UL 62841-4-2

STANDARD FOR SAFETY

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-2: Particular Requirements For Hedge Trimmers

UL Standard for Safety for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-2: Particular Requirements For Hedge Trimmers, UL 62841-4-2

First Edition, Dated September 13, 2019

Summary of Topics

Adoption Of The First Edition Of IEC 62841-4-2, Standard For Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-2: Particular Requirements For Hedge Trimmers As The First Edition Of UL 62841-4-2

This standard is an adoption of IEC 62841-4-2, Edition 1, published by the IEC December 2017 including Corrigendum 1 of IEC 62841-4-2, dated June 2018.

The new requirements are substantially in accordance with Proposal(s) on this subject dated January 25, 2019 and June 14, 2019.

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Underwriters Laboratories Inc.
UL 62841-4-2
First Edition

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-2: Particular Requirements For Hedge Trimmers

September 13, 2019

This national standard is based on publication IEC 62841-4-2, First Edition (2017), including Corrigendum 1 dated June 2018.

ANSI/UL 62841-4-2-2019

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as “CSA Group”) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at any time. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL 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 inquires@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. The most recent designation of ANSI/UL 62841-4-2 as an American National Standard (ANSI) occurred on September 13, 2019. 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.

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Preface

This is the harmonized CSA Group and UL Standard For Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-2: Particular Requirements For Hedge Trimmers. It is the First edition of CSA C22.2 No. 62841-4-2 and the First edition of UL 62841-4-2.

This harmonized standard is based on IEC Publication 62841-4-2: First edition, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-2: Particular Requirements For Hedge Trimmers, issued December 2017. IEC 62841-4-2 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). 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 UL 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. 62841-4-2 is to be used in conjunction with the First edition of CAN/CSA-C22.2 No. 62841-1. The requirements for hedge trimmers 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. 62841-4-2, the CAN/CSA-C22.2 No. 62841-1 subclause applies.

UL 62841-4-2 is to be used in conjunction with the First edition of UL 62841-1. The requirements for hedge trimmers 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 UL 62841-4-2, 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 UL.

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 UL 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 62841-4-2, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 4-2: Particular Requirements For Hedge Trimmers, copyright 2017, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword is not a part of the requirements of this standard but is included for information purposes only.

NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 62841-4-2, Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 4-2: Particular Requirements for Hedge Trimmers, copyright 2017, 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 4-2: PARTICULAR REQUIREMENTS FOR HEDGE TRIMMERS

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.

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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.

International Standard IEC 62841-4-2 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

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

FDIS	Report on voting
116/346/FDIS	116/352/RVD

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

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

This Part 4-2 is to be used in conjunction with the first edition of IEC 62841-1 (2014).

This Part 4-2 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for hedge trimmers.

Where a particular subclause of Part 1 is not mentioned in this Part 4-2, 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 4-2 as well as Annex K and Annex L of Part 1 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 publication. At this date, the publication 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.

The contents of the corrigendum of June 2018 have been included in this copy.

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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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – PART 4-2: PARTICULAR REQUIREMENTS FOR HEDGE TRIMMERS

1 Scope

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

Addition:

This standard applies to hand-held **hedge trimmers** which are designed for use by one operator for trimming hedges and bushes, including **extended-reach hedge trimmers** with a maximum length of 3,5 m.

NOTE 101 The measurement of the length for **extended-reach hedge trimmers** is specified in 21.101.

This standard is not applicable to **hedge trimmers** with a rotating blade.

This standard is not applicable to scissors type grass shears.

NOTE 102 Scissors type grass shears are covered by IEC 60335-2-94.

2 Normative references

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

Addition:

IEC 61672-1 *Electroacoustics – Sound level meters – Part 1: Specifications*

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

ISO 11684, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Safety signs and hazard pictorials – General principles*

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

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 control**
device activated by the operator's hand or fingers in order to start or stop the operation of the **cutting device**

3.102 **blade stopping time**
elapsed time from the release of the **blade control** until the moving parts of the **cutting device** stop

3.103 **blade tooth**
part of the **cutter blade** which is sharpened or has sharp edges to perform the shearing action (see Figure 101 and Figure 102)

3.104 **blunt extension**
blunt part of the **cutting device** or a part of an unsharpened plate fitted to the cutting device which extends beyond the **blade teeth** (see Figure 101 and Figure 102)

3.105 **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** (see Figure 101 and Figure 102)

3.106 **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, which may be either single or double sided (see Figure 101, Figure 102, Figure 104 a) and Figure 104 b))

3.107 **cutting length**
effective cutting length 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 (see Figure 103)

Note 1 to entry: Where both **cutter blades** move, the **cutting length** is measured when the first and last **blade teeth** are furthest apart.

3.108 **extended-reach hedge trimmer**
hedge trimmer with a fixed or adjustable elongated construction, including additional separable extensions, if any, such that the **cutting device** is distanced from the handles or grasping surfaces during use

3.109 **front handle**
grasping surface located at or towards the **cutting device** (see Figure 104)

3.110 **hedge trimmer**
hand-held machine provided with a linearly reciprocating **cutting device** intended for trimming bushes and hedges

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

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

3.113 **rear handle**
grasping surface located furthest from the **cutting device** (see Figure 104)

3.114 **shaft**
fixed or extendable element of an **extended-reach hedge trimmer** that distances the **cutting device** from the **rear handle**

3.115 **shear plate**
moving or stationary unsharpened part of the **cutting device** which assists cutting by shearing action against a **cutter blade** (see Figure 101)

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** can be mounted on the **hedge trimmer** 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 and shoulder harness, if any, but includes:*

– the auxiliary handle, if any;

and

*– for **extended-reach hedge trimmers**, the auxiliary extension **shaft** attachment, if any.*

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.*

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:*

Hedge trimmers shall be marked with safety information 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 **hedge trimmers**:

– "⚠ 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 **hedge trimmers** 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.

For all **hedge trimmers** except for Category 1 in Table 101:

– "Wear eye protection" or a relevant safety sign of ISO 7010 or one of the safety signs shown in Figure AA.5."

Additionally, for **extended-reach hedge trimmers**:

– "⚠ DANGER – Keep sufficient distance away from electrical power lines" or symbol C.2.30 of ISO 11684.

– "Wear head protection" or a relevant safety sign of ISO 7010.

A combination of ISO safety signs, such as eye and head protection, is allowed. In addition, a combination of safety signs as specified in Figure AA.6 is allowed.

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 **hedge trimmers**. The additional safety instructions as specified in 8.14.1.102 shall be given for all **extended-reach hedge trimmers**. 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.

8.14.1.101 **Safety instructions for hedge trimmers**

Hedge trimmer safety warnings:

a) **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 hedge trimmer may result in serious personal injury.*

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

c) **When transporting or storing the hedge trimmer, always fit the blade cover.** *Proper handling of the hedge trimmer will decrease the risk of personal injury from the blades.*

d) **When clearing jammed material or servicing the unit, make sure all power switches are off and the power cord is disconnected.** *Unexpected actuation of the hedge trimmer while clearing jammed material or servicing may result in serious personal injury.*

e) **Hold the hedge trimmer 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 hedge trimmer "live" and could give the operator an electric shock.*

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

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

8.14.1.102 **Additional safety instructions for extended-reach hedge trimmers**

Extended-reach hedge trimmer safety warnings:

a) **To reduce the risk of electrocution, never use the extended-reach hedge trimmer near any electrical power lines.** *Contact with or use near power lines may cause serious injury or electric shock resulting in death.*

b) **Always use two hands when operating the extended-reach hedge trimmer.** *Hold the extended-reach hedge trimmer with both hands to avoid loss of control.*

c) **Always use head protection when operating the extended-reach hedge trimmer overhead.** *Falling debris can result in serious personal injury.*

NOTE Alternate wording for "extended-reach" is possible, e.g. "pole" or "long reach".

8.14.2 a) *Addition*:

101) If applicable, information on **cutting devices** and **attachments** permitted to be used with the **hedge trimmer**, e.g. a device attached to the **cutting device** to aid removal of hedge trimmings.

8.14.2 b) *Addition:*

101) Advice to check the hedges and bushes for foreign objects, e.g. wire fences 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) and grasping surface (s) required by 19.101 and 19.102;

104) Instruction to hold the **hedge trimmer** properly, e.g. with both hands if two handles are provided;

105) Advice that the **hedge trimmer** 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 **hedge trimmer**, the user should make sure the locking device(s) of any moving elements (e.g. the extended **shaft** and pivoting element), if any, are in the locked position;

107) Instructions for location and use of **blade control(s)** for the operation of the **hedge trimmer**;

108) Instructions for configuring the machine, including any handle or **cutter blade** adjustment;

109) Instructions for the use and adjustment of any provided shoulder harness in accordance with 19.110 and instructions for release or removal;

110) Identification of centre position and other operating positions for handles that can rotate while in operation as allowed in 19.101.3.

8.14.2 c) *Addition:*

101) If applicable, advice to have any adjustable stopping mechanism maintained at regular intervals.

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 b) 108). 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 approximately 1 r/min during the test.

*Electrical components, covers and other **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 Addition:

*Alternatively, **extended-reach hedge trimmers** may be subjected to the test described in 14.2.3 b) or 14.2.4 b) of IEC 60529:2013, as applicable.*

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 b) 108).

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)
Blade control(s) – prevent unwanted switch-on	c
Blade control(s) – provide desired switch-off for any category in Table 101 or Table 102	b
Blade control(s) – **blade stopping time** not exceeding 1 s more than the required time for Category 3a, 3b and 4 only in Table 101 or Table 102	a
Prevent exceeding thermal limits as in Clause 18	a
Any device to prevent operation in a configuration not permitted by this standard as required in 19.101.1.1	a
Operator presence sensor as in 21.18.102	a
Lock-off function as required in 21.18.102	a
Visible or audible indicator as referenced in 21.18.102	Not an **SCF**
Prevent self-resetting as required in 23.3	a

19 Mechanical hazards

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

19.1 *Addition:*

The requirements of this subclause do not apply to those moving parts, barriers and covers which are separately covered by 19.102, 19.103, 19.105 and 19.106.

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 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 Hedge trimmer handles

19.101.1.1 General

For all **hedge trimmers** except for **extended-reach hedge trimmers**, the minimum number of handles shall be in accordance with Table 101.

If a part containing the motor complies with the dimensions for a handle, it may be considered as a handle.

The handles shall be designed in such a way that each one can be grasped with one hand. Handles shall be suitably shaped to be grasped securely and have a perimeter between 65 mm and 170 mm as illustrated in Figure 105 a), Figure 105 b) or Figure 105 c). The perimeter is determined by a chain measurement with the **blade control**, if any, fully depressed. The gripping length of the handle(s) shall be at least 100 mm long.

If applicable, the part of the handle containing the **blade control** shall be counted as part of the handle gripping length.

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.

Handles shall be locked in position during operation except as allowed by 19.101.3. If they are adjustable without tools to different positions in accordance with 8.14.2 b), it shall not be possible to operate the machine when adjusted to a position which contravenes other provisions of this standard.

NOTE The requirements for endurance and integrity of adjustments are covered in 19.107 and 19.108.

Compliance is checked by inspection and by measurements.

19.101.1.2 Dimensions of bail or closed handles

On bail or closed handles (U-shaped handles) the gripping length is related to the inner width 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 105 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 measurements.

19.101.1.3 Dimensions of handles supported centrally (T-type)

If a 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 105 b)):

– for handles 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 handles 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 measurements.

19.101.1.4 Dimensions of handles that are formed by the shaft

The gripping length *L* in Figure 105 c) 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 measurements.

19.101.2 Extended-reach hedge trimmer handles

19.101.2.1 General

For **extended-reach hedge trimmers**, the minimum number of handles shall be in accordance with Table 102.

If a part containing the motor complies with the dimensions for a handle, it may be considered as a handle.

A **shaft** may be used as a handle if specified in accordance with 8.14.2.

The handles shall be designed in such a way that each one can be grasped with one hand. Handles shall be suitably shaped to be grasped securely and have a perimeter *P* between 65 mm and 170 mm as illustrated in Figure 105 a), Figure 105 b) or Figure 105 c). The perimeter *P* is determined by a chain measurement with the **blade control**, if any, fully depressed. The gripping length of the **front handle** and the **rear handle** shall be at least 100 mm long.

If applicable, the part of the handle containing the **blade control** shall be counted as part of the handle gripping length.

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.

If handles are adjustable to different positions without tools in accordance with 8.14.2 b), it shall not be possible to inadvertently operate the machine when locked in a position which contravenes other provisions of this standard. This may be achieved by at least one **blade control** requiring two separate and dissimilar actions before the **cutting device** operates as described in 21.18.102 for **power switches** and also meet the requirements of 21.17.1 for self-restoring lock-off devices.

Compliance is checked by inspection and by measurements.

19.101.2.2 Dimensions of bail or closed handles

On bail or closed handles (U-shaped handles), the gripping length is related to the inner width 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 105 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 measurements.

19.101.2.3 Dimensions of handles supported centrally (T-type)

If a 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 105 b)):

– for handles 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 handles 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 measurements.

19.101.2.4 Dimensions of handles that are formed by the shaft

The gripping length *L* in Figure 105 c) 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 measurements.

19.101.3 Handles that are adjustable during operation

19.101.3.1 **Hedge trimmers**, except for **extended-reach hedge trimmers**, with handles that are adjustable by side-to-side axial rotation about an axis between them without the use of a tool while the **cutting device** is operating as permitted in Table 101 shall comply with the requirements of 19.101.3.2 to 19.101.3.6.

No more than one of the handles to be held in operation may be adjustable while the machine is operating.

Extended-reach hedge trimmers shall not incorporate handles that are intended to be adjusted in accordance with 8.14.2 while the **cutting device** is operating.

Compliance is checked by inspection, by manual test and by the requirements of 19.101.3.2 to 19.101.3.6.

19.101.3.2 Any adjustable handle shall have a defined centre position. The handle shall have a locking detent at the centre position and at any other intended handle adjustment position of operation as described in 8.14.2. These other operating positions shall not locate the handle further than 95° from the centre position about their axis of rotation. See Figure 106 and Figure 107. The handle, when locked by

the detent, shall be limited to 5° rotation. The handle shall have a handle release control as required in 19.101.3.3 that releases the handle from the detent position.

The handle shall automatically lock into each detent position when adjusting the handle, unless the handle release control is operated.

Compliance is checked by inspection and by measurement.

19.101.3.3 Limitation of movement of adjustable handles

19.101.3.3.1 **Hedge trimmers** with handles that are adjustable during operation shall be designed to prevent uncontrolled movement by fulfilling either 19.101.3.3.2 or 19.101.3.3.3.

19.101.3.3.2 The ease of rotation of an adjustable handle shall be limited after the handle release control is activated.

Compliance is checked by the following test:

*With the **cutting device** clamped securely and the handle release control activated, a 1 Nm torque is applied to the adjustable handle about its axis of rotation. There shall be no more than 5° of rotation of the handle within 2 s. The test is then repeated in the opposite direction of rotation.*

19.101.3.3.3 After the release of the handle from the centre position by the momentary activation of the handle release control, the extent of movement of the adjustable handle of the machine shall be limited.

The rotating handle shall have

– a maximum rotation of 60°; or

– one or more intermediate locking detents limiting rotation to a maximum of 60°

measured from the centre position in either direction about the axis of rotation between the handle positions.

The intermediate locking detent (s) may be intentionally overridden by operation of the handle release control.

NOTE For the case where this requirement is fulfilled by the use of one or more intermediate locking detents, the requirement for maximum rotation is specified in 19.101.3.2.

Compliance is checked by inspection and by measurement.

19.101.3.3.4 An adjustable handle shall be provided with a momentary handle release control to unlock the handles from a locked detent position. Operation of the handle release control shall not adversely affect physical control of the **hedge trimmer**. The handle release control, while intentionally activated, may allow the handle to bypass the detent position without locking.

Compliance is checked by inspection and by manual test.

19.101.3.5 Accessibility of handle release control

19.101.3.5.1 The handle release control shall be located, designed or guarded so that unintentional activation is unlikely.

Compliance is checked by fulfilling one of the requirements specified in 19.101.3.5.2, 19.101.3.5.3 or 19.101.3.5.4.

19.101.3.5.2 The handle release control shall be located outside the gripping surface of the handle, indicated in 8.14.2 b) 103).

Compliance is checked by inspection.

19.101.3.5.3 It shall not be possible to activate the handle release control when a rigid sphere with a diameter of (100 ± 1) mm is applied to the handle release control in any direction with a single linear motion.

Compliance is checked by inspection and by manual test.

19.101.3.5.4 The handle release control shall require two separate and dissimilar actions before the handle is released. It shall not be possible to achieve these two actions with a single grasping motion or a straight line motion.

Compliance is checked by inspection and by manual test.

