UL 62841-2-5

STANDARD FOR SAFETY

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws

UL Standard for Safety for Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws, UL 62841-2-5

First Edition, Dated August 10, 2016

Summary of Topics

This revision of ANSI/UL 62841-2-5, dated December 13, 2019, includes the following:

Revision to Clause 17.102.3DV.2 to Clarify the Requirements. (The revisions do not change the technical content of the requirements)

Deletion of Clause 24.1DV Involving Protection Against Moisture for Appliance Inlets

This standard is an adoption of IEC 62841-2-5, Edition 1 published June 2014. Please note that the National Difference document incorporates all of the U.S. national differences for UL 62841-2-5.

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

The revised requirements are substantially in accordance with Proposal(s) on this subject dated June 21, 2019 and September 27, 2019.

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Underwriters Laboratories Inc.
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First Edition

Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws

August 10, 2016

(Title Page Reprinted: December 13, 2019)

This national standard is based on publication IEC 62841-2-5, First Edition (2014).

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 inquiries@csagroup. org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the First Edition including revisions through December 13, 2019. The most recent designation of ANSI/UL 62841-2-5 as an American National Standard (ANSI) occurred on December 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 2-5: Particular Requirements for Hand-Held Circular Saws. It is the First edition of CAN/CSA-C22.2 No. 62841-2-5 and the First edition of UL 62841-2-5. This harmonized standard has been jointly revised on December 13, 2019. For this purpose, CSA Group and UL are issuing revision pages dated December 13, 2019.

This harmonized standard is based on IEC Publication 62841-2-5: First edition Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws issued June 2014. IEC 62841-2-5 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 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.

This CAN/CSA-C22.2 No. 62841-2-5 Standard for Safety for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws is to be used in conjunction with the First edition of CAN/CSA-C22.2 No. 62841-1. The requirements for hand-held circular saws are contained in this Part 2 Standard and CAN/CSA-C22.2 No. 62841-1. Requirements of this Part 2 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 CAN/CSA-C22.2 No. 62841-2-5, the CAN/CSA-C22.2 No. 62841-1 subclause applies.

This UL Standard 62841-2-5 Standard for Safety for Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws, is to be used in conjunction with the First edition of UL 62841-1. The requirements for hand-held circular saws are contained in this Part 2 Standard and UL 62841-1. Requirements of this Part 2 Standard, where stated, amend the requirements of UL 62841-1. Where a particular subclause of UL 62841-1 is not mentioned in UL 62841-2-5, the UL 62841-1 subclause applies.

Level of harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for CSA Group and 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 IEC 62841-2-5 Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws, copyright 2014, 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 62841-2-5, Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery – Safety – Part 2-5: Particular Requirements for Hand-Held Circular Saws, copyright 2014 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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY – PART 2-5: PARTICULAR REQUIREMENTS FOR HAND-HELD CIRCULAR SAWS

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

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

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

International Standard IEC 62841-2-5 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
116/166/FDIS	116/180/RVD

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

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

This Part 2-5 is to be used in conjunction with the first edition of IEC 62841-1:2014.

This Part 2-5 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular Requirements for Hand-Held Circular Saws.

Where a particular subclause of Part 1 is not mentioned in this Part 2-5, that subclause applies as far as reasonable. 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 smaller roman type

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

Subclauses, notes and figures which are additional to those in Part 1 are numbered starting from 101.

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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore. iec. ch" in the data related to the specific publication. At this date, the publication will be

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

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

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

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

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

102DV ***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 2-5: PARTICULAR REQUIREMENTS FOR HAND-HELD CIRCULAR SAWS

1 Scope

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

Addition:

This part of IEC 62841 applies to hand-held **circular saws**, which hereinafter will be referred to as saws.

This standard does not apply to saws designed for use with abrasive wheels.

NOTE Saws designed for use with abrasive wheels as cut-off machines are covered by IEC 62841-2-22.

2 Normative references

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

Addition:

NOTE In Europe (EN 62841-2-5), the following normative reference applies:

EN 847-1, *Tools for woodworking – Safety requirements – Part 1: Milling tools, circular saw blade*

3 Terms and definitions

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

Addition:

3.53DV.D1 ***Modification: Replace Clause 3.53 of the Part 1 with the following:***

supply cord: flexible cord which can be detachable or fixed to the tool

3.101 **base plate:** part supporting the saw on the material being cut (see Figure 113)

3.102 angular displacement of the saw blade plane with respect to the **base plate** plane, the position of the saw blade plane that is perpendicular to the **base plate** being the 0° bevel position

3.103 **circular saw:** tool intended for cutting various materials with a rotating toothed blade

3.104 **cutting edge zone:** outer 20 % of the blade's radius

3.105 ***D*** maximum specified diameter of the saw blade

3.106 **guarding system:** combination of some or all of the following elements as applicable for the type of saw: **upper guard**, **lower guard**, **base plate** and the mechanism to facilitate the performance of these elements

3.107 **kickback:** sudden reaction to a pinched, jammed or misaligned saw blade, causing an uncontrolled saw to lift up and out of the workpiece

3.108 **lower guard:** movable blade-covering device which, in the closed or rest position, is mainly situated below the **base plate**

3.109 **maximum depth of cut:** maximum thickness of the workpiece that can be cut through when the saw is set to 0° bevel position, at the maximum protrusion of the largest specified saw blade through the plane of the **base plate**

3.110 **plunge type saw:** saw having only an **upper guard** into which the saw blade retracts when not in use (see Figure 104)

3.111 **riving knife:** metal part placed in the plane of the saw blade with the intent of preventing the kerf in the workpiece from closing on the rear part of the saw blade

3.112 **saw with outer pendulum guard:** saw having a **lower guard** which swings outside the **upper guard** (see Figure 101)

3.113 **saw with inner pendulum guard:** saw having a **lower guard** which swings inside the **upper guard** (see Figure 102)

3.114 **saw with tow guard:** saw having a **lower guard** which slides along the **upper guard** (see Figure 103)

3.115 **upper guard:** fixed and/or movable cover of the blade situated above the **base plate**

3.116DV D1 ***Addition: Add the following definition to Clause 3 of the Part 2:***

detachable cord: flexible cord provided with an appliance inlet connector and intended to be connected to a tool through an appliance inlet.

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:

5.17 *Addition:*

The weight of the tool includes the dust extraction adapter and the auxiliary handle, if any.

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:

8.1 *Addition:*

Saws shall be marked with:

– rated no-load speed of the output spindle.

8.2DV D1 *Modification: Add the following to Clause 8.2 of the Part 1:*

Tools shall be marked with the following additional safety warnings:

a) "DANGER – Keep hands and body away from and to the side of the blade. Contact with blade will result in serious injury."

b) "WARNING – Check guarding system. It must cover the blade instantly!"

c) For saws with a blade diameter greater than 140 mm the following warning shall be used: "WARNING – Hold saw with both hands."

d) "WARNING – Support and clamp work."

8.3 *Addition:*

– specified blade diameter or specified blade diameter range.

The direction of rotation of the spindle shall be indicated on the tool by an arrow, raised or recessed or by any other means no less visible and indelible.

8.14.1.101 Additional safety instructions for circular saws

8.14.1.101.1 **General**

The additional safety instructions as specified in 8.14.1.101.2 to 8.14.1.101.6 shall be given. If in English they shall be verbatim and in the following order as applicable and equivalent in any other language. This part may be printed separately from the "General Power Tool Safety Warnings".

All notes are not to be printed; they are information for the designer of the manual.

8.14.1.101.2 **Safety instructions for all saws**

Cutting procedures

a) **DANGER: Keep hands away from cutting area and the blade. Keep your second hand on auxiliary handle, or motor housing.** *If both hands are holding the saw, they cannot be cut by the blade.*

NOTE For **circular saws** with a maximum blade diameter of 140 mm or smaller, the words "Keep your second hand on auxiliary handle, or motor housing" do not apply.

b) **Do not reach underneath the workpiece.** *The guard cannot protect you from the blade below the workpiece.*

c) **Adjust the cutting depth to the thickness of the workpiece.** *Less than a full tooth of the blade teeth should be visible below the workpiece.*

d) **Never hold the workpiece in your hands or across your leg while cutting. Secure the workpiece to a stable platform.** *It is important to support the work properly to minimise body exposure, blade binding, or loss of control.*

e) **Hold the power tool by insulated gripping surfaces, when performing an operation where the cutting tool may contact hidden wiring or its own cord.** *Contact with a "live" wire will also make exposed metal parts of the power tool "live" and could give the operator an electric shock.*

f) **When ripping, always use a rip fence or straight edge guide.** *This improves the accuracy of cut and reduces the chance of blade binding.*

g) **Always use blades with correct size and shape (diamond versus round) of arbour holes.** *Blades that do not match the mounting hardware of the saw will run off-centre, causing loss of control.*

h) **Never use damaged or incorrect blade washers or bolt.** *The blade washers and bolt were specially designed for your saw, for optimum performance and safety of operation.*

8.14.1.101.3 **Further safety instructions for all saws**

Kickback causes and related warnings

– kickback is a sudden reaction to a pinched, jammed or misaligned saw blade, causing an uncontrolled saw to lift up and out of the workpiece toward the operator;

– when the blade is pinched or jammed tightly by the kerf closing down, the blade stalls and the motor reaction drives the unit rapidly back toward the operator;

– if the blade becomes twisted or misaligned in the cut, the teeth at the back edge of the blade can dig into the top surface of the wood causing the blade to climb out of the kerf and jump back toward the operator.

