UL 60745-2-5

STANDARD FOR SAFETY

Hand-Held Motor-Operated Electric Tools – Safety – Part 2-5: Particular Requirements for Circular Saws

UL Standard for Safety for Hand-Held Motor-Operated Electric Tools – Safety – Part 2-5: Particular Requirements for Circular Saws, UL 60745-2-5

Fifth Edition, Dated March 20, 2012

Summary of Topics

This revision of ANSI/UL 60745-2-5 is being issued to reaffirm approval as an American National Standard. No changes in requirements are involved.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL and CSA are committed to updating this harmonized standard jointly. However, the revision pages dated May 24, 2017 will not be jointly issued by UL and CSA as these revision pages only address UL ANSI approval dates.

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.

No Text on This Page

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Hand-Held Motor-Operated Electric Tools – Safety – Part 2-5: Particular Requirements for Circular Saws

March 20, 2012

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This national standard is based on publication IEC 60745-2-5, Fifth Edition (2010).

Approved by

Standards Council of Canada
Conseil canadien des normes

ANSI/UL 60745-2-5-2012 (R2017)

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (CSA) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA and UL. CSA 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. 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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The most recent designation of ANSI/UL 60745-2-5 as a Reaffirmed American National Standard (ANS) occurred on May 24, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

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

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Preface

This is the harmonized CSA and UL standard for Hand-Held Motor-Operated Electric Tools – Safety – Part 2-5: Particular Requirements for Circular Saws. It is the fourth edition of CAN/CSA-C22.2 No. 60745-2-5 and the fifth edition of UL 60745-2-5. This standard is based on IEC 60745-2-5, fifth edition.

This standard (CAN/CSA-C22.2 No. 60745-2-5, fourth edition and UL 60745-2-5, fifth edition) supersedes the third edition of CAN/CSA-C22.2 No. 60745-2-5 and the fourth edition of UL 60745-2-5, published in 2007.

This harmonized standard was prepared by the Canadian Standards Association (CSA) and Underwriters Laboratories Inc. (UL).

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 approved as a National Standard of Canada by the Standards Council of Canada (SCC).

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

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

Level of Harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for CSA 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 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

Differences from the IEC are being added in order to address regulatory and safety 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 literal interpretation 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.

CSA Effective Date

The effective date for CSA International will be announced through CSA Informs or a CSA certification notice.

UL Effective Date

The effective date for UL 60745-2-5, fifth edition, is March 31, 2014.

Between the present and March 31, 2014 new product submittals to UL must be evaluated under all requirements in this Standard or, if requested in writing, evaluated under presently effective requirements only.

As of March 31, 2014, all products Listed or Recognized by UL shall comply with the requirements in this standard.

A UL effective date is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard.

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NATIONAL DIFFERENCES

GENERAL

National Differences from the text of International Electrotechnical Commission (IEC) Publication IEC 60745-2-5, Hand-Held Motor-Operated Electrical Tools – Safety – Part 2-5: Particular Requirements for Circular Saws, copyright 2010, are indicated by notations (differences) and are presented in bold text.

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.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – Part 2-5: Particular requirements for circular saws

FOREWORD

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 nongovernmental 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 60745-2-5 has been prepared by IEC technical committee 116: Safety of hand-held motor-operated electric tools.

This fifth edition cancels and replaces the fourth edition published in 2006, of which it constitutes a technical revision.

Main changes include: in Clause 17, Endurance: introduction of endurance tests in practical use for the guards of all types of saws; in Clause 19, Mechanical hazards: clarifications and editorial improvement in respect to the guarding; and in Annex M, Safety of working stands for operation with hand-held motor-operated electric tools: editorial improvements.

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

FDIS	Report on voting
116/41/FDIS	116/52/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 fourth edition of IEC 60745-1, *Hand-held motor-operated electric tools – Safety – Part 1: General requirements*. It was established on the basis of the fourth edition (2006) of that standard.

NOTE 1 When ″Part 1″ is mentioned in this standard, it refers to IEC 60745-1.

This part 2 supplements or modifies the corresponding clauses of IEC 60745-1, so as to convert that publication into the IEC standard: Safety requirements for circular saws.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states ″addition″, ″modification″ or ″replacement″, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, items, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– additional annexes are lettered AA, BB, etc.

NOTE 3 In this standard, the following print types are used:

– requirements: in roman type;

test specifications: in italic type;

notes: in smaller roman type.

A list of all parts of IEC 60745 series, under the general title *Hand-held motor-operated electric tools – Safety*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

DV.101 DE *Addition to the part 2:*

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.

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – Part 2-5: particular requirements for circular saws

1 Scope

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

Addition:

This standard applies to 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 60745-2-22.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

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

Additional definitions:

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

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

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

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

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

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

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

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

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

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

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

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable.

6 Void

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:

– direction of rotation of the spindle, indicated on the tool by an arrow, raised or recessed or by any other means no less visible and indelible;

– rated no-load speed of the output spindle;

– specified blade diameter or blade diameter range.

8.1DV D1 *Modification: Add the following to Subclause 8.1 of this Part 2:*

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

– WARNING - To reduce the risk of injury, check guarding system. It must cover the blade instantly! Hold saw with both hands. Support and clamp work. Wear eye protection.

If this cautionary marking is included as part of the cautionary marking required in Part 1, Subclause 8.1, the words ″WARNING - To reduce the risk of injury″ need not be repeated.

For circular saws with 140 mm or smaller diameter blades, the words ″Hold saw with both hands″ may be omitted.

Additional subclause:

8.12.1.101 The following additional safety instructions 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 safety instructions.

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

8.12.1.101.1 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 140 mm or smaller diameter blades, the "Keep your second hand on auxiliary handle, or motor housing" may be omitted.

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 piece being cut in your hands or across your leg. Secure the workpiece to a stable platform.** *It is important to support the work properly to minimize body exposure, blade binding, or loss of control.*

e) **Hold the power tool by insulated gripping surfaces only, 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 eccentrically, 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.*

8.12.1.101.2 Further safety instructions for all saws

Kickback causes and related warnings

– Kickback is a sudden reaction to a pinched, bound 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 bound 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 140 mm or smaller diameter blades, the words "with both hands" may be omitted.

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 and check that saw teeth are not engaged into the material.** *If saw blade is binding, 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 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.*

8.12.1.101.3 Safety instructions for saws shown in Figures 101, 102, and 103

Lower guard function

a) **Check lower guard for proper closing before each use. Do not operate the saw if lower guard does not move freely and close instantly. Never clamp or tie the lower guard into the open position.** *If saw is accidentally dropped, 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 may be substituted for "retracting handle."

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

NOTE: Alternate wording may be substituted for "retracting handle."

d) **Always observe that the lower guard is covering the blade before placing 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.*

8.12.1.101.4 Safety instructions for saws shown in Figure 104

Guard function

a) **Check guard for proper closing before each use. Do not operate the saw if guard does not move freely and enclose the blade instantly. Never clamp or tie the guard so that the blade is exposed.** *If saw is accidentally dropped, guard may be bent. Check to make sure that 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.** *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 the "plunge cut" when the blade bevel setting is not at 90°.** *Blade shifting sideways will cause binding and likely kick back.*

d) **Always observe that the guard is covering the blade before placing 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.*

8.12.1.101.5 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.** *Riving knife must be replaced after plunge cutting. Riving knife causes interference during plunge cutting and can create kickback.*

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 riving knife is bent.** *Even a light interference can slow the closing rate of a guard.*

8.12.2 a) *Addition:*

101) Instructions not to use any abrasive wheels.

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

– instructions 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) Instructions to use only blade diameter(s) in accordance with the markings.

8.12.2 b) *Addition:*

101) Instructions for the blade changing procedure.

102) Instruction how to check the function of all blade guard operations.

103) 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.

104) Instruction on the correct use of the dust collection system.

8.12.2 c) *Addition:*

101) Instructions 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 Leakage current

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is applicable.

15 Electric strength

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:

Additional subclauses:

17.101 To provide sufficient endurance for extended use, the lower guard as shown in Figures 101, 102 and 103, or the guarding system as shown in Figure 104, 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 90° 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 17.101.1 and 17.101.2.

17.101.1 The test and measurement is carried out at maximum depth of cut and 90°. The saw is held by the handles 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 Figures 101, 102 and 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.

17.101.2 The following tests and measurements are carried out at maximum depth of cut, at 90° 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 guarding system as shown in Figures 101 and 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 guarding system as shown in Figures 103 and 104, the lower guard, or the guarding system as shown in Figure 104, is fully retracted, released and then shall lock in the blade covering position.

17.102 The lower guard, or the guarding system as shown in Figure 104, shall be resistant against environmental and foreseeable dust accumulation.

Compliance is checked by the tests of 17.102.1 and 17.102.2, as applicable.

17.102.1 For a saw intended to cut wood based materials, a new saw sample is subjected to 1 000 cuts through each of the materials and in the order as specified below:

d) crosscutting soft wood;

e) crosscutting plywood with a minimum of 5 layers;

f) cutting standard medium density fibreboard (MDF) with 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 × D, where D is the blade diameter.

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 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.

Each cut is made with the saw set to 90° and maximum depth of cut. The cutting is conducted with a general purpose combination blade or the blade provided with the tool. An external dust extraction system attached to the saw shall not be used. A non-detachable dust collection system shall be maintained per 8.12.2 b) 104).

NOTE Adequate room ventilation and use of personal protective equipment is recommended.

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 1 K of any convenient value between 20° C and 30 °C.

The saw shall then comply with the tests of 17.101.1 and 17.101.2.