19.101.3.6 A handle release control shall have adequate strength and shall be sufficiently durable.

Compliance is checked by inspection and by the following test:

The handle release control is actuated a total of 2 000 times, engaging all locking detent positions over the full range of travel of the adjustable handle, in both directions.

Each handle release control actuation consists of the following steps a) to d):

a) Starting from any locking detent position, activate the handle release control;

b) Begin rotation of the adjustable handle to the next locking detent position;

c) Release the handle release control at approximately the halfway point to the next locking detent position;

d) Continue rotation of the adjustable handle until the handle engages with the next locking detent position.

After the test, the machine shall withstand the electric strength test of Annex D between live parts and accessible parts and live parts shall not have become accessible, as specified in Clause 9, if the adjustment would cause stress on internal wiring.

At the conclusion of the conditioning, the handle release control shall perform as intended and shall comply with the following test:

While a handle is in any locking detent position, a torque of 6 Nm is applied for 1 min in line with the direction of its intended handle rotation, and it is applied in each direction of rotation.

*During the test, the handle shall not disengage from the locking detent position(s), and the handle shall still operate correctly after the test. Electrical connections shall not have worked loose, and there shall be no deterioration impairing safety in **normal use**.*

19.102 Hand protection

19.102.1 An operator's hand shall be protected from inadvertent contact with the moving **cutter blade** while holding the **front handle** as required in Table 101 or Table 102. Requirements for **hedge trimmers**, except for extended-reach hedge trimmers, are specified in 19.102.2. Requirements for **extended-reach hedge trimmers** are specified in 19.102.3

19.102.2 Hand protection for hedge trimmers except for extended-reach hedge trimmers

19.102.2.1 The **front handle** shall be located so that the distance from the nearest cutting edge of the **cutter blade** to the rear side of any handle, except for Category 1, is not less than 120 mm as shown in Figure 108.

For Category 1, the shortest distance between the front of the handle grip and the nearest **blade tooth** shall be at least 120 mm (see Figure 111). The distances shall be measured along the shortest path from the front of the handle grip to the nearest cutting edge of the **cutter blade**.

For all categories in Table 101, if there is a front hand barrier, then the x_1 and x_2 distances in Figure 108 shall be measured along the shortest path from the backside of the handle, via the edge of the front hand barrier, to the nearest cutting edge of the **cutter blade**. The front hand barrier shall not have any openings with a minor dimension larger than 10 mm.

Additionally, for category 3a **hedge trimmers**, the front hand barrier shall have a minimum shape described by:

– a height y_1 of 90 mm measured perpendicularly from the cutting plane; and

– a width y_2 of 50 mm on either side of the centreline of the **cutting device**.

Both the y_1 and y_2 measurements are made with the **cutting device** in the 0° position, if axially rotatable. See Figure 109.

Compliance is checked by inspection and by measurement.

19.102.2.2 In addition, for category 3a **hedge trimmers** where the **cutting device** can be rotated left or right along an axis of rotation, the front hand barrier shall have a width that extends a minimum of 25 mm beyond the **cutting device** when the **cutting device** is adjusted to its full left and right rotational position (see Figure 110).

Compliance is checked by inspection and by measurement.

19.102.2.3 In addition, for category 1 **hedge trimmers**, the handle shall be constructed such that it is attached to the machine at the front of the handle grip (see Figure 111).

Compliance is checked by inspection.

19.102.3 For **extended-reach hedge trimmers**, the **front handle** shall be located so that the shortest distance from the nearest cutting edge of the **cutter blade** to

– the backside of the handle for bail and T-type handles as shown in Figure 112 a); or

– the nearest point of any gripping surface on a **shaft** used as a handle in accordance with 8.14.2 as shown in Figure 112 b)

shall be at least 250 mm, with the **cutting device** in the most unfavourable configuration in accordance with 8.14.2 where it is possible for the machine to operate.

In addition, the machine shall be constructed such that in any operating configuration described in 8.14.2 b), the shortest distance measured between the point of the **blade control** in the **rear handle** closest to the **cutter blade** and the nearest cutting edge of the **cutter blade** shall be at least 1 000 mm, otherwise the requirements of Clause 19 for **hedge trimmers** that are not **extended-reach hedge trimmers** shall also apply.

Compliance is checked by inspection and by measurement.

19.103 Cutting device

19.103.1 To safeguard against contact with the **cutter blade**, **hedge trimmers** shall be constructed to meet the requirements of one of the categories given in

– Table 101 for all **hedge trimmers**, except for **extended-reach hedge trimmers**;

or

– Table 102 for **extended-reach hedge trimmers**.

Compliance is checked by inspection and by measurement.

Table 101
Hedge trimmer categories (excluding extended-reach hedge trimmers)

Items with requirements	Category number and requirements				
	1	**2**	**3a**	**3b**	**4**
Cutting length	≤ 200 mm	Not applicable	Not applicable	Not applicable	Not applicable
Maximum **blade stopping time** (Subclause 19.104)	No	No	3 s	2 s	1 s
Minimum number of handles	1	2	2	2	2
Minimum number of handles with **blade control**	1	1	1	2 (two with simultaneous actuation)	2 (two with simultaneous actuation)
Location of **blade control**	**rear handle**	**rear handle**	**rear handle**	Not applicable	Not applicable
Blade configuration figure	114	114	115	115	116
Lower barrier required (Subclause 19.105)	No	No	Yes	No	No
Adjustable handle during operation permitted (Subclause 19.101.3)	No	Yes	Yes	Yes	Yes
Front hand barrier required (Subclause 19.102.2)	No	No	Yes	No	No

NOTE 1 In Europe (EN 62841-4-2), Category 3a is not applicable.

NOTE 2 In Europe (EN 62841-4-2), the maximum **blade stopping time** for Category 3b machines is 1 s.

Table 102
Extended-reach hedge trimmer categories

Items with requirements	Category number and requirements				
	1	**2**	**3a**	**3b**	**4**
Cutting length	≤ 200 mm	Not applicable	Not applicable	Not applicable	Not applicable
Maximum **blade stopping time** (Subclause 19.104)	3 s	3 s	3 s	3s	3 s
Minimum number of handles	2	2	2	2	2
Minimum number of handles with **blade control**	1	1	1	1	1
Location of **blade control**	**rear handle**	**rear handle**	**rear handle**	**rear handle**	**rear handle**
Blade configuration figure	114	114	115 (if **blunt extensions** are required)	115 (if **blunt extensions** are required)	116 (if **blunt extensions** are required)
Lower barrier required (Subclause 19.105)	No	No	No	No	No
Front hand barrier required	No	No	No	No	No

19.103.2 Blunt extensions

19.103.2.1 **Blunt extensions** as indicated in 19.103.2.2 through 19.103.2.4 shall extend a distance of at least 400 mm

– from any point of the rear face of the **front handle**; or

– if applicable for **extended-reach hedge trimmers**, from the nearest point of any gripping surface on a **shaft** used as a handle in accordance with 8.14.2.

See Figure 113. If the **front handle** is located part way along the **cutting device**, the **blunt extensions** shall start at the first **blade tooth** and continue beyond the rear of the **front handle** until the 400 mm minimum distance is reached.

Compliance is checked by inspection and by measurement.

19.103.2.2 Hedge trimmer categories 1 and 2 (see Figure 114)

The **blade tooth** opening distance (d_1) shall be no greater than 8 mm.

The minimum depth of the **blunt extensions** (d_2), if required in accordance with 19.103.2.1, shall be no less than 8 mm.

Compliance is checked by inspection and by measurement.

19.103.2.3 Hedge trimmer categories 3a and 3b (see Figure 115)

The distance between adjacent **blunt extensions**, if required in accordance with 19.103.2.1, shall not allow a (19,0 +0/-0,1) mm test cylinder, applied with a force not exceeding 1 N, to contact any **blade tooth**, when the test cylinder is positioned perpendicular to the plane of the **cutting device**.

Compliance is checked by inspection and by manual test.

19.103.2.4 Hedge trimmer category 4 (see Figure 116)

The minimum depth of the **blunt extensions**, if required in accordance with 19.103.2.1, shall be no less than 8 mm as shown in Figure 116 a).

In addition, the distance between the **blade teeth** and the side of a (120 +1/-0) mm test cylinder shall not be less than 4 mm when the test cylinder is positioned perpendicular to the plane of the **cutting device** and between two **blunt extensions** as shown in Figure 116 a).

For machines with **blunt extensions** that are not an integral part of the **cutting device**, the following additional requirement shall be met:

The distance between the end of the cutting plane between the **cutter blades** and the side of the test cylinder shall not be less than 4 mm when the test cylinder is positioned as shown in Figure 116 a) and then tilted around the ends of the **blunt extensions** up to an angle of 40° as shown in Figure 116 b).

Compliance is checked by inspection and by manual test.

19.103.3 Adjustable cutting devices

19.103.3.1 Adjustable **cutting devices** that permit orientation of the **cutting device** relative to the body of the machine and that do not require the use of a tool shall comply with 19.103.3.2 through 19.103.3.6. Adjustable **cutting devices** shall not contravene other provisions of this standard for each operating configuration in accordance with 8.14.2 b).

19.103.3.2 For adjustable **cutting devices** with side to side axial rotation, the operating positions shall not locate the **cutting device** further than 95° from the centre position about their axis of rotation. See Figure 117 for an example of side to side axial rotation.

Compliance is checked by inspection and by measurement.

19.103.3.3 The adjustable **cutting device** shall have locking detents for each operating configuration in accordance with 8.14.2 b). The **cutting device** shall automatically lock into each locking detent position when adjusting the **cutting device** unless the **cutting device** release control is operated.

Compliance is checked by inspection and by manual test.

19.103.3.4 An adjustable **cutting device** shall be provided with a momentary cutting device release control to disengage the **cutting device** from a locked position. A handle in accordance with 8.14.2 b) 103) shall be provided for adjusting the position of the cutting device such that contact with the **cutting device** is not required. The requirements of 21.30 shall not apply to the **cutting device** adjusting handle.

Compliance is checked by inspection and by manual test.

19.103.3.5 The **cutting device** release control shall be located outside the gripping surface of the handle, indicated in 8.14.2 b) 103). For **hedge trimmers** that are not **extended-reach hedge trimmers**, it shall not be possible for a single operator, by use of a hand, to disengage the **cutting device** from a locked position while the machine is operating.

Compliance is checked by inspection and by manual test.

19.103.3.6 A **cutting device** release control shall have adequate strength and shall be sufficiently durable.

Compliance is checked by the following test:

*The **cutting device** release control is actuated a total of 2 000 times, engaging all locking detent positions over the full range of travel of the adjustable **cutting device**, in both directions.*

*Each **cutting device** release control actuation consists of the following steps a) to d):*

*a) starting from any locking detent position, activate the **cutting device** release control;*

*b) begin adjustment of the **cutting device** to the next locking detent position;*

*c) release the **cutting device** release control at approximately the halfway point to the next locking detent position;*

*d) continue adjustment of the **cutting device** until the **cutting device** engages with the next locking detent position.*

After the test, the machine shall withstand the electric strength test of Annex D between live parts and accessible parts and live parts shall not have become accessible, as specified in Clause 9, if the adjustment would cause stress on internal wiring.

*At the conclusion of the conditioning, the **cutting device** release control shall perform as intended and shall comply with the following test:*

*While the **cutting device** is in any locking detent position, a torque of 6 Nm is applied for 1 min in line with the direction of its intended **cutting device** rotation, and it is applied in each direction of rotation.*

*During the test, the **cutting device** shall not disengage from the locking detent position(s), and the **cutting device** shall still operate correctly after the test. Electrical connections shall not have worked loose, and there shall be no deterioration impairing safety in **normal use**.*

19.103.4 For category 3a **hedge trimmers**, except for **extended-reach hedge trimmers**, the **cutting device** shall have a band of highly visible colour other than green, brown or black (e. g. red, yellow or orange) that:

– is at least 10 mm wide;

– is located on the top surface of the **cutting device**;

– extends for at least 90 % of the **cutting length**; and

– fulfils the requirements of 8.12.

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

19.104 Blade stopping time

19.104.1 The **machine** shall meet the maximum **blade stopping time** requirement specified in

– Table 101 for **hedge trimmers**, except for **extended-reach hedge trimmers**;

or

– Table 102 for **extended-reach hedge trimmers**;

with the machine adjusted and lubricated in accordance with 8.14.2.

Compliance is checked by the test of 19.104.3 carried out in accordance with 19.104.2.

19.104.2 *The **hedge trimmer** shall be mounted and instrumented in such a manner that the results of the test are not affected. If an external starting device is used it shall not influence the results.*

*The means for operating the **hedge trimmer** during the test shall be such that the **blade control** is released abruptly from the full "on" position and returns to the "off" position by itself. A device to detect the moment of release of the **blade control** shall be provided.*

*The **hedge trimmer** shall be operated at **maximum speed**.*

Tachometers shall have an accuracy of ±2,5 % and the time recording measurement system shall have a total accuracy of ±25 ms.

Each cycle shall consist of the following sequence:

*– accelerate the **cutting device** from rest to the **maximum speed** (time t_s);*

– hold it at this speed for a short time to ensure that it is stable (time t_r);

*– release the **blade control** and allow the **cutting device** to come to rest (time t_b);*

– allow a short time at rest before commencing the next cycle (time t_o).

If the total time for one cycle is t_c then $t_c = t_s + t_r + t_b + t_o$. The test cycle times for "on" ($t_s + t_r$) and "off" ($t_b + t_o$) shall be decided by the manufacturer but shall not exceed 100 s "on" and 20 s "off".

NOTE This test is not representative for **normal use** and therefore the cycle times are specified by the manufacturer to avoid unnecessary wear or damage to the machine

*Ten "on/off" operations of the **blade control** shall be carried out prior to the test, the **cutting device** and stopping mechanism, if any, being adjusted as described in 8.14.2.*

*The **blade stopping time** is measured from the moment the **blade control** is released until the **cutter blade** has reached the end of the last full stroke. Where there are two **blade controls**, half the test cycles and stop time measurements shall be carried out on each by alternating test cycles between the two **blade controls**.*

*For machines with more than two **blade controls**, the test is repeated on separate samples for each combination of **blade controls**, by alternating test cycles between each pair of **blade controls**.*

19.104.3 *The test sequence shall consist of a total of 2 506 cycles. Measurement of the **blade stopping time** shall be made for the first 6 cycles of each 500 cycles of operation and the final 6 cycles of the test sequence. The **hedge trimmer** shall be adjusted and lubricated as described in 8.14.2. If applicable, the brake mechanism shall be maintained in accordance with 8.14.2.*

*No other **blade stopping times** are required to be measured.*

*Each of the 36 required measured **blade stopping times** shall comply with the requirements of Table 101 or Table 102, as applicable. If the sample fails to complete the full number of cycles but otherwise meets the requirements of this test and if the failure is unrelated to the stopping mechanism, if any, then,*

– either the machinery may be repaired, provided the repair does not affect the stopping mechanism, and the test continued; or

– if the machine cannot be repaired, one further sample may be tested which must then comply fully with the requirements.

The test sequence need not be continuous, however any period of operation shall only be stopped after a set of 6 measured cycles. In addition, any brake mechanism maintenance in accordance with 8.14.2 may only be performed after a set of 6 measured cycles.

19.105 Lower barrier

For machines of category 3a, except for **extended-reach hedge trimmers**, a barrier as shown in Figure 118 shall be provided on the underside of the machine between the **cutting device** and the underside of the machine likely to be held by the user. The barrier shall extend at least 12 mm beyond the underside of the machine when measured at the centreline of the **cutting device**. The barrier shall be constructed so that it will not likely be used as a handle.

Compliance is checked by inspection and by measurement.

19.106 Cutting device cover

A protective cover shall be provided with the machine to cover the **cutting length** of 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.

19.107 Endurance of adjustments

An adjustment means, except for

– adjustable handles as specified in 19.101.3; and

– adjustable **cutting devices** as specified in 19.103.3

shall be sufficiently durable in order to avoid failure leading to non-compliance with the requirements of Clause 19.

Operations that are only required for putting the machine into use in accordance with 8.14.2 a) are not considered to be adjustments.

Compliance is checked by the following test.

For adjustments intended to be made when the machine is not in operation, the adjustment means shall be cycled 400 times in the manner described per 8.14.2 under conditions of its maximum intended travel.

For adjustments intended to be made when the machine is in operation, the adjustment means shall be cycled 2 000 times in the manner described per 8.14.2 under conditions of its maximum intended travel at a minimum of 6 cycles per min.

If applicable, adjustment means shall be maintained in accordance with 8.14.2.

After the test, the machine shall withstand the electric strength test of Annex D between live parts and accessible parts and live parts shall not have become accessible, as specified in Clause 9, if the adjustment would cause stress on internal wiring.