Kickback is the result of saw misuse and/or incorrect operating procedures or conditions and can be avoided by taking proper precautions as given below.

a) **Maintain a firm grip with both hands on the saw and position your arms to resist kickback forces. Position your body to either side of the blade, but not in line with the blade.** *Kickback could cause the saw to jump backwards, but kickback forces can be controlled by the operator, if proper precautions are taken.*

NOTE For **circular saws** with a maximum blade diameter of 140 mm or smaller, the words "with both hands" do not apply.

b) **When blade is binding, or when interrupting a cut for any reason, release the trigger and hold the saw motionless in the material until the blade comes to a complete stop. Never attempt to remove the saw from the work or pull the saw backward while the blade is in motion or kickback may occur.** *Investigate and take corrective actions to eliminate the cause of blade binding.*

c) **When restarting a saw in the workpiece, centre the saw blade in the kerf so that the saw teeth are not engaged into the material.** *If a saw blade binds, it may walk up or kickback from the workpiece as the saw is restarted.*

d) **Support large panels to minimise the risk of blade pinching and kickback.** *Large panels tend to sag under their own weight. Supports must be placed under the panel on both sides, near the line of cut and near the edge of the panel.*

e) **Do not use dull or damaged blades.** *Unsharpened or improperly set blades produce narrow kerf causing excessive friction, blade binding and kickback.*

f) **Blade depth and bevel adjusting locking levers must be tight and secure before making the cut.** *If blade adjustment shifts while cutting, it may cause binding and kickback.*

g) **Use extra caution when sawing into existing walls or other blind areas.** *The protruding blade may cut objects that can cause kickback.*

8.14.1.101.4 **Safety instructions for saws with pendulum guard and saws with tow guard as shown in Figure 101, Figure 102 and Figure 103**

Lower guard function

a) **Check the lower guard for proper closing before each use. Do not operate the saw if the lower guard does not move freely and close instantly. Never clamp or tie the lower guard into the open position.** *If the saw is accidentally dropped, the lower guard may be bent. Raise the lower guard with the retracting handle and make sure it moves freely and does not touch the blade or any other part, in all angles and depths of cut.*

NOTE Alternate wording for "retracting handle" is possible.

b) **Check the operation of the lower guard spring. If the guard and the spring are not operating properly, they must be serviced before use.** *Lower guard may operate sluggishly due to damaged parts, gummy deposits, or a build-up of debris.*

c) **The lower guard may be retracted manually only for special cuts such as "plunge cuts" and "compound cuts". Raise the lower guard by the retracting handle and as soon as the blade enters the material, the lower guard must be released.** *For all other sawing, the lower guard should operate automatically.*

NOTE Alternate wording for "retracting handle" is possible.

d) **Always observe that the lower guard is covering the blade before placing the saw down on bench or floor.** *An unprotected, coasting blade will cause the saw to walk backwards, cutting whatever is in its path. Be aware of the time it takes for the blade to stop after switch is released.*

8.14.1.101.5 **Safety instructions for plunge type saws shown in Figure 104**

Guard function

a) **Check the guard for proper closing before each use. Do not operate the saw if the guard does not move freely and enclose the blade instantly. Never clamp or tie the guard so that the blade is exposed.** *If the saw is accidentally dropped, the guard may be bent. Check to make sure that the guard moves freely and does not touch the blade or any other part, in all angles and depths of cut.*

b) **Check the operation and condition of the guard return spring. If the guard and the spring are not operating properly, they must be serviced before use.** *The guard may operate sluggishly due to damaged parts, gummy deposits, or a build-up of debris.*

c) **Assure that the base plate of the saw will not shift while performing a "plunge cut".** *Blade shifting sideways will cause binding and likely kick back.*

d) **Always observe that the guard is covering the blade before placing the saw down on bench or floor.** *An unprotected, coasting blade will cause the saw to walk backwards, cutting whatever is in its path. Be aware of the time it takes for the blade to stop after the switch is released.*

8.14.1.101.6 **Additional safety instructions for all saws with riving knife**

Riving knife function

a) **Use the appropriate saw blade for the riving knife.** *For the riving knife to function, the body of the blade must be thinner than the riving knife and the cutting width of the blade must be wider than the thickness of the riving knife.*

b) **Adjust the riving knife as described in this instruction manual.** *Incorrect spacing, positioning and alignment can make the riving knife ineffective in preventing kickback.*

c) **Always use the riving knife except when plunge cutting.** *The riving knife must be replaced after plunge cutting. The riving knife causes interference during plunge cutting and can create kickback.* **riving knife**.

NOTE This warning is not applicable for **plunge type saws** with a spring loaded riving knife.

d) **For the riving knife to work, it must be engaged in the workpiece.** *The riving knife is ineffective in preventing kickback during short cuts.*

e) **Do not operate the saw if the riving knife is bent.** *Even a light interference can slow the closing rate of a guard.*

8.14.2 a) *Addition:*

101) Instruction not to use any abrasive wheels;

102) For saws with **riving knife** the instruction shall include the following:

– instruction to ensure that the **riving knife** is adjusted so that the distance between the **riving knife** and the rim of the blade is not more than 5 mm, and the rim of the blade does not extend more than 5 mm beyond the lowest edge of the **riving knife**;

– information about the allowed range of saw blade body thickness and the tooth set of the blade;

103) Instruction to use only blade diameter(s) in accordance with the markings;

104) Instruction to identify the correct saw blade to be used for the material to be cut;

105) Instruction to use only saw blades that are marked with a speed equal or higher than the speed marked on the tool.

Note: In Europe (EN 62841-2-5), the following additional requirement applies:

Instruction to use only saw blades recommended by the manufacturer, which conform to EN 847-1, if intended for wood and analogous materials.

8.14.2 b) *Addition:*

101) Information regarding the **maximum depth of cut**;

102) Instruction for the blade changing procedure;

103) Instruction how to check the function of all blade guard operations;

104) Information regarding what materials can be cut. Instructions to avoid overheating the blade tips and, if cutting plastics is permitted, to avoid melting the plastic;

105) Instructions on the correct use of the dust collection system;

106) Instruction to wear a dust mask.

8.14.2 c) *Addition:*

101) Instruction how to properly clean the tool and **guarding system**.

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.

13 Resistance to heat and fire

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is 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:

17.101 Guarding system – Longevity

17.101.1 To provide sufficient endurance for extended use, the **guarding system** shall have a longevity of 50 000 operating cycles.

Compliance is checked by a new saw sample completing the following test.

*The saw is to be set for 0°**bevel angle** with the **base plate** in horizontal position and the blade removed. The **lower guard**, or the **guarding system** as shown in Figure 104, is retracted from the fully closed position to the maximum open working position and then released. This sequence is repeated at a rate not less than 10 cycles per minute.*

The sample used for this test may be positioned in a manner other than horizontal provided that it can be shown that the alternate position is equal or more severe.

After completion of cycling test as specified above, the saw shall then comply with the tests of 17.101.2 and 17.101.3.

17.101.2 The test and measurement is carried out at **maximum depth of cut** and 0° **bevel angle**. The saw is held or secured with the **base plate** in a horizontal position, the **upper guard** being at the top.

Without any restoration or cleaning, the **lower guard** as shown in Figure 101, Figure 102 and Figure 103, or the **guarding system** as shown in Figure 104, is retracted fully and then allowed to close. The closing time from the fully open position to the fully closed position shall not exceed 0,3 s.

17.101.3 The following tests and measurements are carried out at **maximum depth of cut**, at 0° **bevel angle** and in the following positions:

a) The saw is held with the **base plate** in the horizontal position, with the **upper guard** being at the top.

b) The saw is then held with the **base plate** in the vertical position, with the front of the saw pointing upwards.

For saws using a **lower guard** as shown in Figure 101 and Figure 102, the **lower guard** is retracted fully and then allowed to close. Without any alteration, the final position of the **lower guard** in both cases shall be in contact with the **lower guard** stopper and shall not change as a result of moving the **base plate** to a minimum depth-of-cut setting and the guarding shall comply with the requirements of 19.102.3.

For saws using a **lower guard** as shown in Figure 103 or a **guarding system** as shown in Figure 104, the **lower guard** or the **guarding system** is fully retracted, released and then shall lock in the blade covering position.

17.102 Guarding System-Resistance

17.102.1 The **guarding system** shall be resistant against environmental and foreseeable dust accumulation.

Compliance is checked by the tests of 17.102.2 and 17.102.3, as applicable.

During the tests, ventilation in the test area is permitted providing that air flow does not influence the distribution of dust within the tool.

17.102.2 *For a saw intended to cut wood based materials in accordance with 8.14.2 b) 104), a new saw sample is subjected to 1 000 cuts through each of the materials and in the order as specified below:*

a) crosscutting soft wood;

b) crosscutting plywood with a minimum of 5 layers;

c) cutting standard medium density fibreboard (MDF) having a density between 650 kg/m^3 and 850 kg/m^3.

*The materials are stored indoors for 72 h prior to sawing. The thickness and length of each material to be cut may vary in size, provided the thickness of the material is minimum 10 mm and the cross sectional area of each cut is at least 30 mm times **D**.*

*Each cut is made with the saw set to 0° **bevel angle** and **maximum depth of cut**. The cutting is conducted with a carbide-tipped general purpose combination blade. An external dust extraction system attached to the saw shall not be used. A non-detachable dust collection system shall be maintained per 8.14.2 b) 105).*

NOTE Use of personal protective equipment will help to protect the operator during these tests.

*During each cut, the **lower guard** or the **guarding system** shall cycle from the fully closed position to the maximum open working position for each cutting cycle, without manual assistance. Moreover, for **plunge type saws** with a spring loaded **riving knife**, the **riving knife** shall cycle from its fully extended to the fully retracted position.*

*If the **lower guard**, **guarding system** or the **riving knife** fails to return to its normal position at any time during the test, this is considered a failure.*

After completion of all cuts as specified above, the saw is conditioned for 24 h in air at a relative humidity of (93 ±3) %. The temperature of the air is maintained within 2 K of any convenient value between 20 °C and 30 °C.

The saw shall then comply with the tests of 17.101.2 and 17.101.3.

17.102.3 *For a saw intended to cut materials such as plastic, ferrous metal or masonry in accordance with 8.14.2 b) 104), a new saw sample for each specified material is subjected to the tests as specified below.*

*– Plastics: 1 000 cuts through PVC. The thickness and length of the material may vary in size, provided the cross sectional area of each cut is at least 0,012 **D**^{2}.*

NOTE 1 The above formula simulates the cross sectional area of typical PVC pipes of a diameter approximately equal to 2/3 of the **maximum depth of cut** of the saw. Sawing of such pipes is the predominant application for plastic.

*– Ferrous metals: 200 cuts through soft steel. The thickness and length of the material may vary in size, provided the cross sectional area of each cut is at least 0,13 **D**^{1,46} in mm^2, where **D** is measured in mm.*

NOTE 2 The above formula simulates the cross sectional area of typical metal pipes of a diameter approximately equal to 1/2 of the **maximum depth of cut** of the saw. Sawing of such pipes is the predominant application for metal.