17.102.2 For a saw intended to cut materials such as plastic, metal or masonry, 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 x D^2, where D is the blade diameter.

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 cutting capacity of the saw. Sawing of such pipes is the predominant application for plastic.

– 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 the blade diameter 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 cutting capacity 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 × D, where D is the blade diameter.

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 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.

Each cut is made with the saw set to 90°. 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 8.12.2 b) 104).

NOTE 3 Adequate room ventilation and use of personal protective equipment is recommended.

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 1 K of any convenient value between 20 °C and 30 °C.

The saw shall then comply with the tests of 17.101.1 and 17.101.2.

18 Abnormal operation

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

18.10.4 *Addition:*

During these tests, the speed of the spindle shall not exceed 130 % of the rated no-load speed.

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 arranged or enclosed that, in normal use, adequate protection against injury is provided. The guarding of rotating blade is covered in 19.1.101.

Additional subclause:

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

There are four commonly used guarding systems for saws, as shown in Figures 101, 102, 103 and 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.

Other means of achieving the necessary degree of mechanical safety are allowed, provided that these are as equally effective and reliable as those specified.

Compliance is checked by inspection.

19.3 This subclause is not applicable.

Additional subclauses:

19.101 Guarding above the base plate

19.101.1 The blade above the base plate shall be guarded by the upper guard.

Compliance is checked by inspection.

19.101.2 Apertures in the guarding system above the base plate, unless otherwise specified in 19.101.2.1 to 19.101.2.4, shall be designed to prevent contact with the cutting edge zone of any specified blade.

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 90° and maximum depth of cut.

19.101.2.1 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, as illustrated in Figure 106, or it shall be limited by proximity and height restrictions.

• Proximity restriction

A minimum straight line distance of 120 mm shall be achieved between the cutting edge zone of any specified blade and the designated measuring points of the following grasping areas:

– 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 (D) point from the plane of the base plate on the auxiliary handle or motor casing defined grasping surface. Equidistant between points (C) and (D), 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 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 centreplane 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°.

19.101.2.2 The perpendicular projection of the upper guard on to the blade shall cover at least the smallest specified blade-cutting edge zone. The space between the upper guard and the blade shall be designed to prevent contact with the saw blade teeth tips of the 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. The test is performed with the saw set for 90° and maximum depth of cut.

19.101.2.3 For saws having an inclinable base plate, the distance X between the base plate 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 blade diameter less than 265 mm;

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

c) 55 mm for circular saws with 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 the cut setting is achieved by pivoting the base plate 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 the 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 are parallel, the measurements shall be conducted with the base plate set for the 90° setting and to any depth of cut.

19.101.2.4 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 blade when the saw is set for a 90° cut 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 specified blade shall automatically retract when not in use and the time required for the blade to retract into upper guard shall be in accordance with 19.102.2. The upper guard shall lock the blade automatically in the closed position, when the movement of the base plate is not obstructed by the work piece.

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 90°, 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 cutting depth. 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, 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 For saws using a guarding system as shown in Figures 101, 102 and 103, the perpendicular projection of the lower guard on to the blade shall cover at least the cutting edge zone of the smallest specified blade, except for the blade exposure specified in 19.102.3.

Compliance is checked by inspection.

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

Compliance is checked by measurements. The measurement is carried out at maximum depth of cut and 90°. 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.

19.102.3 For saws using a guarding system as shown in Figures 101 and 102, when the base plate is not inclined and is set for maximum depth of cut, and the lower guard is in the closed position, the angle <ACB of blade exposure, as specified in Figure 112, shall not exceed

– 0°, if the outboard section of the base plate does not enclose the blade on the side opposite the motor or the principal dimension H of the base plate, as specified in Figure 113, is less than 0,10 *D*;

– 10°, if the outboard section of the base plate encloses the blade on the side opposite the motor and the principal dimension H of the base plate as specified in Figure 113, is 0,10 *D* to 0,15 *D*;

– 25°, if the outboard section of the base plate encloses the blade on the side opposite the motor and the principal dimension *H* of the base plate, as specified in Figure 113, is greater than 0,15 *D*.

Compliance is checked by inspection and by measurement.

19.102.4 For saws using a guarding system as shown in Figure 103, the lower guard shall automatically lock in the closed position when the movement of the lower guard is not obstructed by the work piece and allowed to close.

Compliance is checked by manual test.

19.102.5 For saws using a guarding system as shown in Figures 102 and 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 as illustrated in Figure 106. It shall not be able to contact the cutting edge zone of the largest specified blade.

19.103 Base plate

19.103.1 The base plate shall surround the lower guard (or blade in the case of plunge type saws) at least from the front, rear and the motor side. If the outboard section of the base plate is removable or hinged, the dimension H shall be measured in the most unfavourable position. The base plate shall have the following principal dimensions as specified in Figure 113:

$F > 0{,}2\ D$

$H > 0$

where

D is the diameter of the blade;

F is the dimension from the periphery of the largest specified blade to the front edge of the base plate measured along the bottom surface of the base plate at maximum cutting depth;

H is the dimension from the outside edge of the base plate on the blade side, to the near surface of the thickest specified blade of a not inclined base plate.

Compliance is checked by measurement.

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. Then the base plate of the saw is placed on a horizontal flat surface and the lower guard of saws shown in Figures 101, 102 and 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 contact surface shall be not less than 0,15 times the blade diameter and at least one of the flanges shall be locked or keyed to the output spindle. The overlap of the clamping area of the two flanges shall be at least 1,5 mm wide, as specified in Figure 114.

Compliance is checked by measurement and by inspection.

19.105 Handles

Saws with a maximum specified 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. The mass of the saw is measured without saw blade and without flexible cable or cord.

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 8.12.2.

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 17.101.1 and 17.101.2.

20.3 Replacement:

A circular saw set at 90° 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 Figures 101, 102 and 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 Addition

The mains switch shall automatically switch off the motor as soon as the actuating member of the switch is released.

This switch shall have no locking arrangement in the ″on″ position.

The mains switch of a saw shall be equipped with a device that automatically locks it in the ″off″ position when the actuator is released so that two motions are required to energise the tool, or the travel from ″off″ to ″on″ of the part of the switch actuator that has the greatest travel shall not be less than 6,4 mm.

Compliance is checked by inspection.

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.

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.

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.

29 Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

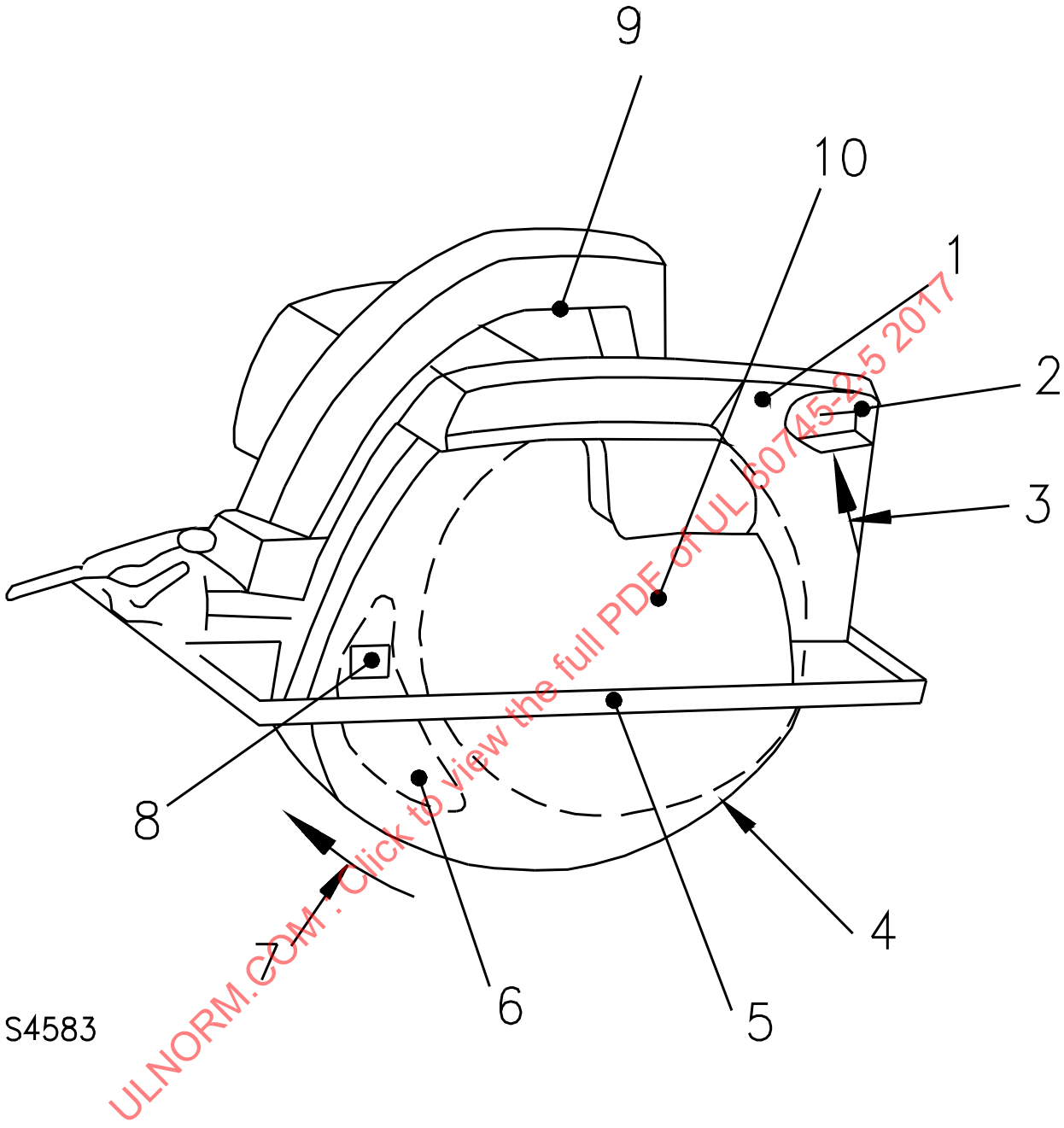
30 Resistance to rusting

This clause of Part 1 is applicable.