At the conclusion of the conditioning, the machine shall continue to comply with 19.1, the adjustment means shall perform as intended and the adjustment shall comply with the requirements of 19.108 as applicable. Electrical connections shall not have worked loose, and there shall be no deterioration impairing safety in ***normal use****.*

19.108 Integrity of adjustments

Handles and other elements of the machine, except for

– adjustable handles as specified in 19.101.3; and

– adjustable **cutting devices** as specified in 19.103.3

intended to be adjusted shall be so designed as to be unlikely to change position unintentionally.

Compliance is checked by the following test.

All adjustments are to be made as described in 8.14.2 a) or 8.14.2 b). If threaded fasteners are used for adjustment, they shall be tightened to two-thirds of the value specified in 27.1, except for

– threaded adjustments of lever-action type fasteners;

– collet-type fasteners; or

– screws with a nominal diameter greater than 6,0 mm

which shall be tightened in accordance with 8.14.2.

Adjustments capable of axial motion shall be tested with an applied force without jerks of (150 ± 5) N for 1 min in either direction along the axis of adjustment. Adjustments capable of rotation shall be subjected to a torque without jerks of 6 Nm for 1 min. The handle or adjustment means shall not break. After the removal of the applied force or torque, there shall be no more than 10 mm translation axially nor more than 10° permanent rotation.

19.109 The length of the **shaft** in combination with the weight distribution of the **extended-reach hedge trimmer** shall not create a hazardous situation by a loss of control.

The force applied at the **rear handle** necessary to maintain the **extended-reach hedge trimmer** in a horizontal orientation, with the **extended-reach hedge trimmer** suspended by the **front handle** or grasping surface in accordance with 8.14.2 b), shall not exceed 100 N.

Compliance is checked by the following test:

*The **extended-reach hedge trimmer** is adjusted to the configuration that results in the longest distance between the **front handle** and the end of the **cutting device** in accordance with 8.14.2 b). The **supply cord** shall be cut off at the point it enters the machine.*

*The machine is suspended from the **front handle**. A force is applied to the **rear handle** in order to bring the machine into a horizontal orientation. See Figure 119.*

The point of suspension and the point of application of the restoring force giving the lowest restoring force shall be selected, but the distance between the two points shall not be less than 0,3 m nor exceed 1 m.

19.110 **Extended-reach hedge trimmers** with a mass of more than 6 kg shall be equipped with a single or double shoulder harness.

Any shoulder harness provided with the machine shall be:

– adjustable to the size of the operator and its operation shall be in accordance with 8.14.2 b);

– designed in a way for easy removal; or

– equipped with a quick release mechanism that ensures that the machine can be removed or released quickly from the operator.

A quick release mechanism, if provided, shall be positioned either at the connection between the machine and harness or between the harness and operator. The quick release mechanism shall only allow separation by deliberate action of the operator.

If a quick release mechanism is provided, it shall be possible to open it while under the weight of the machine. It shall require the use of only one hand and have no more than two release points.

NOTE An example of a release point is a buckle that requires squeezing between a thumb and finger before releasing, e.g. side release buckles.

A single shoulder harness is considered to be designed in a way for easy removal.

A double shoulder harness is considered to be designed in a way for easy removal, if the left and right shoulder straps are not connected to each other in front of the operator's body.

If straps to connect between the left and right shoulder straps are provided, it is also considered to be designed in a way for easy removal when the straps connecting between the left and right shoulder straps can be released under the load of the machine by using one hand and have no more than two release points.

Compliance is checked by inspection and by functional test using the heaviest configuration as identified in 8.14.2.

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 *For **hedge trimmers**, requirements are given in 20.3.1.*

20.3.1 *Replacement:*

*A **hedge trimmer** is dropped once from each of the four orientations shown in Figure 120, while adjusted to its minimum extension in accordance with 8.14.2 b) and with any adjustable device or adjustable handle in the zero degree cutting position, on a concrete surface from a height of 1 m. 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 1 A method for avoiding secondary impacts is tethering.

*If **attachments** 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.*

*Additionally, an **extended-reach hedge trimmer** shall be dropped once in each of the three most unfavourable positions and configurations, on a concrete surface at its maximum extension. For each additional drop, the machine is pivotally supported at the rear of the **blade control** in the **rear handle** 1 m above the concrete surface. The nearest cutting edge of the **cutter blade** to the **rear handle** is raised to a height of 2 m above the concrete surface and allowed to drop onto the concrete surface. See Figure 121.*

Each drop shall be conducted on a separate unit. At the manufacturer's request, each drop may be conducted on the same unit.

NOTE 2 For an **extended-reach hedge trimmer**, a total of seven drops are conducted.

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 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 122) with a weight "A" having a mass of 300 g and falling from a height of 350 mm on to 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.

20.101 Hedge trimmer mechanical strength

20.101.1 Machines shall have the strength to withstand anticipated forces.

Compliance is checked by the test of

*– 20.101.2 for **hedge trimmers**, except for **extended-reach hedge trimmers**;*

*– 20.101.3 for **extended-reach hedge trimmers**; or*

*– 20.101.2 and 20.101.3 for machines that are convertible between a configuration that is an **extended-reach hedge trimmer** and a **hedge trimmer** that is not an **extended-reach hedge trimmer**, as applicable.*

20.101.2 *The **hedge trimmer** is suspended vertically from a point midway along the length of the **cutting device**. A mass of*

– 5 kg for categories 1 and 2; or

– 15 kg for categories 3a, 3b and 4

is gradually suspended at the midpoint of each gripping surface of each handle identified in 8.14.2, in turn, over an area of 75 ±5 mm in width for 1 min.

*After the test, the **hedge trimmer** 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 (excluding deformation of the **cutting device**) as a result of the applied force.*

20.101.3 Extended-reach hedge trimmer strength

20.101.3.1 **Extended-reach hedge trimmers** shall have the mechanical strength to withstand the forces encountered during **normal use**.

Compliance is checked by the following test:

*The **extended-reach hedge trimmer** is adjusted to the configuration that results in the longest distance between the **front handle** and the end of the **cutting device** in accordance with 8.14.2 b). The **extended-reach hedge trimmer** is suspended vertically from a point midway along the length of the **cutting device**. A mass of 20 kg is then gradually suspended at the midpoint of each gripping surface of each handle identified in 8.14.2, in turn, over an area of 75 ±5 mm in width for 1 min.*

*After the test, the **extended-reach hedge trimmer** shall comply with the acceptance criteria of 20.1 and parts of the **extended-reach hedge trimmer** shall not have separated or permanently deformed to a degree that the mechanical safety of the machine as required by this standard is impaired (excluding deformation of the **cutting device**) as a result of the applied force.*

20.101.3.2 **Extended-reach hedge trimmers** equipped with telescoping **shafts** shall be provided with "stops" that prevent the shafts and other parts from becoming separated during **normal use**.

Compliance is checked by the following test:

*The machine is suspended vertically from a point midway along the length of the **cutting device** with the **cutting device** aligned as closely as possible in parallel with the axis of the **shaft**. The machine shall be in its retracted configuration. A mass of 10 kg is attached to the **rear handle**/grasping position. Any locking means is then individually released as quickly as possible to allow the **rear handle** to descend to its fully extended position.*

*As a result of the test, parts of an **extended-reach hedge trimmer** shall not separate, break or show cracking visible with normal vision.*

20.101.3.3 The **extended-reach hedge trimmer** shall possess the mechanical strength to withstand static forces while cuts are being performed.

The machine shall not

– temporarily deflect more than 15 % of the length measured from the point of the **blade control** in the **rear handle** closest to the **cutter blade** and the nearest cutting edge of the **cutter blade** while a force of 50 N is applied to the **blade tooth** nearest to the **front handle**;

– permanently be deformed by more than 5 % of the length measured from the point of the **blade control** in the **rear handle** closest to the **cutter blade** and the nearest cutting edge of the **cutter blade** after removal of the applied force above; and

– break or show cracking visible with normal vision as a result of the applied force that could lead to non-compliance with the requirements of Clause 20.

Compliance is checked by the following test:

*The **extended-reach hedge trimmer** is adjusted to the configuration that results in the longest distance between the **front handle** and the end of the**cutting device** in accordance with 8.14.2 b). With the axis of the machine in a horizontal position rigidly mounted at the midpoint of the **front handle** and **rear handle** over an area of 75 ±5 mm in width, a force of 50 N is applied for 1 min in each direction perpendicular to the plane of the **cutting device** (Y_1 and Y_2) and each direction transversely in the plane of the **cutting device** (Z_1 and Z_2) at the **blade tooth** nearest to the **front handle**. See Figure 123. During the test, the **cutting device** shall not disengage from its detent position, if any. The temporary and permanent deformation shall be evaluated for each orientation. A new sample may be used for each orientation.*

21 Construction

This clause of Part 1 is applicable except as follows:

21.17 *Replacement of the first paragraph:*

The function of a **power switch** is accomplished by either the single or two-handed operation of the **blade control(s)** as required by Table 101 or Table 102, as applicable.

Operational requirements for **power switches** throughout this standard apply to **blade controls**, except where indicated. Electrical requirements apply to the portion of the **blade control** that controls the electrical load responsible for **hedge trimmer** operation.

There shall be no arrangement to lock a **blade control** in the "on" position. **Blade controls** shall require an applied operator force in order to actuate. The **cutting device** shall stop when any **blade control** is released.

Blade controls shall be designed such that the hazards due to inadvertent starting are reduced to a minimum. This shall be deemed to be met if one of the following options is fulfilled:

– For **hedge trimmers** that employ a single **blade control**, the requirements of 21.18.102 shall apply; or

– For **hedge trimmers** that employ a minimum of two handles with a **blade control** in each handle, the **cutting device** shall only operate for combinations of blade controls required for operation as identified in 8.14.2 b).

21.18 *Replacement:*

21.18.101 When the **blade control** or, if applicable, combination of **blade controls** that are required to operate the **cutting device** as identified in 8.14.2 b) have been operated, the **cutting device** shall operate within 1 s.

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

21.18.102 Hedge trimmers with a single blade control

21.18.102.1 General

Additional requirements for **hedge trimmers** that employ a single **blade control** are given in 21.18.102.2 to 21.18.102.4.

21.18.102.2 The **blade control** 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 the need to release any of the handle(s) or grasping surface(s) required by 19.101.

Compliance is checked by inspection and by manual test.

21.18.102.3 The **hedge trimmer** shall be provided with a **blade control** 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 grasping surface identified in accordance with 8.14.2 b) 6).

The lock-off device and the **operator presence sensor** (if any) shall be actuated before the blade control can enable drive to the **cutting device**.

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

– the **blade control** 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 **blade control** 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 The visual or audible indication is intended to only indicate the state of the **hedge trimmer**.

The **hedge trimmer** shall return to the original locked state within 1 s when the **blade control** 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 a lock-off device located within any grasping surface identified in accordance with 8.14.2 b) 103), in order to determine if it is possible to actuate the **blade control** and the lock-off device with a single grasping motion or a straight line motion, compliance is checked by the following test:*

The lock-off device shall not be actuated by a 25 mm diameter x 75 mm long rod with a force not exceeding 20 N on the lock-off device in any direction. The 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.

21.18.102.3DV D2 *Modification: Replace the second paragraph of Clause 21.18.102.3 of the Part 4 with the following:*

The lock-off device shall be actuated before the blade control can enable drive to the cutting device.

21.18.102.4 Operator presence sensor

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

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

NOTE An example of an **operator presence sensor** is shown in Figure 124.

Compliance is checked by inspection.

21.30 *Modification:*

This subclause of Part 1 is applicable for **hedge trimmers** that are not **extended-reach hedge trimmers**.

21.30.101 **Extended-reach hedge trimmers** are considered to be machines likely to cut into concealed wiring or their own cord and shall meet the following requirements:

Handles and grasping surfaces of **extended-reach hedge trimmers**, as specified in 8.14.2 b) 6), shall be formed of insulating material or, when of metal, shall be either adequately covered by insulating material having a thickness of at least 1 mm or their **accessible parts** shall be isolated by insulating barrier(s) from accessible metal parts that may become live by the **cutting device**. These insulating barriers are not to be regarded as **basic insulation**, **supplementary insulation** or **reinforced insulation**.

An insulated, stick type, auxiliary handle and sections of the **shaft** of an **extended-reach hedge trimmer** that are required to meet this requirement shall be provided with a flange having a height not less than 12 mm above the handle and covering at least 240° of the circumference to provide a barrier to minimize the likelihood of the hand from slipping onto surfaces that are not suitably insulated or isolated.

A flange between the **front handle** and the **cutting device** may be omitted if the **shaft** insulation extends at least from the **front handle** to a location 1,2 m from the point of the **blade control** in the **rear handle** closest to the **cutter blade** and the nearest cutting edge of the **cutter blade**.

Compliance is checked by inspection, by measurement and by the tests of 20.5.

21.35 This subclause of Part 1 is not applicable.

21.101 For **extended-reach hedge trimmers**, the maximum distance measured between the point of the **blade control** furthest from the **cutter blade** to the tip of the **cutter blade** with the machine adjusted to its most unfavourable configuration shall be no more than 3,5 m.

Compliance is checked by measurement.

22 Internal wiring

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

22.6 *Modification:*

This subclause of Part 1 is not applicable for adjustable parts of the **hedge trimmer** that can rotate with respect to each other that are covered in 22.101, 19.101.3.6, 19.103.3.5 and 19.107.

22.101 Adjustable parts of the **hedge trimmer** that are intended to rotate with respect to each other in accordance with 8.14.2 shall not cause undue stress on internal wiring.

This subclause is not applicable for adjustable parts of the hedge trimmer that can rotate with respect to each other that are covered in 19.101.3.6, 19.103.3.5 and 19.107.

Compliance is checked by inspection and the following test:

For machines without rotation limiting end stops, the rotatable parts of the machine are subjected to 2 000 continuous rotations in each direction with any intermediate locking detents disabled.

For machines with rotation limiting end stops, the rotatable parts of the machine are subjected to 2 000 cycles stop to stop, with any intermediate locking detents disabled. After the 2 000 cycles are completed, each end stop shall be subjected to a gradually applied torque of 6 Nm for 1 min. The end stop shall not allow the rotating element to go beyond the limits of its intended travel.

NOTE Intermediate locking detents are not considered to be rotation limiting end stops.

*After the test, the machine shall withstand the electric strength test of Annex D between **live parts** and **accessible parts** and **live parts** shall not have become accessible, as specified in Clause 9.*

23 Components

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

23.1.10 *Replacement:*

Switches shall be so constructed that there will be no failure that might impair compliance with this standard.

Compliance is checked by the following.

Switches, if separately tested and found to comply with IEC 61058-1:2008, shall meet the requirements specified in 23.1.10.1. In addition, if a ***blade control*** *incorporates a mechanical linkage to an electrical switch, the* ***blade control*** *and switch combination is tested as in 23.1.10.2.*

Switches which have not been separately tested and found to comply with IEC 61058-1:2008 or do not meet the requirements of 23.1.10.1, are tested as in 23.1.10.2 to 23.1.10.3.

23.1.10.2 *Replacement:*

The endurance properties of switches and **blade controls** shall be adequate.