*– Masonry: 500 cuts through masonry fibreboard (fibre cement board). The thickness and length of the fibreboard may vary in size, provided the thickness of the material is minimum 10 mm and the cross sectional area of each cut is at least 30 mm times **D**.*

*Each cut is made with the saw set to 0° **bevel angle**. The depth of cut, the saw blade and the rate of sawing shall be as specified for the respective material. An external dust extraction system attached to the saw shall not be used. A non-detachable dust collection system shall be maintained per 8.14.2 b) 105).*

NOTE 3 Use of personal protective equipment will help to protect the operator during these tests.

*During each cut, the **lower guard** or the **guarding system** shall cycle from the fully closed position to the maximum open working position for each cutting cycle, without manual assistance. Moreover, for **plunge type saws** with a spring loaded **riving knife**, the **riving knife** shall cycle from its fully extended to the fully retracted position.*

*If the **lower guard**, **guarding system** or the **riving knife** fails to return to its normal position at any time during the test, this is considered a failure.*

After completion of all cuts as specified above, the saw is conditioned for 24 h in air at a relative humidity of (93 ±3) %. The temperature of the air is maintained within 2 K of any convenient value between 20 °C and 30 °C.

The saw shall then comply with the tests of 17.101.2 and 17.101.3.

17.102.3DV.1 D1 *Modification: Replace the first paragraph of Clause 17.102.3 of the Part 2 with the following:*

For a saw intended to cut materials such as plastic, ferrous and non-ferrous metal or masonry in accordance with 8.14.2 b) 104), a new saw sample for each specified material is subjected to the tests as specified below.

17.102.3DV.2 D1 *Modification: Replace the item under Note 1 of Clause 17.102.3 of the Part 2 with the following:*

– Ferrous metals: 200 cuts through one sample material of ferrous metal, if applicable, in accordance with 8.14.2 (b) (104). The thickness and length of the material may vary in size, provided the cross sectional area of each cut is at least 0,13 $D^{1,46}$ in mm^2, where *D* is measured in mm.

17.102.3DV.3 D1 *Modification: Add the following item under Note 1 of Clause 17.102.3 of the Part 2:*

– Non-ferrous metals: 200 cuts through one sample material of non-ferrous metal, if applicable, in accordance with 8.14.2 (b) (104). The thickness and length of the material may vary in size, provided the cross sectional area of each cut is at least 0,13 $D^{1,46}$ in mm^2, where *D* is measured in mm.

18 Abnormal operation

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

18.8 *Replacement of Table 4 by the following:*

Table 4 – Required performance levels

Type and purpose of SCF	Minimum Performance Level (PL)
Power switch – prevent unwanted switch-on	Shall be evaluated using the fault conditions of 18.6.1 without the loss of this SCF
Power switch – provide desired switch-off	Shall be evaluated using the fault conditions of 18.6.1 without the loss of this SCF
Provide desired direction of rotation	c
Any electronic control to pass the test of 18.3	a
Overspeed prevention to prevent output speed above 130 % of rated (no-load) speed	c
Prevent exceeding thermal limits as in Clause 18	a
Prevent self-resetting as required in 23.3	c
Lock-off function as required by 21.18.1.2	c

19 Mechanical hazards

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

19.1 *Replacement of the first paragraph:*

Moving and dangerous parts other than the rotating blade shall be so positioned or enclosed to provide adequate protection against personal injury. The guarding of rotating blade is covered in 19.1.101.

19.1.101 Saws shall be so guarded as to minimise the risk of accidental access to the rotating blade. **Guarding systems** shall not be removable without the aid of a tool.

There are four commonly used **guarding systems** for saws, as shown in Figure 101, Figure 102, Figure 103 and Figure 104. **Guarding systems** can be designed with the blade on the right or on the left side of the saw. These **guarding systems** shall comply with the requirements of 19.101 and 19.102. Each one of these **guarding system** types can be designed with or without the **riving knife** (item 6 in the figures).

– If a **guarding system** is designed with a **riving knife**, it shall meet the additional requirements of Annex AA.

– If a **guarding system** is designed without a **riving knife**, it shall meet the additional requirements of Annex BB.

Compliance is checked by inspection.

19.3 This subclause is not applicable.

NOTE The requirements for accessibility of dangerous moving parts through dust collection openings are specified in 19.101.2.1.

19.101 Guarding above the base plate

19.101.1 For saws using a **guarding system** as shown in Figure 101, Figure 102 and Figure 103, the upper guard shall meet the requirements of 19.101.2.

19.101.2 Specific requirements

19.101.2.1 Apertures in the **guarding system** above the **base plate**, unless otherwise specified in 19.101.2.2 to 19.101.2.5, shall be designed to prevent contact with the cutting edge zone of any specified blade diameter in accordance with the marking required by 8.3.

*Compliance is checked with the test probe 'a' of Figure 105, which is inserted at any angle and to the depth possible. The test is performed with the saw set for 0° **bevel angle** and **maximum depth of cut**.*

19.101.2.2 On the motor side of the **upper guard**, adjacent to the **cutting edge zone** at the front of the blade an aperture may be provided for viewing the line of the cut. This viewing aperture shall either meet the requirements of 19.101.2.1, as illustrated in Figure 106, or it shall be limited by proximity and height restrictions (see Figure 108).

- Proximity restriction

Any unobstructed straight line distance between the **cutting edge zone** of any specified blade diameter in accordance with the marking required by 8.3 and the designated measuring points of the following grasping areas shall be at least 120 mm:

– the auxiliary handle, if provided;

– if no auxiliary handle is provided:

- the motor casing, if the motor casing is designed as grasping area;
- the switch trigger grasping surface, if the motor casing is not designed as grasping area.

*Compliance is checked by the following measurements, which shall be conducted with the **base plate** set to **maximum depth of cut** and 90°.*

a) To establish the measuring points on the auxiliary handle or the motor casing (as shown in Figure 107), follow the procedure outlined below.

Establish the closest (A) and the most distant (B) points on the auxiliary handle or motor casing defined grasping surface from the blade. For the motor casing, the closest (A) point to the blade is assumed to be in the plane of the main handle farthest from the blade. Equidistant between points (A) and (B), but not more than 45 mm away from point (A), draw the vertical intersecting line of the plane parallel with the blade and the surface of the auxiliary handle or motor casing, as applicable.

*Then establish the closest (C) and the most distant (E) point from the plane of the **base plate** on the auxiliary handle or motor casing defined grasping surface. Equidistant between points (C) and (E), draw the horizontal intersecting line of the plane parallel with the **base plate** and the surface of the auxiliary handle or motor casing, as applicable.*

The intersection of the vertical and horizontal lines drawn on the applicable surface is the defined measuring point.

*Then measure from this defined point to the **cutting edge zone**.*

b) For the switch grasping area:

*Measure the distance from the **cutting edge zone** to the geometric centre of the switch trigger grasping surface with the switch in the "off" position.*

- Height restriction

The height of the viewing aperture (*H*) measured from the bottom plane of the **base plate**, as shown in Figure 108a, is limited to the point where the line of sight, from the ordinary operator's head position to the tip of the saw blade cutting the wood, is intersecting the outer surface of the **upper guard**.

The maximum permissible height H, in millimetres, is given by the formula

$$H = 848U / (205 + S)$$

where

U is the maximum distance, in millimetres, from the **cutting edge zone** of a saw blade with diameter ***D*** to the outer surface of the **upper guard** at the top end of the viewing aperture, measured perpendicularly to the plane of the saw blade (see Figure 108b);

S is the distance, in millimetres, from the plane of the saw blade to a parallel centre plane of the switch handle (see Figure 108c).

*Compliance is checked by measurement, which shall be conducted with the **base plate** set to **maximum depth of cut** and 90°.*

19.101.2.3 Except as specified in 19.101.2.4, the perpendicular projection of the **upper guard** on to the blade shall cover at least the **cutting edge zone** of the smallest specified blade. The space between the **upper guard** and the blade diameter in accordance with the marking required by 8.3 shall be designed to prevent contact with the saw blade teeth tips of that specified blade.

*Compliance is checked with the test probe 'a' of Figure 105, which is inserted at any angle and to the depth possible, as illustrated in Figure 106. For the test, the saw set is fitted with a 2 mm thick steel disc with the smallest specified diameter in accordance with 8.3, set for 0° **bevel angle** and **maximum depth of cut**. The test probe shall not be able to contact the edge of the steel disc.*

19.101.2.4 For saws having an inclinable **base plate** for the purpose of bevelling, the distance '*x*', along any line perpendicular to the plane of the **base plate** between:

– any plane that is parallel to the bottom of the **base plate** that makes contact with an upper edge of the **base plate** nearest to the blade,

and

– the edge of the lateral side of the **upper guard** on the side opposite to the motor and adjacent to the front **cutting edge zone** of the blade, as shown in Figure 109,

shall not exceed:

a) 38 mm for **circular saws** with a maximum blade diameter less than 265 mm;

b) 45 mm for **circular saws** with a maximum blade diameter equal or greater than 265 mm;

c) 55 mm for **circular saws** with a maximum blade diameter equal or greater than 265 mm and where the **lower guard** is not provided with any retracting handle and the only means for operating the **lower guard** is remotely from the motor side of the **upper guard**.

*Compliance is checked by measurement of the distance 'x' along the lines perpendicular to the plane of the **base plate**, as shown in Figure 109.*

*For all saws where the depth-of-cut setting is achieved by pivoting the **base plate** at the front of the blade, the measurements shall be conducted with the **base plate** set for the 90° setting and to **maximum depth of cut**.*

*For saws where the depth-of-cut setting is achieved by pivoting the **base plate** at the rear of the blade or where the **base plate** at minimum and maximum depth of cut are parallel, the measurements shall be conducted with the **base plate** set for the 90° setting and to any depth of cut.*

19.101.2.5 The **cutting edge zone** of the blade above the **base plate** shall not be accessible from the front of the saw.

*Compliance is checked with the rigid test probe 'b' of Figure 110 which shall not contact the periphery of a blade with diameter **D** when the saw is set for a 0° **bevel angle** and any depth of cut and the probe 'b' is centred with the blade then advanced in any single plane perpendicular to the blade and parallel to the **base plate**, as illustrated in Figure 111. The test is repeated with probe 'b' offset 13 mm to the right of the blade centre and then offset 13 mm to the left of the blade centre.*

19.101.3 Saws using a **guarding system** as shown in Figure 104 shall be equipped with an **upper guard** into which any blade with a diameter in accordance with 8.3 shall automatically retract when not in use and the time required for the blade to retract into **upper guard** shall be in accordance with 19.102.4. The **upper guard** shall lock the blade automatically in the closed position, when the movement of the **base plate** is not obstructed by the workpiece.

