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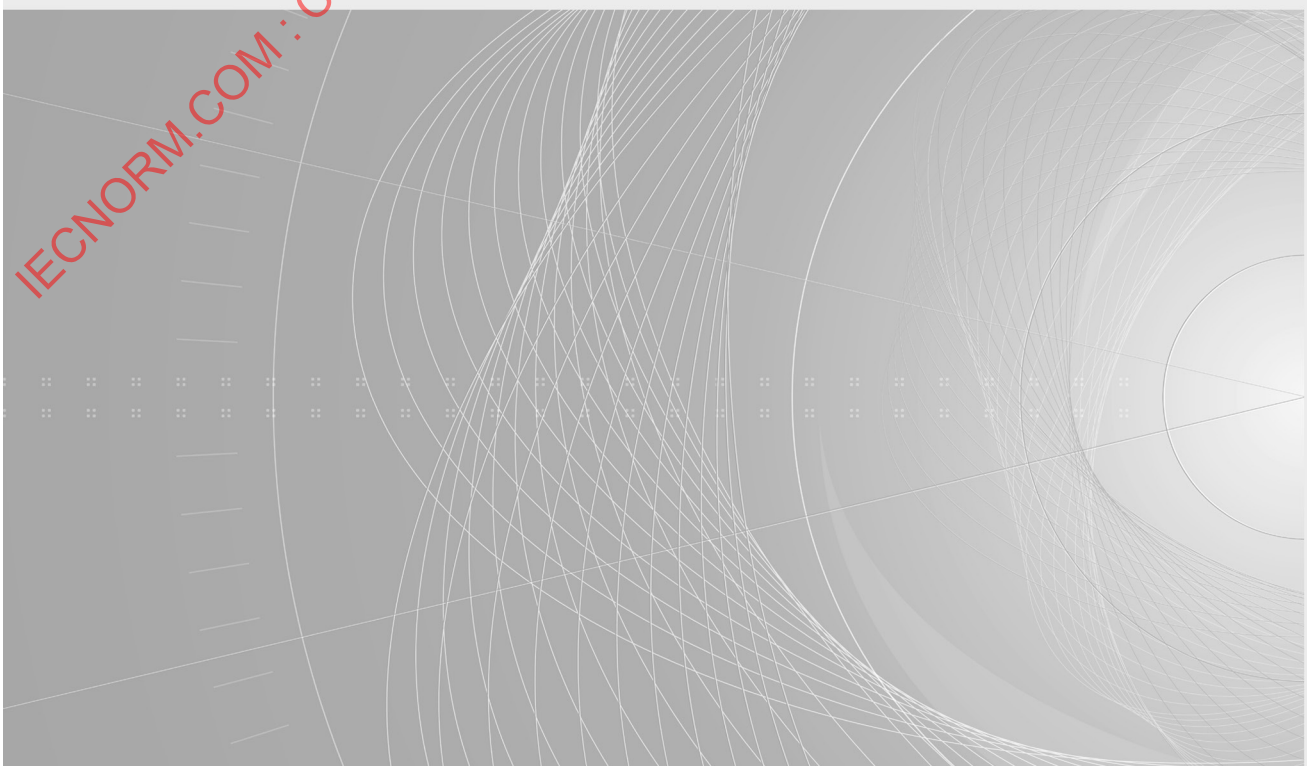
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety –
Part 2-5: Particular requirements for hand-held circular saws



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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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

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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

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62841-2-5 edition 1.1 contains the first edition (2014-06) [documents 116/166/FDIS and 116/180/RVD] and its amendment 1 (2025-02) [documents 116/860/FDIS and 116/878/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 62841-2-5 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

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 small 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 document and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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.

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:

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

3.102
bevel angle
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**

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.

8.2 *Addition:*

NOTE 101 In Canada and the United States of America, the following additional requirements apply.

Tools shall be marked with the following additional safety warnings:

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

  In Canada, the equivalent French wording of the above warning is as follows: "DANGER – Tenir les mains et le corps à l'écart de la lame et se tenir de côté par rapport à la lame. Le contact avec la lame entraînera des blessures graves."

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

  In Canada, the equivalent French wording of the above warning is as follows: "AVERTISSEMENT – Vérifiez le système de protection. Il doit couvrir la lame instantanément!"

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

  In Canada, the equivalent French wording of the above warning is as follows: "AVERTISSEMENT – Tenir la scie avec les deux mains."

– "WARNING – Support and clamp workpiece."

  In Canada, the equivalent French wording of the above warning is as follows: "AVERTISSEMENT – Supporter et assujettir la pièce à travailler."

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

8.14.101.1 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 Figures 101, 102 and 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.*

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 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.*

17.101.3 *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 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 **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/m³ and 850 kg/m³.

~~*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.*~~

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~~ 18.4 and 18.5.3	a
Prevent self-resetting as required in 23.3	~~c~~ a
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 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.

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 Figures 101, 102 and 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

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 Figures 101 and 102

19.102.1.1 For saws using a **guarding system** as shown in Figures 101 and 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 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. 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:

$F > 0{,}2\ \boldsymbol{D}$

$G > 0$

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 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 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.

19.107 Guarding system – Longevity

19.107.1 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 19.107.2 and 19.107.3.

19.107.2 *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 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.*

19.107.3 *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 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 such that*

- *the **lower guard** stopper is present with all of its components (**lower guard** stopper components may show wear as a result of the test); and*
- *the **lower guard** is in contact with the stopper; and*
- *if a gap occurs between the rear portion of the **lower guard** and the **upper guard** with the **base plate** in the horizontal position, the guarding is evaluated in accordance 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.*

19.108 Guarding system – Resistance

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

Compliance is checked by the tests of 19.108.2 and 19.108.3, 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.

19.108.2 *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 19.107.2 and 19.107.3.

19.108.3 *For a saw intended to cut materials such as plastic, 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 one sample material of ferrous metal, as 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.*

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.

– *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.*

– *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 19.107.2 and 19.107.3.

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~~ 19.107.2 and 19.107.3.*

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 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:

21.18.1.1 *Addition:*

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

21.18.1.2 *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 subclause of Part 1 is applicable, except for saws that are intended only for cutting metal in accordance with 8.14.2 b) 104).

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~~.~~, except as follows:

23.3 *Addition:*

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

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.