Compliance is checked by submitting three samples of the switch or ***blade control*** *to the accelerated cycle endurance test of 17.2.4.4 of IEC 61058-1:2008, but with load conditions as specified in either 23.1.10.2.1 or 23.1.10.2.2 and with the number of cycles as specified below, but at a rate not greater than 10 cycles per minute. During the test, the* ***cutting device*** *is lubricated as described in 8.14.2.*

In cases where the ***blade control*** *is carried out by a mechanical linkage to an electrical switch, the linkage may be tested with the electrical switch connected to an indicator circuit instead of the machine load.*

Blade controls *where a single actuation is required for operation are tested for 50 000 cycles of operation. The tests are conducted by actuation of the* ***blade control*** *for each cycle.*

For ***blade controls*** *that require non-sequential simultaneous two-handed actuation for operation (turning on the* ***hedge trimmer****), each* ***blade control*** *is tested for 10 000 cycles of operation by alternate operation of each* ***blade control*** *combination identified in 8.14.2 b). One cycle is regarded as the completion of Sequence 1 and Sequence 2 as identified in Table 103, where* ***blade control*** *1 and* ***blade control*** *2 are one combination identified in 8.14.2 b). The test for each combination may be conducted with a separate machine sample.*

For ***blade controls*** *that require sequential simultaneous two-handed actuation for operation (turning on the* ***hedge trimmer****), each* ***blade control*** *is tested for 10 000 cycles of operation by alternate operation of each* ***blade control*** *combination identified in 8.14.2 b). One cycle is regarded as the completion of Sequence 1 and Sequence 2 as identified in Table 104, where* ***blade control*** *1 and* ***blade control*** *2 are one combination identified in 8.14.2 b). The test for each combination may be conducted with a separate machine sample.*

If a ***blade control*** *is comprised of mechanical contacts in series with electronic circuitry containing one or more semiconductor switching devices (SSD) as defined in IEC 61058-1:2008 where the circuitry provides a protective function by reducing the current during switch operation, then*

– on three additional samples, the electronic circuitry shall be bypassed and the test repeated for at least 1 000 operating cycles; or

– the protective function shall be considered to be a ***safety critical function*** *and comply with the greater of the performance levels for* ***blade controls****in 18.8.*

Switches other than ***blade controls****, such as speed selector switches, which are likely to be switched while energized, are tested as described above, but for 1 000 operating cycles only for the load conditions encountered in* ***normal use****.*

*Switches, other than **blade controls**, intended for operation without electrical load, and which can be operated only with the aid of a tool or are interlocked so that they cannot be operated under electrical load, are not subjected to the tests of 17.2.4.4 of IEC 61058-1:2008.*

*Switches, other than **blade controls**, for 20 mA load as classified in 7.1.2.6 of IEC 61058-1:2008 are also not subjected to the tests of 17.2.4.4 of IEC 61058-1:2008.*

*After completion of the above tests, the switch shall be able to be turned on and off and comply with the insulating compliance (TE3) of 17.2.5.3 of IEC 61058-1:2008 for **basic insulation**.*

Table 103
Test cycle for two-handed blade controls with non-sequential operation

	Blade control to turn on hedge trimmer	Blade control to turn off hedge trimmer
Sequence 1	1 then 2	1 then 2
Sequence 2	2 then 1	2 then 1

Table 104
Test cycle for two-handed blade controls with sequential operation

	Blade control to turn on hedge trimmer	Blade control to turn off hedge trimmer
Sequence 1	1 then 2	1 then 2
Sequence 2	1 then 2	2 then 1

23.1.10.2.1 This subclause of Part 1 is applicable.

23.1.10.2.2 This subclause of Part 1 is applicable.

23.1.10.3 *Replacement:*

The breaking capacity of **blade controls** of **hedge trimmers** shall be adequate.

*Compliance is checked by the locked-rotor test (TC9) of 17.2.4.9 of IEC 61058-1:2008 with a current of 6 × I-M. Alternatively, the test is performed with each electrical switch associated with any **blade control(s)** incorporated in the **hedge trimmer** with the motor locked, each “on” period being not more than 0,5 s, and each “off” period being not less than 10 s.*

*If multiple identical (e.g. manufacturer and part number) electrical switches are incorporated in the **hedge trimmer** and are subjected to the same load conditions, then only one of these electrical switches needs to be tested.*

*After this test, the **blade control(s)** shall have no electrical or mechanical failure. If the **blade control(s)** operates properly in the "on" and "off"" positions at the end of the test, it is considered to have no mechanical or electrical failures.*

23.3 *Addition:*

Protection devices (e.g. overload or over-temperature protection devices) or circuits that switch off the **hedge trimmer** 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 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 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 125 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.

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.

25 Terminals for external conductors

This clause of Part 1 is applicable.

26 Provision for earthing

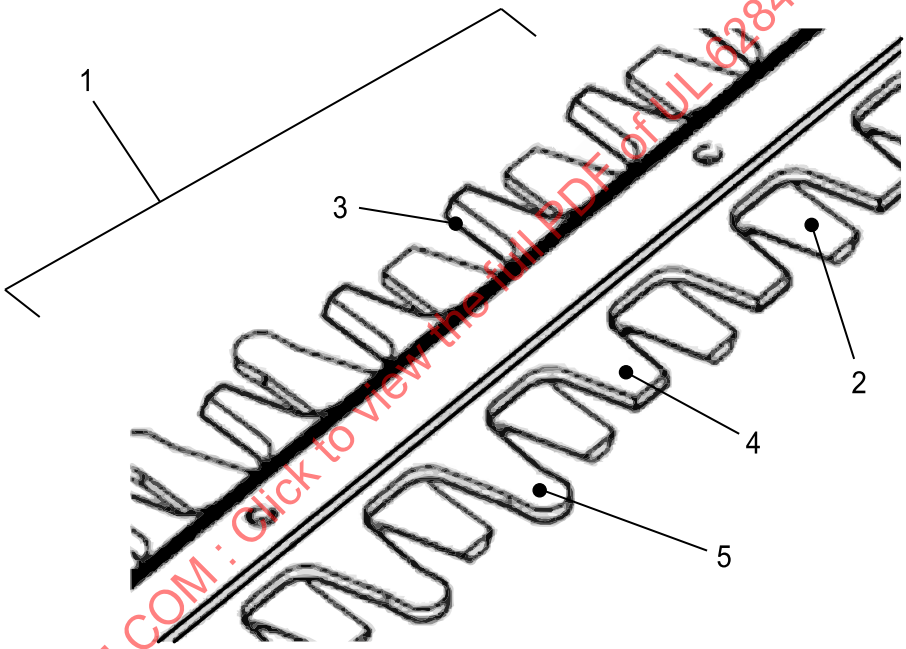
This clause of Part 1 is applicable.

27 Screws and connections

This clause of Part 1 is applicable.

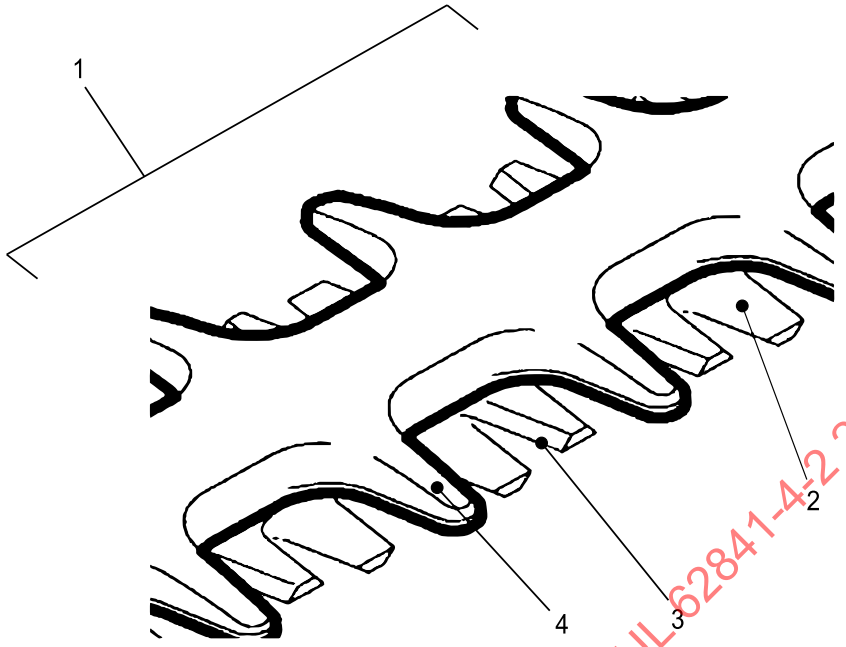
28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.



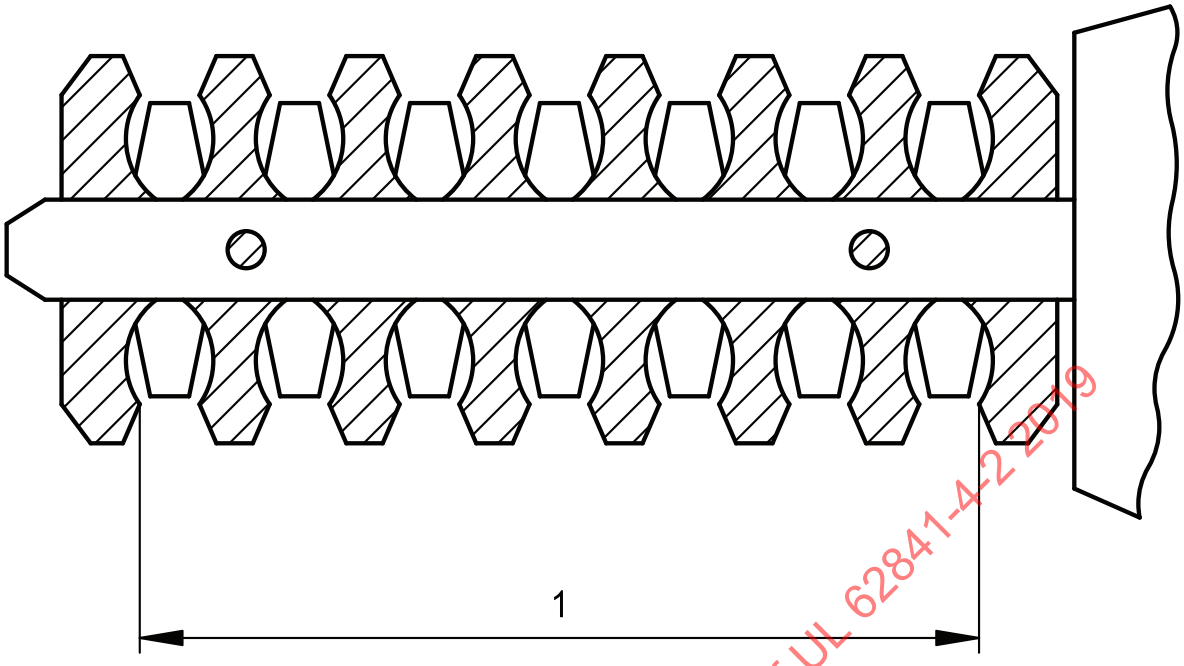
Key
1 **cutting device**
2 **cutter blade**
3 **blade tooth**
4 **shear plate**
5 **blunt extension**

Figure 101
Pictorial representation of some definitions



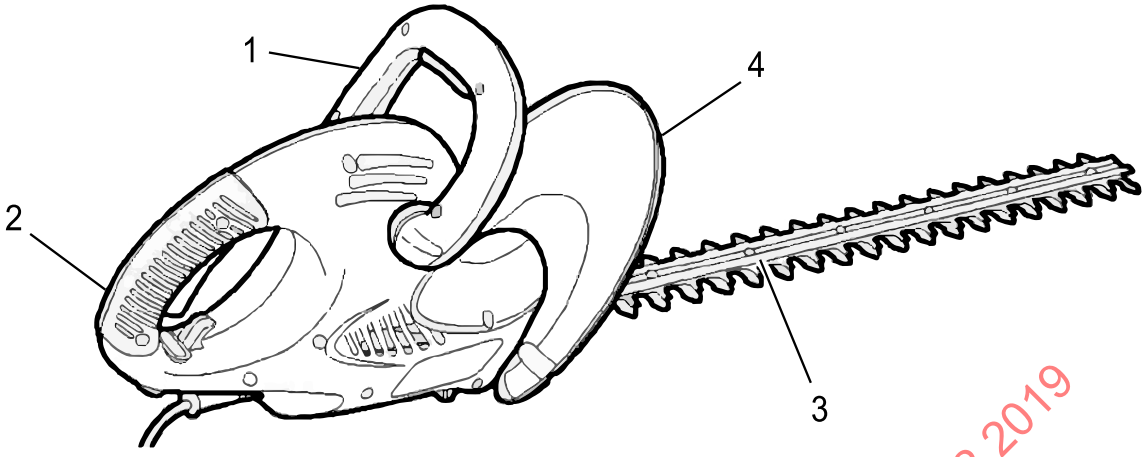
Key
1 **cutting device**
2 **cutter blade**
3 **blade tooth**
4 **blunt extension**

Figure 102
Pictorial representation of some definitions



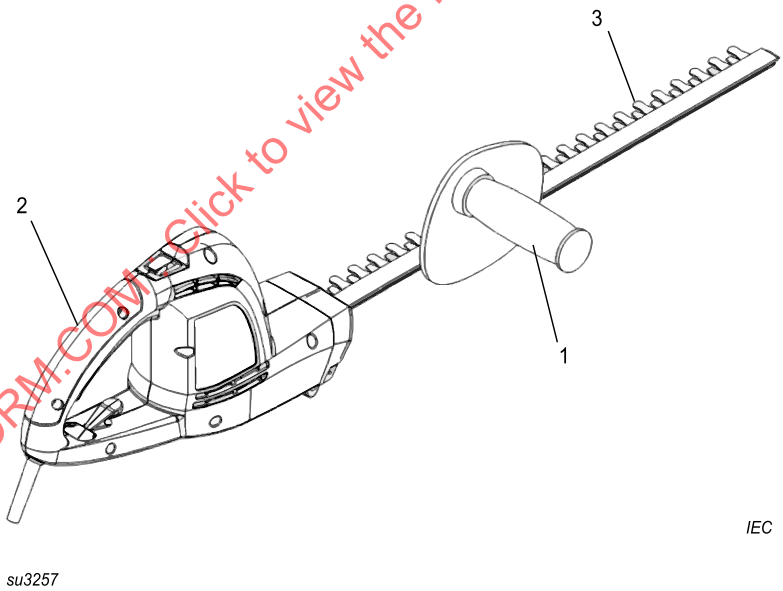
Key
1 **cutting length**

Figure 103
Measurement of cutting length



Key
1 **front handle**
2 **rear handle**
3 double-sided **cutting device**
4 front hand barrier

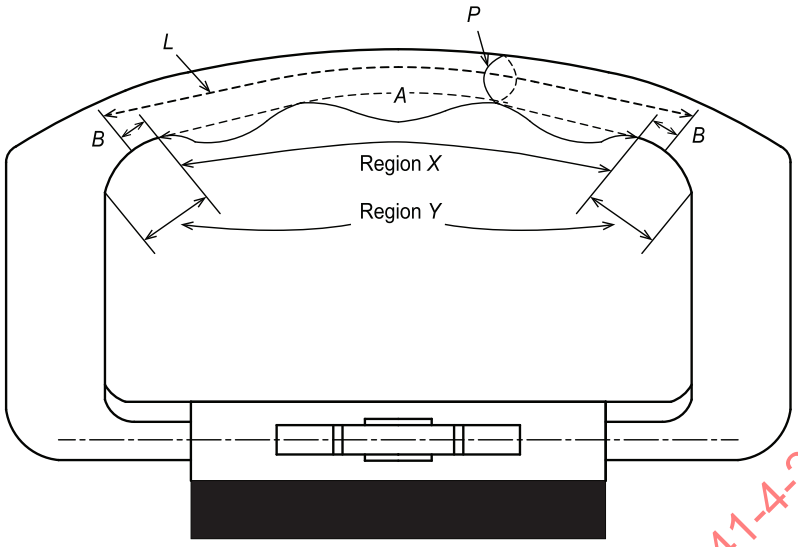
a) Double-sided cutting device



Key
1 **front handle**
2 **rear handle**
3 single-sided **cutting device**

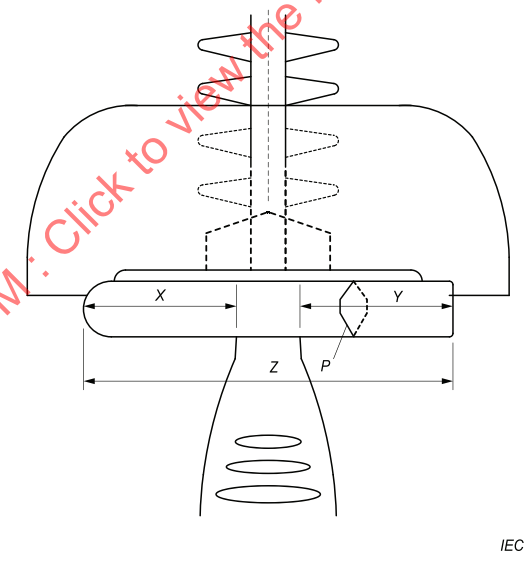
b) Single-sided cutting device

Figure 104
Handles positioning



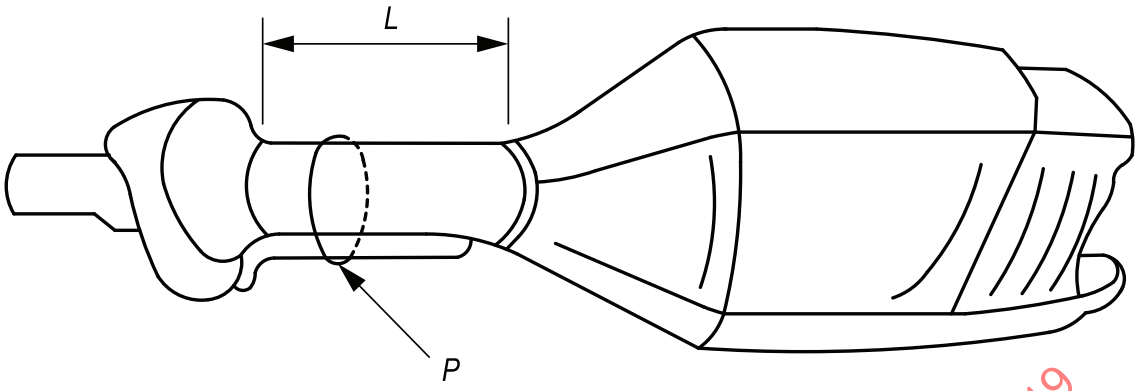
Key
A gripping length in region *X*
B transition radius length in region *Y*
L maximum gripping length
P perimeter

a) Gripping length of a bail 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) Gripping length of a straight handle supported centrally (i.e. T type)