*Compliance is checked by inspection and measurement. The measurement is carried out with the saw held by the handles and the **base plate**, initially in the horizontal plane and set to **maximum depth** of cut and 0° **bevel angle**, is released to the blade covering position.*

*The saw is then placed on a horizontal workpiece with the **base plate** at bottom. The saw is pressed by the handles downwards to the **maximum depth of cut**. After releasing the handles, the saw-unit with the saw-blade shall move upwards and lock automatically in the closed position.*

The opening in the **upper guard** for the passage of the blade and **riving knife**, if any, shall comply with 19.101.2.1, as illustrated in Figure 106.

Compliance is checked by inspection and application of the test probe 'a' of Figure 105.

The opening in the **upper guard** to allow the plunging movement of the motor shall be as small as possible.

Compliance is checked by inspection.

19.102 Guarding below the base plate

19.102.1 Guarding system as shown in Figure 101 and Figure 102

19.102.1.1 For saws using a **guarding system** as shown in Figure 101 and Figure 102, the **lower guard** shall meet the requirements of 19.102.1.2 to 19.102.1.3.

19.102.1.2 The perpendicular projection of the **lower guard** onto the blade shall cover at least the **cutting edge zone** of all specified blade diameters in accordance with 8.3, except for the blade exposure specified in 19.102.1.3 and the exposure due to the contour of the front leading edge of the **lower guard** lip to facilitate the opening of the **lower guard**.

Compliance is checked by inspection and by measurement.

19.102.1.3 When the **lower guard** is in the closed position and the **base plate** is not inclined and is set for **maximum depth of cut**, the blade periphery exposure angle ∠ACB as specified in Figure 112 shall not exceed the value specified in Table 101. When the **base plate** is configured for bevel setting other than zero, it is necessary to increase the angle ∠ACB to facilitate an unassisted **lower guard** opening.

Table 101
Lower guard exposure angle

The outboard section of the base plate configuration	**∠ACB**
does not surround the blade on the side opposite the motor, or is removable, or the principal dimension *G* of the **base plate**, as specified in Figure 113, is less than 0,10 ***D***	0°
surrounds the blade on the side opposite the motor and the principal dimension *G* of the **base plate** as specified in Figure 113, is from 0,10 ***D*** to 0,15 ***D***	10°
surrounds the blade on the side opposite the motor and the principal dimension *G* of the **base plate**, as specified in Figure 113, is greater than 0,15 ***D***	25°

Compliance is checked by inspection and by measurement.

19.102.2 For saws using a **guarding system** as shown in Figure 103, the **lower guard** in the closed position shall cover the **cutting edge zone** of all specified blade diameters in accordance with 8.3 and shall automatically lock in the closed position when the movement of the lower guard is not obstructed by the workpiece and allowed to close.

*Compliance is checked with the test probe 'a' of Figure 105 when inserted at any angle and to the depth possible as illustrated in Figure 106. It shall not be able to contact the **cutting edge zone** of the blade.*

19.102.3 For saws using a **guarding system** as shown in Figure 102 and Figure 103 equipped with a **riving knife**, the **lower guard** of which needs to allow for the passage of the blade, **riving knife** and its holder, the apertures in the **lower guard** shall be kept as small as possible.

*Compliance is checked with the test probe 'a' of Figure 105 when inserted at any angle and to the depth possible. It shall not be able to contact the **cutting edge zone** of a blade with diameter **D** as illustrated in Figure 106, with the saw adjusted to the most unfavourable depth-of-cut setting.*

19.102.4 For saws with a diameter ***D*** less than 210 mm, the closing time of the lower guard shall not exceed 0,2 s. For saws with a diameter ***D*** of 210 mm and above, the closing time of the **lower guard** in seconds, shall be less than the numerical equivalent of ***D***, expressed in metres, but not more than 0,3 s.

*Compliance is checked by measurement carried out at **maximum depth of cut** and 0° **bevel angle**. The saw is held with the **base plate** in horizontal position, the lower guard being at bottom. The **lower guard** is retracted fully and then allowed to close.*

19.103 Base plate

19.103.1 The **base plate** shall surround the saw blade at least from the front, rear and the motor side. The portion of the **base plate** on the saw blade side, referred to as the outboard section of the **base plate**, may be fixed, adjustable, hinged or removable. The **base plate** shall have the following principal dimensions as specified in Figure 113:

F > 0,2 ***D***

G > 0

where

F is the shortest dimension below the **base plate**, measured from the periphery of a blade with diameter ***D*** to the nearest surface of the probe 'a' of Figure 105 that is held in contact with the edge of the **base plate** and in a perpendicular orientation to the **base plate** at any location in front of the saw blade except for the outboard section;

G is the smallest dimension measured from the outside edge of the **base plate** on the blade side to the nearest surface of a blade with the thickest saw blade body specified by the manufacturer in accordance with 8.14.2 a) 102):

– if the outboard section of the **base plate** is adjustable or hinged, G is the smallest dimension permitted by the design;

– if the outboard section of the **base plate** is removable, *G* is the smallest distance from the plane of the outboard side of the blade to the outside edge of the fixed part of the **base plate** at the front of the blade.

*Compliance is checked by measurement at **maximum depth** of cut and 0° **bevel angle**.*

19.103.2 The **base plate** dimensions and the weight distribution of the saw shall be such that it does not cause blade binding.

Compliance is checked by the following test.

*The saw is set to **maximum depth of cut**, with blade and **riving knife** if any, removed. Any outboard section provided with the saw is adjusted to the most adverse position. The position of the cord shall not influence the outcome of the test. For **plunge type saws**, Figure 104, the base plate is fixed to remain at maximum depth of cut. Then the **base plate** of the saw is placed on a horizontal flat surface and the **lower guard** of saws shown in Figure 101, Figure 102 and Figure 103 is fixed in the open position. The saw shall not tip over and the base plate shall remain the only supporting structure. The test is performed with the **base plate** set at 90° and at the maximum bevel setting.*

19.104 **Flanges**

The outer diameter of the clamping surface overlap of the flanges shall be not less than 0,15 ***D*** and at least one of the flanges shall be locked or keyed to the output spindle. The clamping surface overlap ***a*** of the two flanges shall be at least 1,5 mm wide, as specified in Figure 114.

Compliance is checked by inspection and by measurement.

19.105 **Handles**

Saws with a maximum blade diameter larger than 140 mm shall have at least two handles.

For saws with a mass less than 6 kg, the motor casing may be considered as a second handle. In this case, the motor casing shall be suitably shaped.

Compliance is checked by inspection and by measurement.

19.106 **Blade changing**

Provision shall be made to enable the operator to replace the blade without difficulty and without having to remove guards.

Examples of such designs are: spindle lock, flats on the outer flange or other means specified in the instructions as required by 8.14.2.

Compliance is checked by inspection.

20 Mechanical strength

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

20.1 *Addition:*

*In addition, following the tests, the **lower guard** or the **guarding system** shall comply with the tests in 17.101.2 and 17.101.3.*

20.3 *Replacement:*

*A **circular saw** set at 0° **bevel angle** shall withstand being dropped three times in total on a concrete surface from a height of 1 m. For these three drops, the sample shall be positioned to vary the point of impact in the three most unfavourable positions and the lowest point of the tool shall be 1 m above the concrete surface.*

*Saws using a **guarding system** as shown in Figure 101, Figure 102 and Figure 103 are set for **maximum depth of cut**. An impact to the **lower guard** or the **riving knife** shall be avoided. This may be accomplished by removing the **riving knife** and by fixing the **lower guard** in a fully retracted position or removing the **lower guard**.*

*Saws using a **guarding system** as shown in Figure 104 are tested in the fully blade covering position. An impact to the **base plate** shall be avoided.*

*If the **riving knife** and the **lower guard** were removed, they shall be reinstalled without altering the condition of saw, prior to any evaluation of the **circular saw**.*

NOTE 1 While primary impacts can be controlled by orientation of the saw prior to the drop, a method for avoiding secondary impacts to the **lower guard** is tethering.

NOTE 2 Impact tests on the **lower guard** are made in Annex BB.

21 Construction

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

21.18.1.1 *Addition:*

Circular saws are regarded as tools with a risk associated with continued locked-on operation.

21.1.1.2 *Replacement:*

Circular saws are regarded as tools with a risk associated with inadvertent starting. The power switch trigger and lock-off devices, if any, shall be so located, designed or guarded that inadvertent operation is unlikely to occur.

The travel from "off" to "on" of the part of the power switch actuator that has the greatest travel shall not be less than 6,4 mm;

or

two separate and dissimilar actions shall be necessary before the motor is switched on (e. g. a power switch which has to be pushed in before it can be moved laterally to close the contacts to start the motor). It shall not be possible to achieve these two actions with a single grasping motion or straight line motion.

Compliance is checked by inspection and manual test.

21.35 This clause of Part 1 is applicable.

21.101 The saw, without use of any attachments or modification, shall be designed so that it cannot be used as a stationary tool in the inverted position.

Compliance is checked by inspection.

NOTE In Europe (EN 62841-2-5), the following additional subclause applies:

The saw blade provided with the tool, if intended for cutting wood and analogous materials, shall comply with EN 847-1.

Compliance is checked by inspection and by receipt of relevant information from the saw blade manufacturer.

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

This clause of Part 1 is applicable.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable.