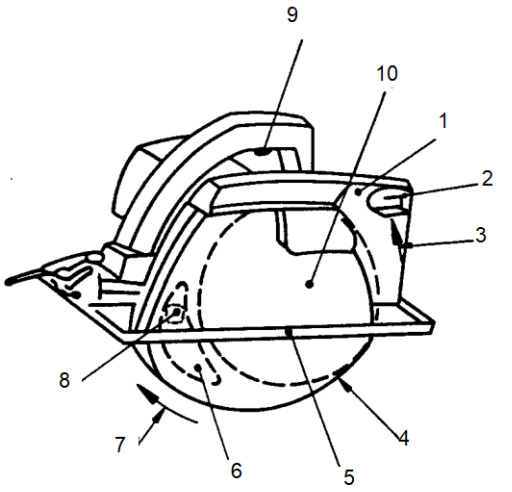


Figure 101 – Circular saw with outer pendulum guard

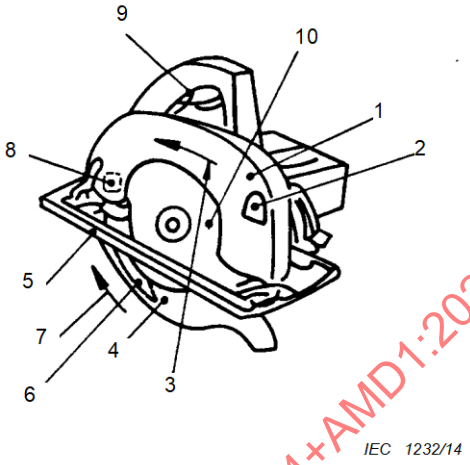


Figure 102 – Circular saw with inner pendulum guard

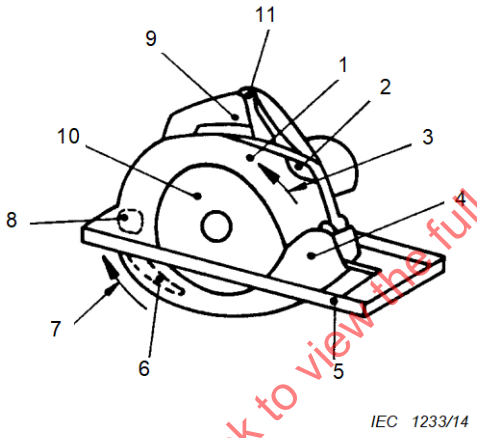


Figure 103 – Circular saw with tow guard

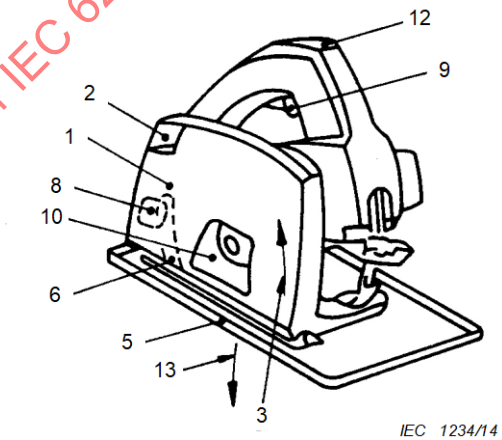
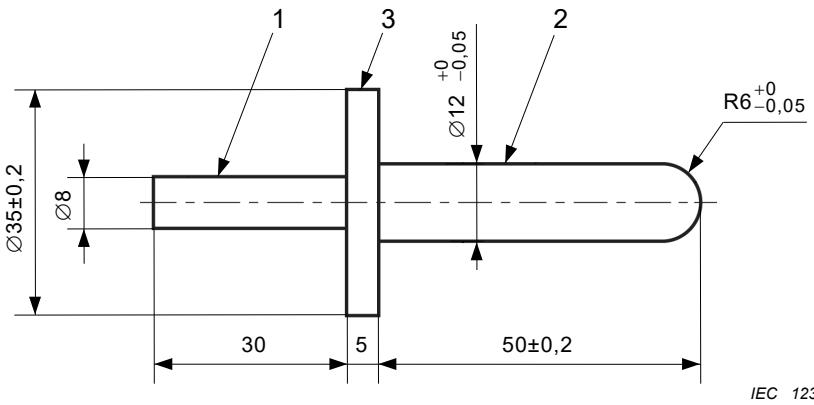


Figure 104 – Plunge type saw

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 power switch
10 saw blade
11 lever for unlocking tow guard lock
12 lever for unlocking plunge guard lock
13 direction of plunging movement

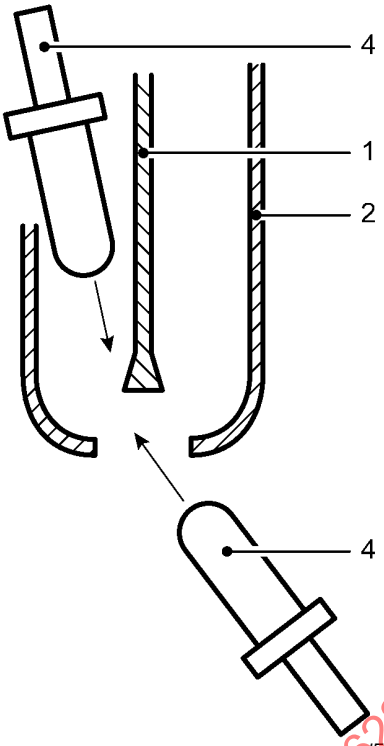
Dimensions in millimetres



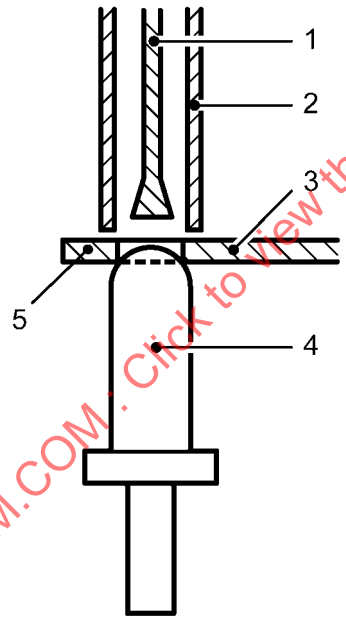
Key

1 handle section
2 test section
3 probe's flange

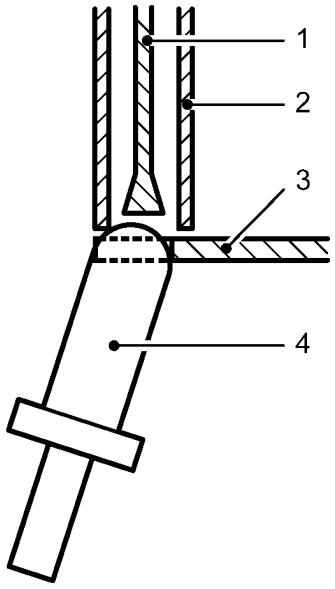
Figure 105 – Test probe 'a'