31 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

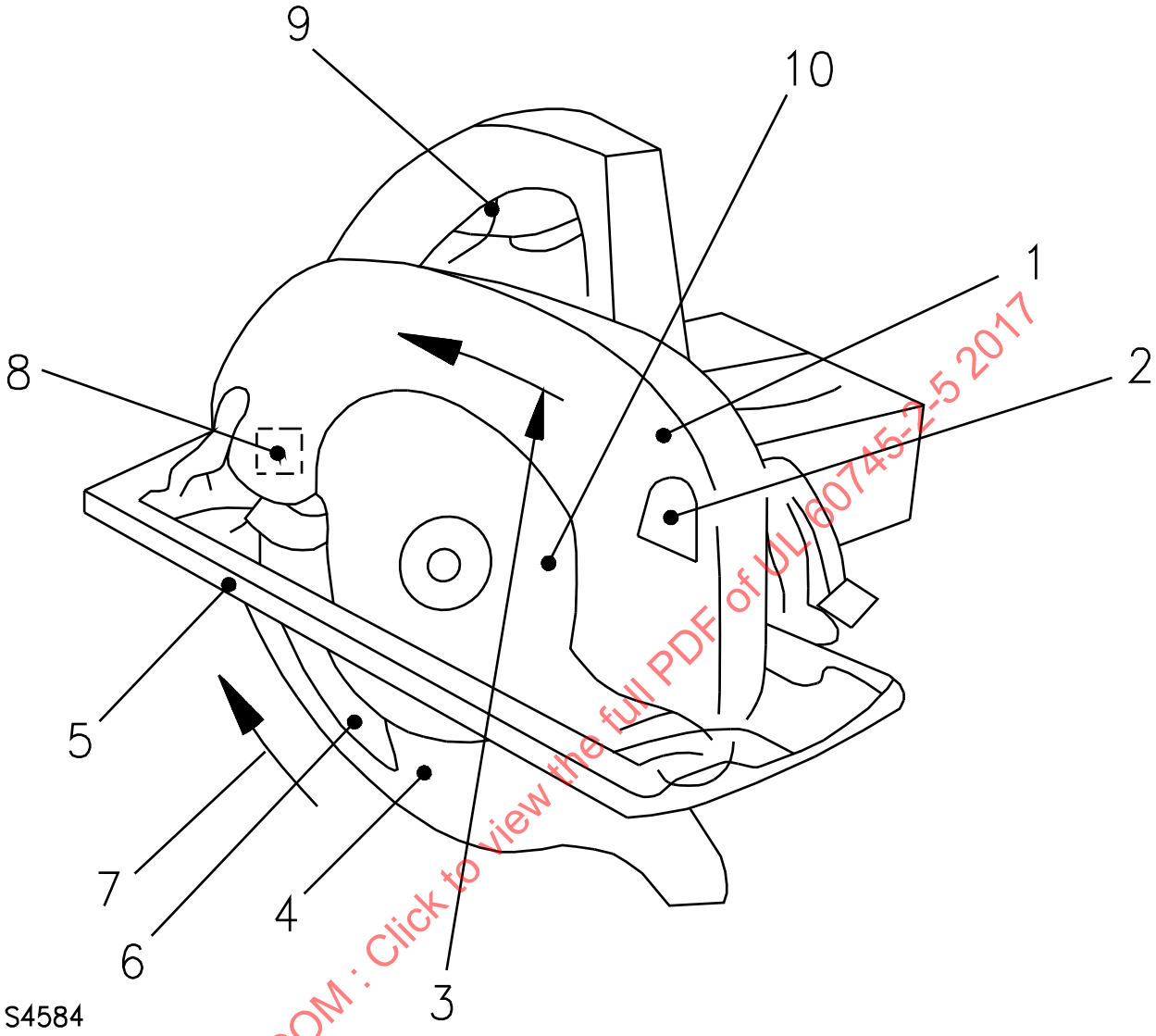
Figure 101 – Circular saw with outer pendulum guard



Key to Figures 101 to 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 switch
10 saw blade
11 lever for unlocking tow guard lock
12 lever for unlocking plunge guard lock
13 direction of plunging movement

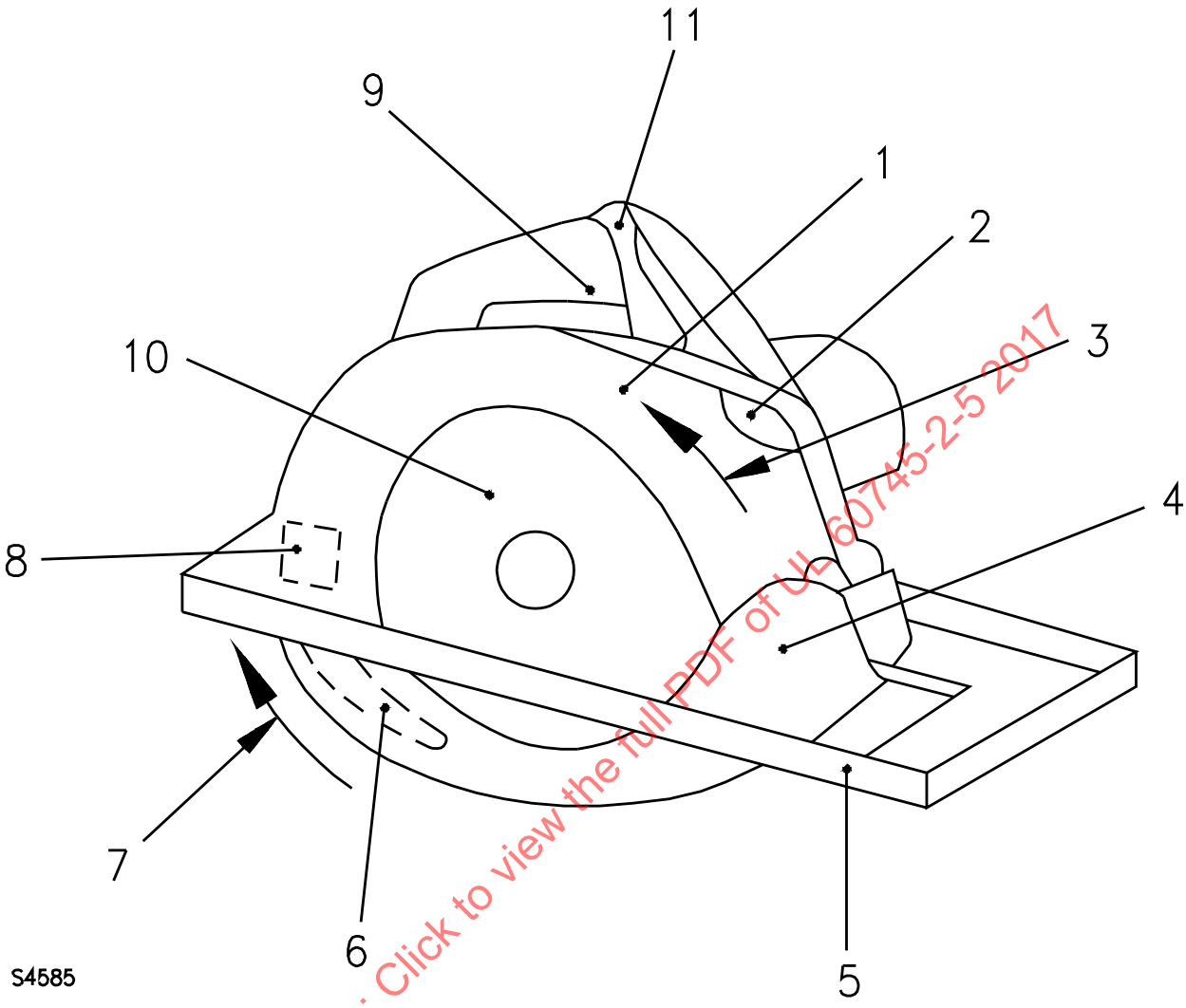
Figure 102 – Circular saw with inner pendulum guard



Key to Figures 101 to 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 switch
10 saw blade
11 lever for unlocking tow guard lock
12 lever for unlocking plunge guard lock
13 direction of plunging movement