24.1DV *National Difference deleted*

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

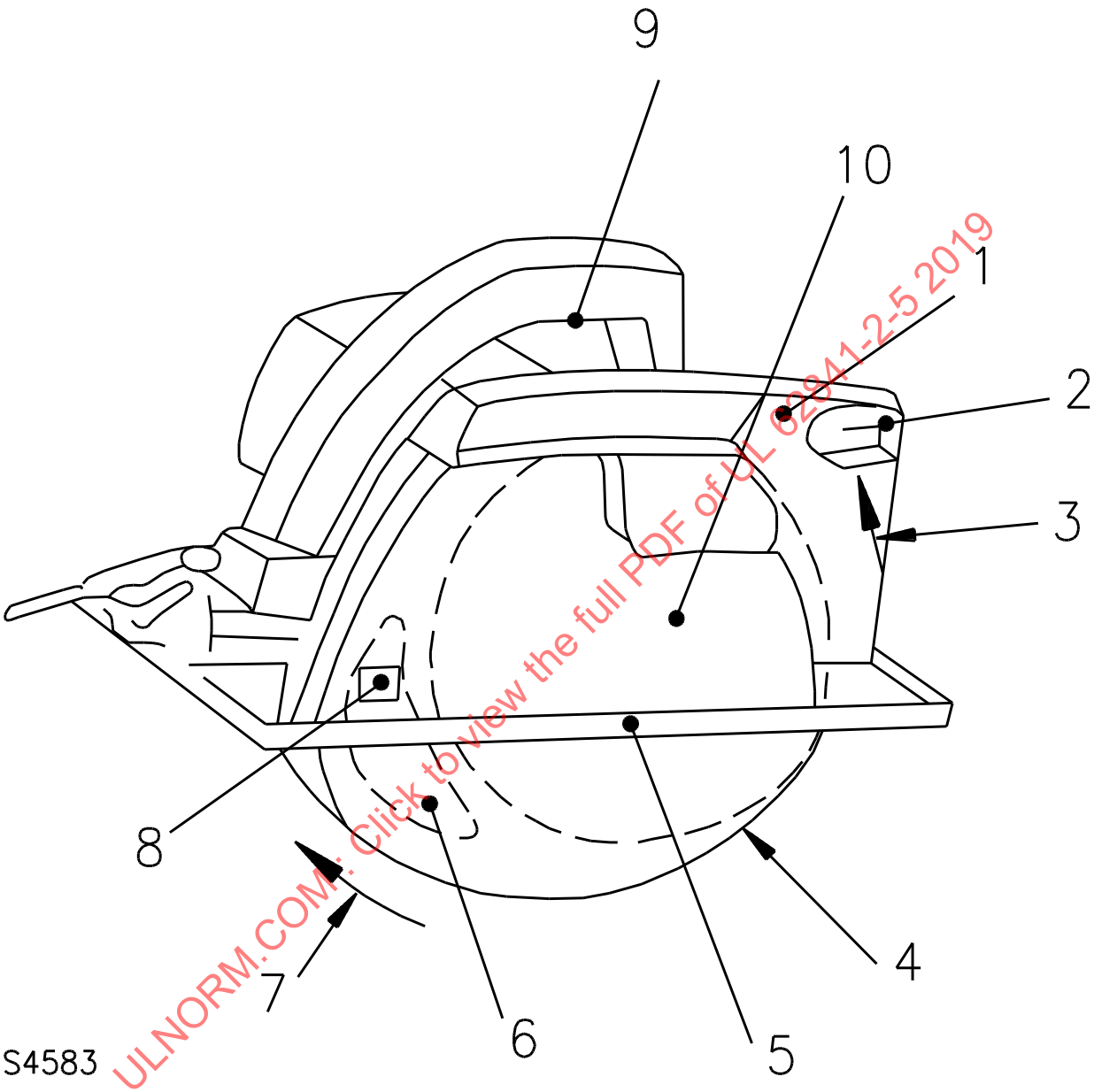
This clause of Part 1 is applicable.

28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.

