate** or a separate component which extends beyond the shearing portion of the **cutting device**

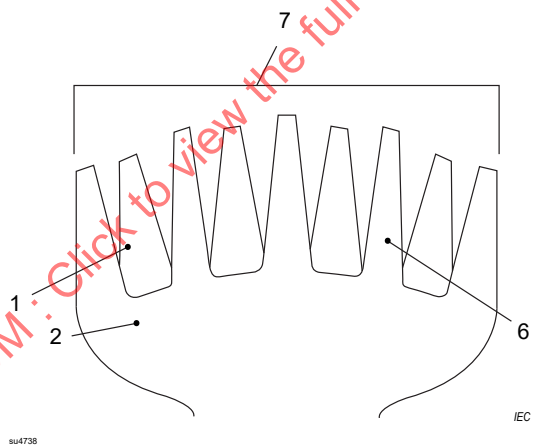
Note 101 to entry: See Figure 110, Figure 111 and Figure 112.

3.110
shear plate
moving or stationary unsharpened part of the **cutting device** which assists cutting by shearing action against a **cutter blade**

Note 101 to entry: See Figure 101.



Top view



Bottom view

Key

1 **cutter blade**

2 **shear plate** with **projections**

3 sharpened edge of **blade tooth**

4 **blade tooth**

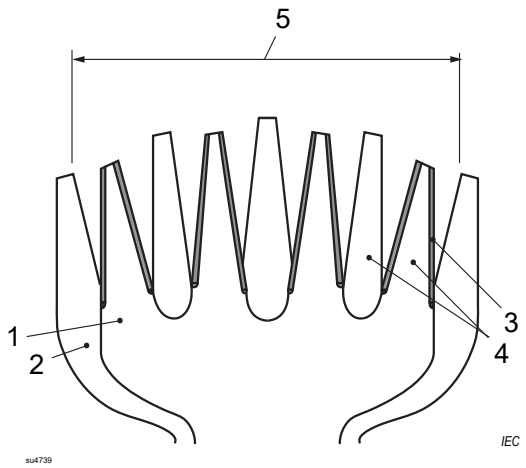
5 **cutting width**

6 portion of **shear plate** which assists cutting by shearing action against a **cutter blade**

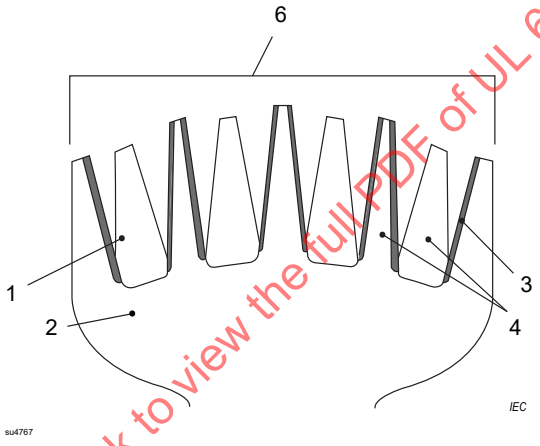
7 **cutting device**

Figure 101

Cutting device with one cutter blade and shear plate



Top view



Bottom view

Key

1 **cutter blade** (top)

2 **cutter blade** (bottom) with **projections**

3 sharpened edge of **blade tooth**

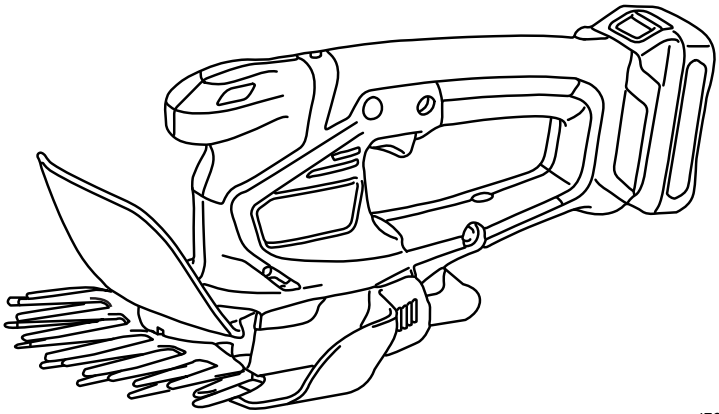
4 **blade tooth**

5 **cutting width**

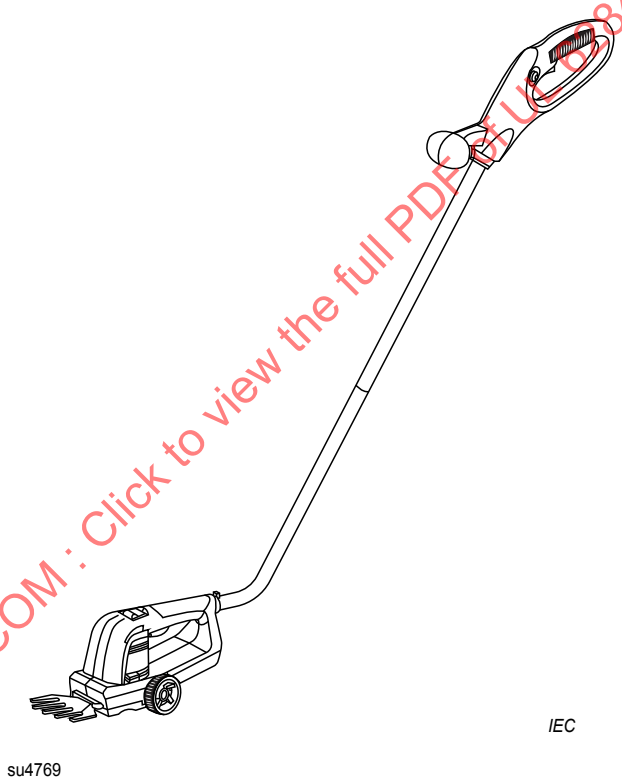
6 **cutting device**

Figure 102

Cutting device with two cutter blades



a) Grass shear without extension shaft



b) Grass shear with extension shaft

Figure 103

Examples of grass shears

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable, except as follows.

5.8 *Addition:*

*If different **cutting devices** for cutting grass can be mounted on the machine in accordance with 8.14.2 a) and 8.14.2 b), the **cutting devices** are regarded as **attachments**.*

5.17 *Addition:*

*The mass of the machine excludes the **cutting device** cover.*

5.101 *The tests are carried out on the machine as supplied. However, a machine constructed as a single machine but supplied in a number of units is tested after assembly in accordance with 8.14.2.*

5.102 *Unless otherwise specified, for Clauses 19 and 21, machines are tested in each operating configuration as described in 8.14.2.*

5.103 *For machines that do not attain **maximum speed** under no load conditions, the manufacturer shall provide samples with special hardware and/or software in order to perform the required tests.*

6 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

7 Classification

This clause of Part 1 is applicable.

8 Marking and instructions

This clause of Part 1 is applicable, except as follows.

8.2 *Addition:*

Grass shears shall be marked with the following safety information, as applicable, which shall be written in one of the official languages of the country in which the machine is to be sold or marked with the appropriate symbol.

For all machines:

– “Wear ear protection”, a relevant safety sign of ISO 7010 or the safety sign specified in Figure AA.5. This marking may be omitted if the measured emission sound pressure level at the operator’s ear in accordance with Annex I does not exceed 85 dB(A); and

"⚠ DANGER – Keep hands away from blade"; or

– the safety sign specified in Figure AA.1; or

– the safety sign specified in Figure AA.2.

The DANGER marking or symbol shall be readily visible to the user and shall not be located on the underside of the machine.

For all machines with a degree of protection of less than IPX4:

– "⚠ WARNING – Do not expose to rain"; or

– the safety sign specified in Figure AA.3.

For mains supplied machines:

– "⚠ WARNING – Remove plug from the mains immediately if the cable is damaged or cut"; or

– the safety sign specified in Figure AA.4.

8.12 *Replacement of the first paragraph:*

Markings required by the standard shall be legible and durable. Signs shall be in contrast such as colour, texture, or relief, to their background such that the information or instructions provided by the signs are clearly legible when viewed with normal vision from a distance of (500 ± 50) mm. Signs need not be in accordance with the colour requirements of ISO 3864-2.

If markings are embossed, stamped or moulded, contrasting colours are not required.

8.14.1 *Addition:*

The additional safety instructions as specified in 8.14.1.101 shall be given for all mains supplied **grass shears**. This part may be printed separately from the "General Machine Safety Warnings".

NOTE 101 "General Machine Safety Warnings" are referred to as "General Power Tool Safety Warnings" in Part 1.

8.14.1.1 *Addition to item 2) c):*

For machines classified at least IPX4, the warning may be replaced as specified below.

c) **Do not operate the machine in rain or wet conditions.** *Water entering the machine may increase the risk of electric shock or malfunction that could result in personal injury.*

8.14.1.101 Safety instructions for grass shears

For **grass shears** that can be converted to a Category 1 hedge trimmer, the term “grass shear” may be replaced by alternate wording (e.g. “grass shear/hedge trimmer” or “grass shear/shrub shear”). For this case, the verbatim warnings below need not be repeated for the two configurations.

Grass shears safety warnings:

a) **Do not use the grass shear in bad weather conditions, especially when there is a risk of lightning**. *This decreases the risk of being struck by lightning*.

b) **Keep all power cords and cables away from cutting area.** *Power cords or cables may be hidden and can be accidentally cut by the blade*.

c) **Wear ear protection.** *Adequate protective equipment will reduce the risk of hearing loss.*

NOTE 101 This warning can be omitted if the measured emission sound pressure level at the operator's ear in accordance with Annex I does not exceed 85 dB(A).

d) **Hold the grass shear by insulated gripping surfaces only, because the blade may contact hidden wiring or its own cord.** *Blades contacting a "live" wire may make exposed metal parts of the grass shear "live" and could give the operator an electric shock*.

e) **Keep all parts of the body away from the blade. Do not remove cut material or hold material to be cut when blades are moving.** *Blades continue to move after the switch is turned off. A moment of inattention while operating the grass shear may result in serious personal injury.*

f) **When clearing jammed material or servicing the grass shear, make sure the power switch is off and the power cord is disconnected.** *Unexpected actuation of the grass shear while clearing jammed material or servicing may result in serious personal injury.*

g) **Carry the grass shear by the handle with the blade stopped and taking care not to operate the power switch**. *Proper carrying of the grass shear will decrease the risk of inadvertent starting and resultant personal injury from the blades*.

h) **When transporting or storing the grass shear, always use the blade cover**. *Proper handling of the grass shear will decrease the risk of personal injury from the blades*.

8.14.2 a) *Addition:*

101) If applicable, information on **cutting devices** and **attachments** permitted to be used with the **grass shear**, e.g. an **extension shaft**;

102) Instructions for configuring the machine, including any handle, ground supporting devices, **accessories** or **attachments**.

8.14.2 b) *Addition:*

101) Advice to check for foreign objects, e.g. debris and hidden wiring;

102) Recommendation for the use of a **residual current device** with a tripping current of 30 mA or less;

103) Identification of gripping surfaces of handle(s) required by 19.101 through 19.103;

104) Instruction to hold the **grass shear** properly;

105) Advice that the **grass shear** is intended to be used by the operator at ground level and not on ladders or any other unstable support;

106) Advice that before operating the **grass shear**, the user should make sure the **extension shaft**, if any, is in the locked position;

107) Instructions for location and use of the **power switch** for the operation of the **grass shear**;

108) For **grass shears** with an adjustable handle in accordance with 19.102, instruction to adjust the handle only while the **cutting device** is not operating.

9 Protection against access to live parts

This clause of Part 1 is applicable.

10 Starting

This clause of Part 1 is applicable.

11 Input and current

This clause of Part 1 is applicable.

12 Heating

This clause of Part 1 is applicable, except as follows.

12.2.1 *Replacement:*

The load conditions for the heating test of 12.2 are as follows:

*The machine is operated with a torque load applied such that **rated input** or **rated current** is drawn. The machine is operated for 30 min in its most unfavourable configuration in accordance with 8.14.2 a) 102). During this period, the torque load is adjusted as necessary to maintain **rated input** or **rated current**.*

13 Resistance to heat and fire

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is applicable, except as follows.

14.2.1 *Replacement:*

The machine is not connected to the supply.

The machine is placed in its normal rest position on a perforated turntable. The turntable is then turned continuously at (1 ± 0,1)/min during the test.

***Detachable parts** are removed and subjected, if necessary, to the relevant treatment with the main part. Movable covers that are non-**detachable parts** and are not self-restoring are placed in the most unfavourable position.*

NOTE Examples of self-restoring covers include those that are spring loaded or close by gravity.

14.2.2 *Replacement of the last paragraph:*

*Immediately after the appropriate treatment, the machine shall withstand the electric strength test of Annex D between **live parts** and **accessible parts**, the test voltage being 2 500 V. Then the machine is connected to the supply. It shall not start with the **power switch** in the "off" position.*

*Afterwards, inspection shall show that there is no trace of water on insulation which could result in a reduction of **creepage distances** between bare conductors of different potential below the values specified in 28.1. For all instances where **creepage distances** could be reduced below the values specified in 28.1, a short circuit is introduced between adjacent conductors simultaneously. The machine is then evaluated for*

– the risk of fire in accordance with item a) of 18.6.1; and

*– the loss of any **SCF**, unless the machine is rendered into a safe state.*

15 Resistance to rusting

This clause of Part 1 is applicable.

16 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable, except as follows.

17.2 *Modification:*

This subclause of Part 1 is applicable as for **hand-held tools**.

Addition:

The machine is operated in its most unfavourable configuration in accordance with 8.14.2 a) 102).