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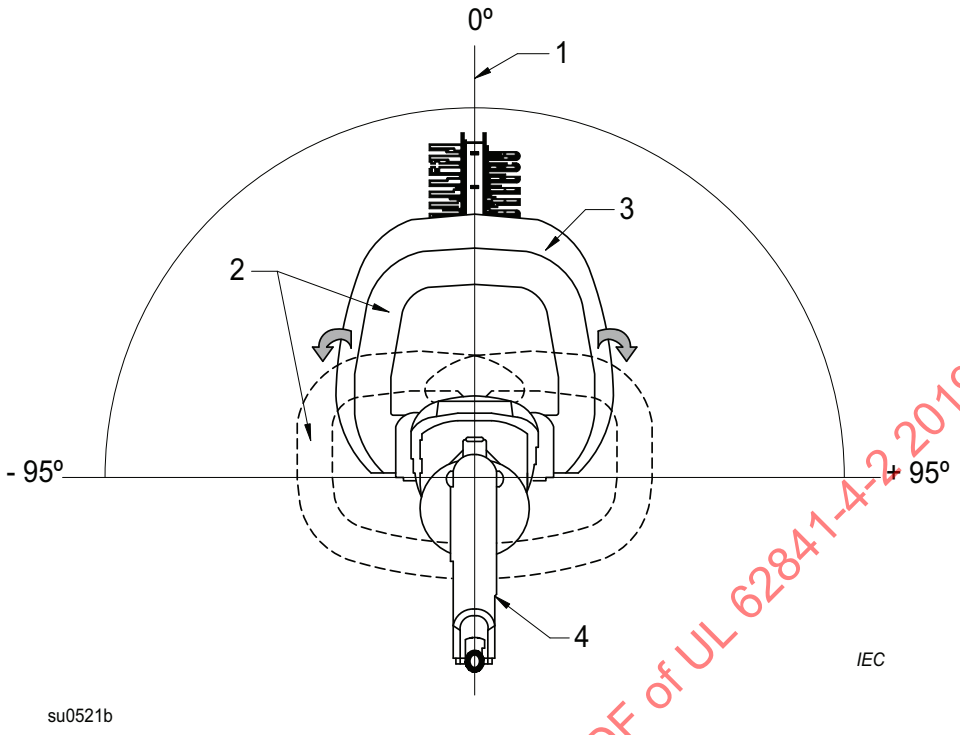
Key
L maximum gripping length
P perimeter

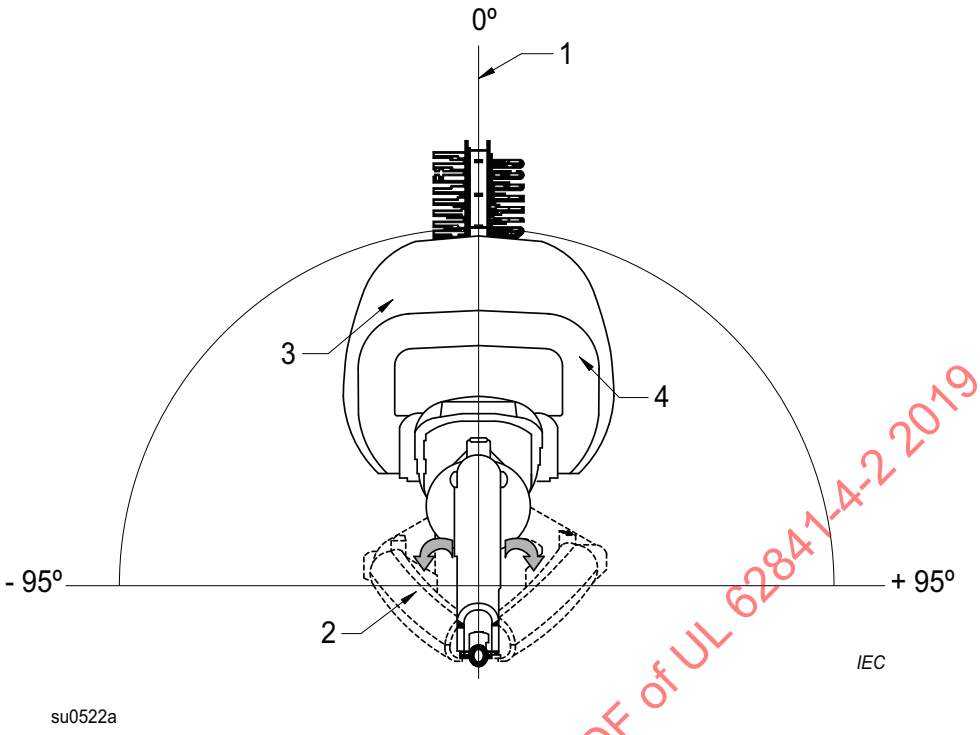
c) Determination of gripping length and perimeter dimension of a handle formed by the shaft

Figure 105
Measurement of handle gripping length



Key
1 zero degree centre position
2 rotating **front handle**
3 front hand barrier
4 fixed **rear handle**

Figure 106
Adjustable front handle limits for side to side handle rotation



Key
1 zero degree centre position
2 rotating **rear handle**
3 front hand barrier
4 fixed **front handle**

Figure 107
Adjustable rear handle limits for side to side handle rotation

Dimensions in millimetres

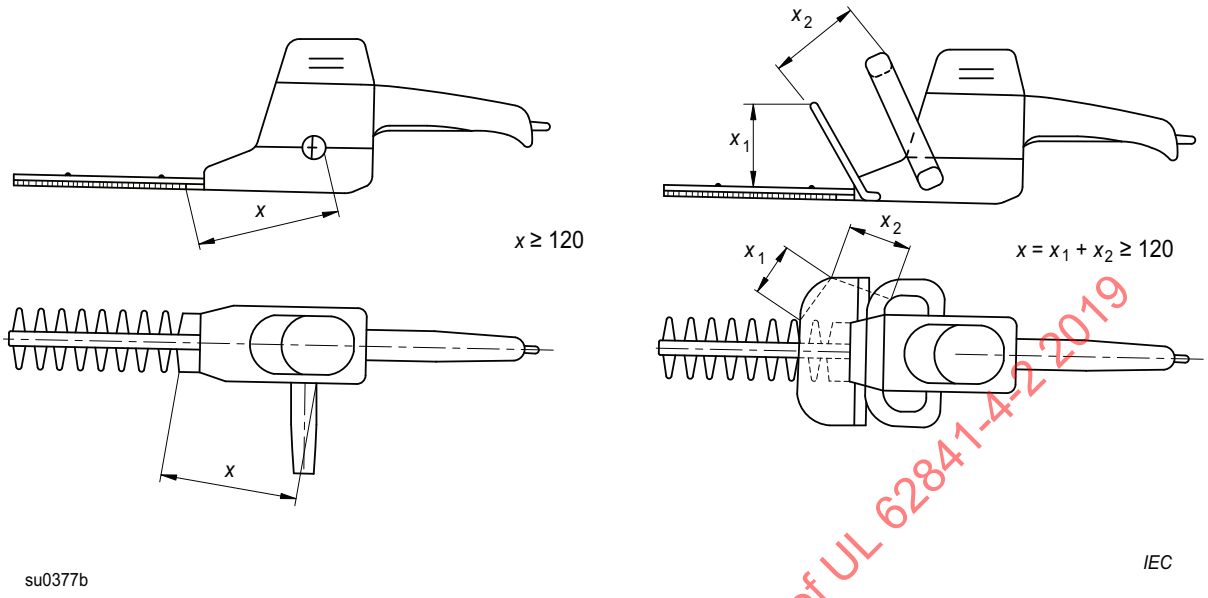
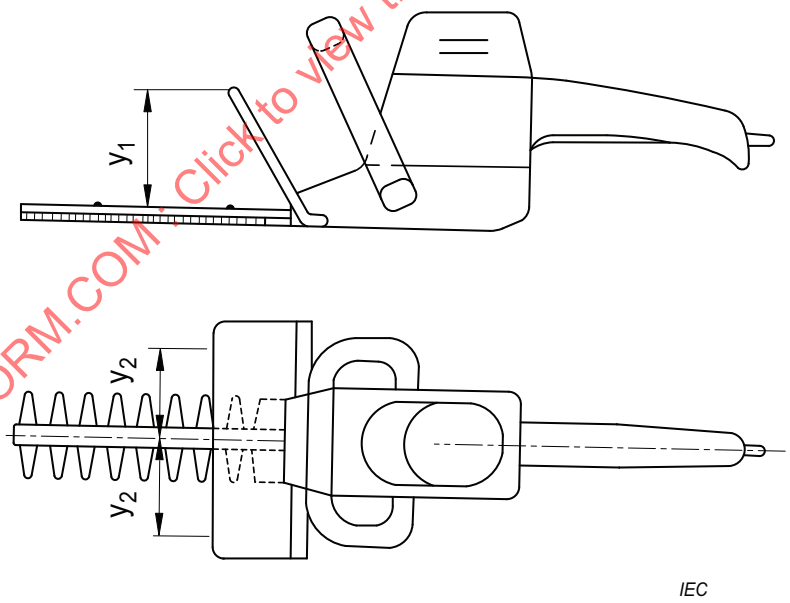
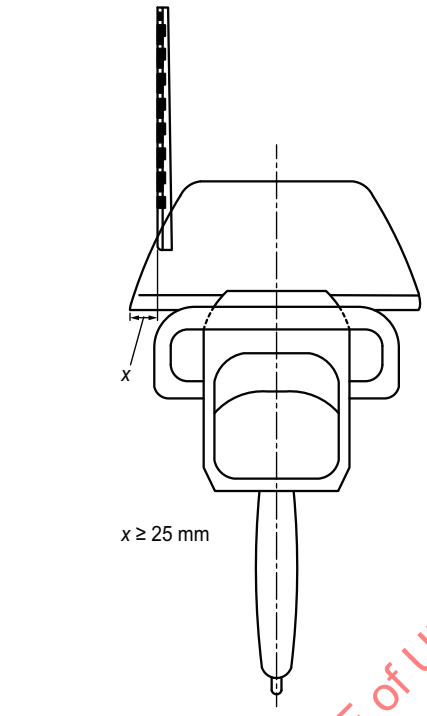


Figure 108
Measurement of reach distance



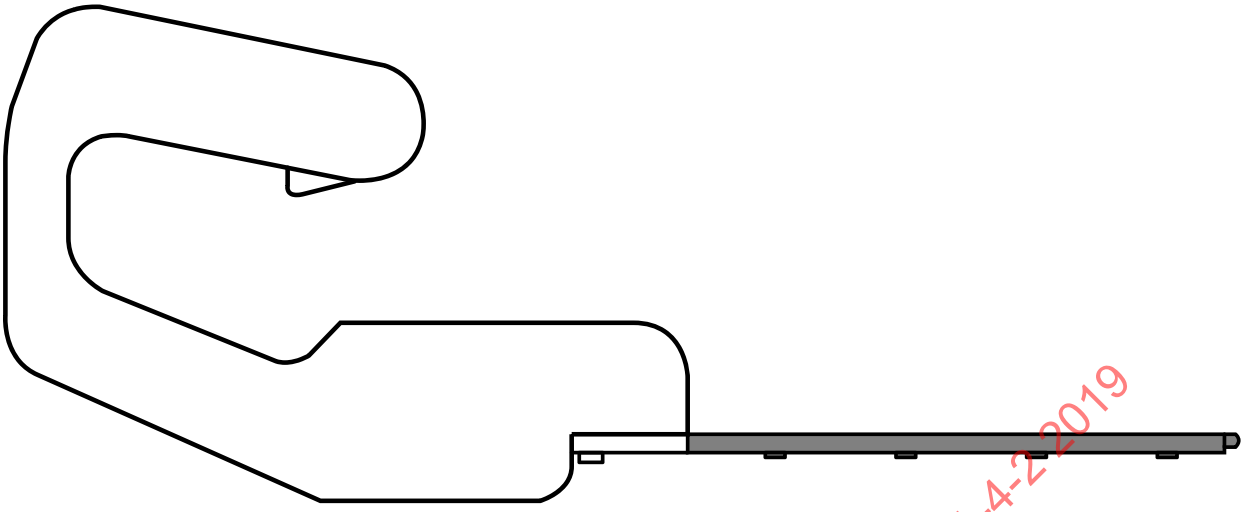
su0377c

Figure 109
Front hand barrier dimensions



Key
x Extended width of front hand barrier

Figure 110
Front hand barrier width for category 3a with adjustable cutting device

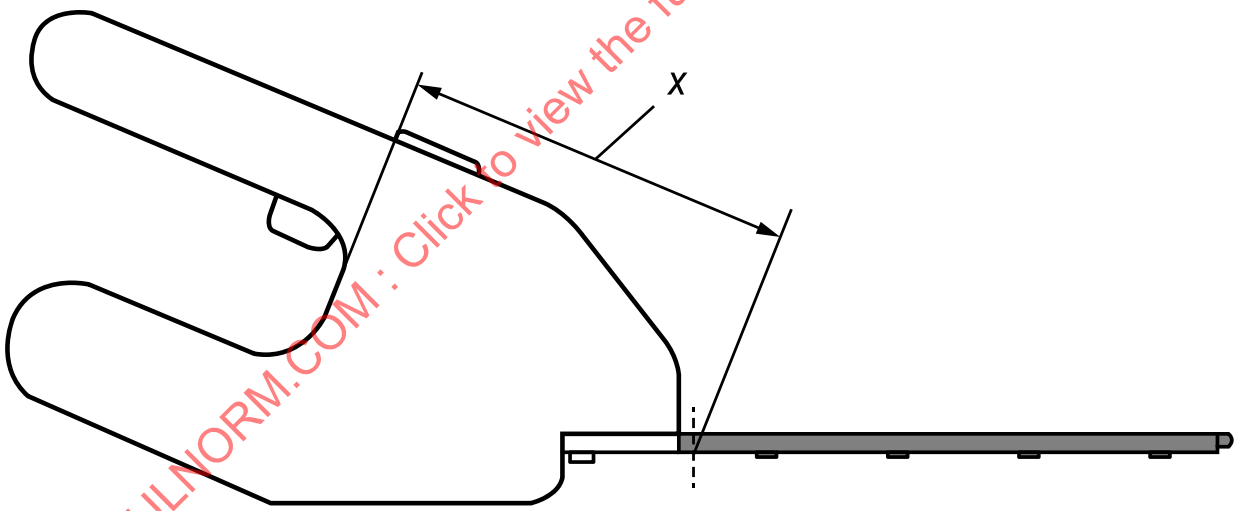


su3264

IEC

Key
x ≥ 120 mm
y < 120 mm

a) Handle not attached at front (does not comply with 19.102.2.3)

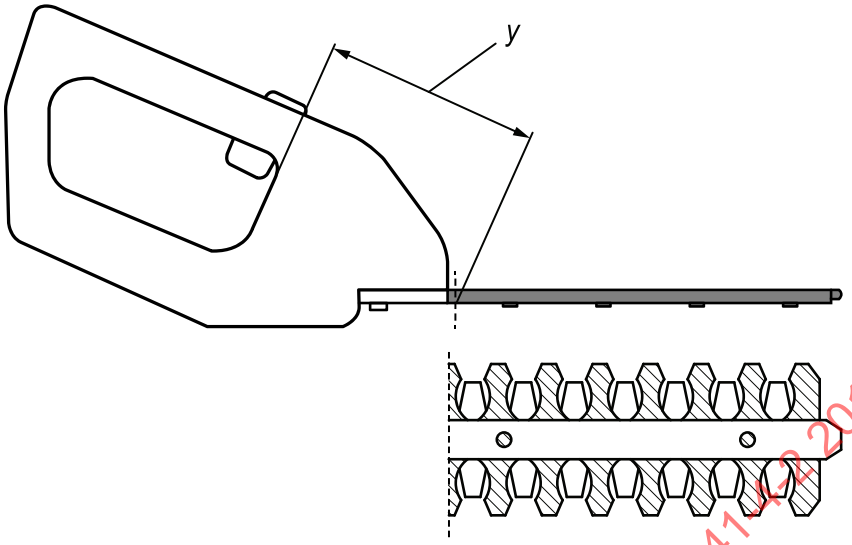


su3265

IEC

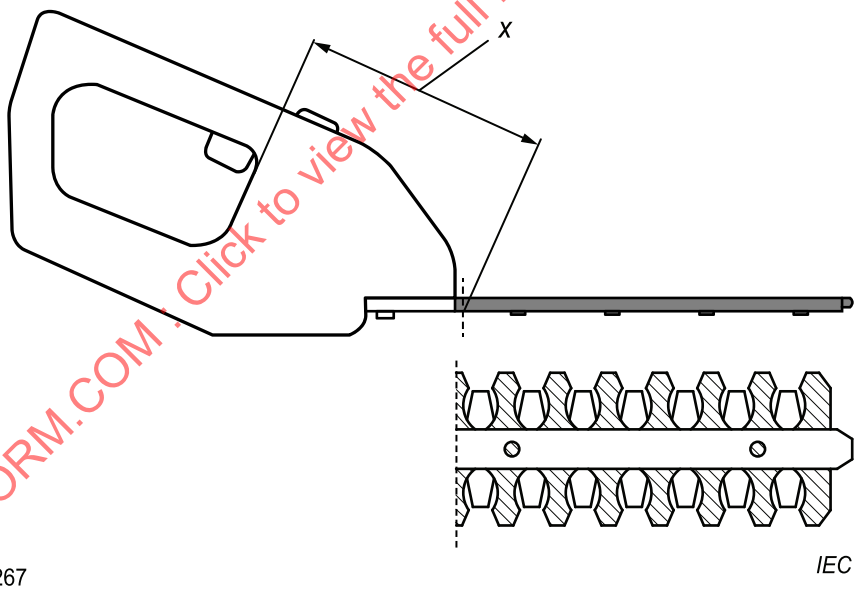
Key
x ≥ 120 mm
y < 120 mm

b) Handle attached at front (complies with 19.102.2.1 and 19.102.2.3)