Figure 101

Circular saw with outer pendulum guard



Key to Figure 101 to Figure 104

1 **upper guard**

2 chip ejection port

3 indication of direction of saw blade rotation

4 **lower guard**

5 **base plate**

6 **riving knife**

7 direction of **lower guard** opening

8 holder for **riving knife**

9 power switch

10 saw blade

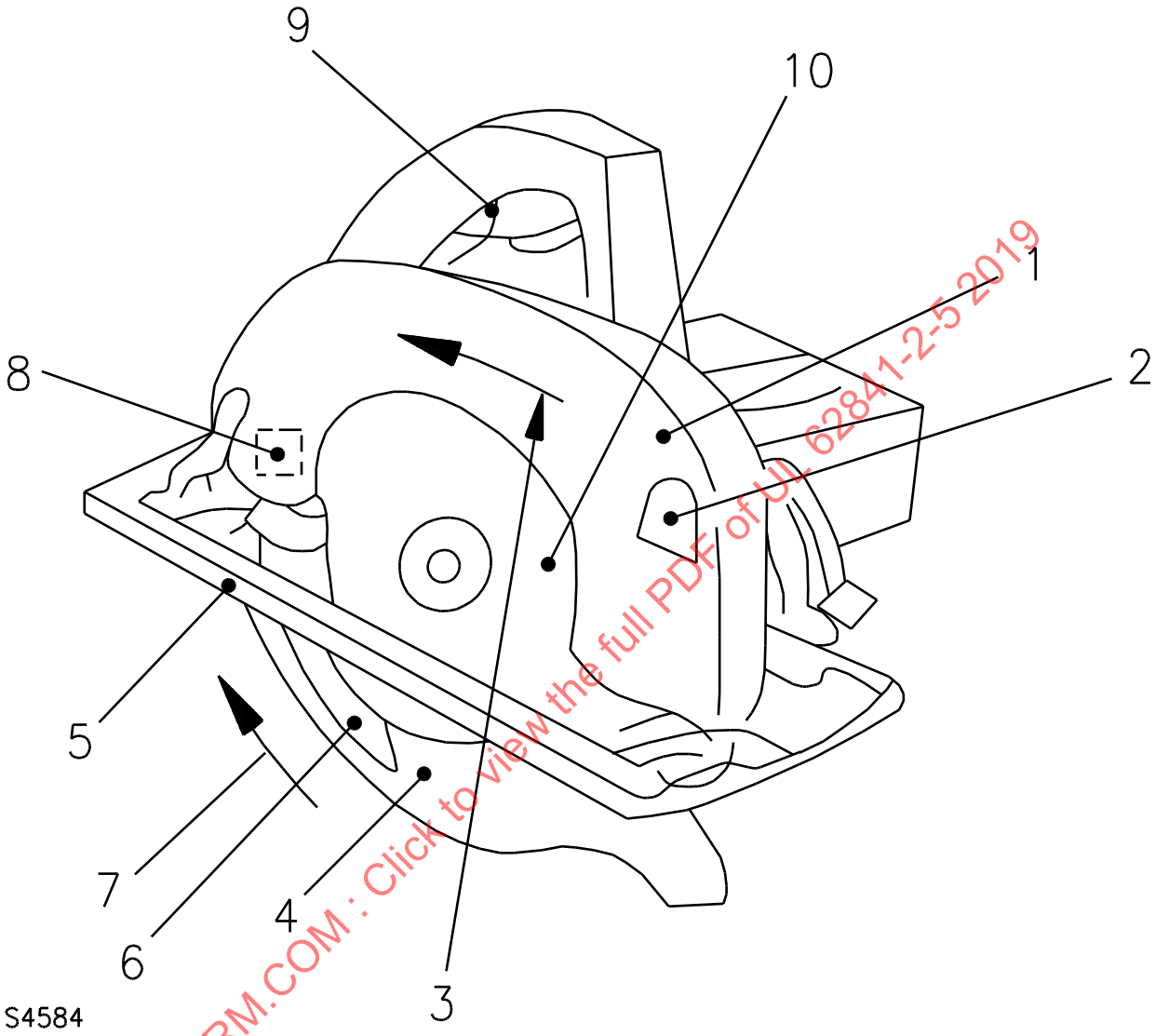
11 lever for unlocking tow guard lock

12 lever for unlocking plunge guard lock

13 direction of plunging movement

Figure 102

Circular saw with inner pendulum guard



Key to Figure 101 to Figure 104

1 **upper guard**

2 chip ejection port

3 indication of direction of saw blade rotation

4 **lower guard**

5 **base plate**

6 **riving knife**

7 direction of **lower guard** opening

8 holder for **riving knife**

9 power switch

10 saw blade

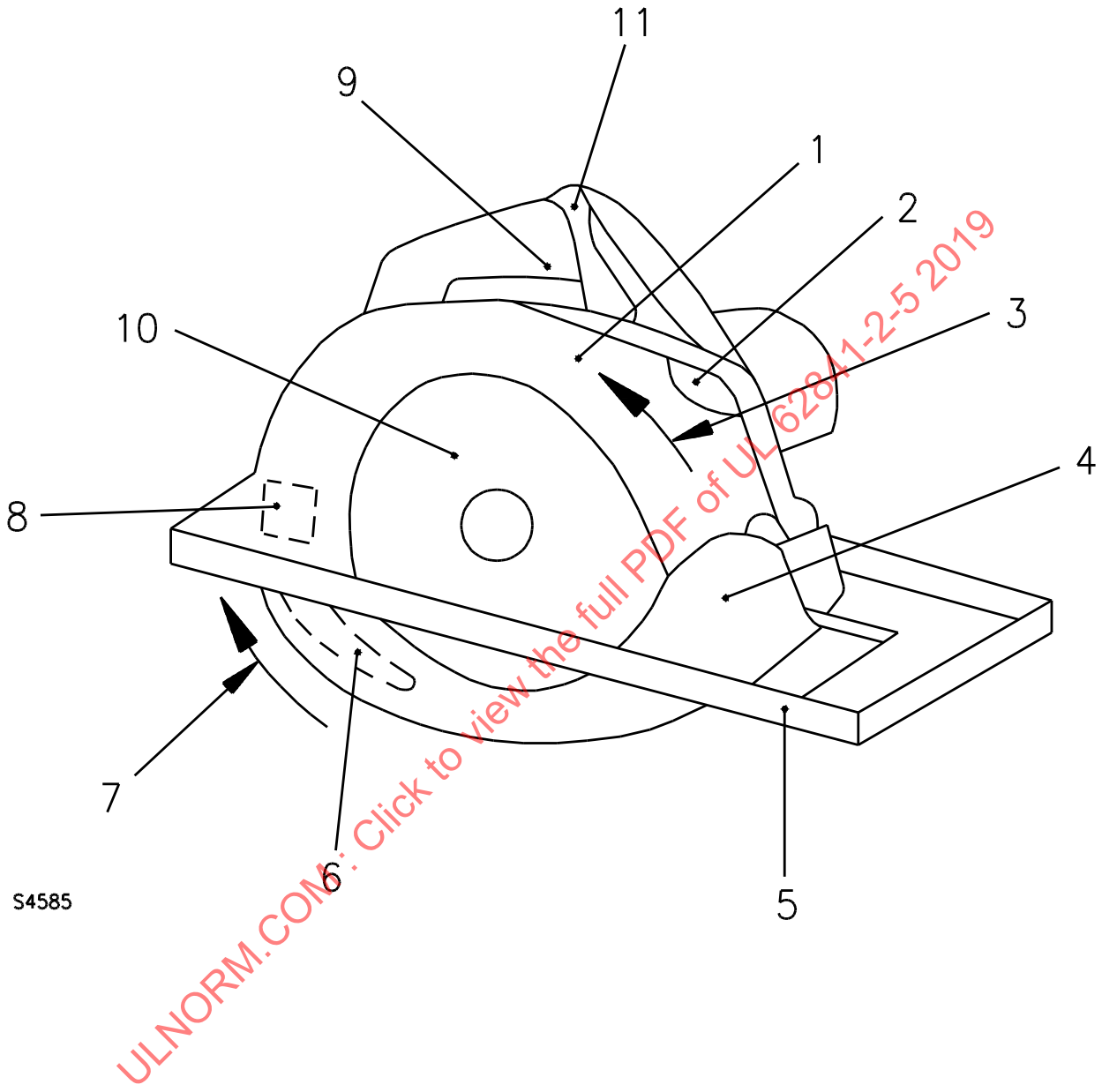
11 lever for unlocking tow guard lock

12 lever for unlocking plunge guard lock

13 direction of plunging movement

Figure 103

Circular saw with tow guard



Key to Figure 101 to Figure 104

1 **upper guard**

2 chip ejection port

3 indication of direction of saw blade rotation

4 **lower guard**

5 **base plate**

6 **riving knife**

7 direction of **lower guard** opening

8 holder for **riving knife**

9 power switch

10 saw blade

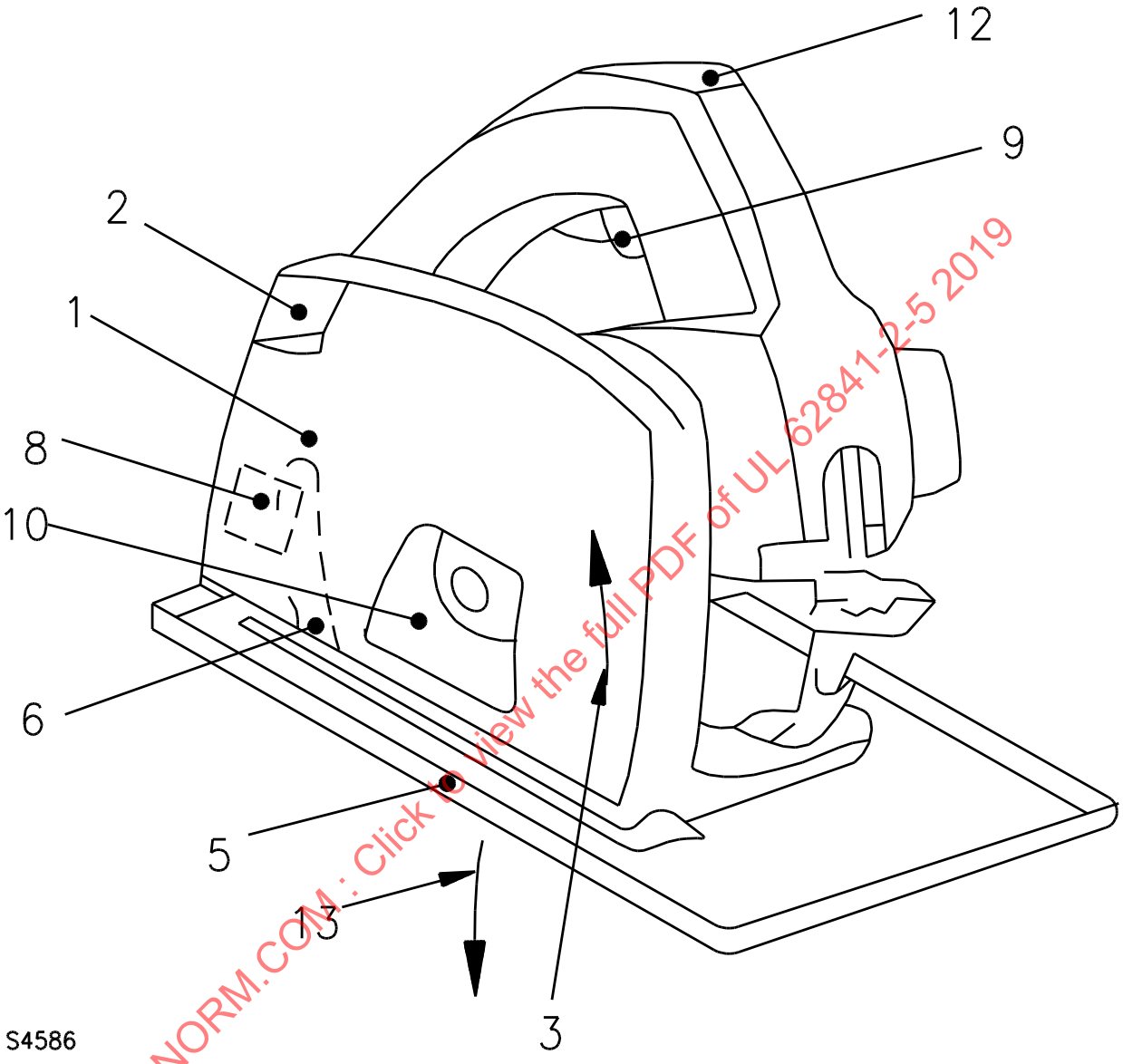
11 lever for unlocking tow guard lock

12 lever for unlocking plunge guard lock

13 direction of plunging movement

Figure 104

Plunge type saw



Key to Figure 101 to Figure 104

1 **upper guard**

2 chip ejection port

3 indication of direction of saw blade rotation

4 **lower guard**

5 **base plate**

6 **riving knife**

7 direction of **lower guard** opening

8 holder for **riving knife**

9 power switch

10 saw blade

11 lever for unlocking tow guard lock

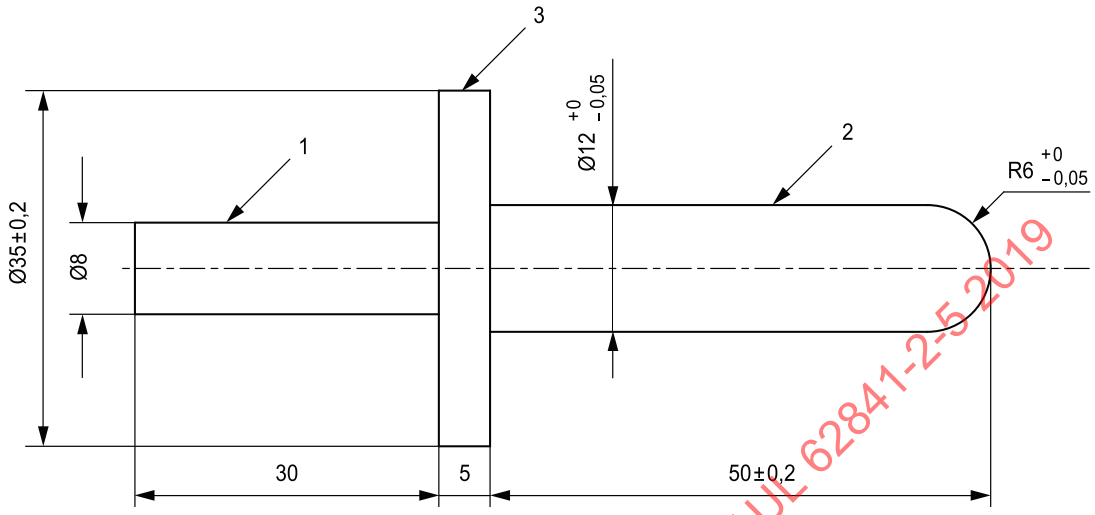
12 lever for unlocking plunge guard lock

13 direction of plunging movement

Figure 105

Test probe 'a'

Dimensions in millimetres



su0667a

Key

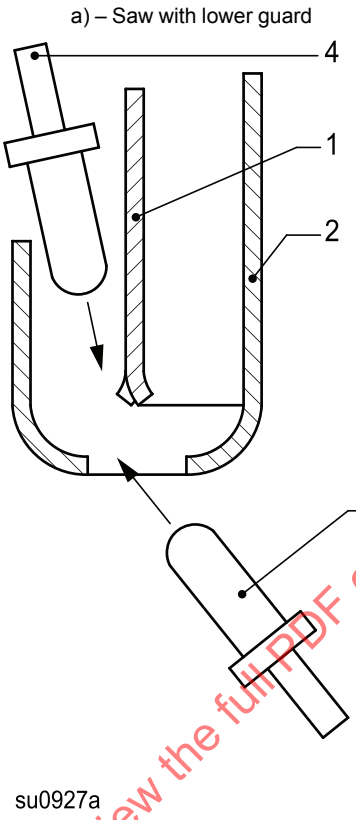
1 handle section

2 test section

3 probe's flange

Figure 106

Use of test probe 'a' on circular saw guards



Key

1 saw blade

2 guard

3 **base plate**

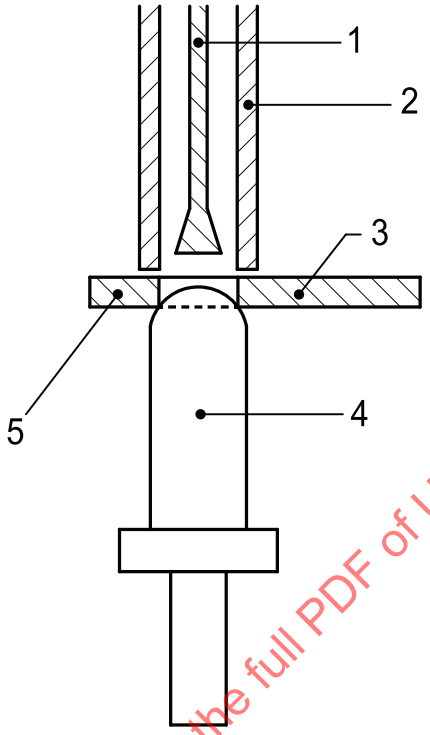
4 test probe 'a'