*Care shall be taken to avoid overheating the **cutting device** by operating continuously and therefore appropriate interruptions for cooling and lubrication may be introduced.*

18 Abnormal operation

This clause of Part 1 is applicable, except as follows.

18.5 *Modification:*

The requirements for tools other than **lawn and garden machinery** are applicable.

18.8 *Replacement of Table 4 by the following:*

Table 4
Required performance levels

Type and purpose of SCF	Minimum Performance Level (PL)
Power switch– prevent unwanted switch-on	b
Power switch–provide desired switch-off	b
Prevent exceeding thermal limits as in Clause 18	a
Any electronic control relied upon to pass the test of 20.101	a
Lock-off function as required in 21.18.103.1	a
Visible or audible indicator as referenced in 21.18.103.1	Not an **SCF**
Operator presence sensor as in 21.18.103.2	a
Prevent self-resetting as required in 23.3	a

19 Mechanical hazards

This clause of Part 1 is applicable, except as follows.

19.1 *Replacement of the first paragraph:*

All power-driven hazardous parts (e.g. gears), other than those moving parts (e.g. **cutting device**), barriers and covers which are separately covered by 19.103, 19.104 and 19.105, shall be so positioned or enclosed to provide adequate protection. The requirements of this subclause apply to all operating configurations as described in 8.14.2.

19.3 This subclause of Part 1 is not applicable.

19.4 This subclause of Part 1 is not applicable.

NOTE 101 Requirements for handles are given in 19.101.

19.6 This subclause of Part 1 is not applicable.

19.7 This subclause of Part 1 is not applicable.

19.8 This subclause of Part 1 is not applicable.

19.101 Handles

19.101.1 General

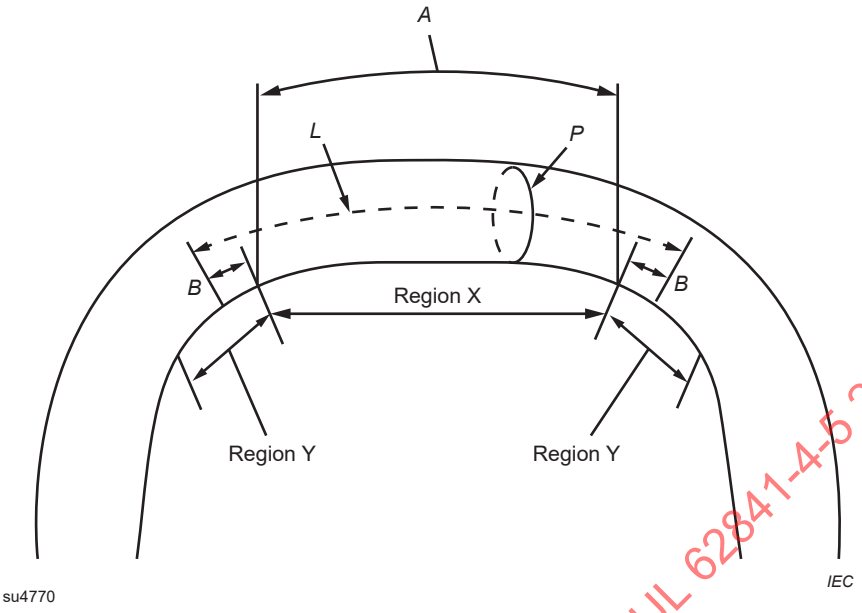
If a part containing the motor complies with the dimensions for a handle, it may be considered to be a handle if identified in accordance with 8.14.2 b) 103).

The handle shall be designed in such a way that it can be grasped with one hand. The gripping length of the handle shall be suitably shaped to be grasped securely and have a perimeter between 65 mm and 170 mm as illustrated in Figure 104 a), Figure 104 b) or Figure 104 c). The perimeter is determined by a chain measurement with the **power switch**, if any, fully depressed.

If there are finger grips or similar superimposed profiles, the handle gripping length shall not be measured along the surface, but only the arc or straight-line distance of the gripping surface, as applicable, shall be taken into account.

The gripping length *L* in Figure 104 c) and Figure 105 a) shall be measured in accordance with 19.101.3.

Compliance is checked by inspection and by measurement.



Key

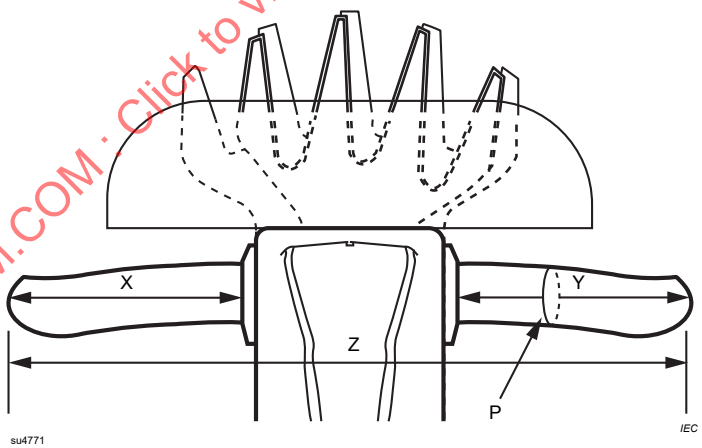
A gripping length in region *X*

B transition radius length in region *Y*

L maximum gripping length

P perimeter

a) Measurement of gripping length of a U-shaped or closed handle



Key

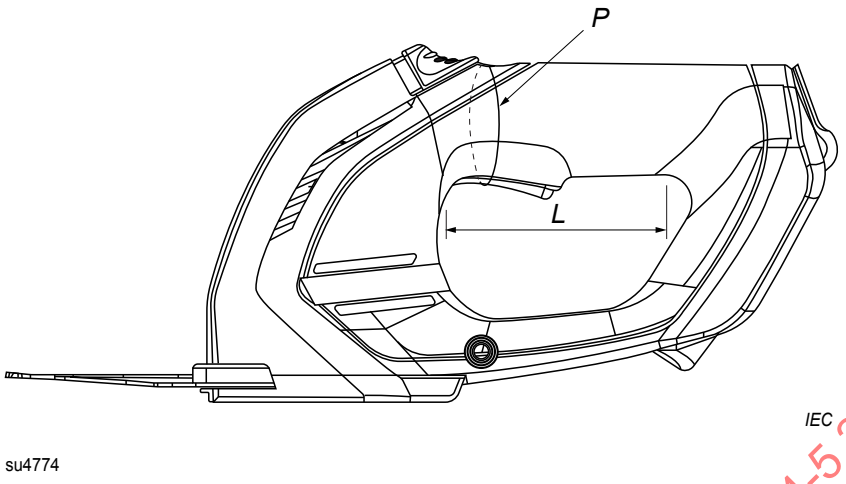
P perimeter of handle (not including the support)

X part of gripping length

Y part of gripping length

Z complete length

b) Measurement of gripping length of a straight handle supported centrally (i.e. T type)



Key

L maximum gripping length

P perimeter

c) Measurement of gripping length and perimeter dimension of the inline handle incorporating the power switch

Figure 104

Measurement of handle dimensions

19.101.2 Handle that incorporates the power switch

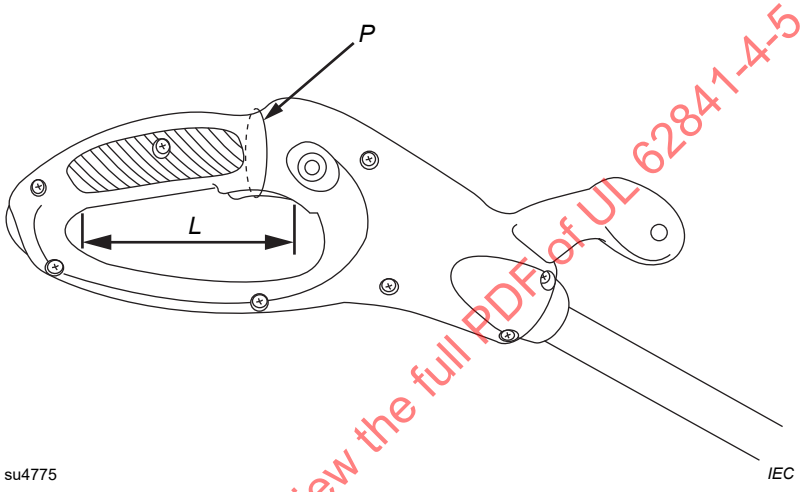
Grass shears shall have at least one handle that incorporates the **power switch**

– for machines not fitted with an **extension shaft**, which is an inline handle as shown in Figure 104 c); or

– for machines fitted with an **extension shaft**, as shown in Figure 105 a) or Figure 105 b).

The gripping length *L* of a handle incorporating a **power switch** shall be at least 100 mm.

There shall be a minimum radial clearance of 25 mm around the **power switch** with the **power switch** actuator not depressed as shown in Figure 106.

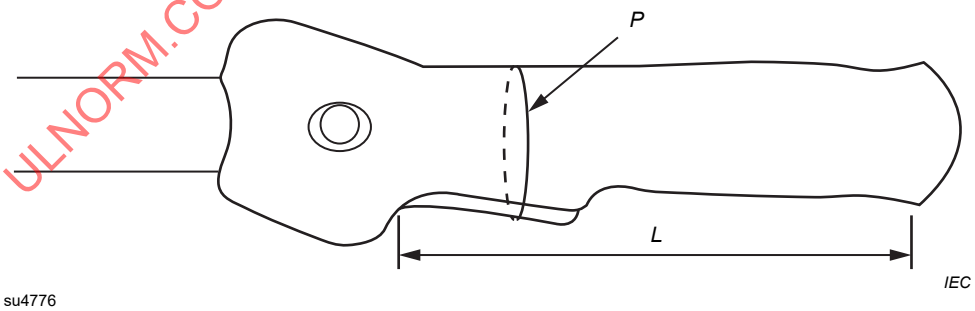


Key

L maximum gripping length

P perimeter

a) Measurement of handle dimensions for machines fitted with an extension shaft with an inline handle



b) Measurement of handle dimensions that are formed by an extension shaft

Figure 105

Measurement of handle dimensions for machines fitted with an extension shaft

Dimensions in millimetres

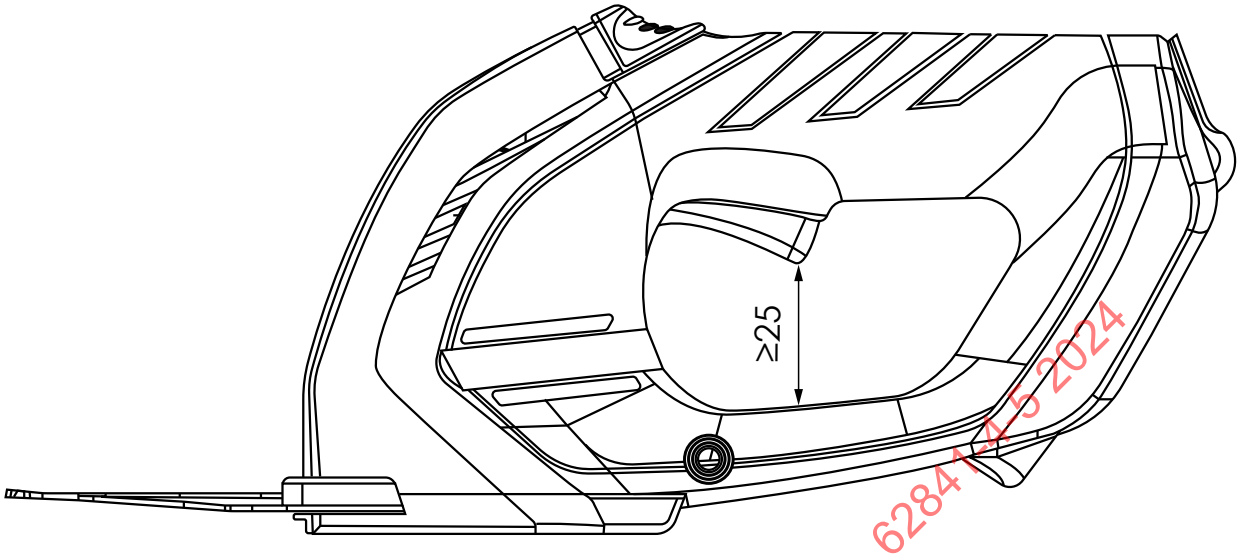


Figure 106

Minimum radial clearance around the power switch

For machines not fitted with an **extension shaft**, **power switches** shall not be incorporated on bail or closed handles (U-shaped handles) as shown in Figure 104 a) or handles supported centrally (i.e. T-type) as shown in Figure 104 b).

The **extension shaft**, if any, may have a **power switch** that is incorporated on

– an inline handle as shown in Figure 105 a); or

– a handle that is formed by an **extension shaft** as shown in Figure 105 b); or

– a bail or closed handle (U-shaped handle) as shown in Figure 104 a); or

– a handle supported centrally (i.e. T-type) as shown in Figure 104 b).

For machines with a permanently attached **extension shaft**, the **power switch** shall only be incorporated on a handle located on the **extension shaft**.

Compliance is checked by inspection and by measurement.

19.101.3 Dimensions of bail or closed handles

On bail or closed handles (U-shaped handles), the gripping length is related to the inner length of the gripping surface. There shall be a minimum radial clearance of 25 mm around the gripping length.

If a bail or closed handle is used, the gripping length *L* in Figure 104 a) shall be measured using lengths *A* and *B* as follows:

– the length *A* is measured within region *X* where the radius is at least 100 mm;

– the length(s) *B* are measured within region(s) *Y* where the transition radius is less than 100 mm, but each length *B* cannot exceed 10 mm in each region *Y* of the gripping surface.