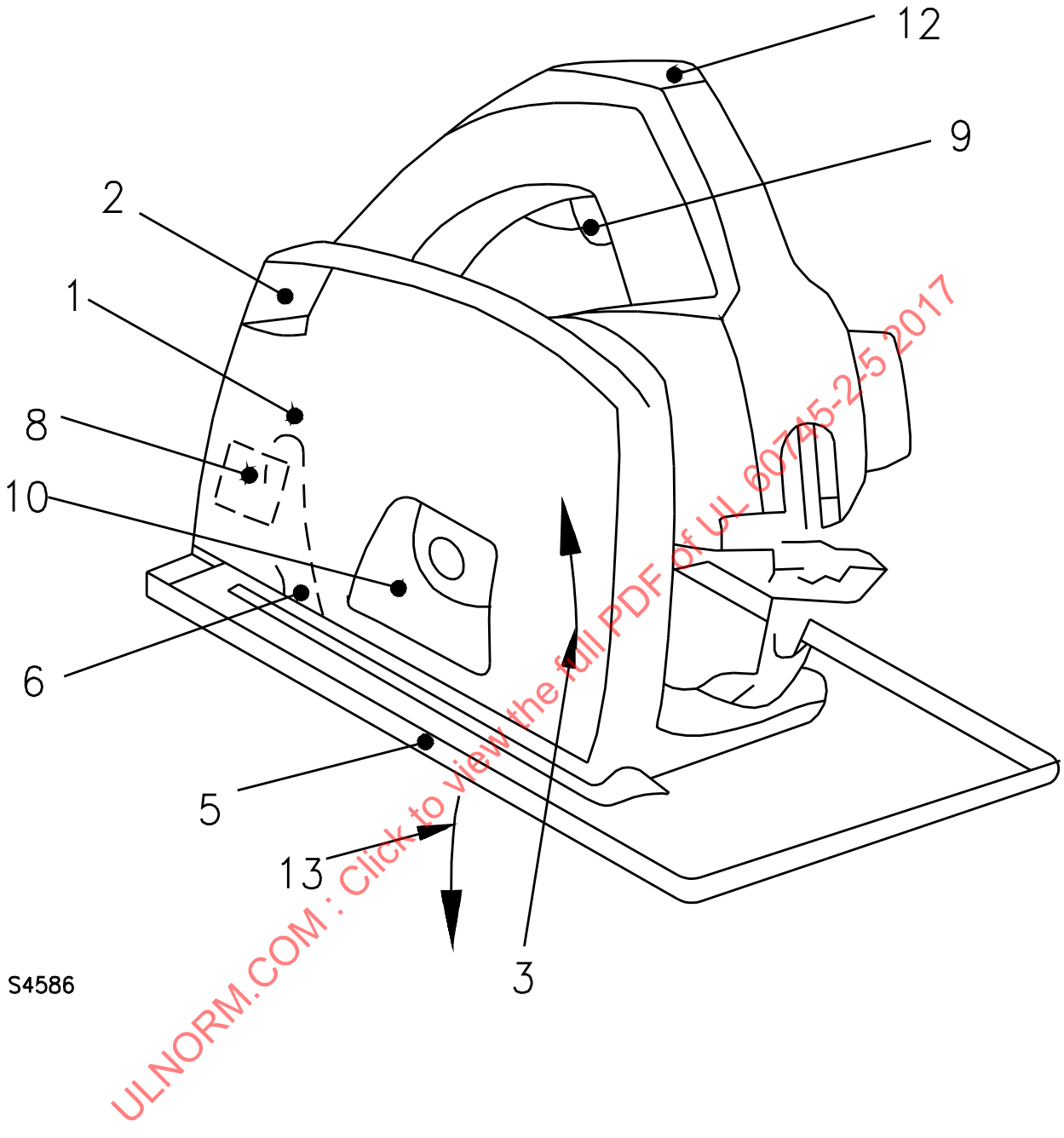
Figure 103 – Circular saw with tow guard



Key to Figures 101 to 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 switch
10 saw blade
11 lever for unlocking tow guard lock
12 lever for unlocking plunge guard lock
13 direction of plunging movement

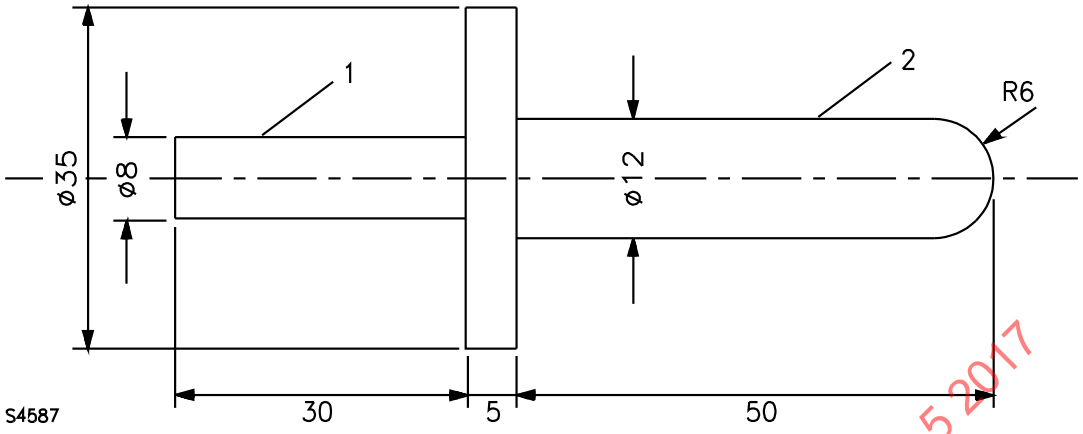
Figure 104 – Plunge type saw



Key to Figures 101 to 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 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″