5 outboard section of the **base plate**

Figure 106

Use of test probe 'a' on circular saw guards

b) – Plunge type saw with outboard section



Key

1 saw blade

2 guard

3 **base plate**

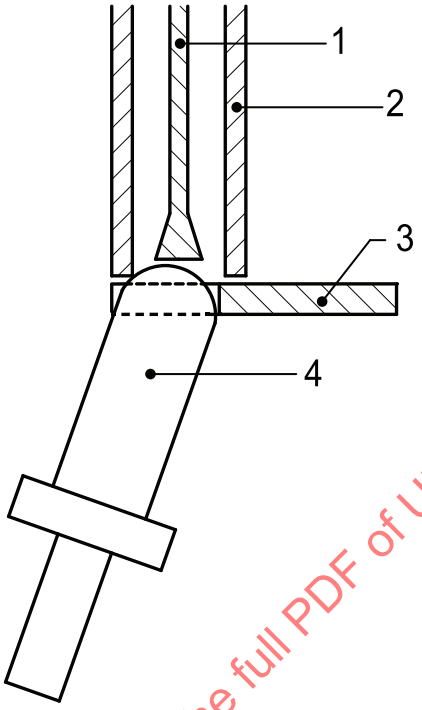
4 test probe 'a'

5 outboard section of the **base plate**

Figure 106

Use of test probe 'a' on circular saw guards

c) – Plunge type saw without outboard section



su0927c

Key

1 saw blade

2 guard

3 **base plate**

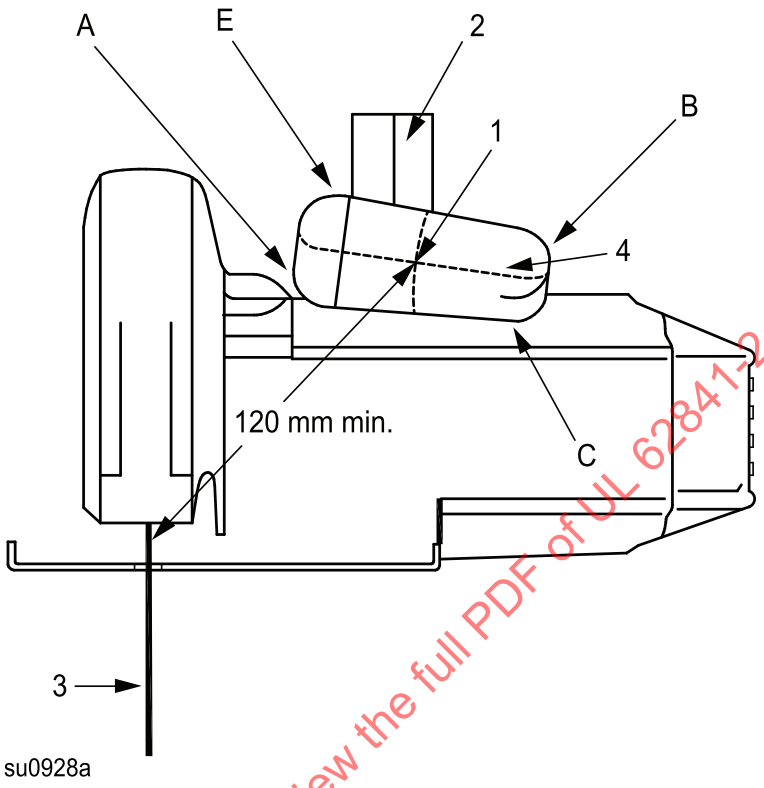
4 test probe 'a'

5 outboard section of the **base plate**

Figure 107

Distance from the gripping surface to the blade's cutting edge zone

a) – Circular saw with auxiliary handle



Key

1 defined measurement point

2 main handle

3 blade

4 auxiliary handle

A point on auxiliary handle/motor casing closest to the saw blade

B point on auxiliary handle/motor casing most distant from the saw blade

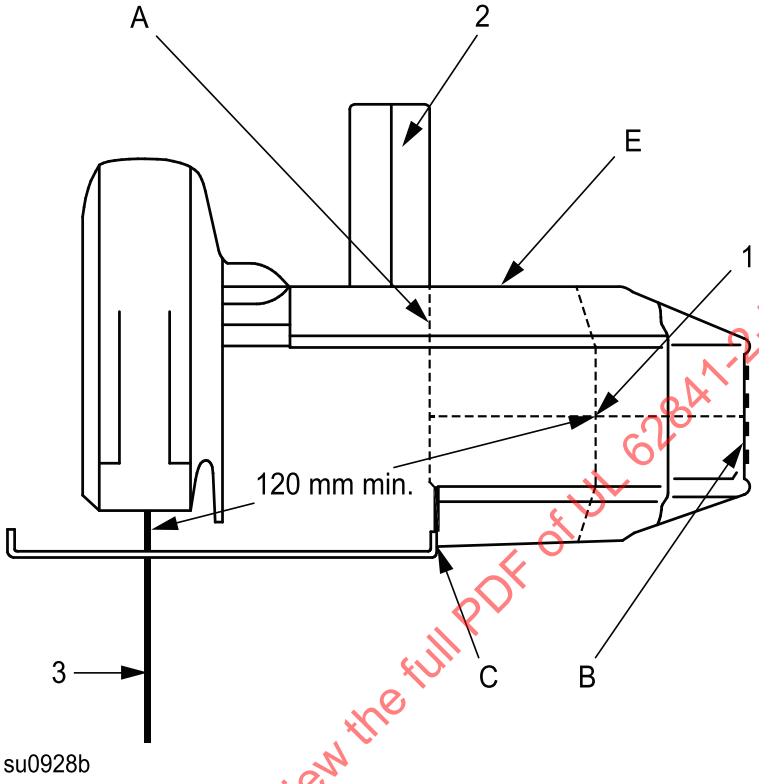
C point on auxiliary handle/motor casing closest to the plane of the **base plate**

E point on auxiliary handle/motor casing most distant from the plane of the **base plate**

Figure 107

Distance from the gripping surface to the blade's cutting edge zone

b) Circular saw with auxiliary handle (motor casing as grasping area)



Key

1 defined measurement point

2 main handle

3 blade

4 auxiliary handle

A point on auxiliary handle/motor casing closest to the saw blade

B point on auxiliary handle/motor casing most distant from the saw blade

C point on auxiliary handle/motor casing closest to the plane of the **base plate**

E point on auxiliary handle/motor casing most distant from the plane of the **base plate**

Figure 108

Height restriction of the viewing aperture (see 19.101.2.2)

a) Height H of viewing aperture

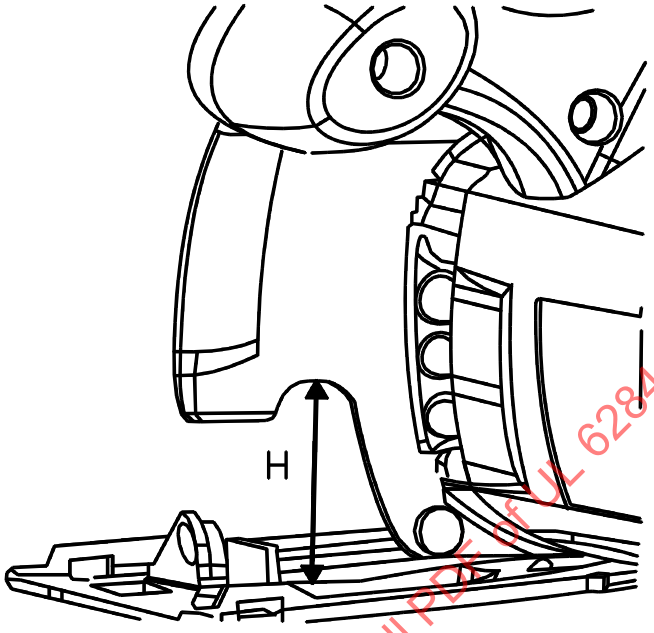


Figure 108

Height restriction of the viewing aperture (see 19.101.2.2)

b) Dimension *U*

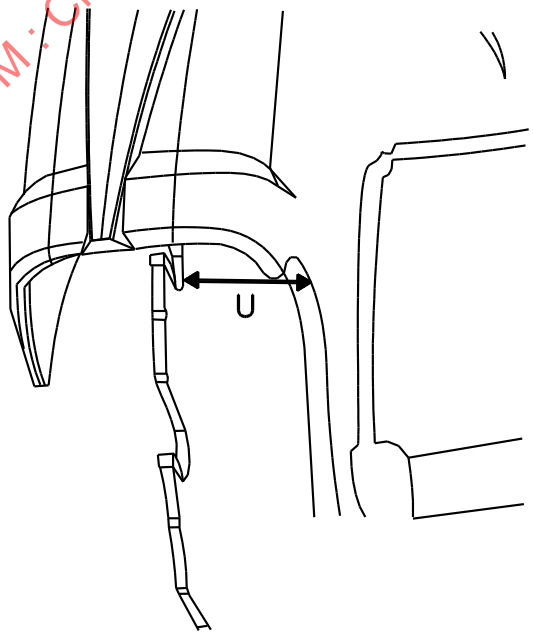


Figure 108

Height restriction of the viewing aperture (see 19.101.2.2)

c) Dimension *S*

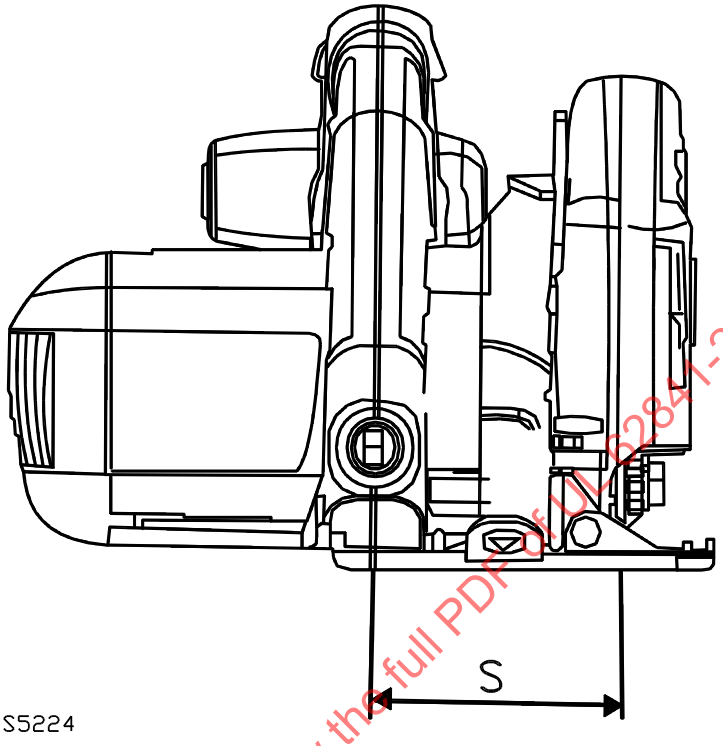
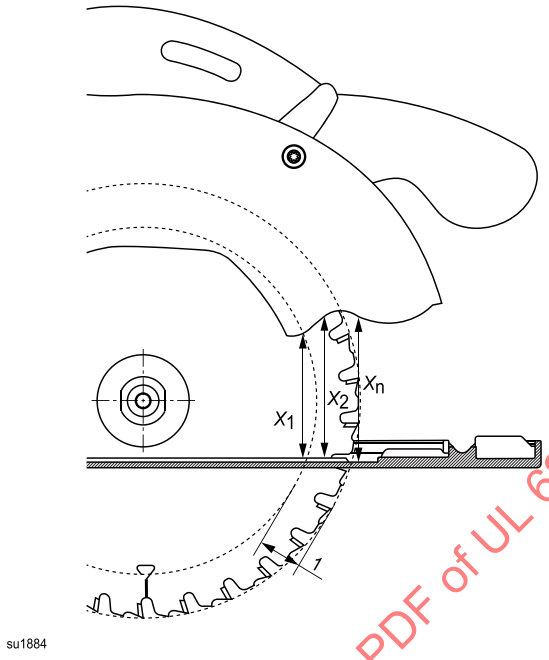