Compliance is checked by inspection and by measurement.

19.101.4 Dimensions of handles supported centrally (T-type)

If the handle is supported centrally (i.e. T-type), there shall be a minimum radial clearance of 25 mm around the gripping length. The gripping length shall be calculated as follows (see Figure 104 b)):

– for a handle with a perimeter *P* (not including the support) of less than 80 mm, the gripping length is the sum of the two parts of the gripping length *X* + *Y* on either side of the support;

– for a handle with a perimeter *P* (not including the support) of 80 mm or more, the gripping length is the complete length *Z* from end to end.

Compliance is checked by inspection and by measurement.

19.101.5 Dimensions of handles that are formed by an extension shaft

The gripping length *L* in Figure 105 b) shall be measured using the straight portion of the handle, not including any transition radius, finger grips or similar superimposed profiles.

Compliance is checked by inspection and by measurement.

19.102 Adjustable handles

Grass shears shall not incorporate a handle that is intended to be adjusted in accordance with 8.14.2 a) 102) while the **cutting device** is operating.

It shall not be possible to adjust the handle to an operating position in accordance with 8.14.2 b) 108) which contravenes other provisions of this standard.

Means shall be provided for fixing adjustable handle(s).

Compliance is checked by inspection and by manual test.

19.103 Protection of the hand from the cutting device

An operator's hand shall be protected from inadvertent contact with the shearing portion of the **cutting device** while holding any handle identified in 8.14.2 b) 103).

For machines that are not fitted with an **extension shaft**, the inline handle that incorporates the **power switch** shall be constructed such that it is attached to the machine at the front of the handle grip (see Figure 107).

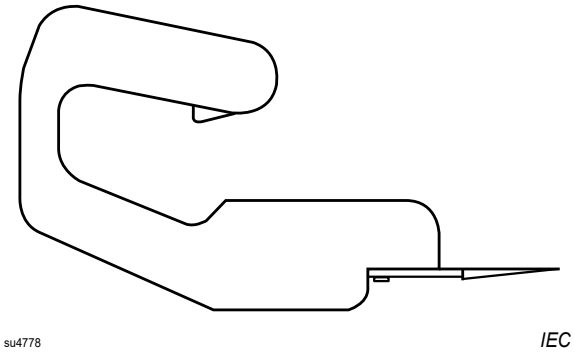
For an inline handle that incorporates the **power switch** in accordance with 19.101.2, the shortest chain distance between the front of the gripping length of the handle in accordance with 8.14.2 b) 103) and the nearest sharpened edge of any **blade tooth** shall be at least 120 mm. See Figure 107 b) and Figure 107 d). A front hand barrier may be used to achieve the required 120 mm distance (see Figure 108 a)).

For an inline handle that incorporates the **power switch** in accordance with 19.101.2 with a front hand barrier, the distance is the sum of the x_1 and x_2 distances in Figure 108 a) measured along the shortest path from the front of the gripping length of the handle in accordance with 8.14.2 b) 103), via the edge of the front hand barrier, to the nearest sharpened edge of any **blade tooth**. The front hand barrier shall not have any openings with a minor dimension larger than 10 mm.

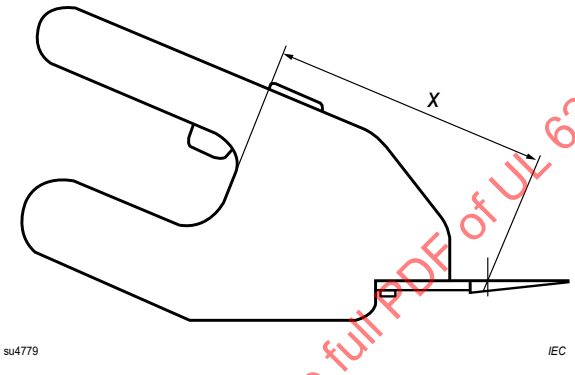
For bail or closed handles in accordance with 19.101.3 or centrally supported (i.e. T-type) handles in accordance with 19.101.4, the handle shall be located so that the distance *X* from the nearest cutting edge of the **cutting device** to the rear side of any handle is not less than 120 mm as shown in Figure 109.

For bail or closed handles in accordance with 19.101.3 or centrally supported (i.e. T-type) handles in accordance with 19.101.4, with a front hand barrier, the distance is the sum of the x_1 and x_2 distances in Figure 108 b) measured along the shortest path from the rear side of the handle in accordance with 8.14.2 b) 103), via the edge of the front hand barrier, to the nearest sharpened edge of any **blade tooth**. The front hand barrier shall not have any openings with a minor dimension larger than 10 mm.

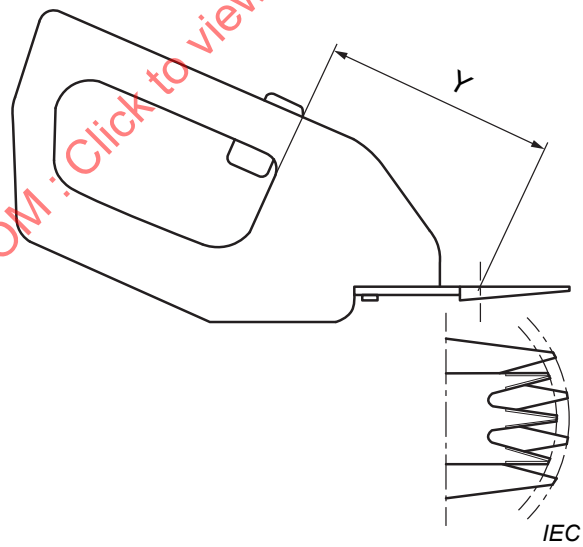
Compliance is checked by inspection and by measurement.



a) Handle not attached at front (does not comply with 19.103)



b) Handle attached at front (complies with 19.103)



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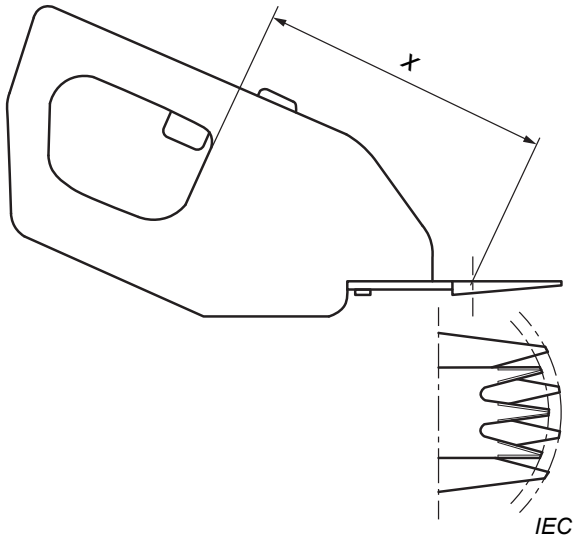
c) Handle attached at front and rear (does not comply with 19.103)



d) Handle attached at front and rear (complies with 19.103)

Key

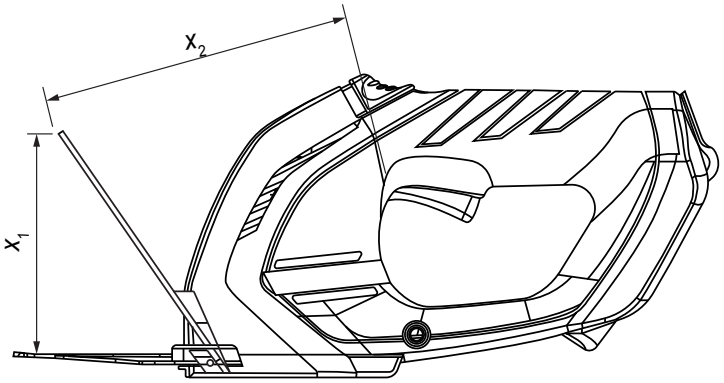
$X \geq 120$ mm

$Y < 120$ mm

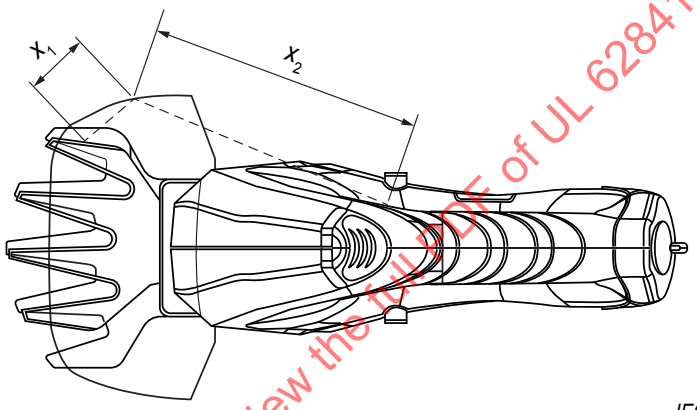
Figure 107

Examples of handle attachment and measurement of distance for hand protection

Dimensions in millimetres



$x = x_1 + x_2 \geq 120$



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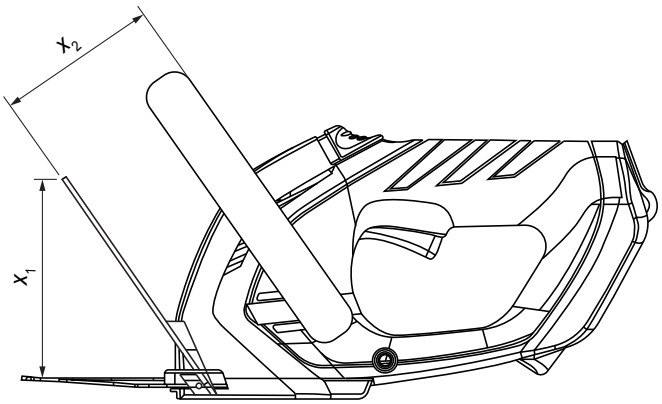
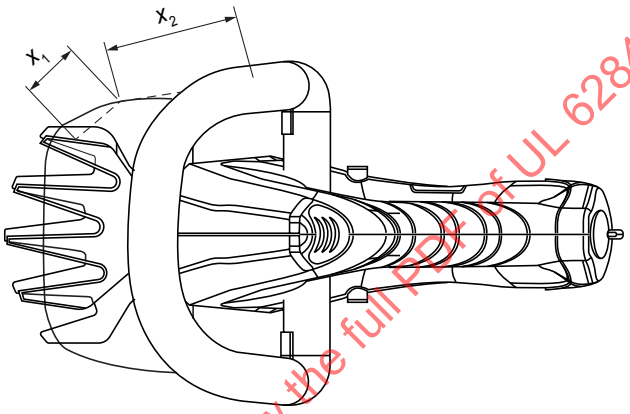
a) Measurement method for machines with a front hand barrier and an inline handle



$x = x_1 + x_2 \geq 120$



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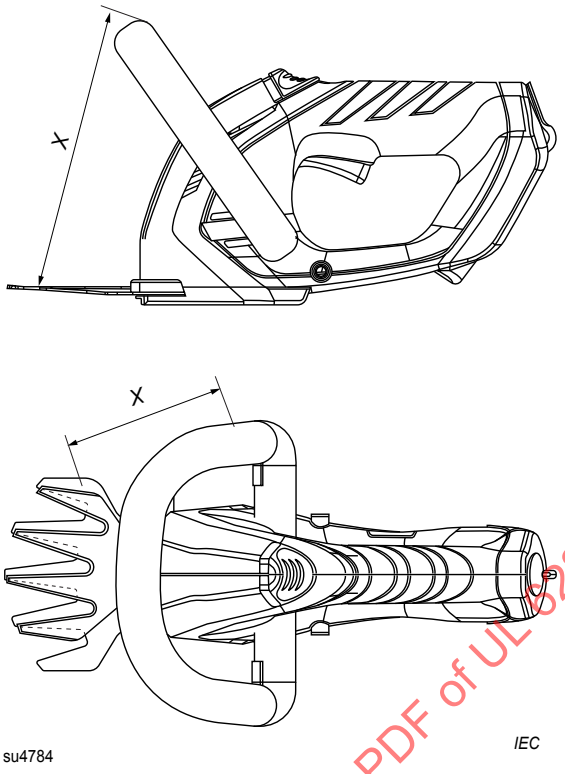
b) Measurement method for machines with a front hand barrier and bail or closed handles or centrally supported (i.e. T-type) handles

Figure 108

Measurement of distance for hand protection for machines with a front hand barrier



Key

$X \geq 120$ mm

Figure 109

Measurement of distance for hand protection for machines with bail or closed handles or centrally supported (i.e. T-type) handles without a front hand barrier

19.104 Cutting device

19.104.1 **Grass shears** shall be provided with **projections** that extend at least 2 mm beyond the shearing portion of the **cutting device**.

The **projections** may be

– incorporated as an integral part of a stationary **cutter blade**, where the **projections** may have a sharpened or unsharpened edge (see Figure 110); or

– incorporated as an integral part of a **shear plate** (see Figure 111); or

– a separate stationary plate that is not part of a **cutter blade** or a **shear plate** (see Figure 112).