a) Saw with lower guard



b) Plunge type saw with outboard section



c) Plunge type saw without 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

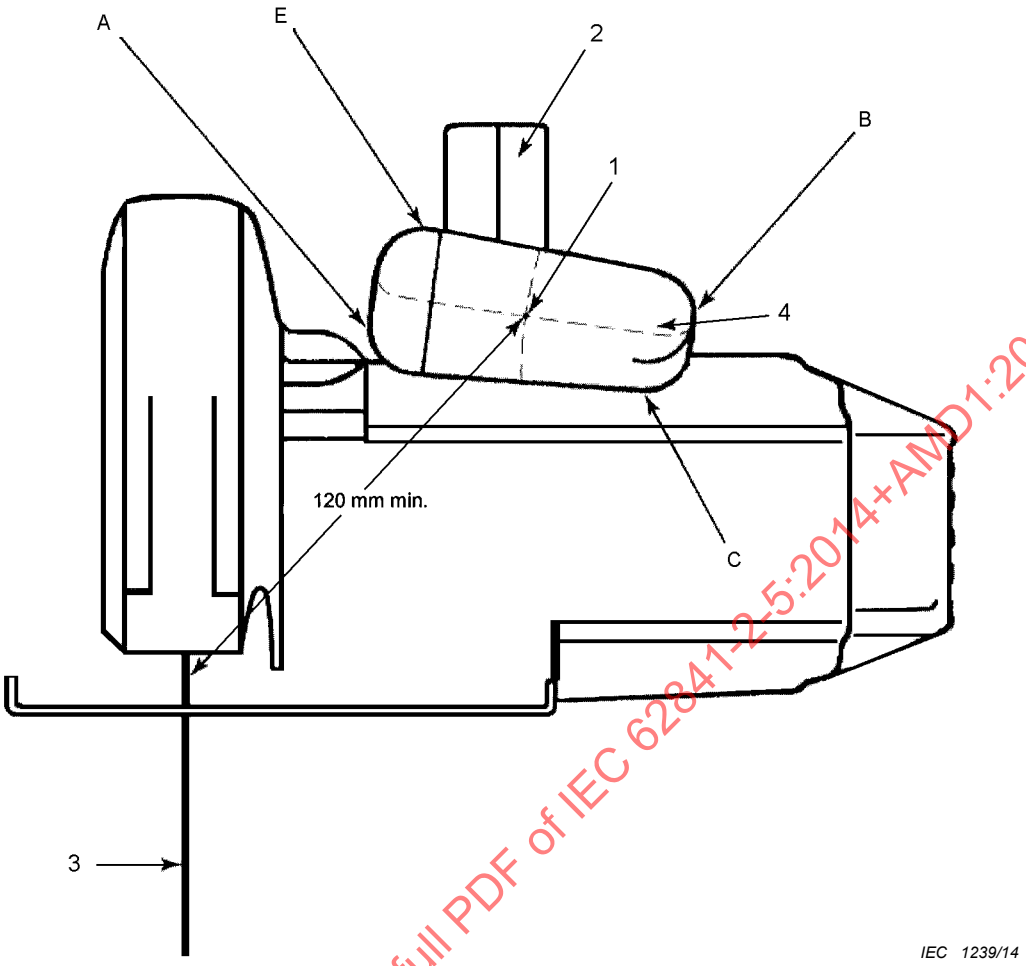


Figure 107a) – Circular saw with auxiliary handle

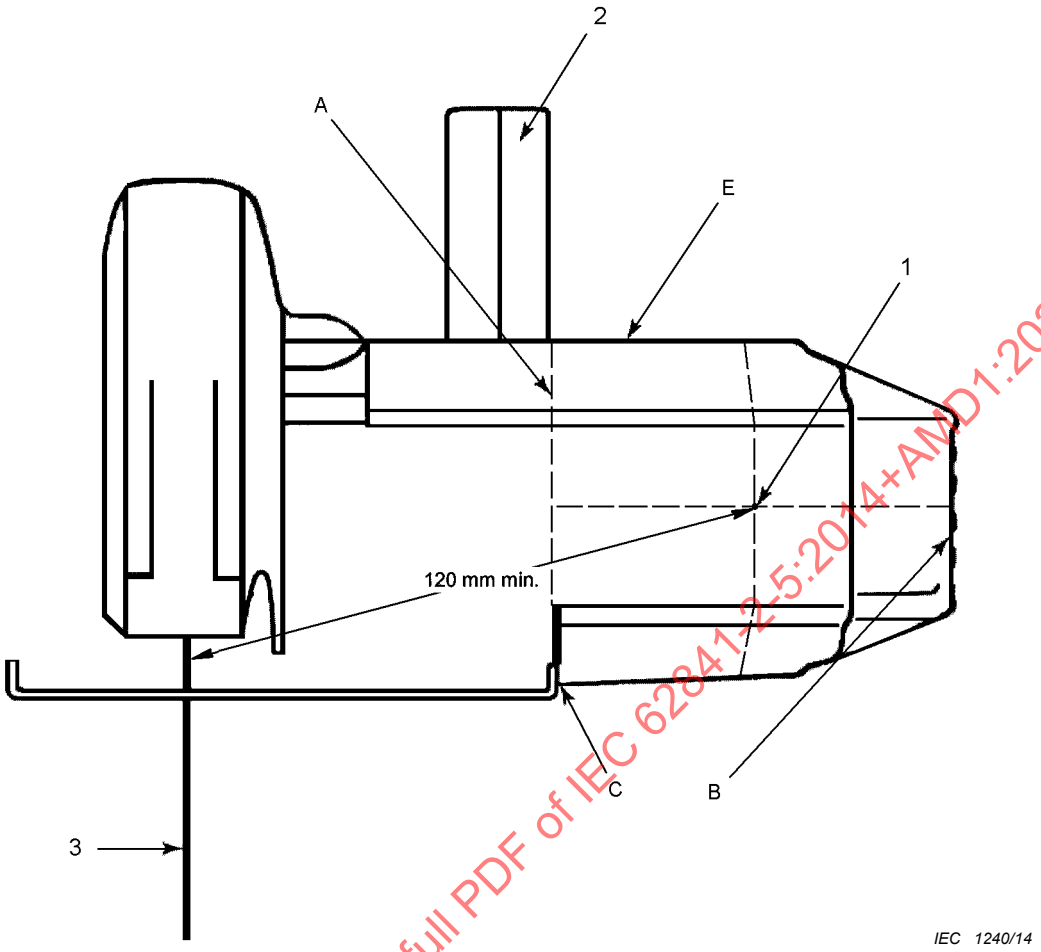
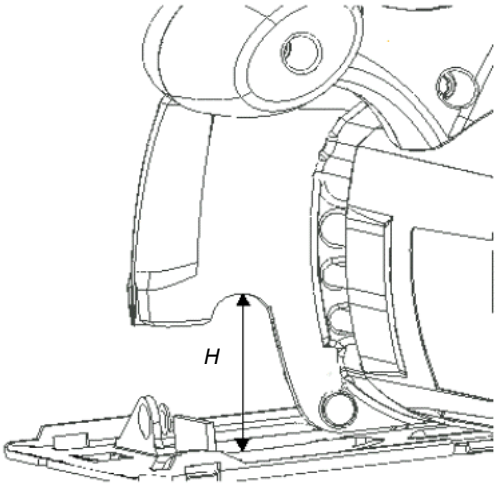


Figure 107b) – Circular saw without auxiliary handle (motor casing as grasping area)

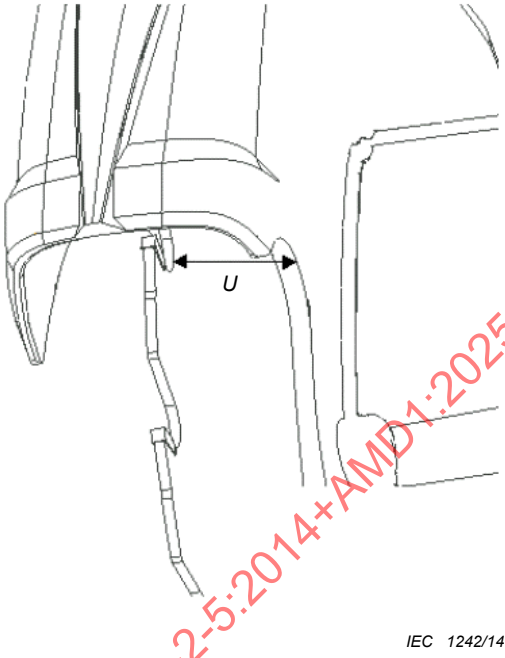
Key

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**

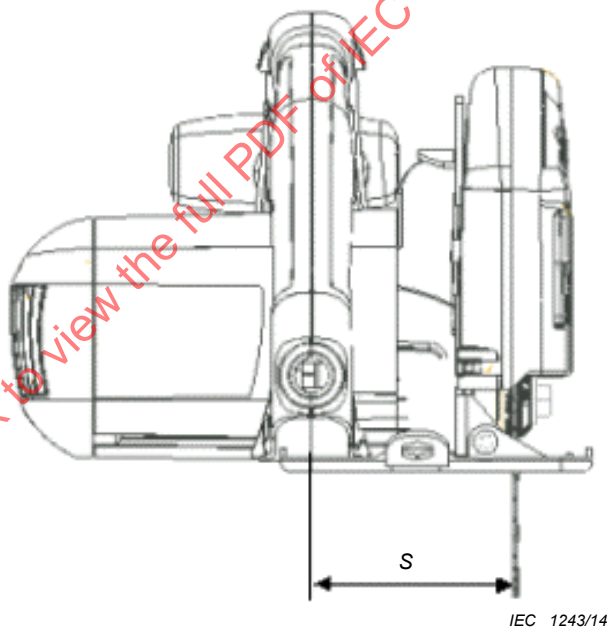
Figure 107 – Distance from the gripping surface to the blade's cutting edge zone