Figure 109

Distance from the edge of the lateral side of the upper guard to the base plate



Key

1 **cutting edge zone**

x = max (x_1, x_2..., x_n)

Figure 110

Test probe 'b'

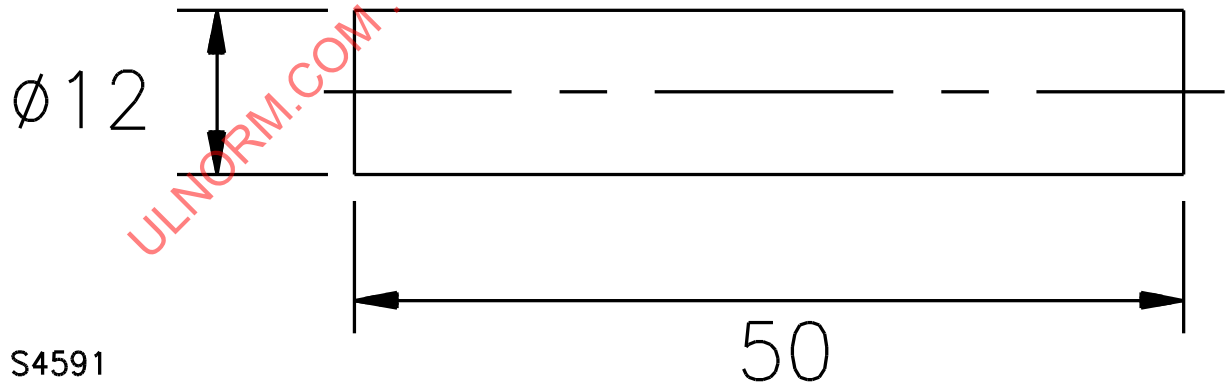
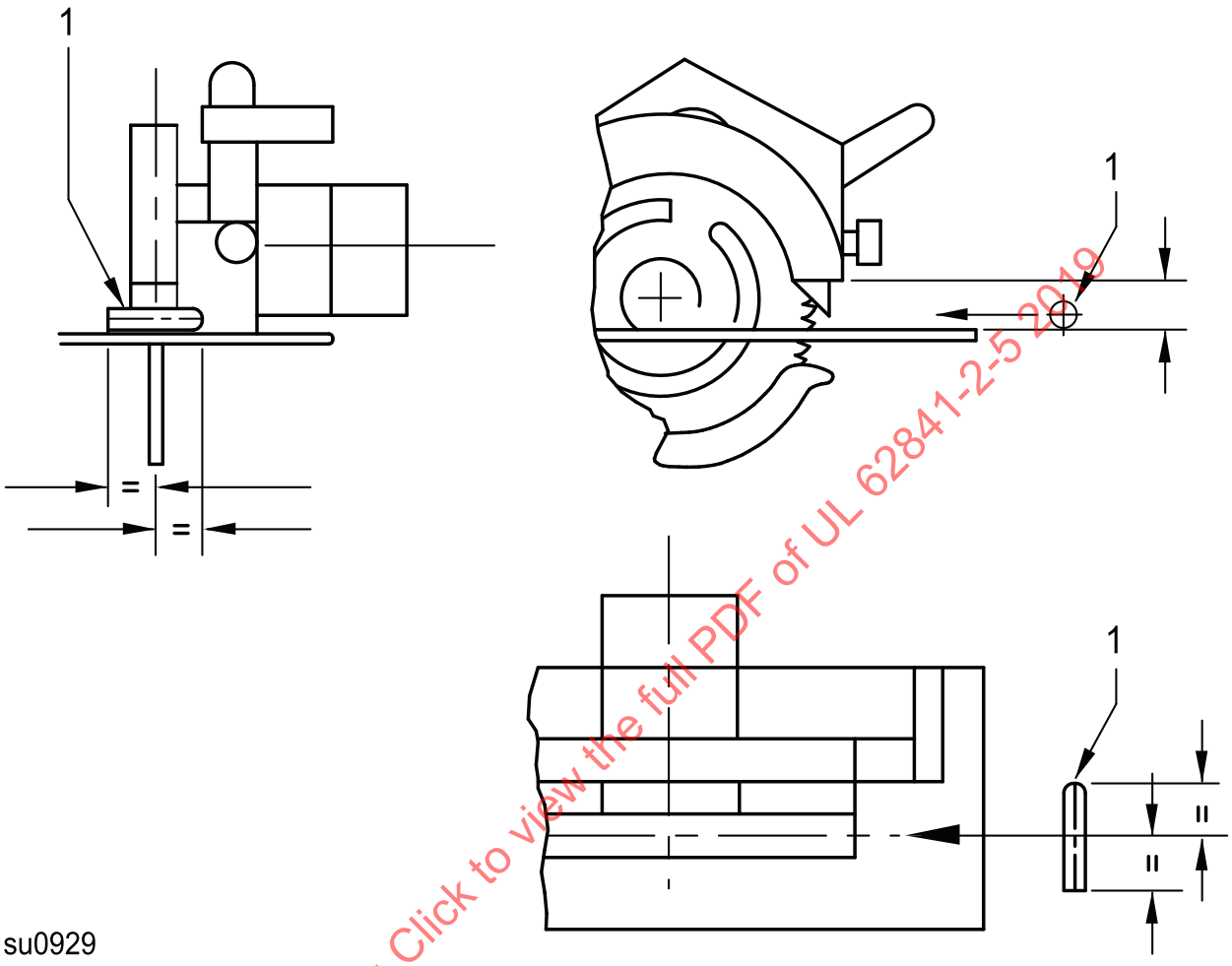


Figure 111

Accessibility to the front cutting edge zone



su0929

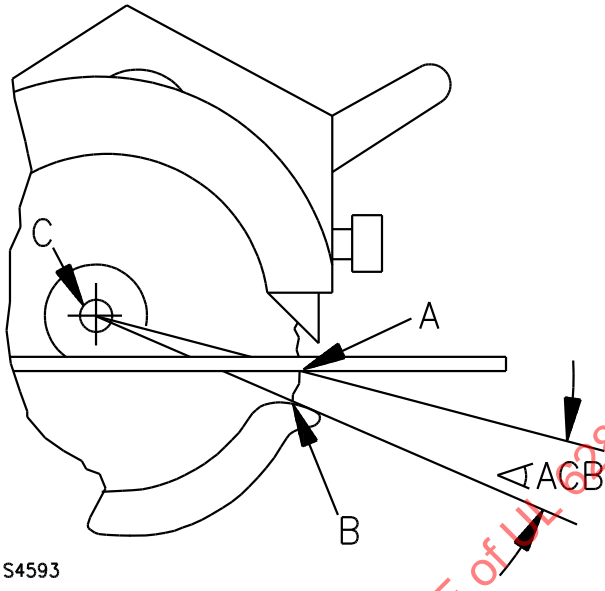
Key

1 test probe 'b'

= means that the distances are equal

Figure 112

Blade exposure angle of the lower guard



Key

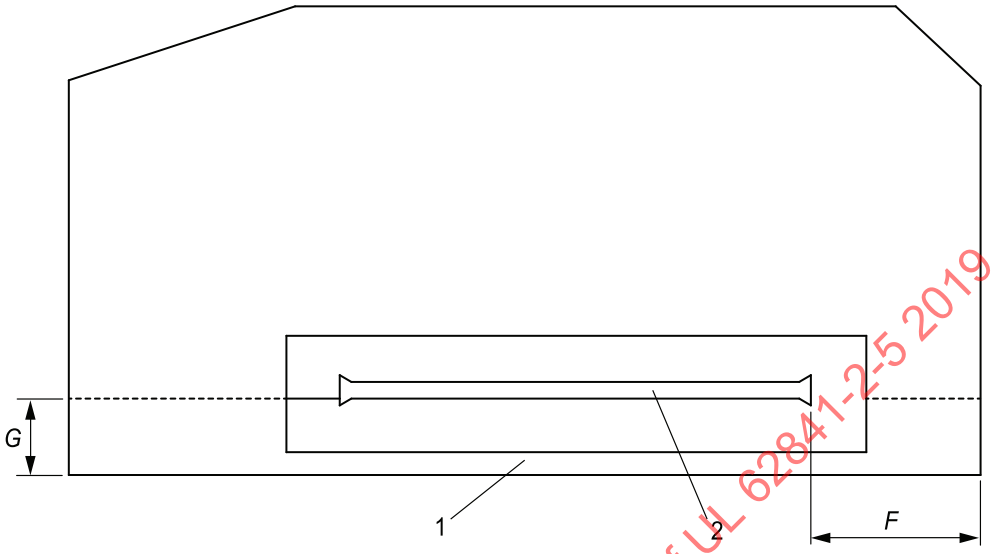
A) A blade periphery intersect point of the maximum blade diameter with the bottom plane of the **base plate**

B) blade periphery intersect point of the maximum blade diameter with the perpendicular projection of either side of the **lower guard** onto the blade that yields the largest ∠ ACB

C) centre of blade

Figure 113

Principal dimensions of the base plate



Key

1 outboard section of the **base plate**

2 saw blade

G, *F* principal dimensions, see 19.103.1

NOTE The illustrated shape of the **base plate** is only an example and not a required design.