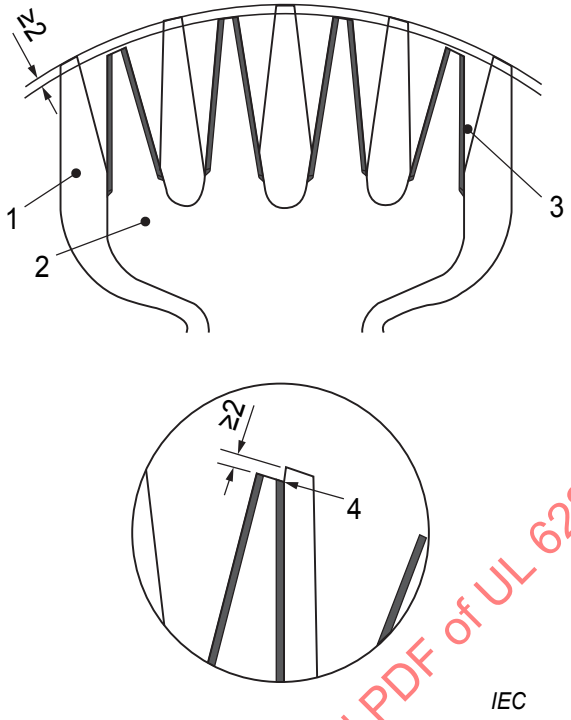
For machines with **projections** incorporated in a stationary **cutter blade**, the number of **projections** shall be equal to the number of **blade teeth** on the **cutter blade** with the larger number of **blade teeth**.

For machines with **projections** incorporated as an integral part of a **shear plate**, the number of **projections** shall be greater than the number of **blade teeth**.

For machines with a separate stationary plate that is not part of a **cutter blade** or a **shear plate**, the number of **projections** shall be greater than or equal to the largest number of **blade teeth** on any **cutter blade**. The separate stationary plate shall be aligned with the **cutting device** and have an overall width greater than the **cutting width** of the machine.

Compliance is checked by inspection and by measurement.

Dimensions in millimetres



Key

1 stationary **cutter blade** with integral **projection** (≥2 mm)

2 **cutter blade**

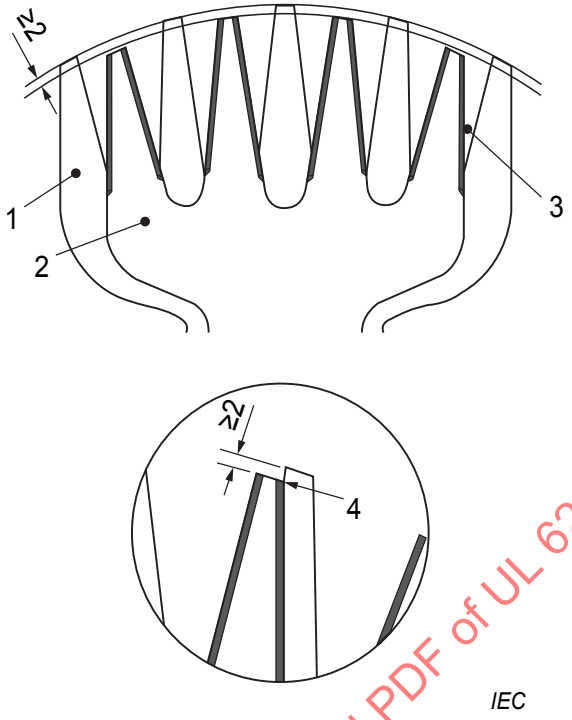
3 shearing portion of **cutting device**

4 outermost edge of the shearing portion of **cutting device**

Figure 110

Projection incorporated as an integral part of a cutter blade

Dimensions in millimetres



Key

1 **shear plate** with integral **projection** (≥2 mm)

2 **cutter blade**

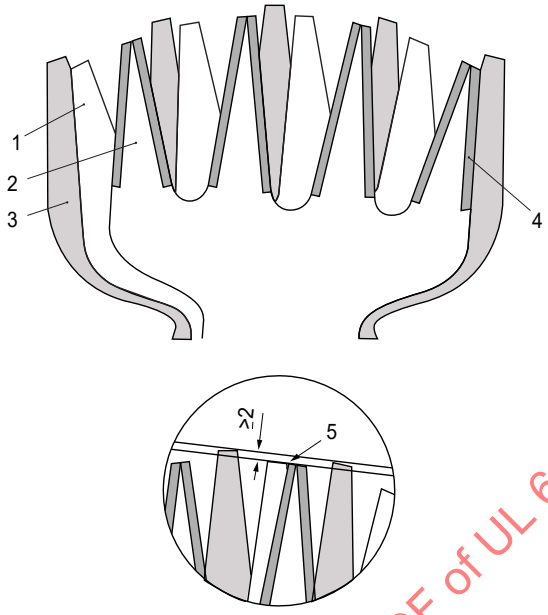
3 shearing portion of **cutting device**

4 outermost edge of the shearing portion of **cutting device**

Figure 111

Projection incorporated as an integral part of a shear plate

Dimensions in millimetres



Key

1 **shear plate** or **cutter blade**

2 **cutter blade**

3 separate stationary plate with **projections** (≥2 mm)

4 shearing portion of **cutting device**

5 outermost edge of the shearing portion of **cutting device**

Figure 112

Projection as a separate stationary plate

19.104.2 The **cutting width** of the **cutting device** shall not exceed 200 mm.

Compliance is checked by measurement.

NOTE 101 See 3.104.

19.105 Cutter blade(s) cover

A protective cover shall be provided with the machine to cover the **cutting device** in order to prevent injuries during transportation and storage in accordance with 8.14.2. The cover shall not become detached from the **cutting device** when the machine is oriented in a vertical downwards position.

Compliance is checked by inspection and by manual test.

20 Mechanical strength

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

*Damage to the **cutting device** is ignored.*

20.3 *Replacement:*

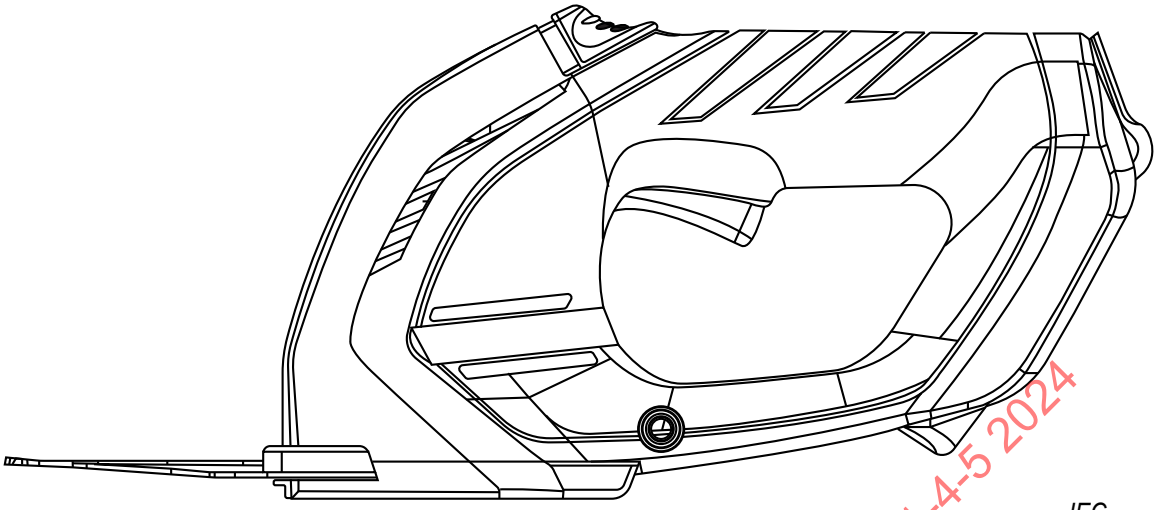
*For **grass shears**, the tests of 20.3.101 and 20.3.102 apply.*

20.3.101 *For **grass shears** without an **extension shaft**, the machine, with the **cutting device** attached, is dropped once from each of the four orientations shown in Figure 113, with any adjustable handle in the zero degree cutting position, on a concrete surface. The lowest point of the machine shall be 1 m above the concrete surface. For the test, separable **accessories** are not mounted. Secondary impacts shall be avoided.*

NOTE A method for avoiding secondary impacts is tethering.

*If **attachments** other than the **cutting device** are provided as specified and mounted in accordance with 8.14.2, the test is repeated, with each **attachment** or combination of **attachments** mounted to a separate machine sample.*

Each drop shall be conducted on a separate sample, unless a single sample can be subjected to multiple drops without failure. If a sample has been subjected to multiple drops and fails, then the drop in the orientation that resulted in the failure is repeated using a new sample. If the new sample passes the test for the drop in that orientation, then the requirements for the drop in that orientation are considered to be fulfilled. The test is continued in this manner until all drops in each of the four orientations are completed.



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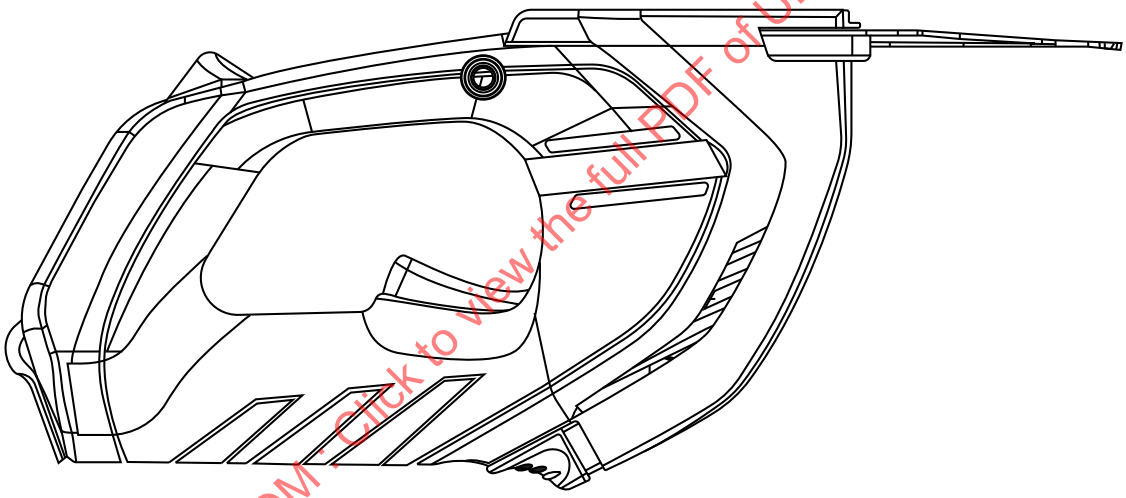
a) Plane of the cutting device parallel to the ground, machine upright



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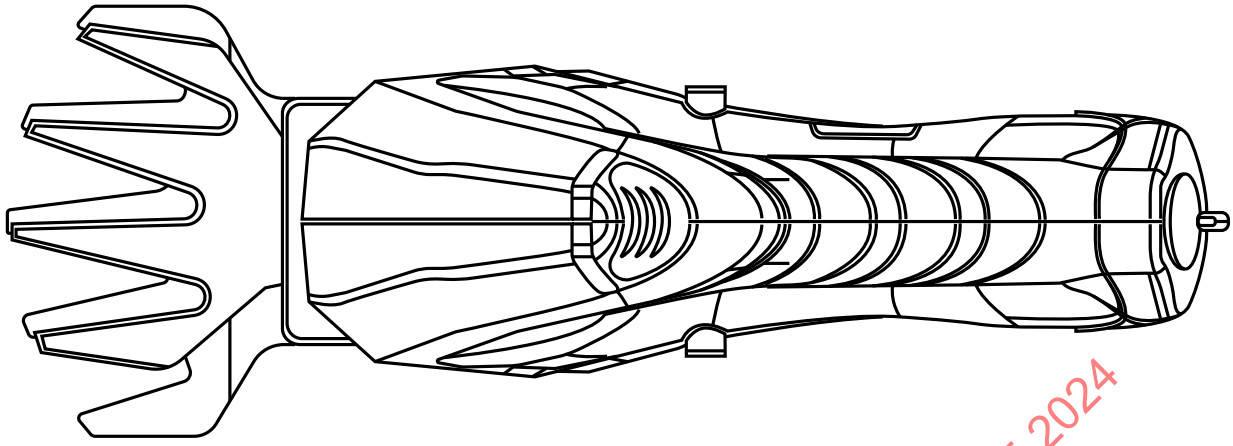
b) Plane of the cutting device parallel to the ground, machine inverted



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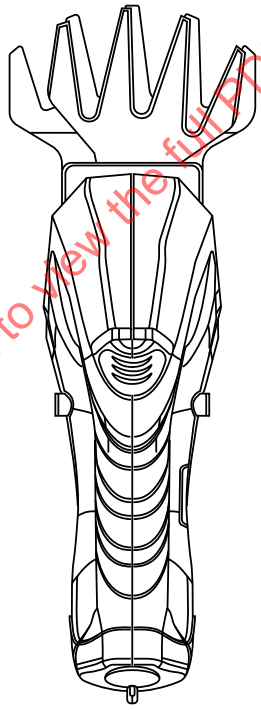
c) Plane of the cutting device perpendicular to the ground



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d) Cutting device pointing vertically upwards

Figure 113

Grass shear positions for drop test

20.3.102 For **grass shears** with an **extension shaft**, the machine, with the **extension shaft** and **cutting device** fitted in accordance with 8.14.2, is placed on its right or left side, whichever is more unfavourable, on the concrete surface in a stable resting position. If the **extension shaft** has angular adjustment provisions, it shall be made as straight as possible.

The machine is then lifted vertically by 1 m and allowed to drop freely onto the concrete surface. For the test, separable **accessories** are not mounted.

The test is then repeated as follows:

– the machine is placed on the concrete surface as in the initial test;

– the machine is lifted vertically by 1 m; then

– the machine is rotated about its longitudinal axis approximately 90° in one direction prior to dropping freely onto the concrete surface.

The test is then repeated again as follows:

– the machine is placed on the concrete surface as in the initial test;

– the machine is lifted vertically by 1 m; then

– the machine is rotated about its longitudinal axis approximately 90° in the opposite direction prior to dropping freely onto the concrete surface.