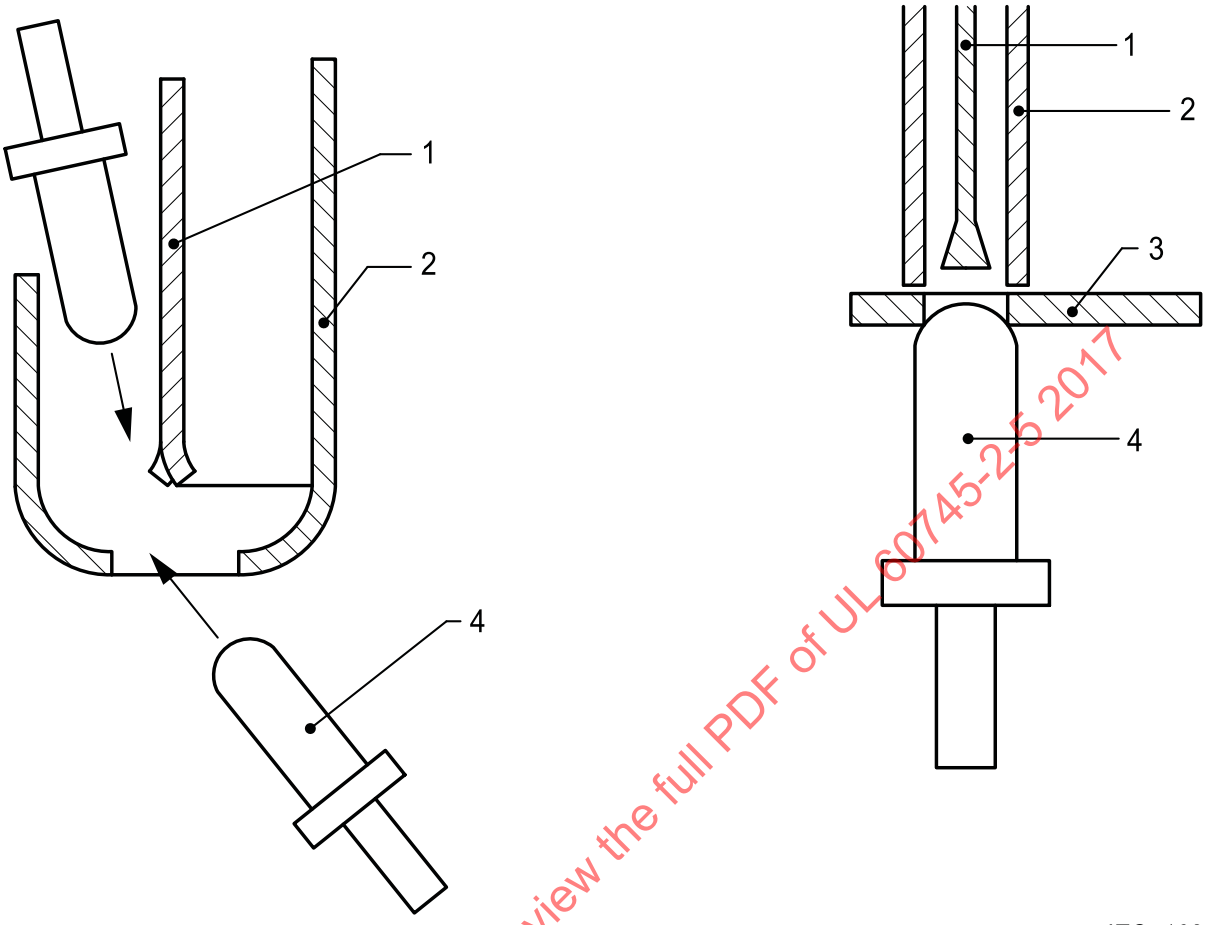
Dimensions in mm

Key

1 handle section

2 test section

Figure 106 – Use of test probe ″a″ on circular saw guards



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su0927

Key

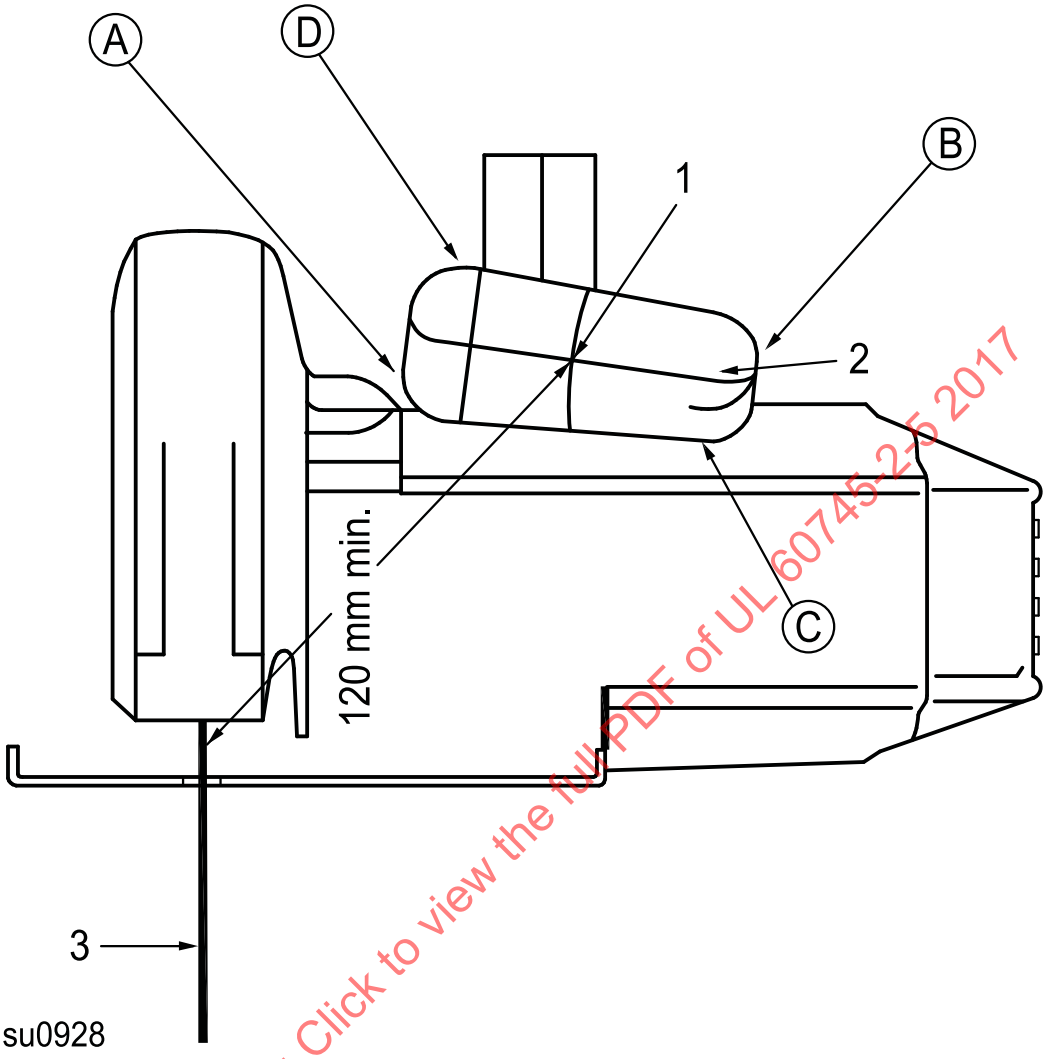
1 saw blade

2 guard

3 base plate

4 test probe ″a″

Figure 107 – Distance from the gripping surface to the blade's cutting zone



Key

1 defined measurement point

2 handle

3 blade

A point on handle closest to the saw blade

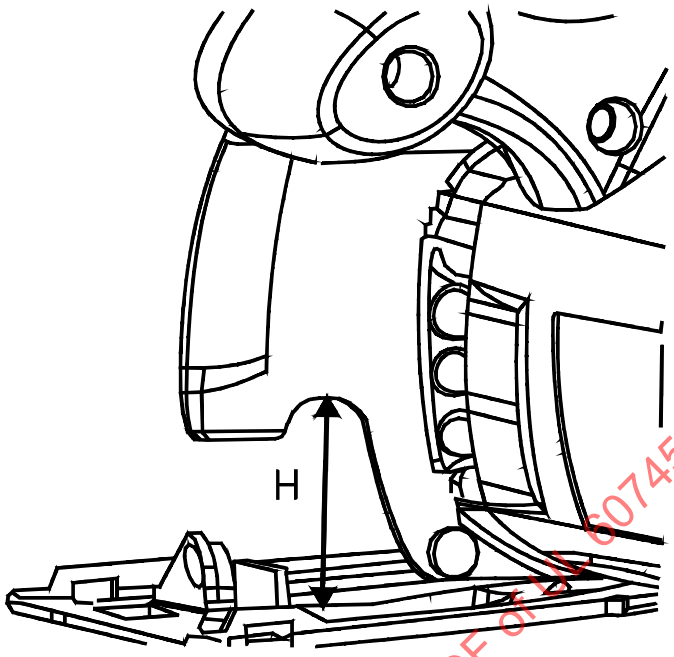
B point on handle most distant from the saw blade

C point on handle closest to the plane of the base plate

D point on handle most distant from the plane of the base plate

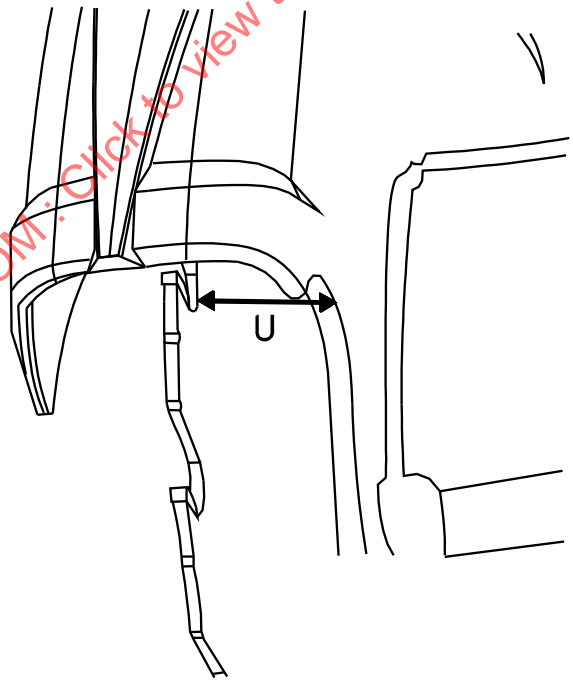
Figure 108 – Height restriction of the viewing aperture (see 19.101.2.1)

Figure 108a – Height of viewing aperture



S5222

Figure 108b – Dimension *U*



S5223

Figure 108c – Dimension *S*

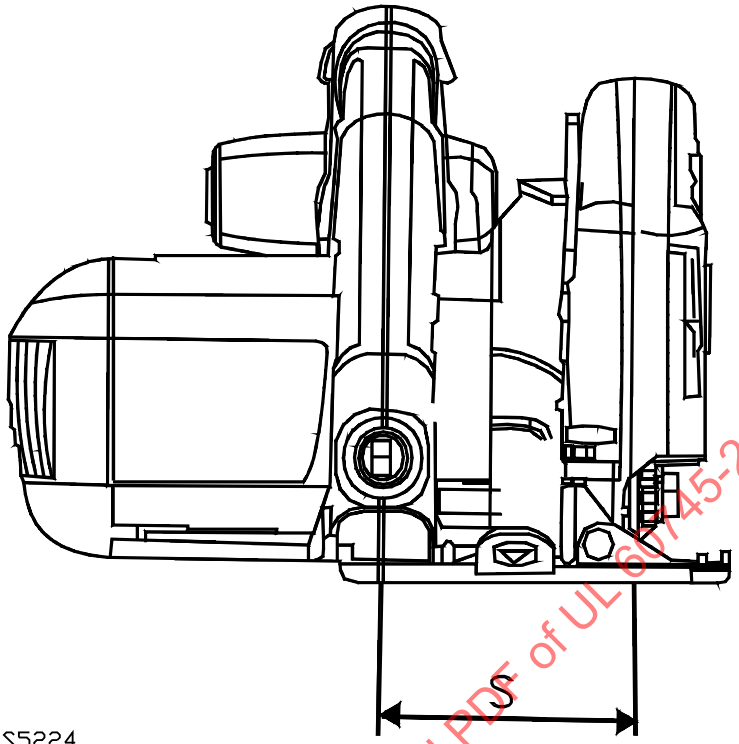
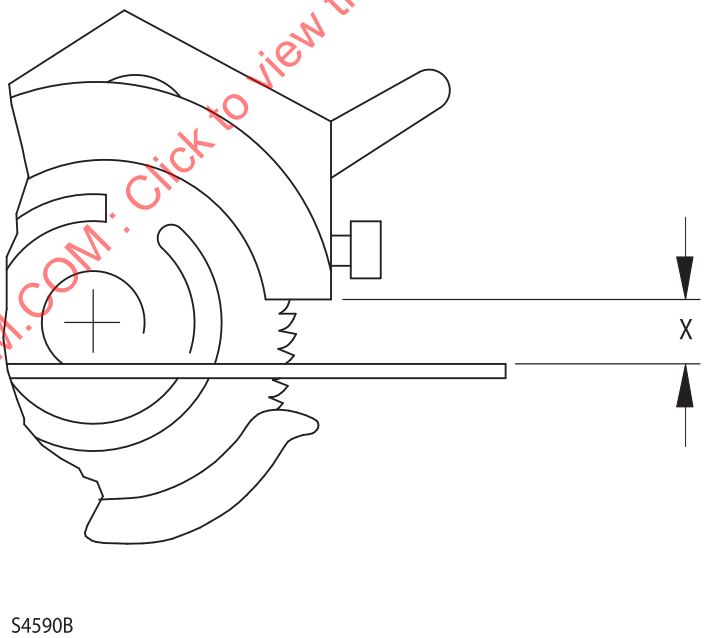


Figure 109 – Distance from the edge of the lateral side of the upper guard to the base plate