a) Height *H* of viewing aperture

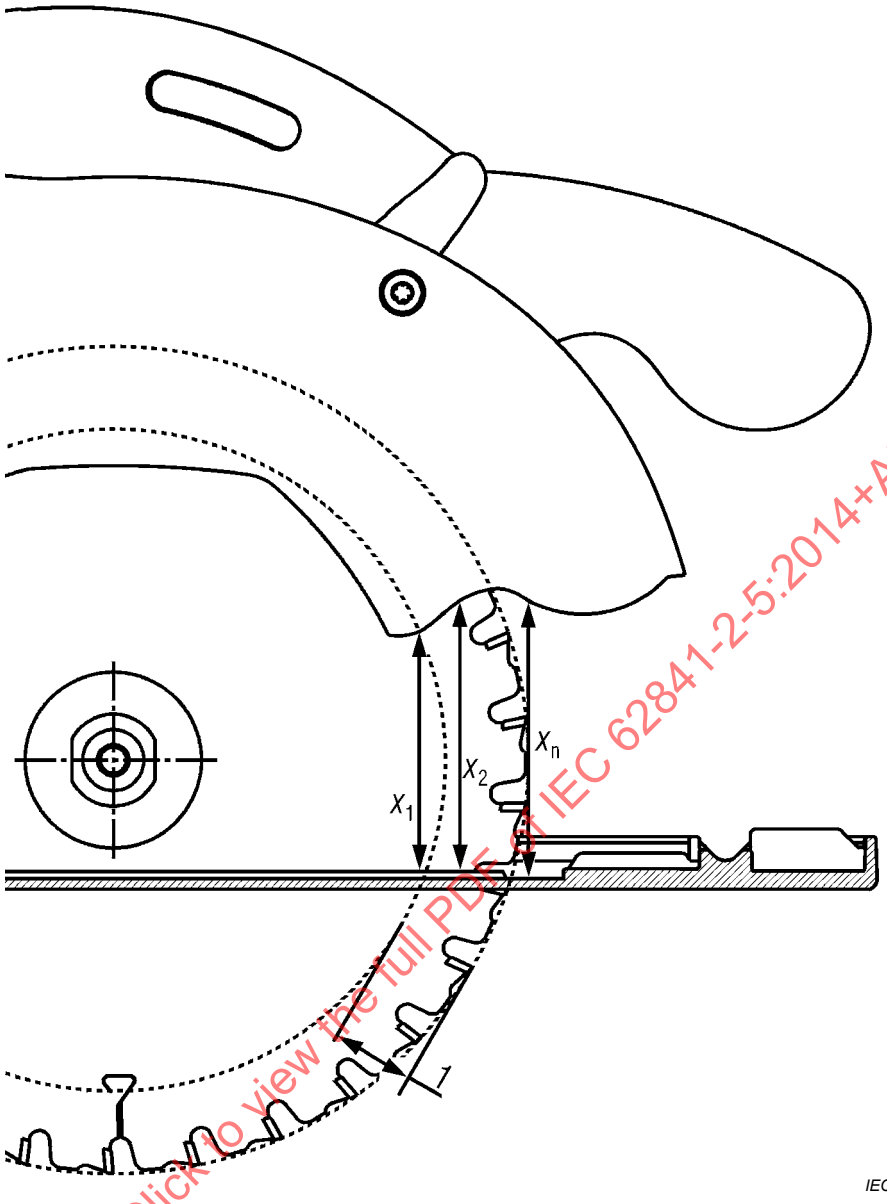


b) Dimension *U*



c) Dimension *S*

Figure 108 – Height restriction of the viewing aperture (see 19.101.2.2)



Key

1 **cutting edge zone**

x = max (x_1, x_2, … , x_n)

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

Dimensions in millimetres

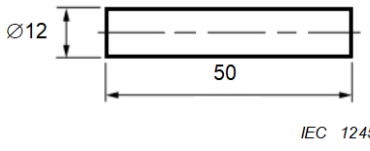
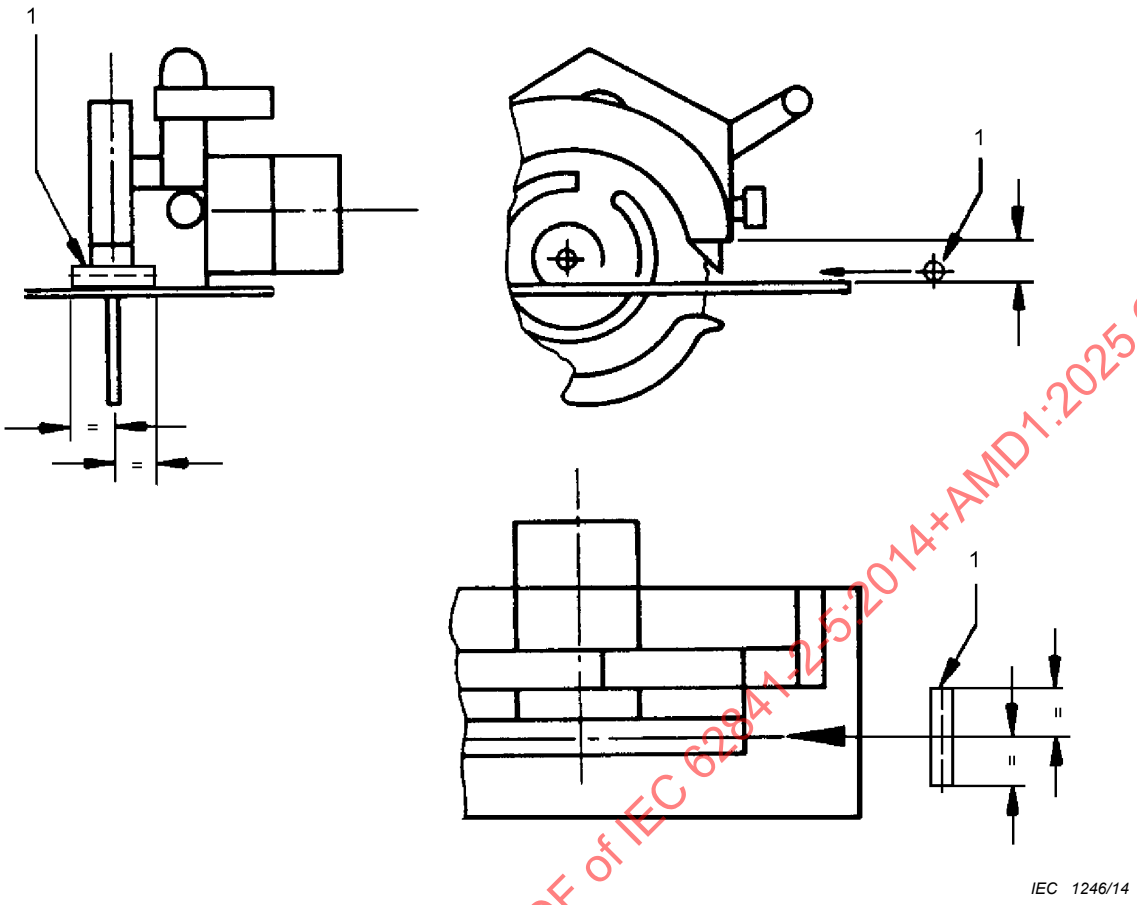


Figure 110 – Test probe 'b'

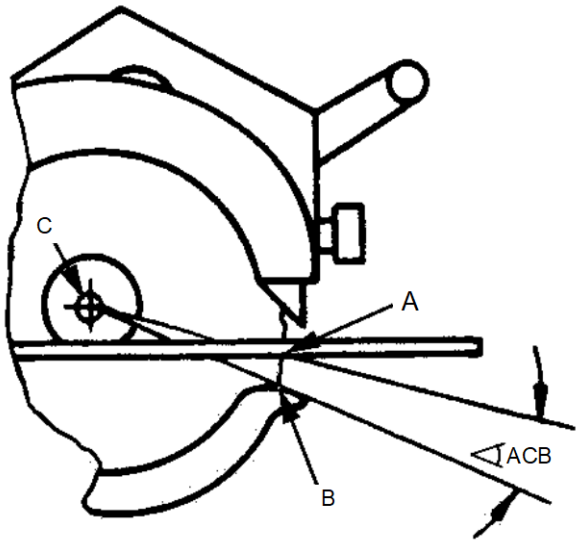


Key

1 test probe ‘b’’

= means that the distances are equal

Figure 111 – Accessibility to the front cutting edge zone



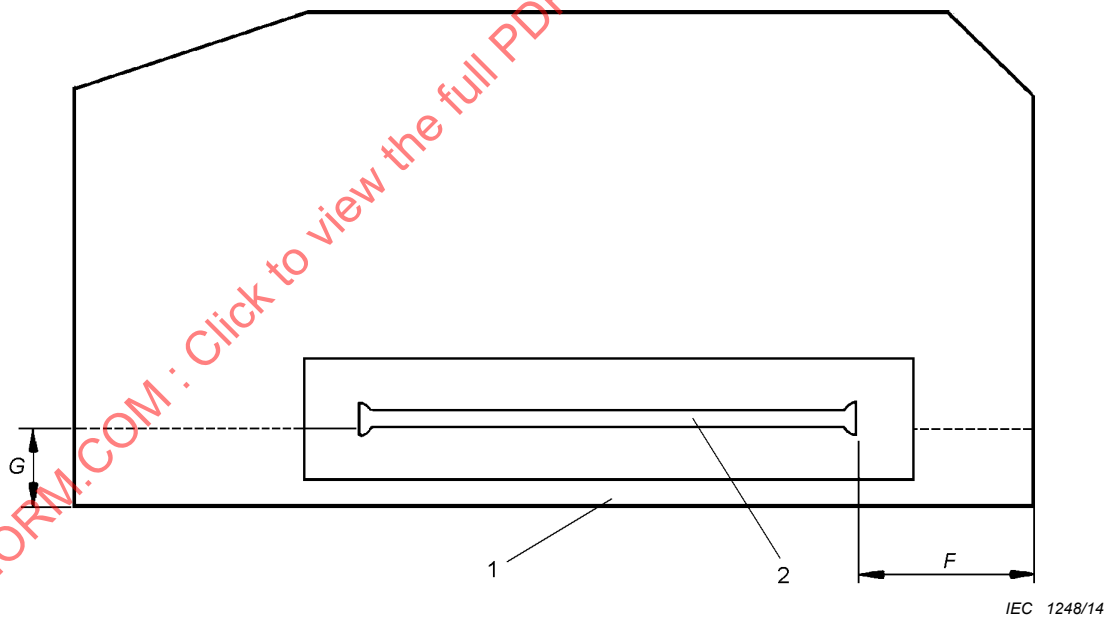
Key

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 112 – Blade exposure angle of the lower guard