Key
x ≥ 120 mm
y < 120 mm

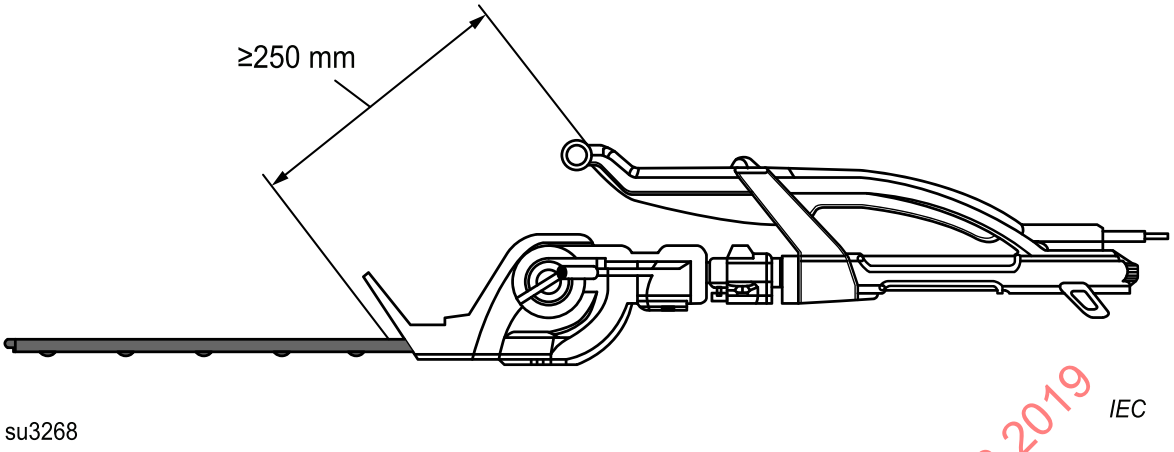
c) Handle attached at front and rear (does not comply with 19.102.2.1, but complies with 19.102.2.3)



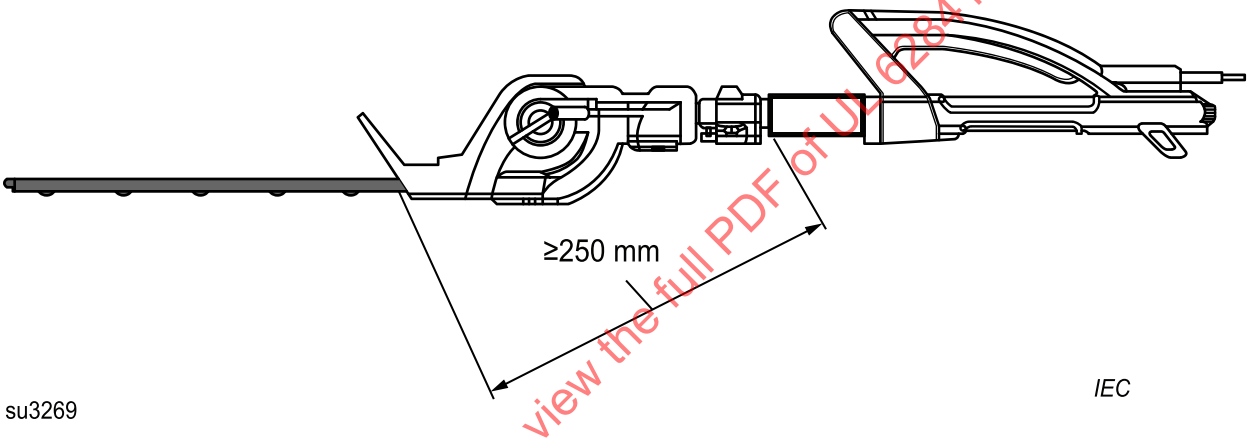
Key
x ≥ 120 mm
y < 120 mm

d) Handle attached at front and rear (complies with 19.102.2.1 and 19.102.2.3)

Figure 111
Examples of compliant/non-compliant handle distances and handle attachments for category 1



a) Measurement of distance from the front handle to the nearest cutting edge



b) Measurement of distance from the grasping surface on the shaft to the nearest cutting edge

Figure 112
Measurement of distance from the cutter blade to handles and grasping surfaces

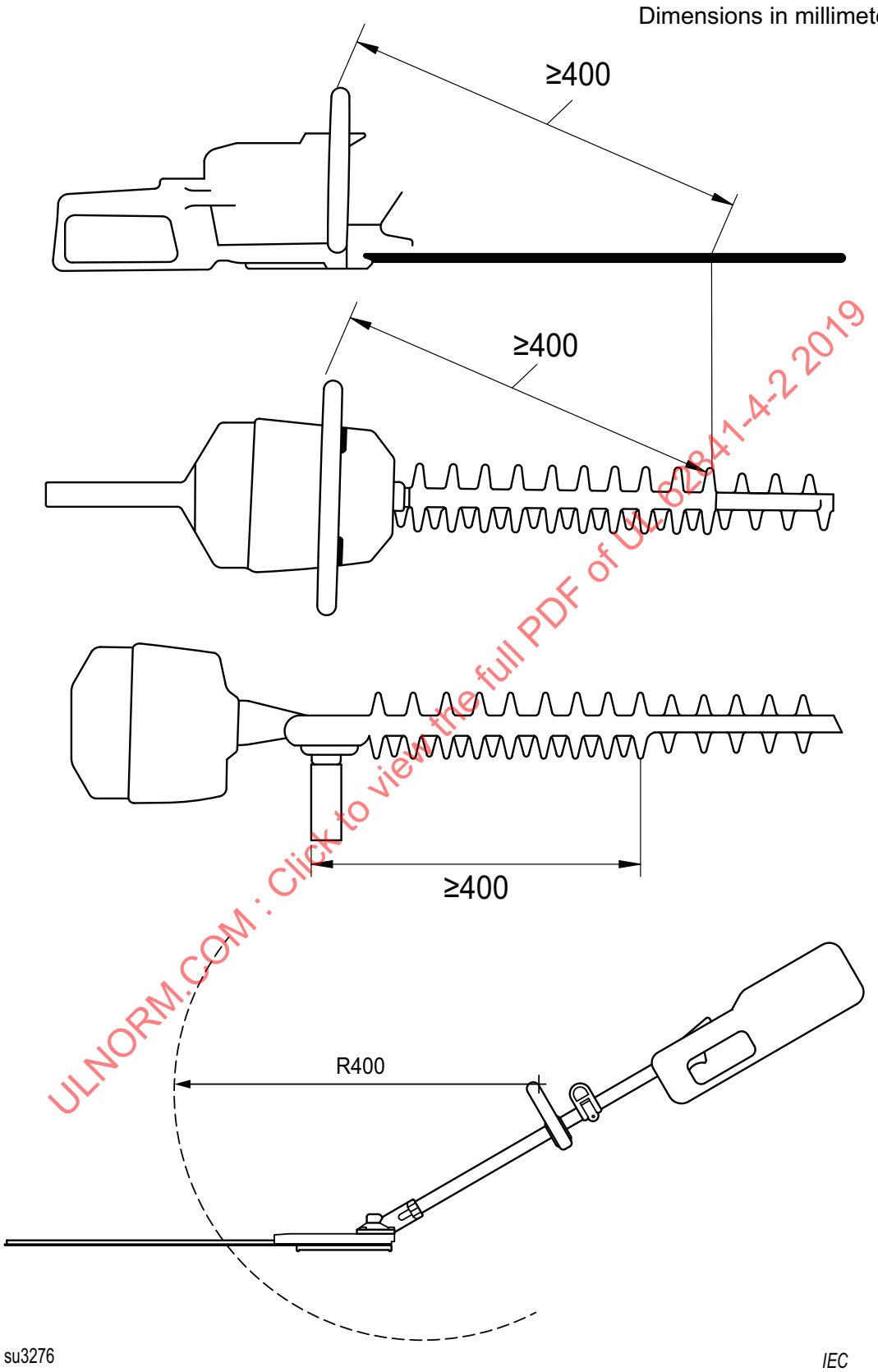
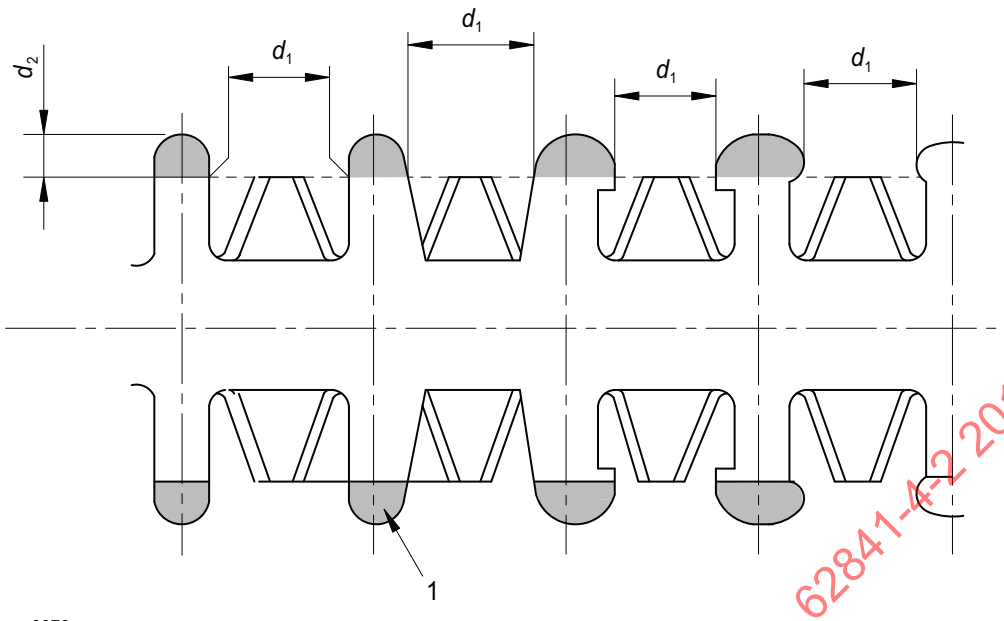


Figure 113
Measurement method for minimum length of blunt extensions along the axis of the cutting device



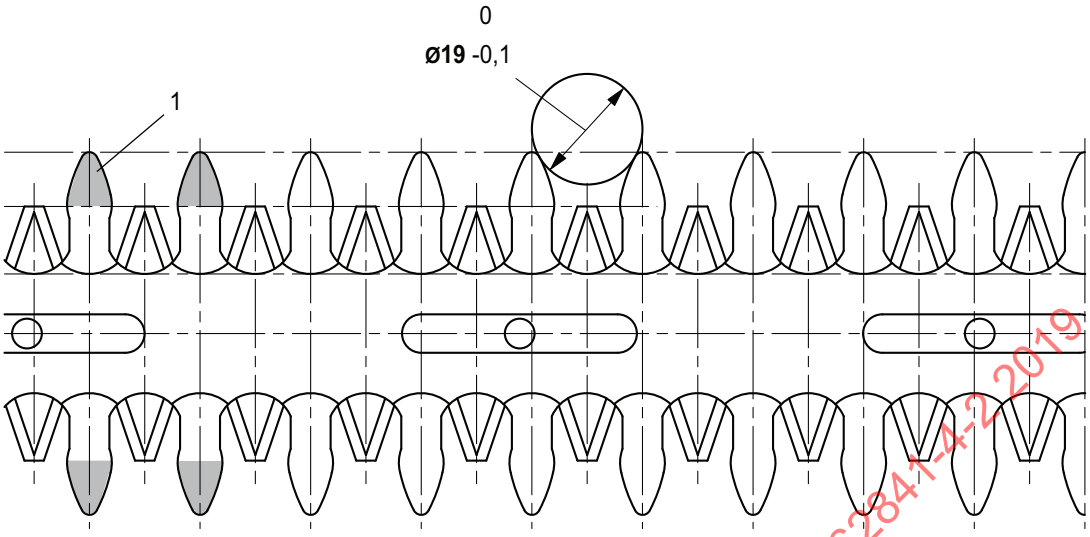
This **cutting device** may be single or double-sided.

Key

1 **blunt extension**

Figure 114
Cutting device configuration examples for categories 1 and 2 (see Table 101 and Table 102)

Dimensions in millimetres

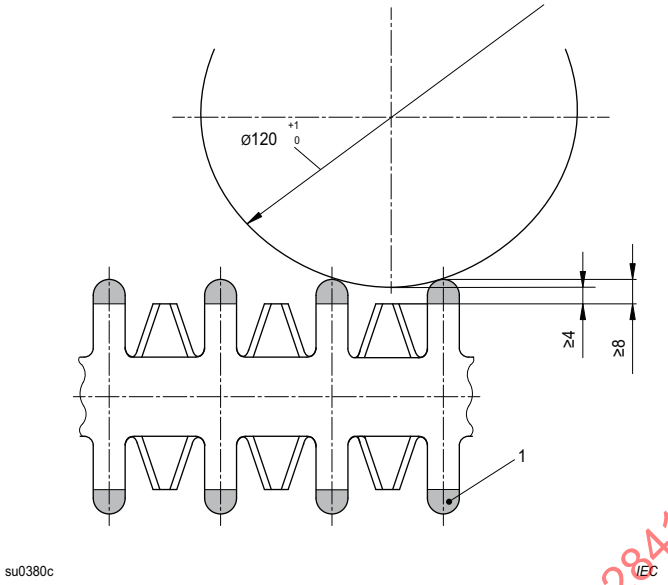


This **cutting device** may be single or double-sided.

Key

1 **blunt extension**

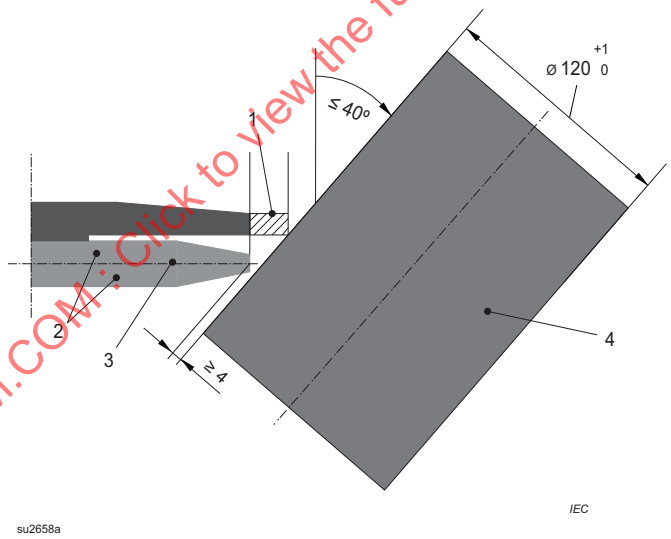
Figure 115
Cutting device configuration example for categories 3a and 3b (see Table 101 and Table 102)



This **cutting device** may be single or double-sided.