Dimensions in mm

Figure 110 – Test probe ″b″

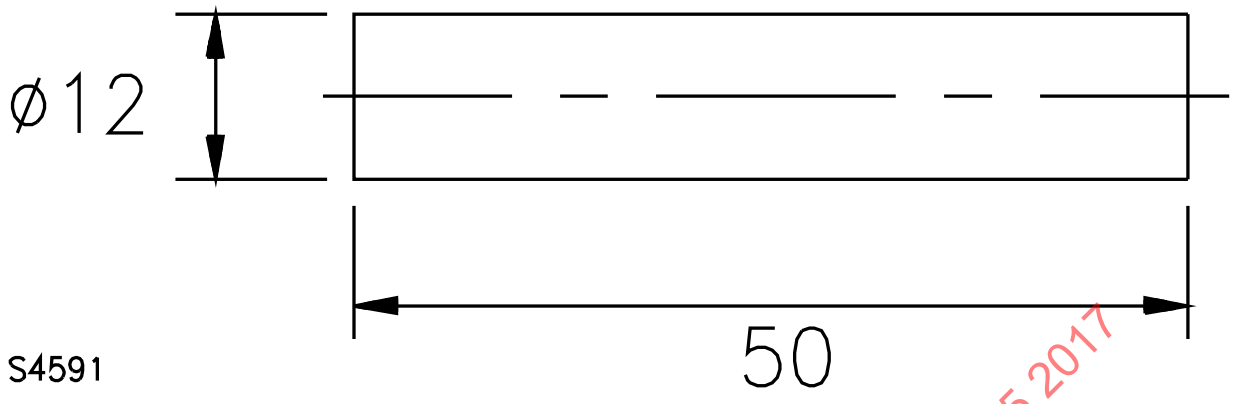
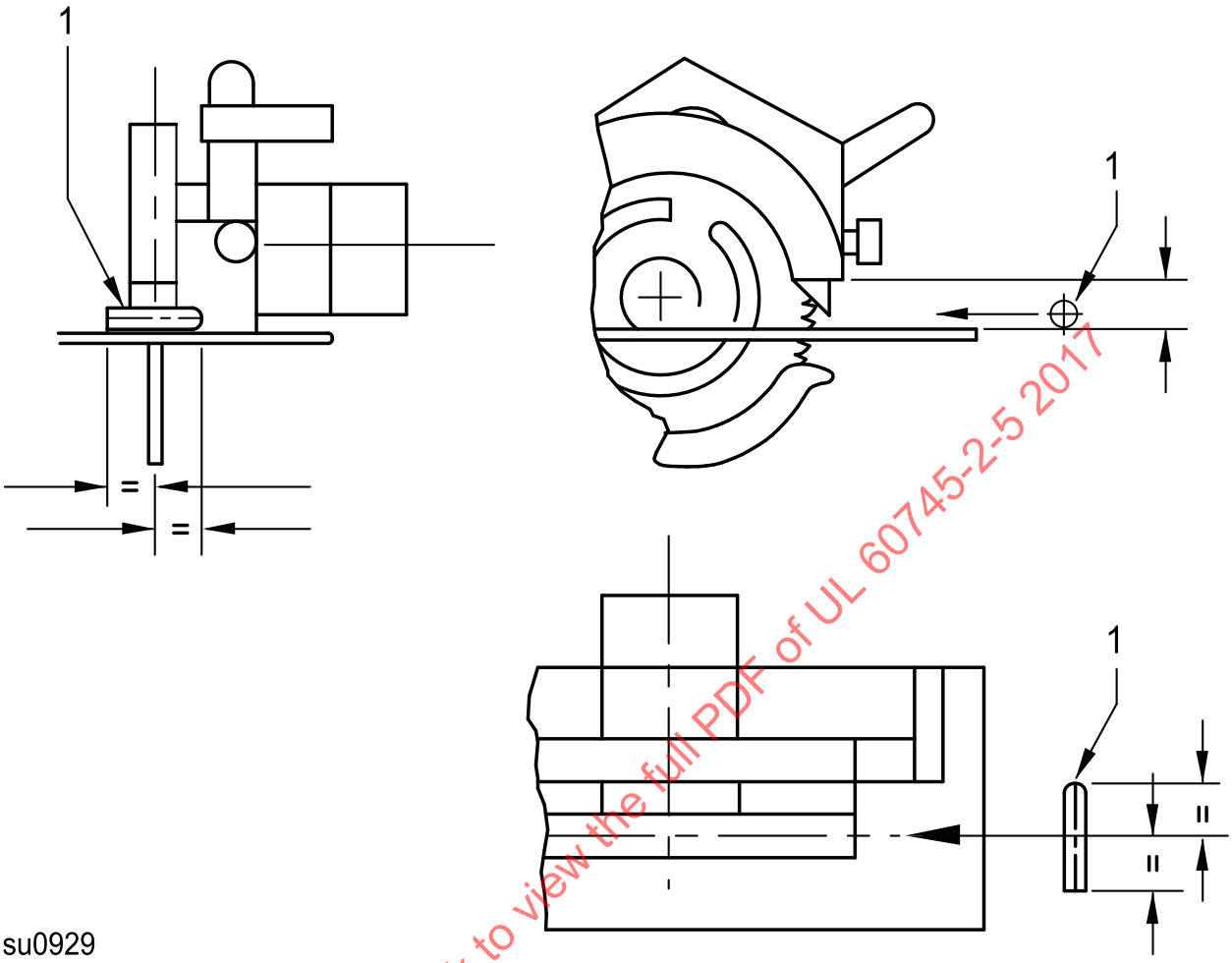


Figure 111 – Accessibility to the front cutting edge zone

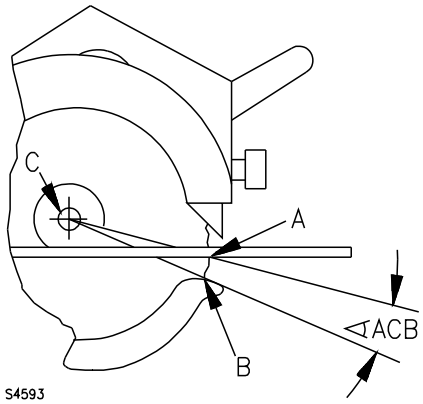


su0929

Key

1 test probe ″b″

Figure 112 – Blade exposure angle of the lower guard



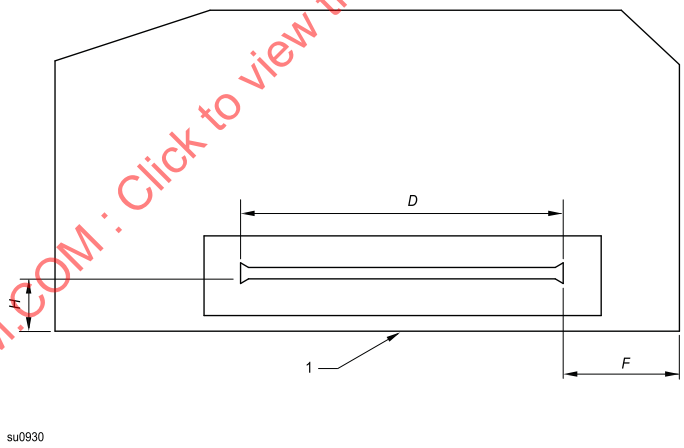
Key

A – blade periphery intersect point with the bottom plane of the base plate

B – blade periphery intersect point with the perpendicular projection onto the blade, of either side or the front tip of the movable guard, that yields the largest ∠ACB