Key

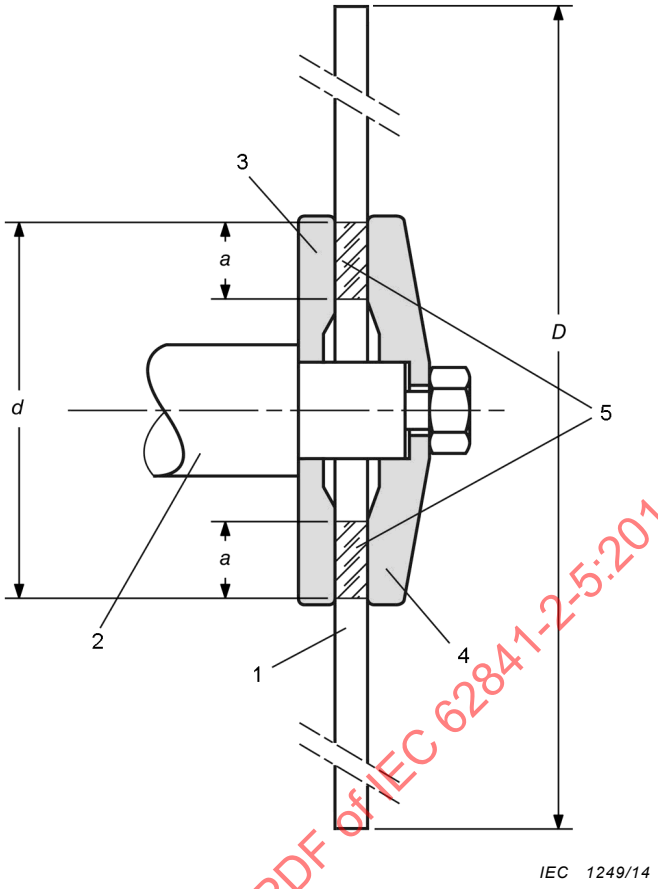
1 outboard section of the **base plate**

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.

Figure 113 – Principal dimensions of the base plate



Key

a	clamping surface overlap
D	maximum specified saw blade diameter
d	outer diameter of the clamping surface overlap
1	saw blade
2	output spindle
3	inner flange
4	outer flange
5	clamping surface overlap area

Figure 114 – Flange characteristics

Annexes

The annexes of Part 1 are applicable except as follows.

Annex I
(informative)

Measurement of noise and vibration emissions

NOTE In Europe (EN 62841-2-5), Annex I is normative.

I.2 Noise test code (grade 2)

This clause of Part 1 is applicable except as follows:

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

Addition:

Circular saws are held and used as specified in I.2.5.

I.2.5 Operating conditions

Addition:

Circular saws are tested under load observing the conditions shown in Table I.101.

NOTE 101 The values for sawing wood are also representative for sawing plastics.

Circular saws intended to cut metal are tested under load observing the conditions shown in Table I.102.

Circular saws with speed setting devices shall be adjusted to the settings to cut the workpiece material required in the test.

The temperature requirements of 5.6 are not applicable.

Table I.101 – Operating conditions for circular saws cutting wood

Orientation	Cutting a horizontal piece of chipboard with minimum dimensions 800 mm × 600 mm and a thickness depending on **maximum depth of cut** of the **circular saw** **maximum depth of cut** ≤ 40 mm: chipboard thickness 19 mm **maximum depth of cut** > 40 mm: chipboard thickness 38 mm The workpiece shall be firmly fixed by screws or clamps, air cylinders or the like to the test bench and supported on resilient material. It shall be mounted so that it does not have any significant resonance in the frequency range that can influence the test result. The board excess end shall be 250 mm from the clamped area and shall be readjusted at the beginning of each series of tests.
Tool bit	New blade for the entire series of tests, as specified for cutting chipboard
Feed force	Just sufficient to cut at a brisk pace. Equal force shall be applied to both handles, if applicable. Excessive grip forces shall be avoided.

Test cycle	One test cycle is given by cutting off one approximately 10 mm wide strip (set by rip fence if available) across the 600 mm width of the chipboard. The measurement starts when the blade enters the wood and finishes when the blade leaves the wood.

I.2.9 Declaration and verification of noise emission values

Addition:

For saws intended to cut wood and metal, the noise emission values for cutting wood and cutting metal shall be declared.

I.3 Vibration

I.3.3.2 Location of measurement

Addition:

Figure I.101 shows the positions on the main handle and the auxiliary handle, if applicable.

I.3.5.1 General

Addition:

For **battery** operated tools, the tests are conducted with the lightest **battery** in accordance with K.8.14.2 e) 2) of Part 1 that has sufficient capacity to complete the fifteen measurements as specified in I.3.6.1 of Part 1, under the operating conditions described in Table I.101 or Table I.102.

I.3.5.3 Operating conditions

Addition:

Circular saws intended to cut wood are tested under load observing the conditions shown in Table I.101.

NOTE The values for sawing wood are also representative for sawing plastics.

Circular saws intended to cut metal are tested under load observing the conditions shown in Table I.102.

Circular saws with speed setting devices shall be adjusted to the settings to cut the workpiece material required in the test.

Table I.102 – Operating conditions for circular saws cutting metal

Orientation	Cutting a horizontal piece of sheet aluminium with the minimum length of 600 mm, a width of 300 mm and a thickness of 3 mm. The workpiece shall be firmly fixed by screws, clamps, air cylinders or the like to the test bench and supported on resilient material. The metal sheet excess shall be at least 100 mm from the clamped area and shall be readjusted at the beginning of each series of tests, which consists of five test cycles.
Tool bit	New saw blade for the entire series of tests, as specified for sawing aluminium.
Feed force	Just sufficient to cut at a brisk pace. Equal force shall be applied to both handles, if applicable. Excessive grip forces shall be avoided.
Test cycle	Cutting off an approximately 10 mm wide strip across the 300 mm width of the metal sheet. Measurement starts when the saw blade enters the metal sheet and stops when the saw leaves the metal sheet.

I.3.6.1 Reported vibration value

Addition:

If more than one operating mode was measured, the result a_h for each operating mode applicable shall be reported:

$a_{h,W}$ = mean vibration “cutting wood”

$a_{h,M}$ = mean vibration “cutting metal”

I.3.6.2 Declaration of the vibration total value

Addition:

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

– for saws for cutting wood
the value of $a_{h,W}$, with the work mode description “cutting wood”;
– for saws for cutting metal
the value of $a_{h,M}$, with the work mode description “cutting metal”.