Key
1 **blunt extension**

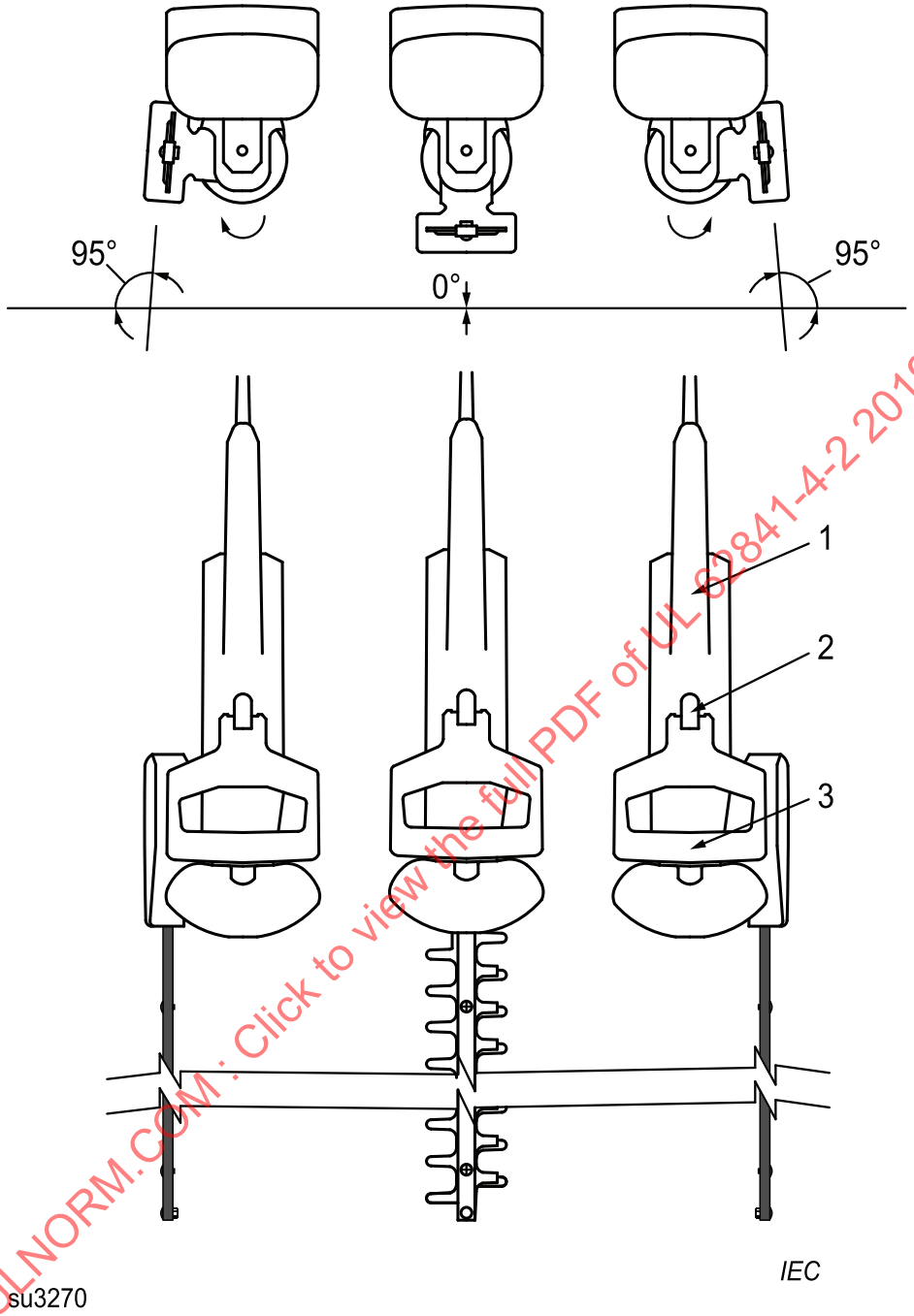
a) Test cylinder perpendicular to cutting plane



Key
1 **blunt extension**
2 **cutter blade**
3 cutting plane
4 test cylinder

b) Test cylinder tilted to cutting plane

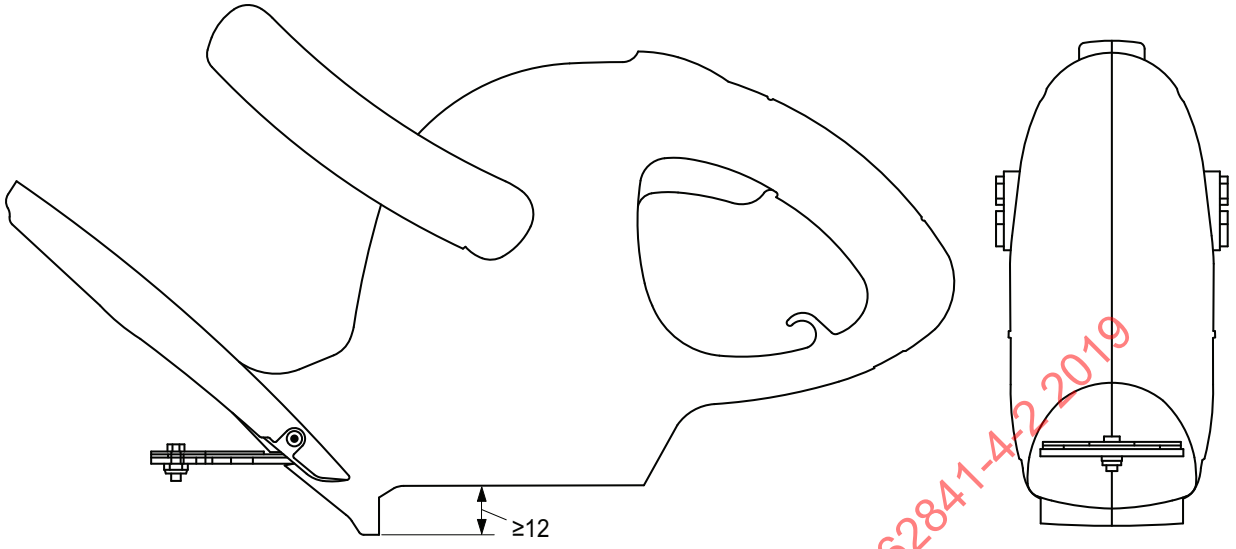
Figure 116
Cutting device configuration example for category 4 (see Table 101 and Table 102)



Key
1 **rear handle**
2 **cutting device** release control
3 **front handle**

Figure 117
Adjustable cutting device side to side limits

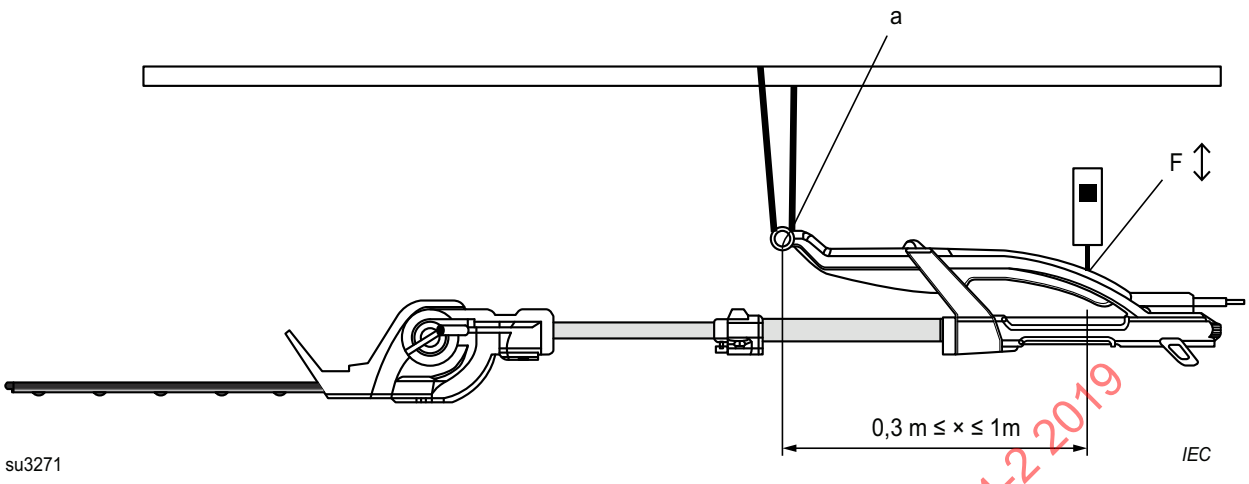
Dimensions in millimetres



su0383a

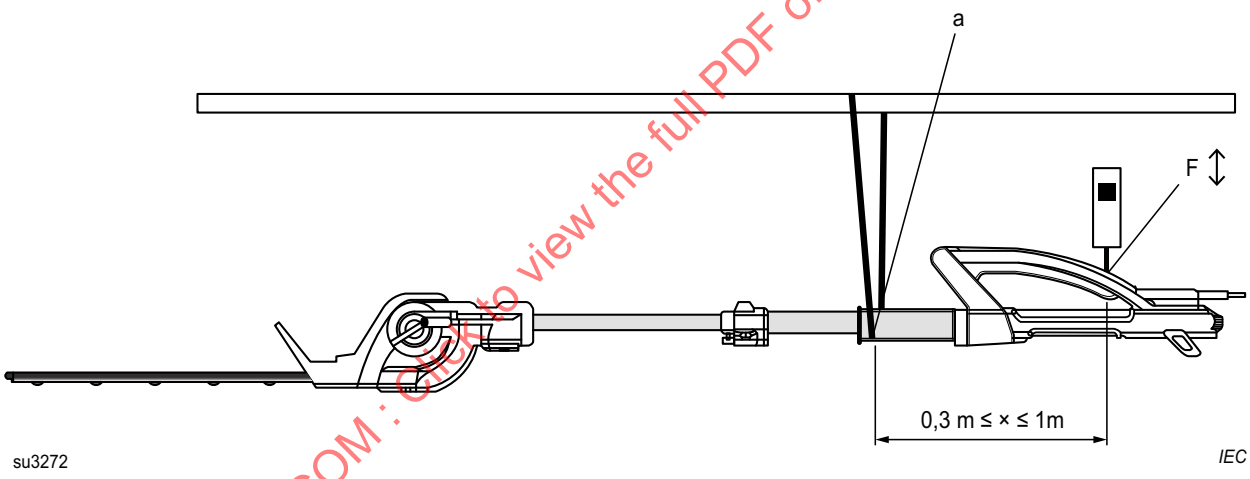
IEC

Figure 118
Lower barrier



Key
a suspension point on **front handle**
F point of application of force to the **rear handle**

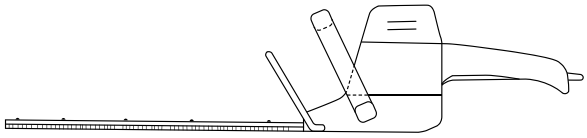
a) Extended-reach hedge trimmer with front handle



Key
a suspension point on handle
F point of application of force to the **rear handle**

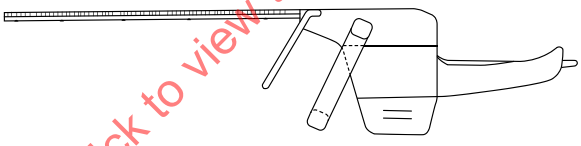
b) Extended-reach hedge trimmer with handle on shaft

Figure 119
Measurement of the force necessary to maintain an extended-reach hedge trimmer in a horizontal orientation



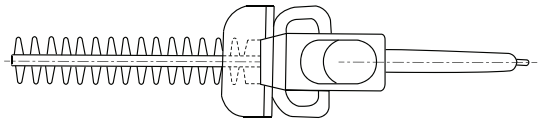
su1828

a) Cutting device pointing horizontal and cutting plane parallel to ground, machine upright



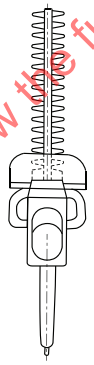
su1829

b) Cutting device pointing horizontal and cutting plane parallel to ground, machine inverted



su1830

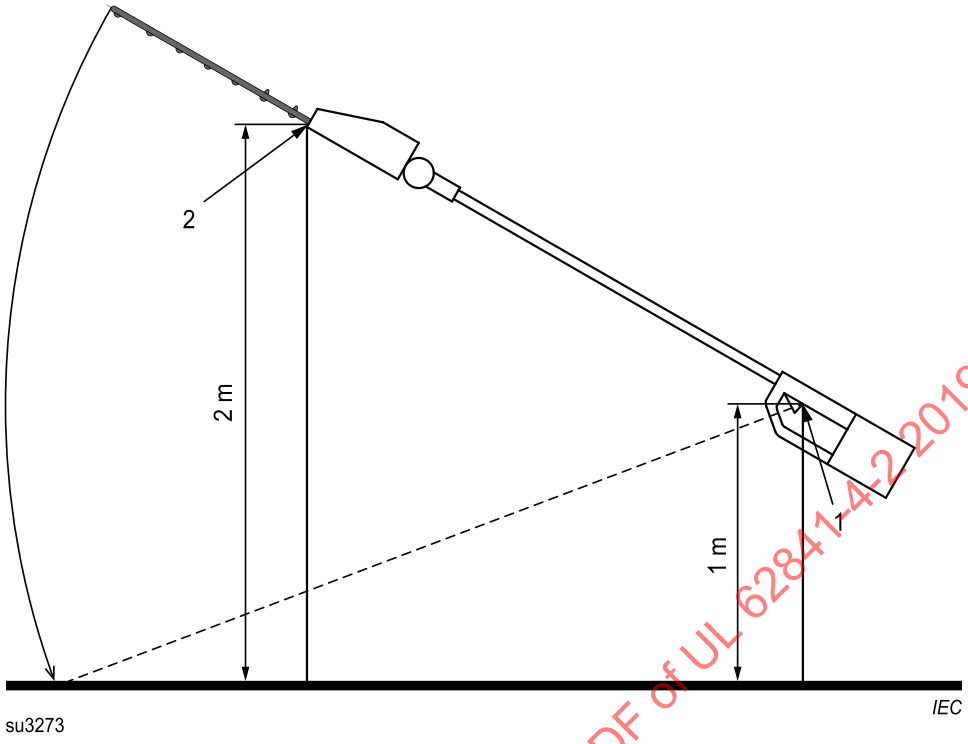
c) Cutting device pointing horizontal and cutting plane perpendicular to the ground, as for cutting the side of a hedge (left or right hand)



su1826

d) Cutting device pointing vertically upwards, as for cutting the side of a hedge

Figure 120
Hedge trimmer positions for drop test of 20.3.1



Key
1 pivotal support at the rear of the **blade control** in the **rear handle**
2 nearest cutting edge of the **cutter blade** to the **rear handle**