Secondary impacts shall be avoided.

NOTE 101 A method for avoiding secondary impacts is tethering.

*If **attachments** other than the **cutting device** are provided as specified and mounted in accordance with 8.14.2, the test is repeated, with each **attachment** or combination of **attachments** mounted to a separate machine sample.*

Each drop shall be conducted on a separate sample, unless a single sample can be subjected to multiple drops without failure. If a sample has been subjected to multiple drops and fails, then the drop in the orientation that resulted in the failure is repeated using a new sample. If the new sample passes the test for the drop in that orientation, then the requirements for the drop in that orientation are considered to be fulfilled. The test is continued in this manner until all drops in each of the four orientations are completed.

20.5 *Addition:*

Any insulation covering metal handles shall be suitable for temperatures foreseen in **normal use**.

Compliance is checked by the following test:

A separate sample of the covered part shall be conditioned at a temperature not less than 25 K higher than the maximum temperature measured for that part during the test of Clause 12, but not less than (70 ± 2) °C for 168 h. After conditioning, the sample shall be allowed to attain approximately ambient temperature.

The insulating covering shall not have peeled off, be able to move longitudinally or have shrunk to such an extent that the required insulation is not given.

*After this, the sample shall be maintained for 4 h at a temperature of (–10 ± 2) °C and then immediately subjected to an impact applied by means of an apparatus (see Figure 114) with a weight "A" having a mass of 300 g and falling from a height of 350 mm onto a chisel "B" of hardened steel, the edge of which is placed on the sample. One impact shall be applied to each place where the covering is likely to be weak or damaged in **normal use**. The distance between the impact points shall be at least 10 mm.*

*After this, an electric strength test is carried out according to Clause D.2 using 1 250 V AC between the handles and grasping surfaces in contact with foil and the **cutting device**.*

During this test, no flashover or breakdown shall occur.

20.5DV D2 *Modification: Replace the first paragraph of Clause 20.5 of this Part 4 with the following:*

If a pliable insulation material is

– sed to cover a tubular-shaped metal handle; and

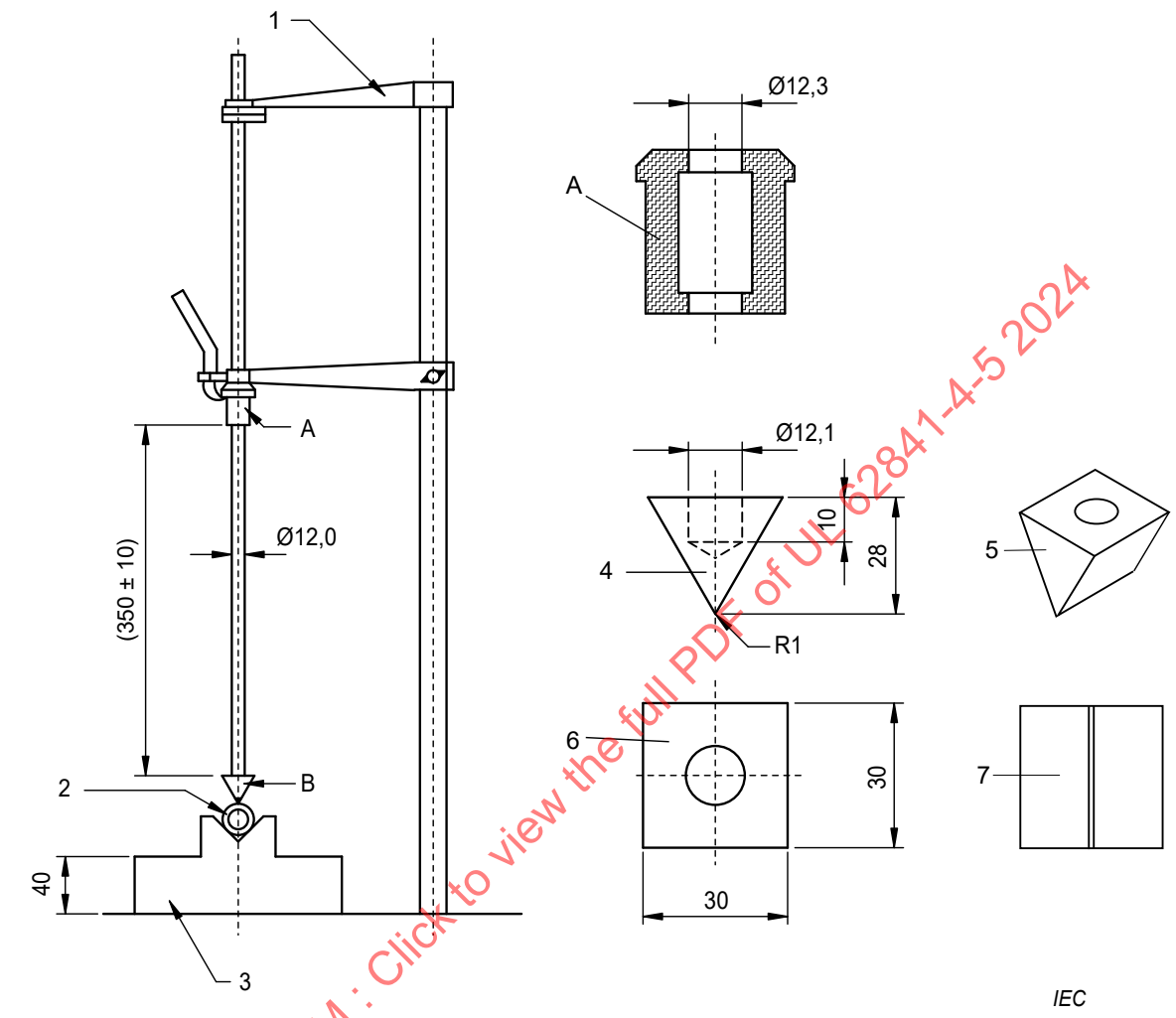
– relied upon to fulfill the requirements of this subclause,

it shall be suitable for temperatures foreseen in normal use and shall have adequate mechanical strength in order to provide insulation between the grasping area and the cutting device. This requirement is not applicable for metal handles that are isolated by insulating barrier(s) from accessible metal parts that could become live by the cutting device in accordance with 21.30.

NOTE 101DV Examples of pliable insulation material include foam, heat shrink, and elastomeric tubing.

NOTE 102DV Examples of a tubular-shaped metal handle include those with a round, oval or square cross-section.

Dimensions in millimetres



Key

A weight with mass of (300 ± 5) g

B chisel made of hardened steel

1 fixing arm

2 sample

3 base having a mass of at least 10 kg

4 chisel detail

5 chisel isometric view

6 chisel plan view

7 chisel bottom view

Figure 114

Impact test apparatus for handle insulation

20.101 Cutting device strength and rigidity

The rigidity and mounting of the **cutting device** of the **grass shear** shall be capable of safely withstanding impact with a hard object.

Compliance is checked by the following test:

*The machine is fixed on a steel plate or a smooth concrete surface in such a manner that a test piece can be easily introduced into the **cutting device**.*

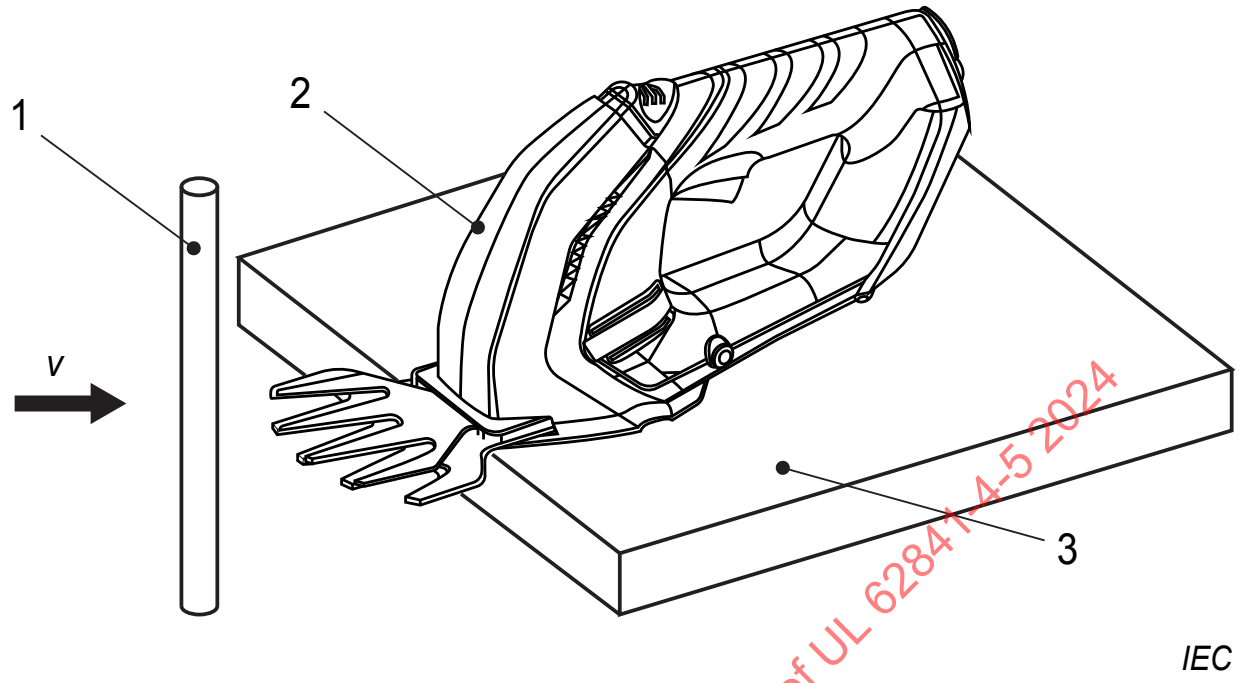
The test piece shall be a nominal (12 ± 1) mm diameter copper rod, having a hardness of Rockwell F65 (soft) or Brinell 35 (soft) or of other material with comparable characteristics. The rod is fixed into a suitable carrying device. See Figure 115.

*The machine is run at **maximum speed** at no-load. The rod is then introduced into the **cutting device** at a speed of v = (1 ± 0,2) m/s. The test is terminated after (12,5 ± 2,5) s or when the **cutting device** stops or if the rod is cut, whichever occurs first.*

*No part of a **cutter blade** or part of the **cutting device** shall become detached. Detachment of the entire **cutting device** is not considered a failure if the requirements of 19.1 are fulfilled after reassembly of the **cutting device** in accordance with 8.14.2 a) 102), if this is possible. Any breakage of a **cutter blade** shall be considered a failure of the test. Breakage of the driving mechanism of the **cutting device** or chipping of the **cutting device** shall not be deemed to be a test failure.*

*It is not necessary for the **grass shear** to be operable after the test.*

*If it is operable after the test, then following this test, it shall be run at **maximum speed** at no-load for 30 s. No part of a **cutter blade** or part of the **cutting device** shall become detached. Detachment of the entire **cutting device** is not considered a failure if the requirements of 19.1 are fulfilled. Any breakage of a **cutter blade** shall be considered failure of the test. Breakage of the driving mechanism of the **cutting device** or chipping of the **cutting device** shall not be deemed to be a test failure.*



Key

1 copper rod

2 **grass shear** fixed on a steel or concrete base

3 steel or concrete base

v speed and direction of movement of copper rod

Figure 115

Cutting device strength test

20.102 Machines fitted with **extension shafts** shall have the strength to withstand anticipated forces.

Compliance is checked by the following test.

*The machine, with the **extension shaft** fitted and in the most unfavourable configuration in accordance with 8.14.2 a) 102), is suspended vertically from a point approximately midway along the length of the motor unit. A mass of 5 kg is gradually suspended at the midpoint of each gripping surface of each **extension shaft** handle identified in 8.14.2 a) 102), in turn, over an area of (75 ± 5) mm in width for 1 min.*

After the test, the machine shall comply with the acceptance criteria of 20.1 and shall not have separated or permanently deformed to a degree that the mechanical safety of the machine as required by this standard is impaired as a result of the applied force.

21 Construction

This clause of Part 1 is applicable, except as follows.

21.17.1 *Addition:*

This subclause of Part 1 is also applicable for an **operator presence sensor** whose motion is mechanically obstructed and either functions as a lock-off device or is locked off as a switch.

21.17.1.3 *Replacement of Table 7:*

Table 7
Switch trigger force

Trigger type	Force N
Single finger trigger (trigger length < 30 mm)	100
Multi finger trigger (trigger length ≥ 30 mm)	150
Operator presence sensor	100

21.18 *Replacement:*

Additional requirements for **power switches** are given in 21.18.101 to 21.18.103.

21.18.101 The **power switch** required by 21.17 shall be a **momentary power switch**, without a lock-on device, which can be switched on and off by the user without releasing any of the handle(s) required by 19.101.

Compliance is checked by inspection and by manual test.

21.18.102 When the **power switch** has been actuated, the **cutting device** shall start within 1 s.

Compliance is checked by inspection, by measurement and by manual test.

21.18.103 Prevention of inadvertent starting

21.18.103.1 **Grass shears** shall be provided with a **power switch** having a lock-off device such that at least two separate and dissimilar actions are required before drive to the **cutting device** is possible. It shall not be possible to achieve these actions with a single grasping motion or a straight line motion within any gripping surfaces of handle(s) identified in accordance with 8.14.2 b) 103).

Drive to the **cutting device** shall only be enabled when the lock-off device is operated prior to the **power switch**.