C – centre of blade

Figure 113 – Principal dimensions of the base plate



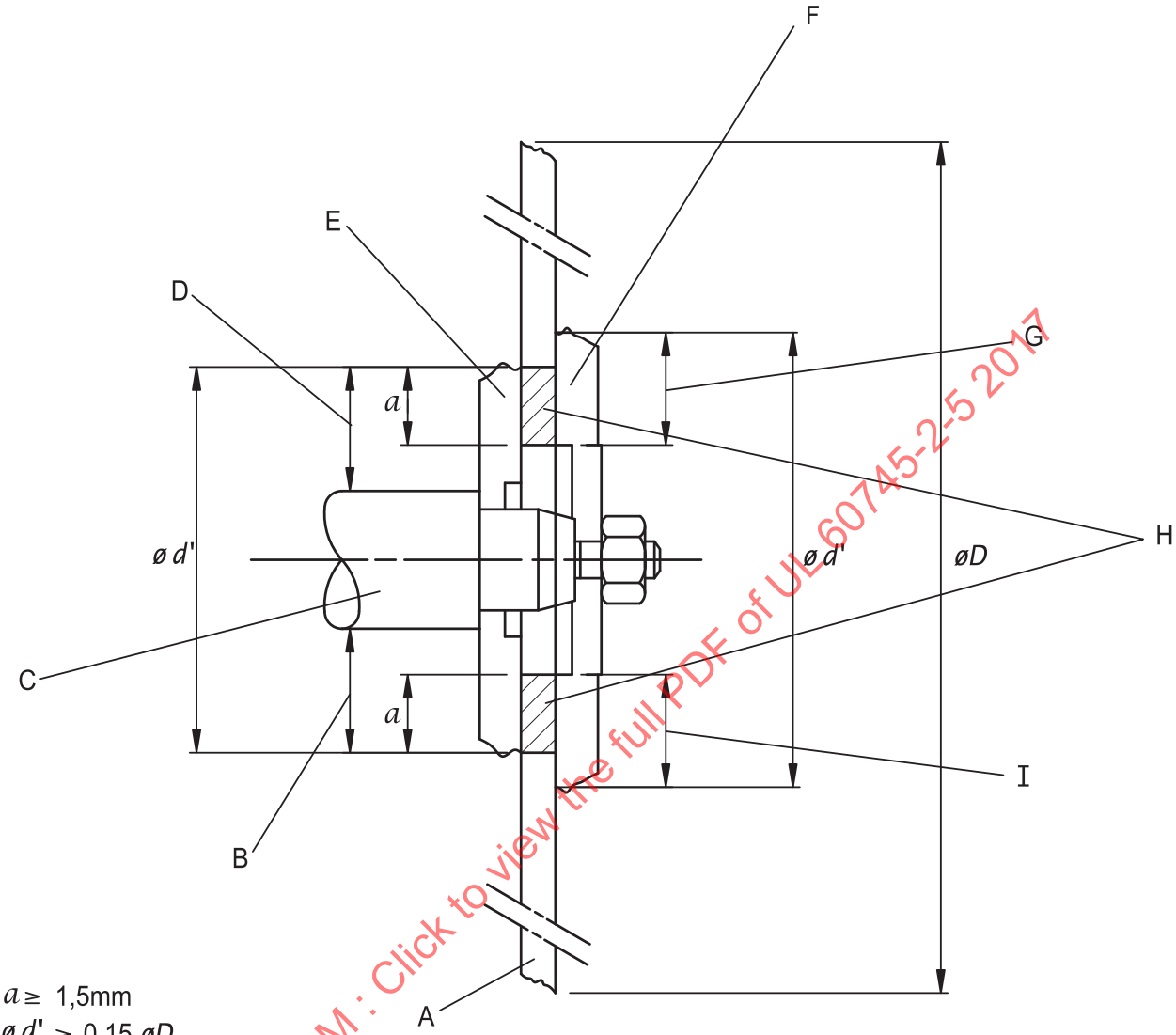
Key

1 – outboard section of the base plate

H, D, F – principal dimensions, see 19.103.1

NOTE – The shape of the base plate need not be rectangular nor the one shown.

Figure 114 – Flange characteristics



$a \geq$ 1,5mm
$ø\,d' \geq 0{,}15\ øD$

S5225b

Key

A – blade
B – clamping area
C – output spindle
D – clamping area
E – inner flange
F – outer flange
G – contact surface
H – overlap surface
I – contact surface

Annexes

The annexes of Part 1 are applicable except as follows:

Annex K
(normative)
Battery tools and battery packs

K.1 Addition:

All clauses of this part 2 apply unless otherwise specified in this annex.

K.8.12.1.101.1 **Safety instructions for all saws**

Replacement of item e):

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

Annex L
(normative)
Battery tools and battery packs provided with mains connection or non-isolated sources

Addition:

All clauses of this Part 2 apply.

Annex M
(normative)
Safety of working stands for operation with hand-held motor-operated electric tools

NOTE Subclauses, tables and figures which are additional to those in Annex M of Part 1 are numbered starting from 301 to distinguish them from additions to Annex M of Part 1.

MDV D1 ***Modification of this part 2 by replacing Annex M with the following:***

Annex M of the part 1 and this part 2 are not applicable.

M.1 Scope

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

Addition:

This annex applies to saw tables intended to be equipped with hand-held motor operated circular saws with a maximum saw blade diameter of 260 mm intended for cutting wood and similar materials.

All clauses of Annex M of Part 1 apply unless otherwise specified in this annex.

M.3 Terms and definitions

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

M.3.301 **saw table:** working stand with which a hand-held circular saw can be used similar to a circular saw bench in a stationary position (see Figure M.301)

M.3.302 **blade guard:** protection mounted above the saw table which prevents access to the saw blade (see Figure M.301)

M.3.303 **electrical system:** mains connection and associated control systems

M.8 Marking and instructions

This clause of Part 1 is applicable except as follows:

M.8.1 Modification:

Saw tables shall be marked with:

– rotation direction of the saw blade;

– maximum cutting depth or maximum saw blade diameter;

– rated voltage and maximum rated input or current.

NOTE Saw tables are equipped with electrical systems and thus require voltage and input or current ratings.

Compliance is checked by inspection.

M.8.12.1 Addition:

The operating instruction shall contain warning statements on the following subjects:

– warning not to use the hands to remove loose splinters, chips and similar parts of the workpiece from the vicinity of the moving saw blade;

– warning not to use the saw table outdoor when raining;

– warning not to perform any sawing operation “freehand”, i.e. guiding the workpiece only with the hand, without a rip fence or mitre gauge.

Compliance is checked by inspection.

M.8.12.2 Addition:

The operating instruction shall contain the substance of the following, if applicable:

– information how to mount and secure the hand-held saw to the saw table;

– information about the specified dimensions of saw blades (thickness of the body, cutting width of teeth) in order to match with the riving knife;

– instruction on how to replace the riving knife of the hand-held saw by the blade guard support with riving knife function and its adjustment;

– instruction to store the push stick or push block always with the saw table when not in use;

– instructions for the proper use of the blade guard;

– information explaining the phenomenon of kickback and instructions for cutting procedures to avoid kickback;

– instructions for the proper use and adjustment of the riving knife;

– instructions for cross-cutting, ripping, and the proper use of cross-cut fence (mitre gauge) and rip fence;

– instructions on how to align the blade with the rip fence and with the cross-cut fence (mitre gauge) slots;

– instruction for depth of cut and bevel angle adjustments;

– instruction on how to support the workpiece on the outfeed side and on the side of the table surface;

– instructions for slotting and rabbeting;

– instruction for the proper use and basic construction guidelines for work helpers, such as push stick, push block, auxiliary fence and featherboard;

– instructions for changing and adjusting the table insert;

– warning of inappropriate applications of the saw table, i.e. not to use the saw table for cutting firewood logs;

– instructions for the selection of the saw blade depending on the material to be cut;

– warning not to use a deformed or damaged saw blade;

– instruction to connect the circular saw to a dust collecting device when sawing.

M.19 Mechanical hazards

This clause of Part 1 is applicable except as follows:

M.19.1 Addition:

The saw table shall be equipped with an adequate guarding system which shall comply with the requirements of M.19.1.301 to M.19.1.302.

M.19.1.301 Guarding below the table top

If the design of the saw table is such that the base plate of the circular saw is not in contact with the table plate, the cutting edge zone of the saw blade between the base plate and the table plate shall be guarded by a fixed guard in any position.

Compliance is checked by inspection and by the following tests.

The test probe "a" shown in Figure 105 is applied at minimum and maximum depth of cut and any inclination of the saw blade. It shall not be possible to touch the saw blade teeth in the area between the table plate and base plate of all saws specified in the instructions as required by M.8.12.2.

M.19.1.302 Guarding above the table top

M.19.1.302.1 Blade guard

A blade guard shall be provided to guard that portion of the saw blade above the table top which is not required for cutting.

Circular saw tables shall have a blade guard for the crown and the front of the saw blade that may be an adjustable guard, a self-closing guard or a combination of these. An adjustable guard when adjusted shall remain in any position necessary to give the required protection.

M.19.1.302.1.1 The blade guard shall be designed to prevent contact with the periphery and/or both sides of the toothed rim of the saw blade, the riving knife being considered as a safety measure against touching the rising part of the toothed rim. This protection shall be given at any tilted position of the saw blade. The blade guard shall be capable of being lowered or turned down onto the table surface in front of the saw blade.

Compliance is checked by inspection.

M.19.1.302.1.2 The blade guard shall be made of a material (e.g. plastic, aluminium) which is soft enough to be cut with the saw blade without damage to the saw blade. On nontransparent blade guards, the line of the cut shall be indicated.

Compliance is checked by inspection.

M.19.1.302.1.3 The blade guard shall be fitted with an exhaust outlet.

Compliance is checked by inspection and the following test.

It shall not be possible to touch dangerous moving parts with the test probe "a" of Figure 105 through dust collection openings after the removal of the removable provisions. During the test, the adjustable guard shall be against the table top and the circular saw with the highest intended cutting depth shall be mounted.

M.19.1.302.1.4 The blade guard side walls shall either have a minimum thickness of 6 mm or shall have internal ribs with a minimum thickness of 3 mm designed to bear against the body of the saw blade in order to minimize the risk of damage to the blade guard.

Compliance is checked by inspection.

M.19.1.302.1.5 The blade guard shall be so designed that it is lifted when leading in a workpiece with a thickness of 20 mm above the adjusted height of the blade guard.

Compliance is checked by inspection.

M.19.1.302.2 Blade guard support

M.19.1.302.2.1 The blade guard shall be held by a blade guard support which is placed either

– in the cutting line and meets the requirements of a riving knife at the same time, or

– outside the cutting line.

Compliance is checked by inspection.

M.19.1.302.2.2 A blade guard support placed outside the cutting slot shall be arranged such that it is possible to saw with the maximum cutting width which can be set by the rip fence without being impeded by the blade guard support.

Compliance is checked by inspection.

M.19.1.302.2.3 The blade guard support shall have sufficient stability.

Compliance is checked by the following test, carried out without a saw blade fitted.

The following applies (see Figure M.302).

– *Point X is the part of the guard nearest to the operator on the infeed side.*

– Point Y is the part of the guard which is in line with the very first tooth of the saw blade intended for maximum cutting depth.

The blade guard shall be subjected to a load of 20 N at the front edge of the blade guard (point X), first in the direction A and then in direction B. The distance between both deflections, measured at point Y, shall not be more than 30 mm.

M.19.1.303 Riving knife

M.19.1.303.1 Saw tables which are ready for operation shall be equipped with a riving knife. This requirement is met when a hand-held circular saw with its own riving knife is installed.

For mounting a circular saw without riving knife, a riving knife shall be separately installed which allows adjustment at each cutting depth.

The riving knife shall be rigidly fixed within the cutting depth and be in alignment with the plane of the blade and disposed to it so as to pass freely through the cutting groove; it shall not contact the blade. The position of the riving knife shall not change as a result of operation.