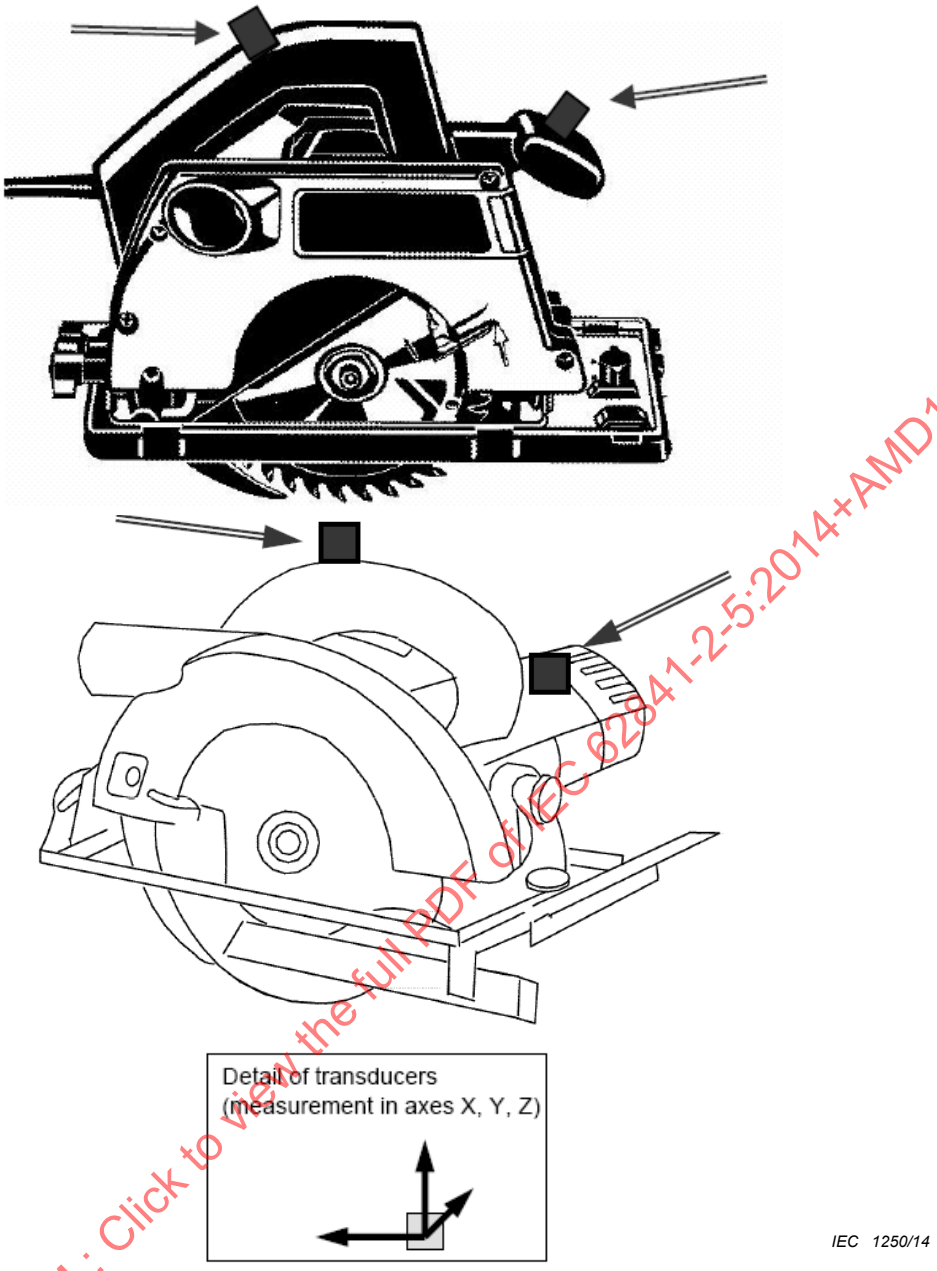


Figure I.101 – Position of transducers for circular saws

Annex K
(normative)

Battery tools and battery packs

K.1 *Addition:*

All clauses of this Part 2-5 apply unless otherwise specified in this annex.

K.8.14.1.101.1 Safety instructions for all saws

Replacement of item e):

e) **Hold the power tool by insulated gripping surfaces, 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 AA
(normative)

Additional requirements for saws with a riving knife

Annex AA presents additional requirements for saws with a **riving knife**. The clause and subclause numbering used here refers to the clauses and subclauses in the main text being complemented by these additional requirements.

AA.19 Mechanical hazards

Riving knives for saws shall meet the requirements of AA.19.101 to AA.19.105:

AA.19.101 The **riving knife** shall be rigidly fixed within the depth of cut 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 AA.19.102. The **riving knife** is fastened in accordance with the instructions required by 8.14.2.*

*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 **cutting edge zone** of a saw blade with diameter **D**.*

*After this test, the tip of the **riving knife** shall not have been displaced by more than 3 mm in direction of the force.*

AA.19.102 The **riving knife** and its holder shall be so designed as to allow the adjustment of the **riving knife**, for all specified blade diameters in accordance with 8.3 to comply with the following conditions (see Figure AA.102):

a) below the **base plate**, the radial distance between the **riving knife** and the periphery of the saw 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 periphery of the saw blade shall not exceed 5 mm, when measured along the line perpendicular to the **base plate**.

Compliance is checked by inspection and by measurement.

AA.19.103 For saws with a **maximum depth of cut** exceeding 55 mm, the **riving knife** and its holder shall be so designed that, when the depth of cut is adjusted, the **riving knife** continues to comply with the requirements of items a) and b) of AA.19.102.

Compliance is checked by inspection.

AA.19.104 The **riving knife** 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 **base plate** level for the **maximum depth of cut** of the saw, shall be at least equal to 1/8 ***D***. 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 **base plate** is set to **maximum depth of cut** at 90°. The **riving knife** is adjusted for saw blade diameter **D** in accordance with AA.19.102. The **riving knife** is fastened in accordance with the instructions required by 8.14.2.*

*At the centre of the **riving knife** tip, a force W equal to the weight of the tool 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.*

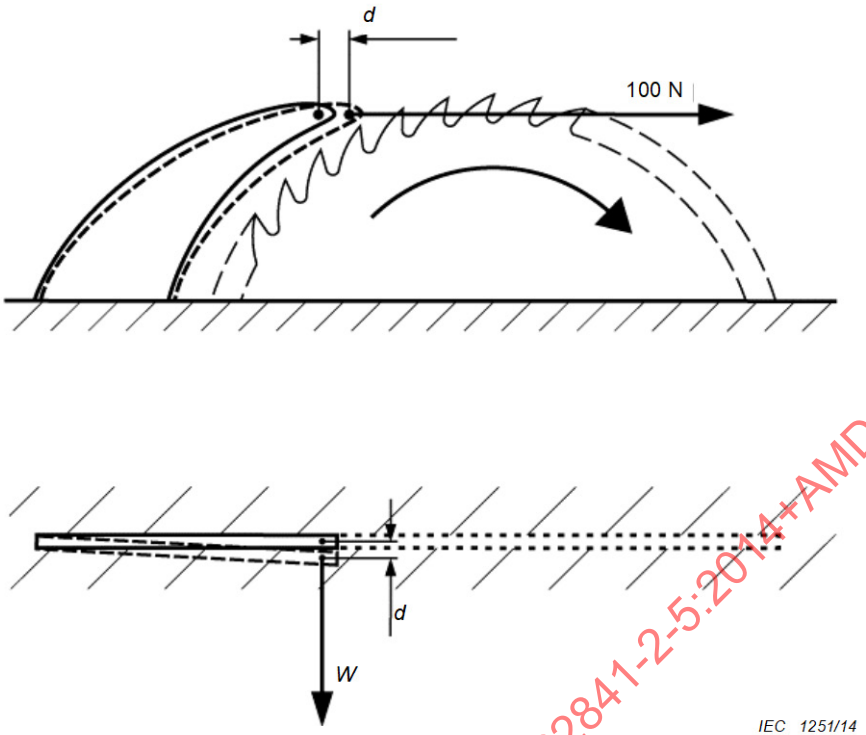
AA.19.105 The saw shall be designed and made in such a way that it cannot rest on the **riving knife** when placed on a horizontal plane in all its stable positions with the **lower guard** in the closed position.

Compliance is checked by manual test.