It shall not be necessary to sustain the actuation of the lock-off device until the **power switch** is activated, provided

– the **power switch** or an **operator presence sensor** (if any) is activated within 5 s of the release of the lock-off device; and

– there is a visual or audible indication as soon as the lock-off actuator is released and continues at least until the **power switch** or an **operator presence sensor** (if any) is activated;

or

– an **operator presence sensor** (if any) is activated prior to the release of the actuator of the lock-off device.

NOTE 101 The visual or audible indication is intended to only indicate the state of the **grass shear**.

The **grass shear** shall return to the original locked state within 5 s when the **power switch** is released (i.e. at least two separate and dissimilar actions are required before drive to the **cutting device** is possible), unless

– an **operator presence sensor** is provided; and

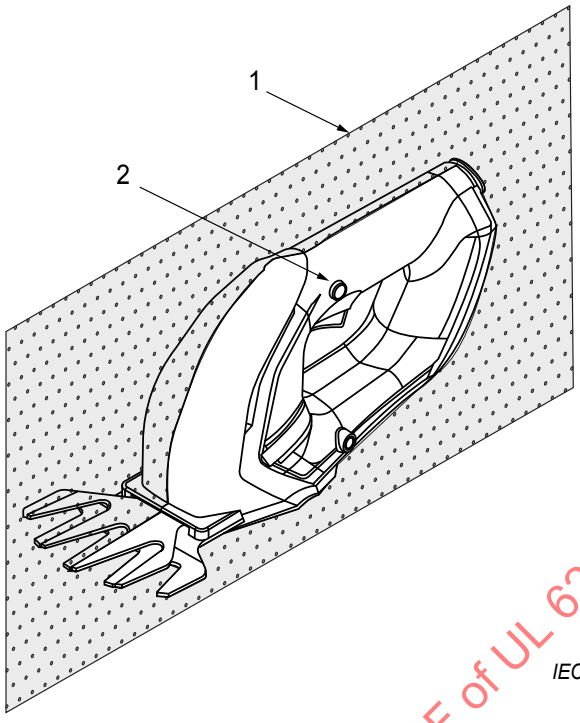
– the hand is not released from the **operator presence sensor**.

The operator presence sensing function may be achieved by any combination of mechanical, electrical or electronic means.

Compliance is checked by inspection, by measurement and by manual test.

*Additionally, for lock-off devices that are actuated in a direction generally perpendicular to the longitudinal vertical plane of the machine, (see Figure 116), and that are located within any grasping surface of handle(s) or grasping surface(s) identified in accordance with 8.14.2 b) 103), in order to determine if it is possible to actuate the **power switch** and the lock-off device with a single grasping motion or a straight line motion, compliance is checked by the following test:*

*With the **power switch** in the "off" position, a 25 mm diameter × 75 mm long steel rod with a force not exceeding 20 N is applied to the lock-off device in any direction. The steel rod shall be applied such that its cylindrical surface bridges the surface of the lock-off device and any surface adjacent to the lock-off device. During the test, it shall not be possible to actuate the **power switch** with a force not exceeding 20 N.*



Key

1 longitudinal vertical plane of the machine

2 lock-off device

Figure 116

Example of a lock-off device located within the gripping surface of a handle

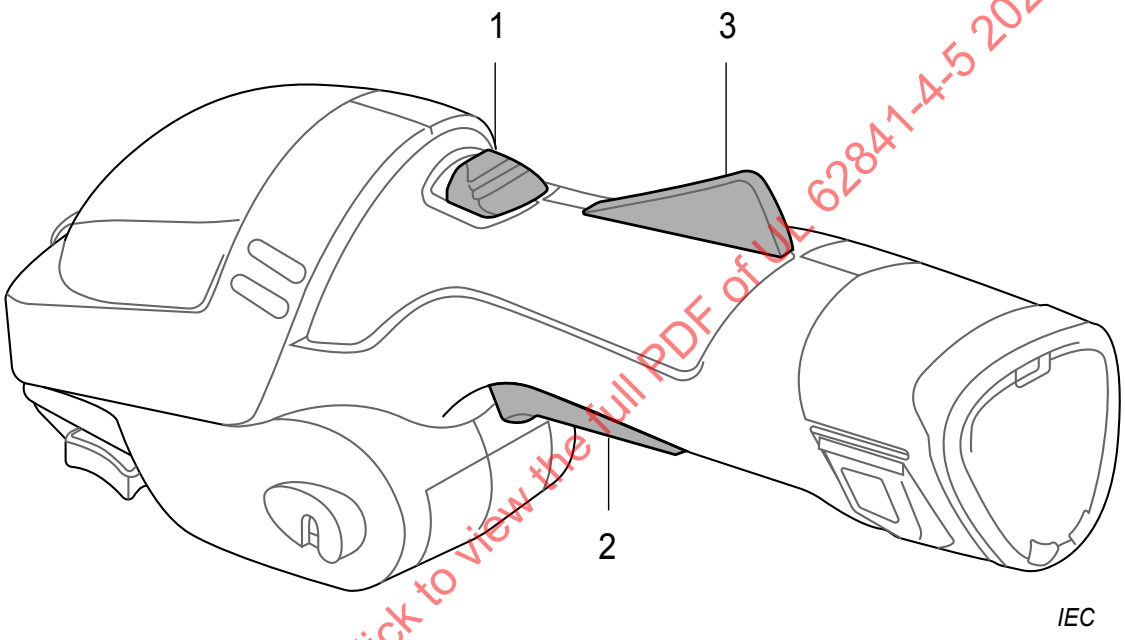
21.18.103.2 Operator presence sensor

The **operator presence sensor**, if any, shall be incorporated in the handle or grasping surface associated with the **power switch**.

The function of the **operator presence sensor** may be achieved by one or any combination of mechanical, electrical or electronic means.

NOTE 101 An example of an **operator presence sensor** is shown in Figure 117.

Compliance is checked by inspection.



Key

1 lock-off device

2 **power switch**

3 **operator presence sensor**

Figure 117

Example of an operator presence sensor

21.30 *Addition:*

The requirements also apply to **extension shafts**, if any.

21.35 This subclause of Part 1 is not applicable.

21.101 Power switch on extension shaft

A removable **extension shaft**, if any, shall be provided with a **power switch** that overrides or duplicates the function of a **power switch** which may be located on the machine without an **extension shaft**.

Compliance is checked by inspection and by practical test.

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

This clause of Part 1 is applicable, except as follows.

23.3 *Addition:*

Protection devices (e.g. overload or over-temperature protection devices) or circuits that switch off the **grass shear** shall be of the non-self-resetting type.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable, except as follows.

24.1 *Replacement:*

Machines shall be provided with one of the following means of connection to the supply:

– an appliance inlet having at least the same degree of protection against moisture as required for the machine; or

– a **supply cord** with a length between 0,2 m and 0,5 m and fitted with a plug or other connector having at least the same degree of protection against moisture as marked in accordance with 8.1 for the machine.

Plugs, connectors and inlets shall be suitable for the ratings of the machine.

Compliance is checked by inspection and by measurement.

*The **supply cord** is measured from where it exits the machine to where it enters the plug or connector. The length of a cord guard projecting from the body of the machine or from the body of the plug is included in the measurement when determining the length of the **supply cord**.*

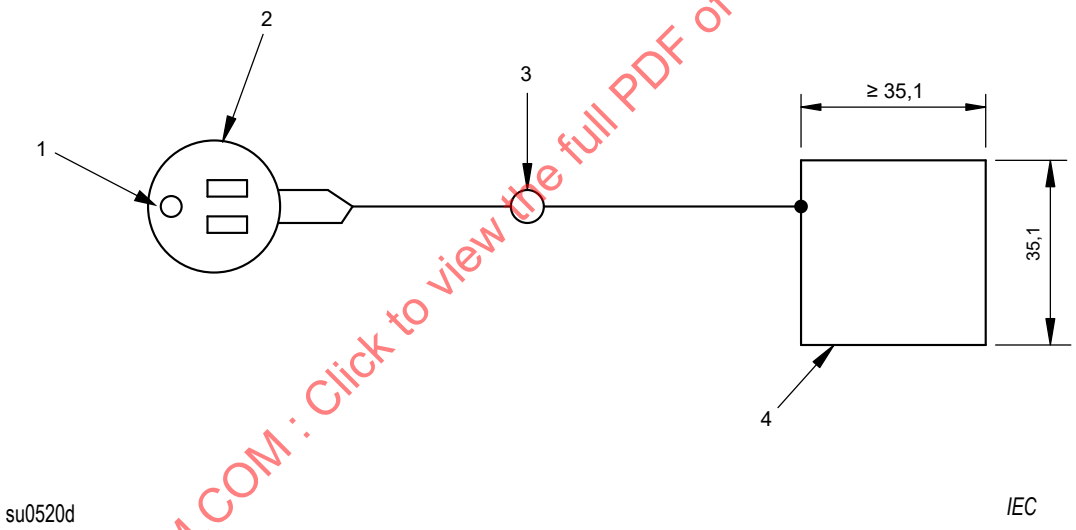
NOTE In Canada and the United States of America, the following additional conditions apply:

The appliance inlet or the attachment plug on the **supply cord** shall be constructed so that, when inserted in the connector of an extension cord, the blades will not be energized until they are inaccessible to contact.

Compliance is checked by the following test.

The receptacle shall be connected to the extension cord of the test assembly illustrated in Figure 118 with the plug inserted in the receptacle as far as possible. The plug shall be withdrawn not more than the distance necessary to permit the test probe to be inserted between the plug body and the extension cord receptacle. The test probe shall be inserted with a force of 18 N (4,1 lb) or less, until the probe contacts one blade of the plug. While the probe is in contact with the blade, the electrical continuity shall be determined by an ohmmeter or similar instrument between the contacts of the extension cord receptacle and the test probe. The test probe shall not contact any current-carrying blade of the attachment plug while the plug is conductively connected to the connector of the extension cord. The test shall be repeated for the other blade of the attachment plug.

Dimensions in millimetres



Key

1 GH (grounding open)

2 extension cord receptacle (three wire grounded)

3 continuity tester

4 test probe made of 1,5 mm thick metal

Figure 118

Test assembly for accessibility of attachment plug blades

24.2 *Addition:*

A **type Z attachment** is allowed.

24.4 *Replacement of NOTE 1 and NOTE 2:*

NOTE 1 In the United States of America, the following conditions apply:

Supply cords shall be not lighter than type SJOW, SJTW, or the equivalent that is oil and weather resistant in accordance with the National Electrical Code, ANSI/NFPA 70.

Attachment plugs and cords shall be equal to or greater than the rating of the machine.

NOTE 2 In Canada, the following conditions apply:

Supply cords shall be not lighter than type SJOW, SJTW, or the equivalent that is oil and weather resistant in accordance with the Canadian Electrical Code, Part 1.

Attachment plugs and cords shall be equal to or greater than the rating of the machine.

25 Terminals for external conductors

This clause of Part 1 is applicable.

26 Provision for earthing

This clause of Part 1 is applicable.

27 Screws and connections

This clause of Part 1 is applicable.

28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable, except as follows.

Replacement:

28.1 **Creepage distances** and **clearances** shall not be less than the values in millimetres shown in Table 12. The values specified in the table do not apply to cross-over points of motor windings.

The values in Table 12 are equal or larger than the values required by IEC 60664-1, when

– an overvoltage category II;

– a material group III;

– a pollution degree 1 for parts protected against deposition of dirt and for lacquered or enamelled windings;

– a pollution degree 3 for other parts;

– inhomogeneous electric field;

– transient overvoltages originating in the equipment not exceeding 4 000 V

are applied.

Protection against deposition of dirt may be achieved through the use of

– encapsulation with a minimum thickness of 0,5 mm; or

– protective coatings that prevent the combined deposition of fine particles and moisture on surfaces between conductors. Requirements for these types of protective coatings are described in IEC 60664-3; or

– enclosures that prevent the ingress of dust by means of filters or seals, provided that no dust is generated within the enclosure itself.

NOTE 1 An example of encapsulation is potting.

If a resonance voltage occurs between the point where a winding and a capacitor are connected together, and metal parts which are separated from **live parts** by **basic insulation** only, the **creepage distance** and **clearance** shall not be less than the values specified for the value of the voltage imposed by the resonance, these values being increased by 4 mm in the case of **reinforced insulation**.

Compliance is checked by measurement.

For machines provided with an appliance inlet, the measurements are made with an appropriate connector inserted. For other machines, they are made on the machine as delivered.

For machines provided with belts, the measurements are made with the belts in place, and the devices intended for varying the belt tension adjusted to the most unfavourable position within their range of adjustment, and also with the belts removed.

Movable parts are placed in the most unfavourable position; nuts and screws with non-circular heads are assumed to be tightened in the most unfavourable position.

*The **clearances** between terminals and accessible metal parts are also measured with the screws or nuts unscrewed as far as possible, but the **clearances** shall then be not less than 50 % of the value shown in Table 12.*

Table 12
Minimum creepage distances and clearances

Dimensions in millimetres

Distances	Class III tools (machines)		Other machines					
			Working voltage ≤ 130 V		Working voltage > 130 V and ≤ 280 V		Working voltage > 280 V and ≤ 480 V	
	Creepage distance	Clearance	Creepage distance	Clearance	Creepage distance	Clearance	Creepage distance	Clearance
Between parts of different potential [a]:								
– if lacquered or enamelled windings or if protected against deposition of dirt	1,0	1,0	1,0	1,0	2,0	2,0	2,0	2,0
– if not protected against deposition of dirt	2,0 [c]	1,5	2,0 [b]	1,5	3,0 [b]	2,5	8,0 [e]	3,0
Between **live parts** and other metal parts over **basic insulation**:								
– if the **live parts** are lacquered or enamelled windings [d] or if protected against deposition of dirt	–	–	1,0	1,0	2,0	2,0	2,0	2,0
– if not protected against deposition of dirt	–	–	2,4 [c]	1,5	4,0 [c]	3,0	8,0 [e]	3,0
Between **live parts** and other metal parts over **reinforced insulation**:								
– if the **live parts** are lacquered or enamelled windings or protected against deposition of dirt	–	–	5,0	5,0	6,0	6,0	10,0 [e]	6,0
– for other **live parts** not protected against deposition of dirt	–	–	5,0	5,0	8,0	8,0	16,0 [e]	8,0
Between metal parts separated by **supplementary insulation**	–	–	2,5	2,5	4,0	4,0	8,0 [e]	4,0

[a] The **clearances** specified do not apply to the air gap between the contacts of thermal controls, **protective devices**, switches of micro-gap construction, and the like, or to the air gap between the current-carrying members of such devices where the **clearance** varies with the movement of the contacts.