Figure 121
Additional drop test of 20.3.1 for extended-reach hedge trimmers

Dimensions in millimetres

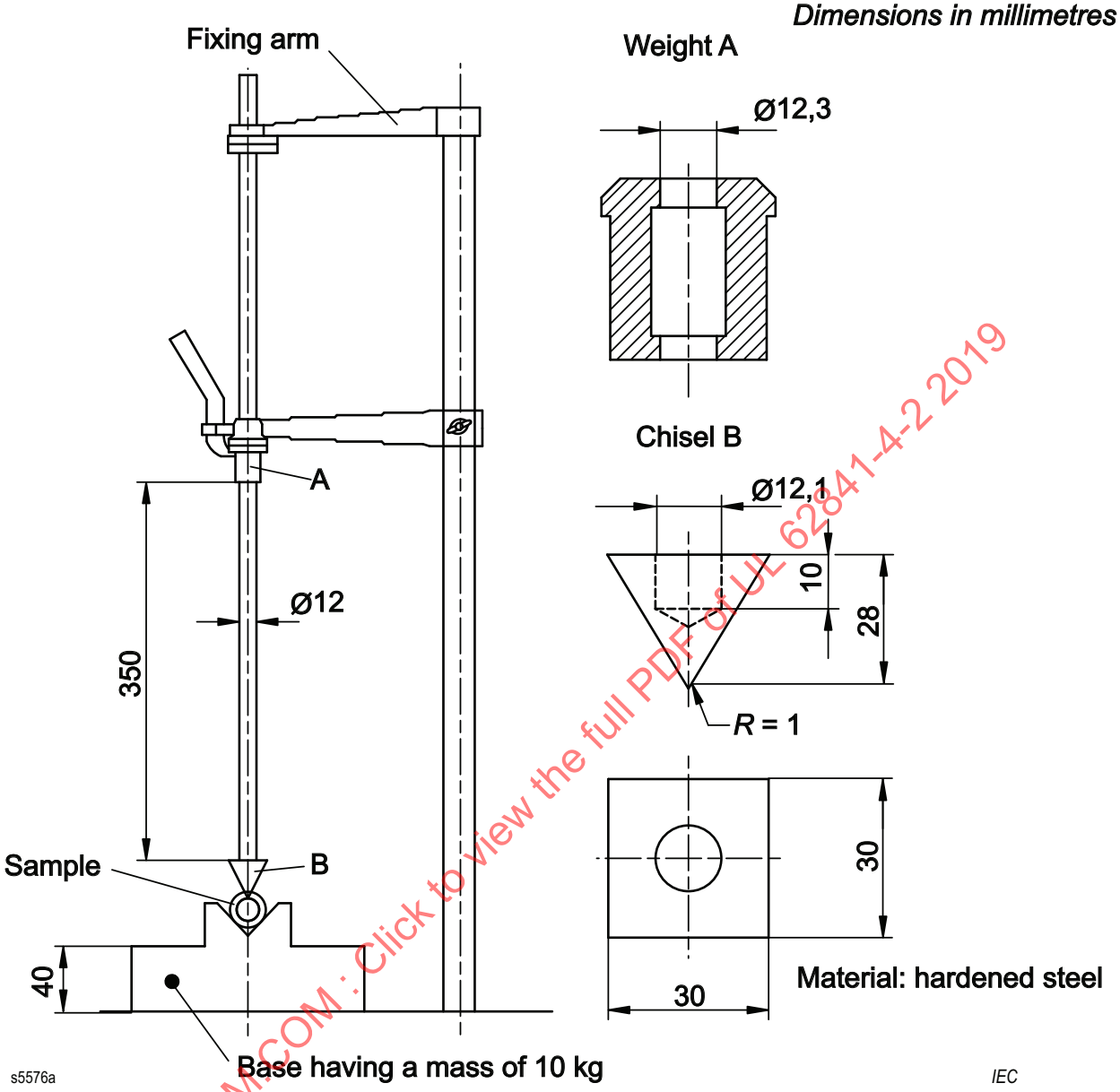


Figure 122
Impact test apparatus for handle insulation

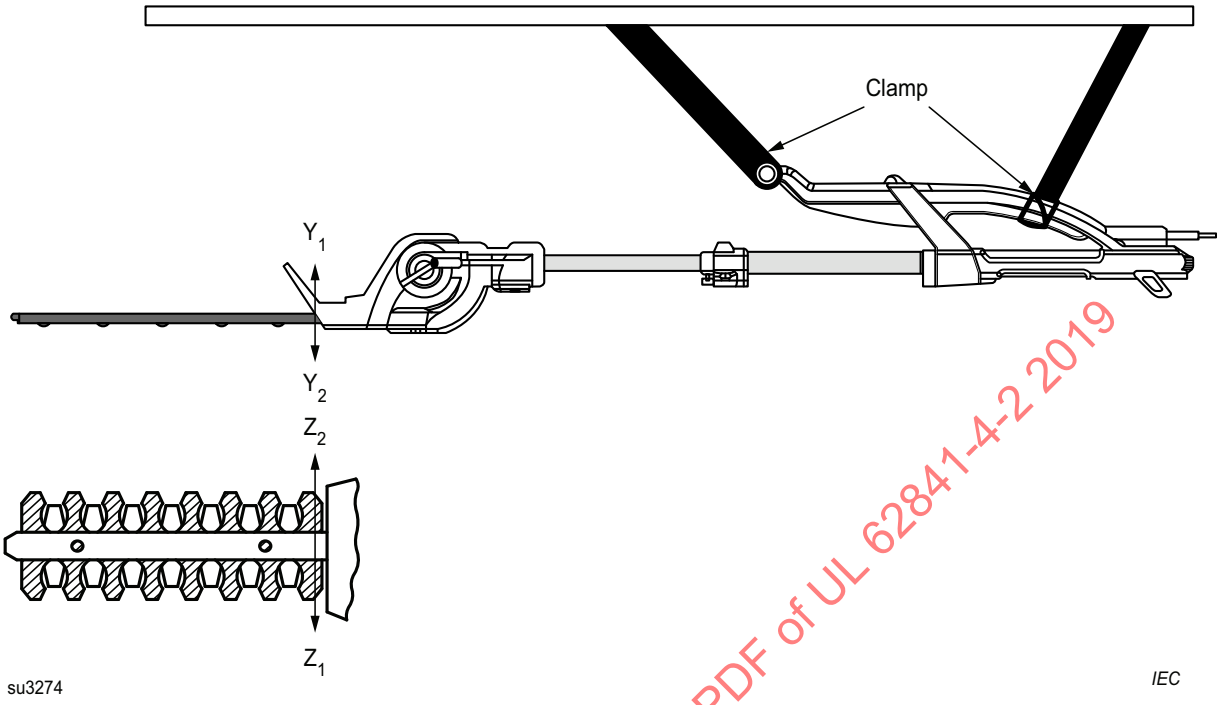
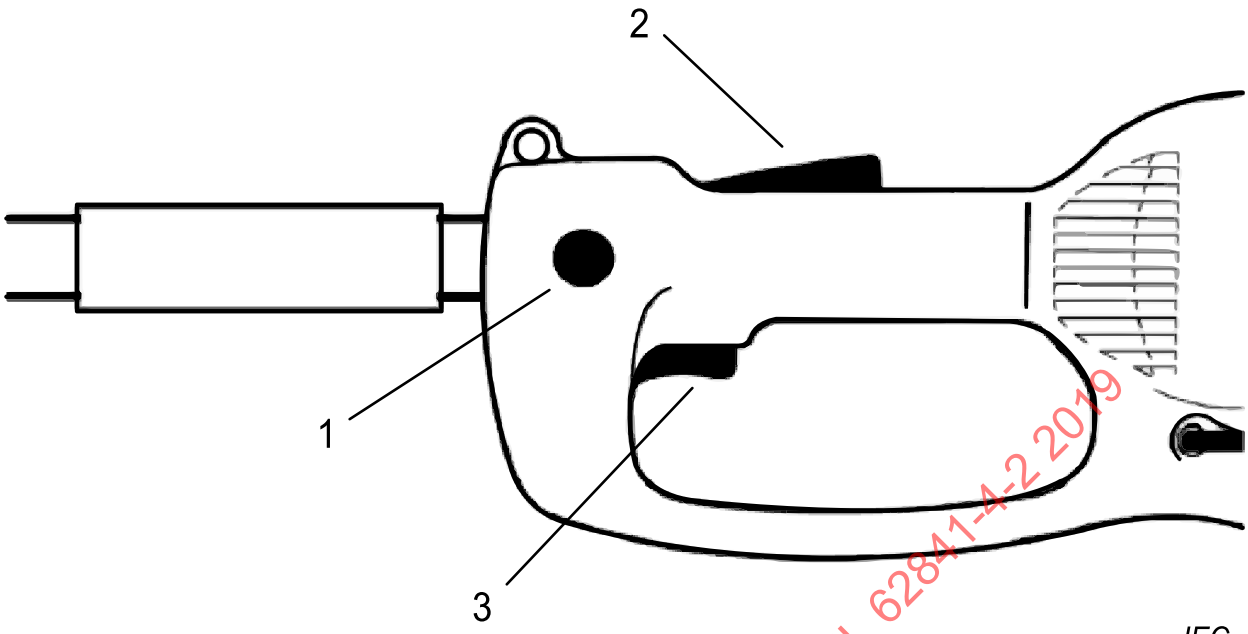
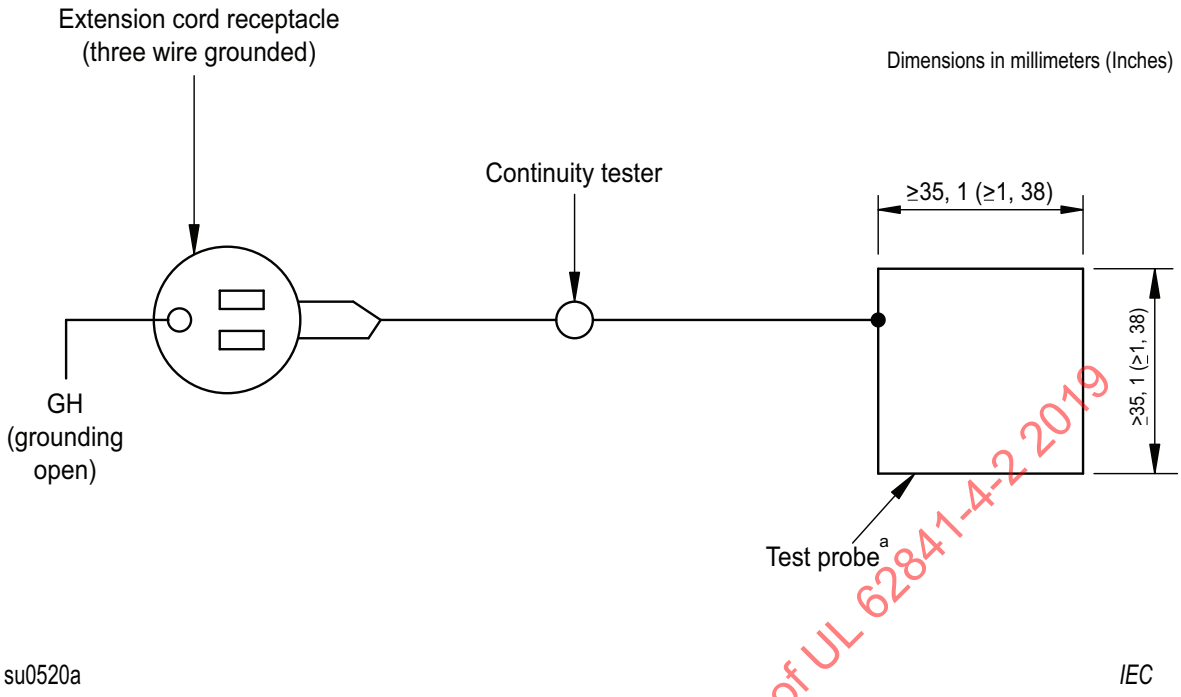


Figure 123
Mounting and application of force for the test of 20.101.3.3



Key
1 lock-off device
2 **operator presence sensor**
3 **blade control**

Figure 124
Example of an operator presence sensor



[a] Test probe shall be made of 1,5 mm (0,06 inch) thick metal

Figure 125
Test assembly for accessibility of attachment plug blades

Annexes

The annexes of Part 1 are applicable, except as follows:

Annex I
(informative)

Measurement of noise and vibration emissions

NOTE In Europe (EN 62841-4-2), 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 and ISO 3744:2010, where the acoustic environment, instrumentation, quantities to be measured, quantities to be determined, and the measurement procedure are specified.

The sound power level shall be given as A-weighted sound power level in dB reference 1 pW. The A-weighted sound pressure levels, from which the sound power 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.

I.2.2.2 This subclause of Part 1 is not applicable.

I.2.2.3 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 (building, 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 –10 °C to 30 °C and the wind speed shall be less than 8 m/s and preferably 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;

– measurements shall be made using an integrating-averaging sound level meter as defined in IEC 61672-1; alternatively, instruments with the time-weighting characteristics "slow", as defined in IEC 61672-1, may be used.

The A-weighted sound power level, L_{WA}, shall be calculated in accordance with 8.6 of ISO 3744:2010, as follows:

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

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

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

where

$\overline{L_{pfA}}$ is the A-weighted surface sound pressure level according to ISO 3744:2010;

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

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

K_{2A} is the environmental correction, A-weighted;

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:

$$S = 2\pi r^2, \text{ in } m^2$$

where the radius of the hemisphere, r = 4 m

so, from equation (I.101)

$$L_{WA} = \overline{L_{pfA}} + 20\,dB$$

Table I.101
Co-ordinates 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*

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 x 3,6 m placed at the centre of the test environment. 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 operator to avoid compression of the absorbing material.

NOTE 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 ground at the centre of the test site shall be flat and have good sound-absorbing properties. The surface shall be either forest ground or grass, with the grass or other organic material having a height of (50 ± 20) mm.

I.2.3 **Emission sound pressure level determination**

This subclause of Part 1 is applicable, except as follows:

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 the **hedge trimmer** shall be determined in accordance with I.2.3.1.

NOTE A **hedge trimmer** is used in a similar way to **hand-held tools**, without a uniquely defined work station. The sound pressure at a distance of 1 m from the machine is applicable.

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

Replacement:

The installation and mounting conditions shall be the same for the determination of both sound power level and emission sound pressure level at the work station.

The machine under test shall be 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 installation and mounting conditions for A-weighted sound power level measurement shall be in accordance with D.1 and D.2 of ISO 22868:2011, as far as applicable to electric **hedge trimmers**.

The operator, if any, shall not be positioned directly between any microphone position and the machine.

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

I.2.5 **Operating conditions**

Modification:

The **hedge trimmer** shall be operated under no load at its nominal speed with the **cutting device** working.

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 **hedge trimmers**.

I.3.5.2 **Attachment, workpiece and task**

Addition:

If different **cutting devices** can be mounted on the **hedge trimmer**, the longest device shall be mounted.

I.3.5.3 **Operating conditions**

Replacement:

Hedge trimmers are tested 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 **hedge trimmers** 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.

For **extended-reach hedge trimmers**, the machine is adjusted to its longest configuration in accordance with 8.14.2 b) and the axis of the **cutting device** is aligned as closely as possible with the axis of the **shaft**.

The machine shall be operated at normal working conditions and working modes according to the user instructions, 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 at typical and **normal use** of the machine under test.

Before starting the test, the tool shall be operated under these conditions of at least 1 min to warm it up.

I.3.6.1 **Reported vibration values**

Addition:

One test cycle is given when the machine is switched on 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.

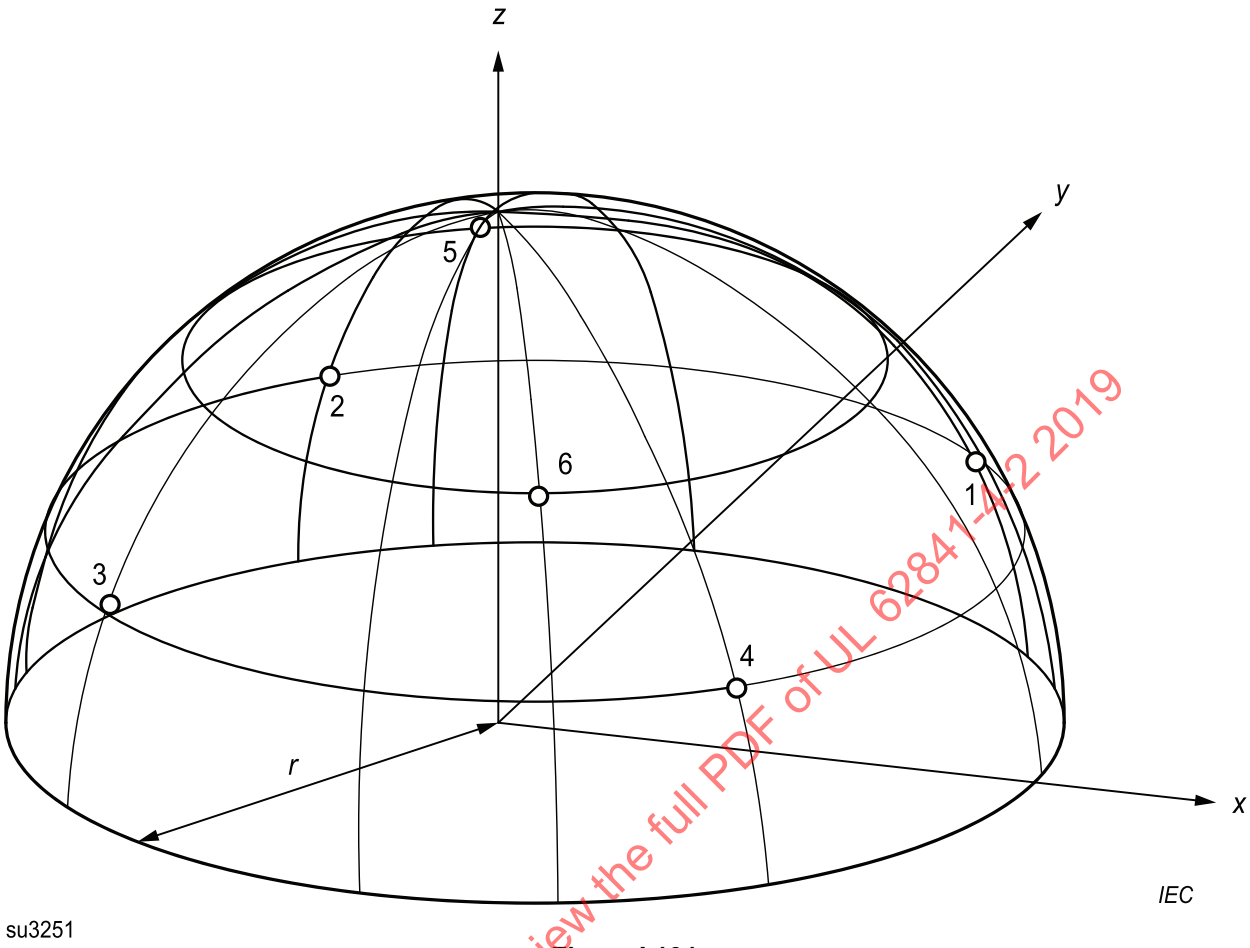


Figure I.101
Microphone positions on the hemisphere (see Table I.101)