AA.20 Mechanical strength

AA.20.2 *Addition:*

*The test is also made on the **guarding system**. No breakage or crack visible with normal vision is allowed and the guard shall meet the requirements of 19.101 and 19.102.*



Key

d deflection

W test force, see AA.19.104

Figure AA.101 – Riving knife stability test

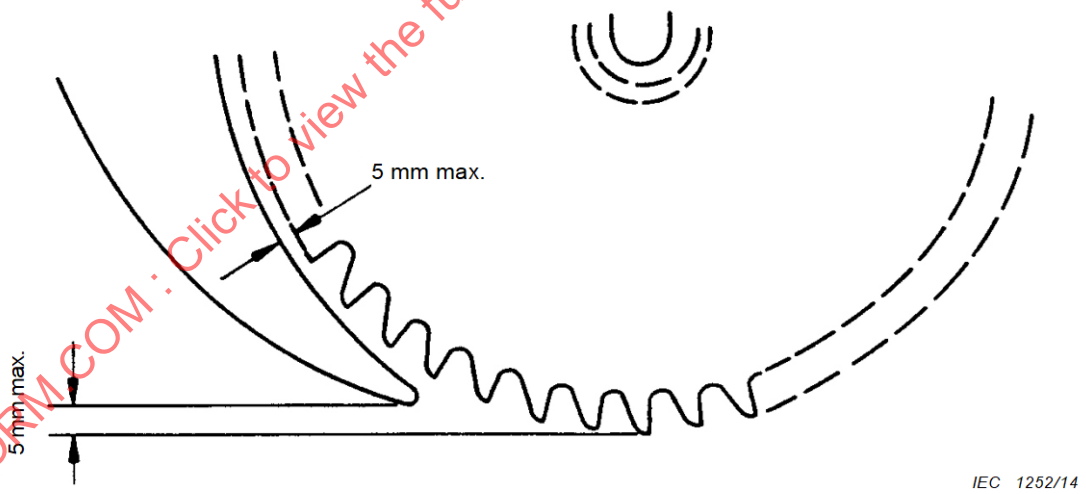


Figure AA.102 – Riving knife adjustment

Annex BB
(normative)

Additional requirements for lower guards for saws without a riving knife

Annex BB presents additional requirements for saws without a **riving knife**. The clause and subclause numbering used here refers to the clauses and subclauses in the main text being complemented by these additional requirements.

BB.20 Mechanical strength

BB.20.101 The **lower guard**, or the **guarding system** as shown in Figure 104, shall be resistant to abuse.

*Compliance is checked by the following tests to be performed with a new saw sample with a 2 mm thick steel disc with diameter **D** fitted.*

*The saw is set to 0° **bevel angle**. Saws using a **guarding system** as shown in Figures 101, 102 and 103 are set for **maximum depth of cut**. Saws using a **guarding system** as shown in Figure 104 are tested in the fully blade covered position. The saw, with its lowest point 1 m above a concrete surface, is dropped twice as follows:*

*a) oriented with the **lower guard** being at bottom, so that the saw will strike the concrete floor with the **base plate** approximately parallel to the floor;*

b) oriented so that the saw will strike the concrete floor in a hand carrying position.

After completion of each drop as specified above, the saw shall then comply with the tests of ~~17.101.2 and 17.101.3~~ 19.107.2 and 19.107.3.

Bibliography

The bibliography of Part 1 is applicable, except as follows:

Addition:

IEC 62841-2-22, *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 2-22: Particular requirements for hand-held cut-off machines*[1]

_____

_____

1 Under consideration.

CONTENTS

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

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62841-2-5 edition 1.1 contains the first edition (2014-06) [documents 116/166/FDIS and 116/180/RVD] and its amendment 1 (2025-02) [documents 116/860/FDIS and 116/878/RVD].

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 62841-2-5 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

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 small 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 document and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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.

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:

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

3.102
bevel angle
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**

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.

8.2 *Addition:*

NOTE 101 In Canada and the United States of America, the following additional requirements apply.

Tools shall be marked with the following additional safety warnings:

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

  In Canada, the equivalent French wording of the above warning is as follows: "DANGER – Tenir les mains et le corps à l'écart de la lame et se tenir de côté par rapport à la lame. Le contact avec la lame entraînera des blessures graves."

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

  In Canada, the equivalent French wording of the above warning is as follows: "AVERTISSEMENT – Vérifiez le système de protection. Il doit couvrir la lame instantanément!"

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

  In Canada, the equivalent French wording of the above warning is as follows: "AVERTISSEMENT – Tenir la scie avec les deux mains."

– "WARNING – Support and clamp workpiece."

  In Canada, the equivalent French wording of the above warning is as follows: "AVERTISSEMENT – Supporter et assujettir la pièce à travailler."

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

8.14.101.1 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 Figures 101, 102 and 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.*

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.

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 18.4 and 18.5.3	a
Prevent self-resetting as required in 23.3	a
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 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.

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 Figures 101, 102 and 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

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 Figures 101 and 102

19.102.1.1 For saws using a **guarding system** as shown in Figures 101 and 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	0°

the principal dimension *G* of the **base plate**, as specified in Figure 113, is less than 0,10 ***D***	
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 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. 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:

$F > 0{,}2\ \boldsymbol{D}$

$G > 0$

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 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 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.

19.107 Guarding system – Longevity

19.107.1 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 19.107.2 and 19.107.3.

19.107.2 *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 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.*

19.107.3 *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 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 such that*

- *the **lower guard** stopper is present with all of its components (**lower guard** stopper components may show wear as a result of the test); and*
- *the **lower guard** is in contact with the stopper; and*
- *if a gap occurs between the rear portion of the **lower guard** and the **upper guard** with the **base plate** in the horizontal position, the guarding is evaluated in accordance 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.*

19.108 Guarding system – Resistance

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

Compliance is checked by the tests of 19.108.2 and 19.108.3, 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.

19.108.2 *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 19.107.2 and 19.107.3.

19.108.3 *For a saw intended to cut materials such as plastic, 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 one sample material of ferrous metal, as 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.*

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.

– *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.*

– *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 19.107.2 and 19.107.3.

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 19.107.2 and 19.107.3.*

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 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:

21.18.1.1 *Addition:*

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

21.18.1.2 *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 subclause of Part 1 is applicable, except for saws that are intended only for cutting metal in accordance with 8.14.2 b) 104).

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, except as follows:

23.3 *Addition:*

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

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.