Table 12 Continued on Next Page

Table 12 Continued

Dimensions in millimetres

Distances	Class III tools (machines)		Other machines					
			Working voltage ≤ 130 V		Working voltage > 130 V and ≤ 280 V		Working voltage > 280 V and ≤ 480 V	
	Creepage distance	Clearance	Creepage distance	Clearance	Creepage distance	Clearance	Creepage distance	Clearance

[b] These **creepage distances** are slightly lower than suggested by IEC 60664-1. **Creepage distances** between parts of different potential (functional insulation) are only associated to fire hazard, not to electric shock hazard. As products in the scope of IEC 62841 are products supervised during **normal use**, lower distances are justified.

[c] These **creepage distances** may be reduced to values in accordance with IEC 60664-1, if the insulation parts are of material group II or lower.

[d] Windings are considered to have **basic insulation** if they are wrapped with tape and then impregnated, or if they are covered with a layer of self-hardening resin, and if, after the test of 14.1, an electric strength test as specified in Clause D.2 is withstood, the test voltage being applied between the conductors of the winding and metal foil in contact with the surface of the insulation.

It is sufficient that the wrapping and impregnation, or the layer of self-hardening resin, cover the windings only at places where it is not possible to obtain the creepage distance or clearance specified for lacquered or enamelled windings.

[e] These **creepage distances** are valid for frequencies up to 30 kHz. For higher frequencies, creepage distances shall be in accordance with IEC 60664-4. **Creepage distances** and **clearances** can be reduced in accordance with IEC 60664-1 if the insulation parts are of material group II or lower and/or for **working voltages** ≤400 V, however they shall not be lower than the values required in the column "**Working voltage** > 130 V and ≤ 280 V".

Distances through slots or openings in external parts of insulating material are measured to metal foil in contact with the accessible surface; the foil is pushed into corners and the like by means of the test probe B of IEC 61032:1997, but it is not pressed into openings.

If necessary, a force is applied to any point on internal wiring and bare conductors, other than those of heating elements, to any point on uninsulated metal capillary tubes of ***thermostats*** *and similar devices, and to the outside of metal enclosures, in an endeavour to reduce the* ***creepage distances*** *and* ***clearances*** *while taking the measurements.*

The force is applied by means of the test probe B of IEC 61032:1997, and has a value of:

– 2 N for internal wiring and bare conductors and for uninsulated capillary tubes of ***thermostats*** *and similar devices;*

– 30 N for enclosures.

The way in which ***creepage distances*** *and* ***clearances*** *are measured is indicated in Annex A.*

For machines having parts with ***double insulation*** *where there is no metal between* ***basic insulation*** *and* ***supplementary insulation****, the measurements are made as though a metal foil were present between the two insulations.*

Means provided for fixing the machine to a support are considered to be accessible.

Creepage distances *and* ***clearances*** *within optocouplers are not measured if the individual insulations are adequately sealed, and if air is excluded between individual layers of the material.*

For parts of different potential, including conductive patterns on printed circuit boards, except for external mains connection, ***creepage distances*** *and* ***clearances*** *smaller than the minimum values specified*

– in Table 12; or

– for conductive patterns on printed circuit boards as specified below

are allowed, provided

– the requirements of Clause 18 are met if these ***creepage distances*** *and* ***clearances*** *are short-circuited in turn; or*

– for ***electronic circuits****, they comply with 18.6 and 18.8.*

For conductive patterns on printed circuit boards, except at their edges, the minimum ***creepage distances*** *and* ***clearances*** *in Table 12 between parts of different potential may be reduced, as long as the peak value of the voltage stress does not exceed:*

150 V per mm with a minimum value of 0,2 mm, if protected against the deposition of dirt;

– 100 V per mm with a minimum value of 0,5 mm, if not protected against the deposition of dirt.

When the limits mentioned above lead to higher values than those of Table 12, the values of Table 12 apply.

NOTE 2 The above values are equal or larger than the values required by IEC 60664-3.

28.2 Depending on the **working voltage**, the distance through insulation shall be sufficient:

– for **working voltages** up to and including 130 V, the distance through insulation between metal parts shall not be less than 1,0 mm, if they are separated by **supplementary insulation**, and not be less than 1,5 mm, if they are separated by **reinforced insulation**;

– for **working voltages** over 130 V, the distance through insulation between metal parts shall not be less than 1,0 mm, if they are separated by **supplementary insulation**, and not be less than 2,0 mm, if they are separated by **reinforced insulation**;

– for all **working voltages**, the distance through **reinforced insulation** used between enamelled or lacquered windings and accessible metal shall not be less than 1,0 mm.

The required distance through insulation may be achieved through several thicknesses of solid insulation layers that may have intervening air between the layers such that the sum of the thicknesses of the solid insulation equals the required thickness.

This requirement does not apply, if either a) or b) is fulfilled.

a) The insulation is applied in thin sheet form, other than mica or similar scaly material, and consists:

– for **supplementary insulation**, of at least two layers, provided that any one of the layers withstands the electric strength test prescribed for **supplementary insulation**;

– for **reinforced insulation**, of at least three layers, provided that, when any two of the layers are placed in contact, they withstand the electric strength test prescribed for **reinforced insulation**.

The test voltage is applied between the outer surfaces of the layer, or of the two layers, as applicable.

b) The **supplementary insulation** or the **reinforced insulation** is inaccessible and meets the following condition:

The insulation, after having been conditioned for seven days (168 h) in an oven maintained at a temperature equal to 50 K greater than the maximum temperature rise determined during the test of Clause 12 withstands an electric strength test as specified in Annex D, this test being made on the insulation both at the temperature occurring in the oven, and at approximately room temperature.

Compliance is checked by inspection and by measurement.

For optocouplers, the conditioning procedure is carried out at a temperature of 50 K in excess of the maximum temperature rise measured on the optocoupler during the tests of Clause 12 and Clause 18, the optocoupler being operated under the most onerous conditions which occur during these tests.

Annexes

The annexes of Part 1 are applicable except as follows.

Annex I
(informative)

Measurement of noise and vibration emissions

NOTE In Europe (EN IEC 62841-4-5), Annex I is normative.

I.2 Noise test code (grade 2)

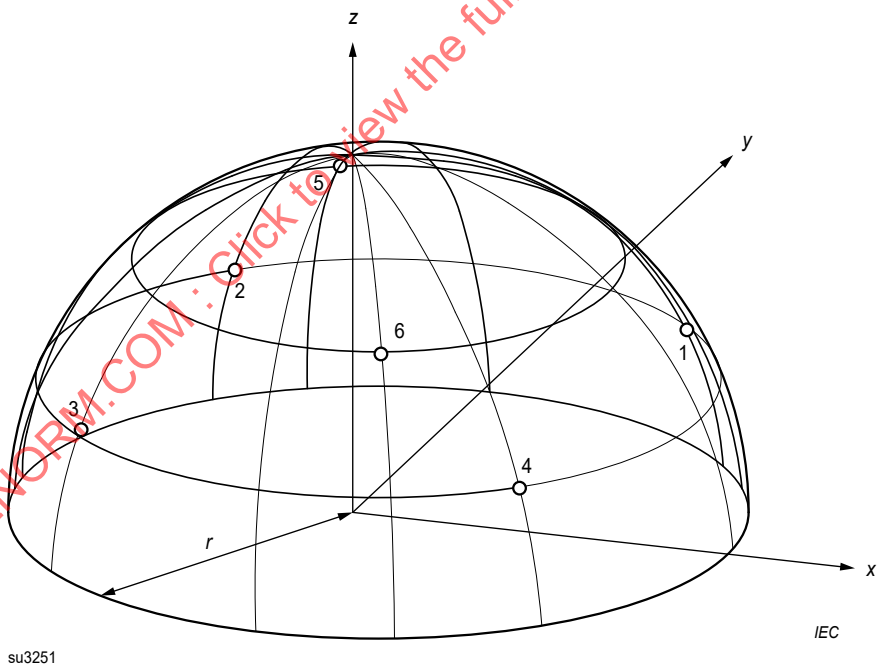
This clause of Part 1 is applicable, except as follows.

I.2.2.1 General

Replacement:

The sound power level shall be measured using a hemispherical measurement surface according to Figure I.101. The acoustic environment, instrumentation, quantities to be measured, quantities to be determined, and the measurement procedure are specified in ISO 3744:2010.

The sound power level shall be given as A-weighted sound power level in dB reference 1 pW. The A-weighted emission sound pressure levels, from which the sound power level is to be determined, shall be measured directly, and not calculated from frequency band data. Measurements shall be made outdoors or indoors in an essentially free field.



Key

r radius of hemisphere

Figure I.101

Microphone positions on the hemisphere (see Table I.101)

I.2.2.2 Hand-held power tools

This subclause of Part 1 is not applicable.

I.2.2.3 Transportable power tools

This subclause of Part 1 is not applicable.

I.2.2.4 Lawn and garden machinery

Replacement:

The test environment outdoors shall be a flat open space (a slope, if any, not exceeding 5/100), visibly free of sound-reflecting objects (buildings, trees, poles, sign boards, etc.) within a circular area with a radius equal to approximately three times the radius of the hemispherical measurement surface used.

For the determination of sound power level, ISO 3744:2010 shall be used subject to the following modifications:

– the microphone array shall be six microphone positions according to Figure I.101 and Table I.101;

– for outdoor and indoor measurements, the reflecting surface shall be replaced by an artificial surface according to I.2.2.101 or a natural ground surface according to I.2.2.102. Reproducibility of results using natural grass or other organic material is likely to be worse than that required for Grade 2 of accuracy. In case of dispute, measurements shall be carried out in the open air and on the artificial surface according to I.2.2.101;

– the measurement surface shall be a hemisphere with a radius, r, for which r = 4 m;

– for measurements outdoors, K_{2A} = 0;

– for measurements outdoors, the environmental conditions shall be within the limits specified by the manufacturers of the measuring equipment. The ambient air temperature shall be in the range from 5 °C to 30 °C and the wind speed shall be less than 5 m/s. A wind screen shall be used whenever the wind speed exceeds 1 m/s;

– for measurements indoors, the environment shall be according to ISO 3744:2010 and the value of K_{2A}, determined without artificial surface and in accordance with Annex A of ISO 3744:2010, shall be ≤ 2 dB, in which case K_{2A} shall be disregarded.

The A-weighted sound power level, L_{WA} in dB, shall be calculated in accordance with 8.2.5 of ISO 3744:2010, as follows:

$$L_{WA} = \overline{L_{pA}} + 10\lg\left(\frac{S}{S_0}\right) \text{ dB} \qquad \text{(I.101)}$$

with $\overline{L_{pA}}$ determined from

$$\overline{L_{pA}} = 10\lg\left[\frac{1}{6}\sum_{i=1}^{6} 10^{0,1L'_{pA,i}}\right] - K_{1A} - K_{2A} \text{ dB}$$

where

$\overline{L_{pA}}$ is the A-weighted surface emission sound pressure level according to 8.2.4 of ISO 3744:2010, in dB;

$L_{p'A,i}$ is the A-weighted sound pressure level measured at the i^{th} microphone position, in dB;

K_{1A} is the background noise correction, in dB, A-weighted;

K_{2A} is the environmental correction, A-weighted, according to the requirements of this noise test code K_{2A} = 0 dB;

S is the area of the measurement surface, in m^2;

S_0 = 1 m^2.

For the hemispherical measurement surface, the area S of the measurement surface is calculated as follows:

$$S = 2\pi r^2$$

where the radius of the hemisphere, r = 4 m

so, from equation (I.101)

$$L_{WA} = \overline{L_{pA}} + 20\ \text{dB}$$

Table I.101
Coordinates of microphone positions

Position No.	*x*	*y*	*z*
1	+0,65 *r*	+0,65 *r*	0,38 *r*
2	–0,65 *r*	+0,65 *r*	0,38 *r*
3	–0,65 *r*	–0,65 *r*	0,38 *r*
4	+0,65 *r*	–0,65 *r*	0,38 *r*
5	–0,28 *r*	+0,65 *r*	0,71 *r*
6	+0,28 *r*	–0,65 *r*	0,71 *r*

Three consecutive tests shall be carried out and the result of the test L_{WA} shall be the arithmetic mean, rounded to the nearest decibel, of the three tests.

I.2.2.101 Requirements for an artificial surface

The artificial surface shall have absorption coefficients as given in Table I.102, measured in accordance with ISO 354:2003.

Table I.102
Absorption coefficients

Frequencies Hz	Absorption coefficients	Tolerance
125	0,1	± 0,1
250	0,3	± 0,1
500	0,5	± 0,1
1 000	0,7	± 0,1
2 000	0,8	± 0,1
4 000	0,9	± 0,1

The artificial surface shall be placed on a hard, reflecting surface and have a size of at least 3,6 m × 3,6 m. It shall be placed so that its geometrical centre coincides with the origin of the coordinate system of the microphone positions. The construction of the supporting structure shall be such that the requirements for the acoustic properties are also met with the absorptive material in place. The structure shall support the weight of an operator when positioning the machine on the structure and the weight of the machine to avoid compression of the absorbing material.