Compliance is checked by inspection and by the following test.

The riving knife is adjusted to the maximum distance specified in M.19.1.303.2. The riving knife is fastened in accordance with the instructions required by M.8.12.2. At the centre of the riving knife tip, a force of 100 N is applied for 1 min in the cutting direction and parallel to the base plate, as shown in Figure AA.101.

During the test, the riving knife shall not touch the blade's cutting edge zone. After this test, the tip of the riving knife shall not have been displaced by more than 3 mm in direction of the force.

M.19.1.303.2 The riving knife and its holder shall be so designed as to allow the adjustment of the riving knife, for all blade diameters resulting in cutting depths between 100% and 90% of the maximum cutting depth, to comply with the following conditions (see Figure AA.102):

a) above the table, the radial distance between the riving knife and the edge of the blade shall not at any point exceed 5 mm at the depth of cut set;

b) the distance from the tip of the riving knife to the rim of the blade shall not exceed 5 mm, when measured along the line perpendicular to the table top.

Compliance is checked by inspection and by measurement.

M.19.1.303.3 The riving knife shall not be thicker than the width of the groove cut by the saw blade and not thinner than the body of the blade.

For saws with a rated cutting depth exceeding 55 mm, the riving knife and its holder shall be so designed that when the cutting depth is adjusted, the riving knife automatically continues to comply with the requirements of M.19.1.303.2.

Compliance is checked by inspection.

M.19.1.303.4 The riving knife, if provided with the saw table, shall be made of steel with a hardness of between 35 HRC and 48 HRC and a resistance to rupture at least equal to 800 MPa.

Its tip shall be rounded, with a radius of not less than 2 mm, and its edges shall not be sharp. The width of the riving knife, measured at the table top level for the maximum cutting depth shall be at least equal to 1/8 of the diameter of the maximum diameter of the saw blade in accordance with the marking required by M.8.1. Moreover, the faces of the riving knife shall be plane, smooth and parallel and shall be slightly chamfered on the edge facing the blade.

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

The circular saw and/or saw table is set to maximum depth of cut at 90°. The riving knife is adjusted for the maximum specified saw blade in accordance with M.19.1.303.2. The riving knife is fastened in accordance with the instructions required by M.8.12.2.

At the centre of the riving knife tip, a force W as specified in Table M.301 is applied for 1 min perpendicular to the blade, as shown in Figure AA.101.

After this test, the tip of the riving knife shall not have been displaced in the direction of the force by more than half the thickness of the riving knife. The test is performed in both directions.

Table M.301 – riving knife testing – strength of riving knife

Diameter of saw blade mm	Load applied to riving knife N
D ≤ 60	10
60 < D ≤ 100	15
100 < D ≤ 200	20
200 < D ≤ 250	25
D > 250	30

M.19.1.304 Table top

M.19.1.304.1 Saw tables shall comply with the dimensions given in Figure M.303 depending on the maximum saw blade diameters.

Compliance is checked by inspection and by measurement.

M.19.1.304.2 The width of the slot in the table shall not exceed 12 mm.

If it is necessary to alter the width of the slot because of using different saw blades or for bevelled cuts, it may be carried out by using interchangeable table inserts.

The table slot shall be lined with a material which is soft enough (e.g. wood, plastic, aluminium) to be cut by the saw blade for a width of at least 3 mm.

Table inserts shall be fixed such that they cannot be thrown out by the rising part of the saw blade.

Compliance is checked by inspection and by measurement.

M.19.1.304.3 When the table is intended to be used for bevel cutting, the adjustment shall be performed by tilting the saw blade and not by tilting the table.

Compliance is checked by inspection.

M.19.1.305 Workpiece guiding

M.19.1.305.1 Rip fence

Saw tables for hand-held circular saws shall be provided with a rip fence or with a cross-cut fence which can also be used as a rip fence (see Figure M.301).

The position of the rip fence shall be adjustable without the aid of a tool.

The guiding side of the rip fence shall be made of a material (e.g. wood, plastic, aluminium) which is soft enough to be cut by the saw blade without damage to the saw blade unless the adjustment of the fence is limited in a way that the rip fence and the saw blade cannot come into contact.

A rip fence shall at least extend from the front of the table to the centre of the saw blade.

If the rip fence is adjustable, parallel to the saw blade, it shall be possible to fasten it in such a position parallel to the saw blade that its outfeed end is located between the points A and B of Figure M.304.

The minimum height of the rip fence in contact with the workpiece shall be half of the maximum depth of cut or 50 mm, whichever is smaller. For small cutting depths, the height of the rip fence in contact with the workpiece shall be between 6 mm and 15 mm. A rip fence shall be either a single part with either side of the rip fence of different heights which can be mounted in two positions, or two parts with sides of different height mounted alternatively.

If the saw blade can be tilted towards a rip fence with two different heights, it shall not touch point B of the rip fence (see Figure M.305).

The guiding sides and the upper surface of the rip fence shall be even and without spacings. Holes up to 10 mm are disregarded.

Compliance is checked by inspection and by measurement.

M.19.1.305.2 Cross-cut fence

Saw tables shall be provided with a cross-cut fence or an angular fence which can be used as a cross-cut fence (see Figure M.301). While cutting, any movement of the cross-cut fence shall be parallel to the saw blade.

The angular adjustment of an angular fence shall be possible without the aid of a tool.

The fixing arrangement shall ensure that the fence cannot rise or swing out of position, as illustrated in Figure M.306.

The minimum height of the guiding surface of the fence shall be 30 mm or the maximum depth of cut, whichever is the smaller.

If the cross-cut fence reaches under the guard, this part of the cross-cut fence shall have a maximum height of 15 mm.

A cross-cut fence which is not adjustable in length shall be dimensioned such that the distance *"e"* between the cross-cut fence and the saw blade as given in Figure M.303 is not exceeded.

If the cross-cut fence is adjustable in length, it shall be possible to fix its length in such a position that the distance between cross-cut fence and saw blade does not exceed the dimension *"e"* as given in Figure M.303.

If contact between the cross-cutting fence and the saw blade cannot be avoided, the part of the cross-cutting fence that can contact the moving saw blade shall be made of a material (e.g. wood, plastic, aluminium) which is soft enough to be cut by the saw blade without damage to the saw blade.

Compliance is checked by inspection and by measurement.

M.19.1.306 Push stick

A push stick or push block handle shall be provided. The surface that may contact the saw blade shall be constructed from shatterproof materials capable of withstanding the pressure necessary to feed the workpiece. The material shall be soft enough (e.g. wood, plastic, aluminium) to be cut by the saw blade without damage to the saw blade.

The minimum length of push sticks shall be 400 mm or the length of the table, whichever is less (see Figure M.301 and Figure M.307).

Compliance is checked by inspection and by measurement.

M.19.301 A saw table shall be constructed so that during normal operation it will not tip over or move.

Compliance is checked by the following test.

The saw table is fitted with the hand-held circular saw specified by the instructions in accordance with M.8.12.2 which is likely to give the most unfavourable results for the purpose of this requirement.

The test is conducted on a horizontal surface of a three layer chip board.

A push force of 100 N is applied to the highest point on the front edge of the saw table, in the plane of the saw blade and in the direction of the feed. As a result of this test, the saw table shall not move.

In addition a push force of up to 300 N is applied to the highest point on the front edge of the saw table, in the plane of the saw blade and in the direction of the feed. As a result of this test, the saw table may move but shall not tip over.

M.20 Mechanical strength

This clause of Part 1 is applicable except as follows:

M.20.1.301 The saw table shall have adequate strength.

Compliance is checked by loading the table with a mass of 15 kg. The load is applied in the table centre, distributed equally on a rectangular area with the dimensions of 0,5 × table length times 0,5 × table width.

After removing the mass, the saw table shall not show any permanent deformation.

M.20.1.302 The characteristic of the material for the blade guard shall be

a) for light alloy as follows:

Ultimate tensile strength N/mm^2	**Minimum thickness** mm
160	2,5
200	2,0

b) polycarbonate with a wall thickness of at least 3 mm or other plastic material having an impact strength equal to or better than a polycarbonate of at least 3 mm thickness.

Compliance is checked by examining the relevant drawings, by measurement, and by inspection and by receipt of conformation of the ultimate strength by the manufacturer of the material.

M.21 Construction

This clause of Part 1 is applicable except as follows:

M.21.1 Addition:

A saw table shall be provided with stops to prevent shifting of the circular saw in and crosswise to the direction of cutting. In order to allow the installation of different circular saws the stops may be adjustable.

Screws for fixing shall be secured against loosening, e.g. by spring washers.

Compliance is checked by inspection.

M.21.16 This subclause is not applicable.

M.21.18 Replacement:

Saw tables shall be provided with a device for switching the circular saw "on" and "off". The actuator of the device shall be positioned on the left side of the saw blade below the table (see Figure M.301) and easily accessible from the operator's position.

This switching device shall be capable of being turned off by the operator with a single push motion.

Compliance is checked by inspection.

M.21.18.301 The saw table shall be provided with a device for locking the switch of the hand-held circular saw in the "on" position. This device shall disengage when the saw is removed from the saw table.

Compliance is checked by inspection and by manual test.

M.21.203 Addition:

After voltage recovery, following an interruption of the power supply, the circular saw installed in the saw table shall not restart automatically.

Compliance is checked by inspection and by a functional test.

M.21.301 The table shall be provided with a means to keep the lower guard of the circular saw open while mounted to the table. The means proved to keep the lower guard open shall be accomplished by adequate mechanical means.

Compliance is checked by inspection.