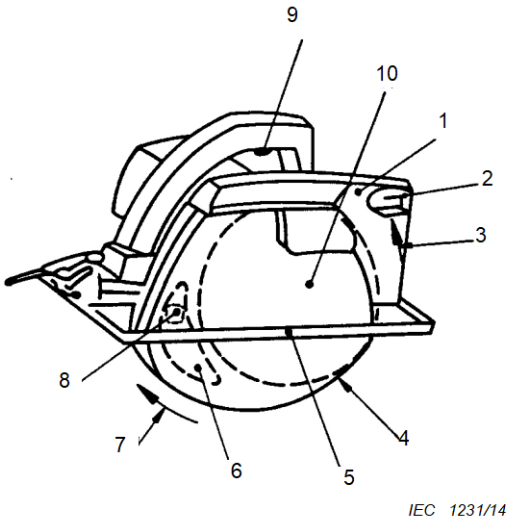


Figure 101 – Circular saw with outer pendulum guard

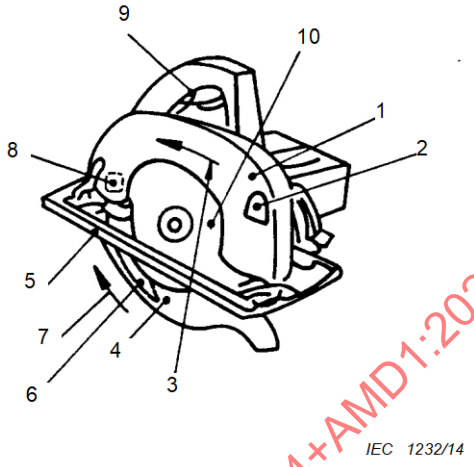


Figure 102 – Circular saw with inner pendulum guard

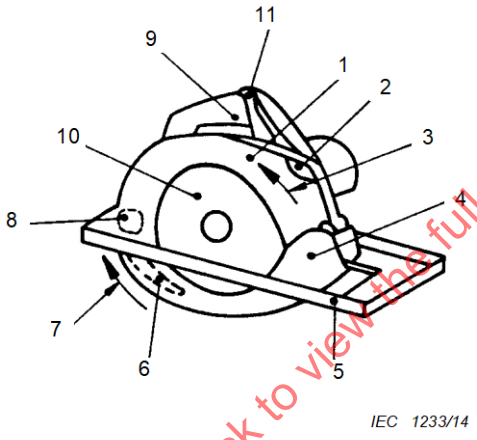


Figure 103 – Circular saw with tow guard

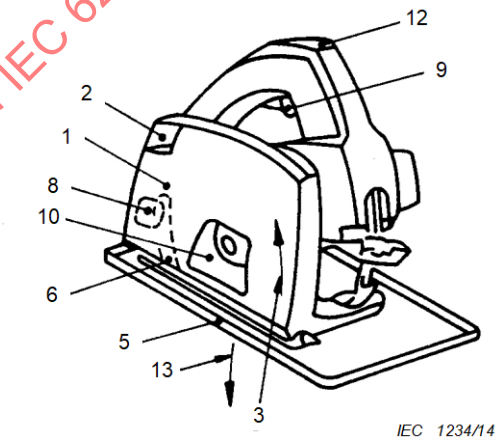
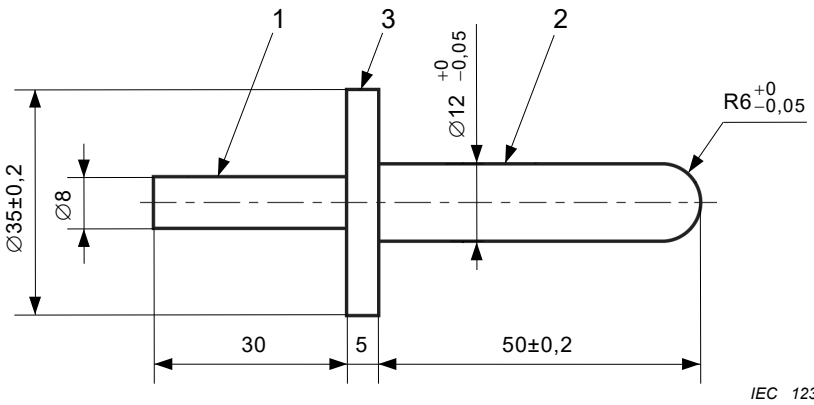


Figure 104 – Plunge type saw

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 power switch
10 saw blade
11 lever for unlocking tow guard lock
12 lever for unlocking plunge guard lock
13 direction of plunging movement

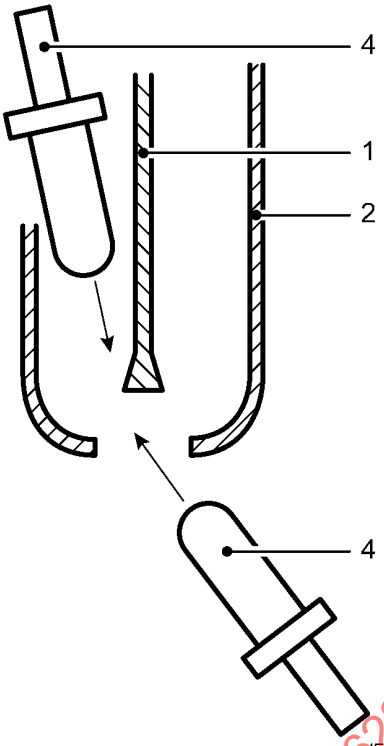
Dimensions in millimetres



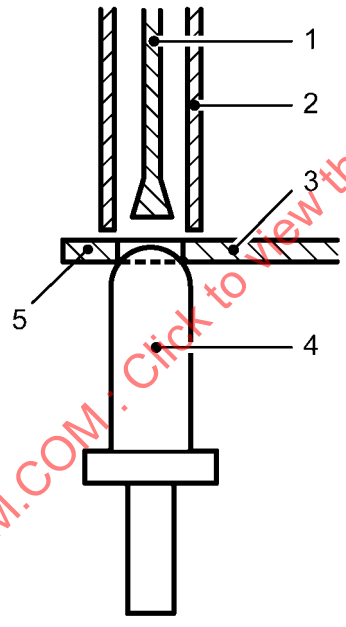
Key

1 handle section
2 test section
3 probe's flange

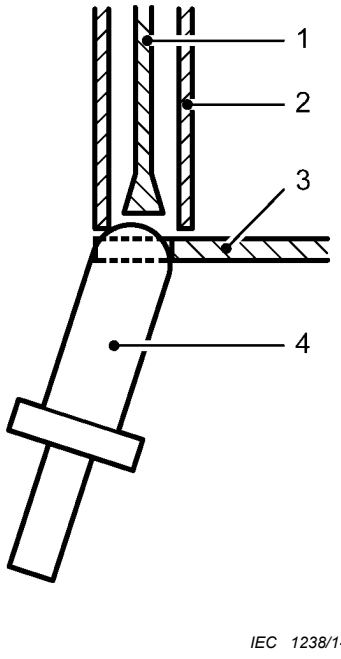
Figure 105 – Test probe 'a'



a) Saw with lower guard



b) Plunge type saw with outboard section



c) Plunge type saw without 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

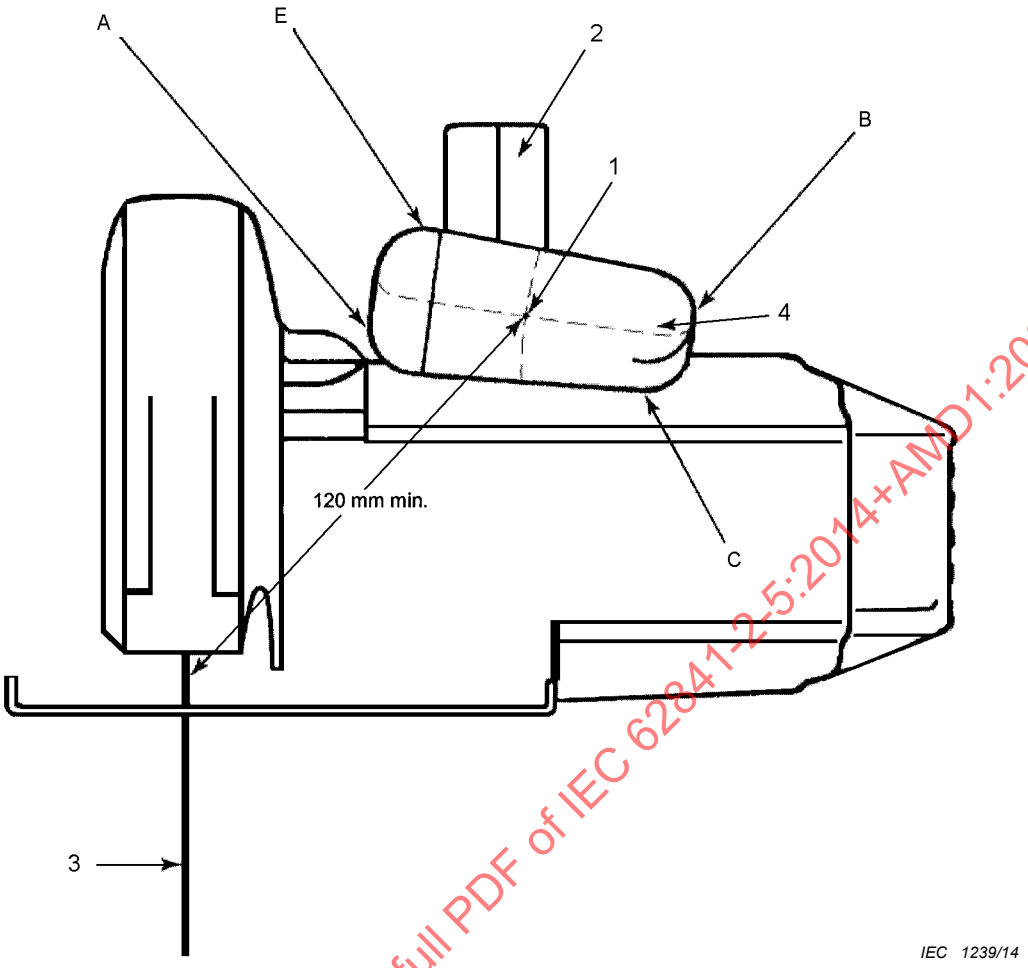


Figure 107a) – Circular saw with auxiliary handle