NOTE 101 See Annex BB for an example of a material and construction which can be expected to fulfil these requirements.

I.2.2.102 Requirements for a natural ground surface

The test environment, within a circular area with a radius equal to approximately the radius of the hemisphere measurement surface used, shall be covered with high-quality natural grass. Before the measurements are taken, the grass shall be cut with a lawnmower to a height of cut as near as possible to 30 mm. The surface shall be clean of grass clippings and debris and shall be visibly free of moisture, frost, or snow.

I.2.3.1 Hand-held tools

Replacement:

The A-weighted emission sound pressure level at the work station, L_{pA}, shall be determined in accordance with ISO 11203 as follows:

$$L_{pA} = L_{WA} - Q \quad \text{dB}$$

where Q = 8 dB.

NOTE 1 This value of Q has been determined, during experimental investigations, to be applicable to **grass shears**. The resulting A-weighted emission sound pressure level at the workstation is equivalent to the value of the surface sound pressure level at a distance of 0,7 m from the power tool. This distance has been chosen to give satisfactory reproducibility of results, and to permit comparison of the acoustic performance of different **grass shears** which do not, in general, have uniquely defined work stations. Under free field conditions, where it may be required to estimate the emission sound pressure level, $L_{pA,r1}$, at a distance r_1 in m from the geometric centre of the power tool, this can be done by applying the formula:

$$L_{pA,r1} = L_{pA} + 20 \lg \left(\frac{1}{r_1}\right) \quad \text{dB}$$

NOTE 2 At any given position in relation to a particular machine, and for given mounting and operating conditions, the emission sound pressure levels determined by the method of this standard will in general be lower than the directly measured sound pressure levels for the same machine in the typical workroom where it is used. This is due to the influence of sound reflecting surfaces in the workroom compared to the free field conditions of the test specified here. A method of calculating the sound pressure levels in the vicinity of a machine operating alone in a workroom is given in ISO TR 11690-3. Commonly observed differences are 1 dB to 5 dB, but in extreme cases the difference might be even greater.

If required, the C-weighted peak emission sound pressure level L_{pCpeak} shall be measured at each of the five measurement positions specified in I.2.2. The C-weighted peak emission sound pressure level at the work station is the highest C-weighted peak sound pressure level measured at any of the five microphone positions; no corrections are permitted.

I.2.3.2 Transportable tools

This subclause of Part 1 is not applicable.

I.2.3.3 Lawn and garden machinery

Replacement:

The emission sound pressure for **grass shears** without **extension shaft** and with removable **extension shaft** shall be determined in accordance with I.2.3.1.

NOTE A **grass shear** without a permanently attached **extension shaft** is used in a similar way to **hand-held tools**, without a uniquely defined work station. The emission sound pressure at a distance from the machine as specified in I.2.3.1 of Part 1 is applicable.

The emission sound pressure for **grass shears** with permanently attached **extension shaft** shall be determined in accordance with ISO 22868: 2011, Clause B.2.

For **grass shears** with permanently attached **extension shaft**, the microphone is positioned according to B.2.3 of ISO 22868:2011, but with the exception that the microphone shall be located (1 650 ± 10) mm above the ground.

I.2.4 Installation and mounting conditions of the power tools during noise tests

Replacement:

The machine under test shall be a new and equipped with **attachments** which affect the acoustic properties, as specified in 8.14.2. Prior to commencing testing, the machine (including any required ancillary equipment) shall be set up in a stable condition as specified in 8.14.2. The machine is placed above the surface in such a way that the projection of the geometrical centre of the main parts (excluding handle etc.) coincides with the origin of the coordinate system of the microphone positions. The longitudinal axis of the machine is aligned with the x-axis.

The plane of the **cutting device** shall be located 30 mm vertically above and parallel to the surface.

The measurement is carried out without an operator.

NOTE It is likely that the results from conducting tests using an operator will not achieve Grade 2 accuracy.

I.2.I.2.5 Operating conditions

Replacement:

Mains powered machines shall be operated at **rated voltage** or, if they have a **rated voltage range**, at the highest voltage.

For **battery** powered machines, the test shall be conducted with a **fully charged battery** at the beginning of the measurements.

For all machines, except for machines powered by **integral batteries**, the machine is operated for 10 min at **maximum speed** at no-load prior to the test.

The machine noise emission is then measured while the machine is operated at **maximum speed** at no-load with the **cutting device** operating.

During measurements, the machine shall operate under stable conditions. Once the noise emission is steady, the measurement time interval shall be at least 15 s. If measurements are to be made in octave or one-third octave frequency bands, the minimum period of observation shall be 30 s for the frequency bands centred on or below 160 Hz, and 15 s for the frequency bands centred on or above 200 Hz.

I.3 Vibration

This clause of Part 1 is applicable except as follows.

I.3.3.2 Location of measurement

Addition:

Figure I.102 shows the positions of the transducers for **grass shears**.

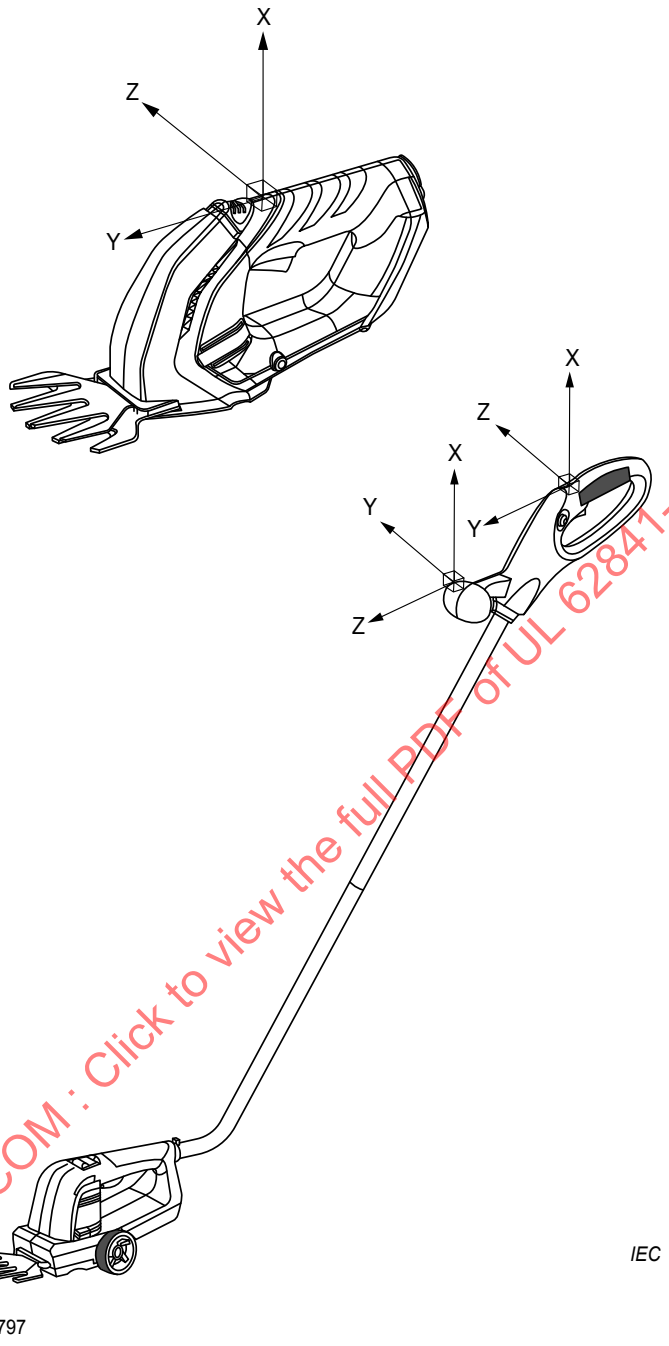


Figure I.102

Positions of transducers for grass shears

I.3.5.2 Attachment, workpiece and task

Addition:

Tests shall be carried out on a new **grass shear**. Where the **grass shear** can be fitted with an optional **extension shaft**, the measurements shall be made for both conditions.

If different **cutting devices** can be mounted on the **grass shear** in accordance with 8.14.2 a) 101), the **cutting device** with the largest **cutting width** shall be mounted.

I.3.5.3 Operating conditions

Replacement:

Before the test, the **grass shear** shall be run-in and warmed up by being operated under these conditions for at least 1 min.

The **grass shear** is tested at **maximum speed** at no-load, the machine being held as in **normal use** with the **cutting device** horizontal.

NOTE As it is difficult to apply or simulate load to **grass shears** in laboratories and test results have shown that the load has no significant influence on the vibration results, the measurements are conducted with no-load only.

Care shall be taken to avoid overheating the **cutting device** by operating continuously (without cutting grass) and therefore appropriate interruptions for cooling and lubrication may be introduced.

The machine shall be operated at normal working conditions and working modes according to 8.14.2, which shall be maintained for the duration of the test. Those operating conditions shall be used that are representative of the highest vibration values likely to occur when operating the machine.

I.3.6.1 Reported vibration values

Addition:

One test cycle is given when the machine is switched on at **maximum speed** at no-load for more than 10 s and then switched off again.

The measurement is conducted over a minimum of 8 s within this period.

I.3.6.2 Declaration of the vibration total value

Addition:

The vibration total value a_h of the handle with the highest emission and the uncertainty K shall be declared.

Annex K
(normative)

Battery tools and battery packs

All clauses of the main body of this Part 4-5 apply unless otherwise specified in this annex. If a clause is stated in this annex, its requirements replace the requirements of the main body of this Part 4-5 unless otherwise specified.

K.3 Terms and definitions

This clause of Part 4-5 is applicable, except as follows.

K.3.63
working voltage
voltage, without the effect of transient voltages, across any insulation or between any parts of different polarity when the tool is supplied by (a) **fully charged battery(ies)** and operating at no-load, or with the tool in the "off" condition, whichever is greater

Addition:

K.3.301
switched circuit
circuit that is a low-power circuit when the **power switch** is in the "off" position

Note 301 to entry: The requirements for a low-power circuit are given in Annex H.

K.5.17 *Addition:*

*The mass of the machine includes the heaviest **detachable battery pack(s)**, but does not include any **separable battery pack(s)**, in accordance with K.8.14.2 e) 2).*

K.8.1 **Grass shears** shall be marked with the IP number according to the degree of protection against ingress of water other than IPX0. If the first numeral for the IP numbering is omitted, the omitted numeral shall be replaced by the letter X, for example IPX5.

Compliance is checked by inspection.

K.8.14.1.101 For **grass shears** that can be converted to a Category 1 hedge trimmer, the term “grass shear” may be replaced by alternate wording (e.g. “grass shear/hedge trimmer” or “grass shear/shrub shear”). For this case, the verbatim warnings below need not be repeated for the two configurations.

Grass shears safety warnings:

a) **Do not use the grass shear in bad weather conditions, especially when there is a risk of lightning.** *This decreases the risk of being struck by lightning.*

b) **Keep all power cords and cables away from cutting area.** *Power cords or cables may be hidden and can be accidentally cut by the blade.*

c) **Wear ear protection.** Adequate protective equipment will reduce the risk of hearing loss.

NOTE 301 This warning can be omitted if the measured emission sound pressure level at the operator’s ear in accordance with Annex I does not exceed 85 dB(A).

d) **Hold the grass shear by insulated gripping surfaces only, because the blade may contact hidden wiring.** *Blades contacting a "live" wire may make exposed metal parts of the grass shear "live" and could give the operator an electric shock.*

e) **Keep all parts of the body away from the blade. Do not remove cut material or hold material to be cut when blades are moving.** *Blades continue to move after the switch is turned off. A moment of inattention while operating the grass shear may result in serious personal injury.*

f) **When clearing jammed material or servicing the grass shear, make sure the power switch is off and the battery pack is removed or disconnected.** *Unexpected actuation of the grass shear while clearing jammed material or servicing may result in serious personal injury.*

NOTE 302 The above warning is omitted for machines with **integral batteries**.

g) **When clearing jammed material or servicing the grass shear, make sure the power switch is off and the lock-off is in the locked position.** *Unexpected actuation of the grass shear while clearing jammed material or servicing may result in serious personal injury.*

NOTE 303 The above warning is omitted for machines with **detachable battery packs** and **separable battery packs**.

h) **Carry the grass shear by the handle with the blade stopped and taking care not to operate the power switch.** *Proper carrying of the grass shear will decrease the risk of inadvertent starting and resultant personal injury from the blades.*

i) **When transporting or storing the grass shear, always use the blade cover.** *Proper handling of the grass shear will decrease the risk of personal injury from the blades.*

K.8.14.2 *b) Modification:*

Item 102) is not applicable.

Addition:

301) Instructions for the use and adjustment of any means of support for **separable battery packs** in accordance with K.21.301 and instructions for release or removal.

K.8.14.2 *c) Addition:*

301) For machines with **integral batteries**, instructions on how to disable the machine during maintenance or servicing.

K.8.14.3 If information about the mass or weight of the machine is provided, it shall be the mass specified in K.5.17, excluding the **battery** (except for **integral batteries**.)

If information about the mass or weight of the **battery(ies)** is provided, it shall cover the range of specified **batteries**.

Compliance is checked by inspection.

K.12.2.1 This subclause of Part 4-5 is not applicable.

K.14 Moisture resistance

This clause of Part 4-5 is not applicable, except as follows.