BRITISH STANDARD

BS EN
50144-2-5:2000

Safety of hand-held electric motor operated tools —

Part 2-5: Particular requirements for circular saws and circular knives

The European Standard EN 50144-2-5:1999 has the status of a British Standard

ICS 25.080.60; 25.140.20

National foreword

This British Standard is the official English language version of EN 50144-2-5:1999. It supersedes BS EN 50144-2-5:1996 which will be withdrawn on 2001-12-01.

The UK participation in its preparation was entrusted by Technical Committee CPL/61, Safety of household and similar electrical appliances, to Subcommittee CPL/61/6, Portable motor operated tools, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

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Summary of pages

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English version

Safety of hand-held electric motor operated tools
Part 2-5: Particular requirements for circular saws and circular knives

Sécurité des outils électroportatifs à moteur
Partie 2-5: Règles particulières pour les scies circulaires et les couteaux circulaires

Sicherheit handgeführter motorbetriebenen Elektrowerkzeugen
Teil 2-5: Besondere Anforderungen an Kreissägen und Kreismesser

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 50144-2-5:1999 E

Foreword

This European Standard has been prepared by Technical Committee TC 61F, Hand-held and transportable electric motor operated tools. The text of the draft was submitted to the Unique Acceptance Procedure (UAP) in April 1994 and was approved by CENELEC as EN 50144-2-5 on 1995-03-06.

A draft for an amendment was submitted to UAP in April 1994 and was approved by CENELEC on 1995-03-06 for inclusion into the European Standard.

A further amendment was submitted to UAP in May 1996 and was approved by CENELEC as amendment A1 to EN 50144-2-5 on 1996-12-09.

Amendments to fulfil the essential requirements of the Machinery Directive were submitted to the formal vote in January 1998 and were approved by CENELEC on 1998-08-01 for inclusion, together with the earlier amendment, into a second edition of EN 50144-2-5.

This European Standard supersedes EN 50144-2-5:1996.

The following dates were fixed:

- latest date by which the EN has to be implemented at a national level by publication of an identical national standard or by endorsement (dop) 2000-06-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2001-12-01

This standard is divided into two parts:

Part 1: General requirements which are common to most hand-held electric motor operated tools (for the purpose of this standard referred to simply as tools).

Part 2: Requirements for particular types of tool which either supplement or modify the requirements given in Part 1 to account for the particular hazards and characteristics of these specific tools.

This European Standard has been prepared under a mandate given to CEN/CENELEC by the European Commission and the European Free Trade Association and supports the essential health and safety requirements of the Machinery Directive.

Compliance with the clauses of Part 1 together with this Part 2 provides one means of conforming with the essential health and safety requirements of the Directive.

For noise and vibration this standard covers the requirements for their measurement, the provision of information arising from these measurements and the provision of information about the personal protective equipment required. Specific requirements for the reduction of the risk arising from noise and vibration through the design of the tool are not given as this reflects the current state of the art. As with any standard, technical progress will be kept under review so that any developments can be taken into account.

CEN TC/255 is producing standards for non electrically driven circular saws (EN 792-12)

Warning: Other requirements and other EC Directives can be applicable to the products falling within the scope of this standard.

This standard follows the overall requirements of EN 292-1 and EN 292-2.

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

NOTE In this European Standard the following print types are used:
- Requirements proper;
- *Test specifications;*
- Explanatory matter.

Contents

1 Scope

This clause of Part 1 is applicable except as follows:

1.1 *Addition:*

This standard applies to all types of circular saws for cutting wood and similar materials and to circular knives.

These requirements do not cover circular saws and circular knives when mounted in a support for use as fixed tools.

This standard does not give requirements for the design of the tool for the reduction of the risk arising from noise and vibration.

2 Definitions

This clause of Part 1 is applicable except as follows:

2.2.18 *Replacement:*

2.2.18 **normal load:** For circular saws the load obtained when the circular saw is operated continuously with the saw blade in the vertical position, the load being such that the input in watts is equal to:

$0{,}25\ s\ \sqrt{n_0}$ For saws with a.c. asynchronous induction motors.

$0{,}2\ s\ \sqrt{n_0}$ For other saws designed for cutting depths exceeding 55 mm.

$0{,}13\ s\ \sqrt{n_0}$ For other saws designed for cutting depths not exceeding 55 mm, and for multi-purpose tools which can be fitted with circular-saw accessories.

Where s is the maximum cutting depth, in millimetres, and n_o the no-load speed of the saw blade, in revolutions per minute, after the tool has been operating for a period of 15 min at no-load, at rated voltage or at the upper limit of the rated voltage range.

Additional definitions:

2.2.101 **circular saw with outer pendulum guard:** A tool the lower guard of which, for operation, swings around the upper fixed guard (see Figure 101).

2.2.102 **circular saw with inner pendulum guard:** A tool the lower guard of which, for operation, swings inside the upper fixed guard (see Figure 102).

2.2.103 **circular saw with tow-guard:** A tool the lower guard of which, for operation, slides along the upper fixed guard (see Figure 103).

2.2.104 **plunge type circular saw:** A tool having only a fixed upper guard into which the saw blade retracts when not in use (see Figure 104).

2.2.105 **guide plate:** Part constituting the plane of reference on the material to be cut.

2.2.106 **fixed guard:** Cover linked to the motor unit which prevents access to the part of the blade situated above the guide plate.

2.2.107 **movable guard:** Cover which, in the rest position, prevents access to the part of the blade which is not covered by the fixed guard and which, in most cases, is situated below the guide plate. Plunge type circular saws have only one guard into which the saw blade retracts at the end of the sawing operation.

2.2.108 **riving knife:** Metal part placed in the plane of the saw blade which prevents the wood from tightening onto the rear part of the saw blade and thus prevents the backward movement of the tool or jamming of the saw blade.

3 General requirements

This clause of Part 1 is applicable.

4 General conditions for the tests

This clause of Part 1 is applicable.

5 Rating

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable.

7 Marking and information for use

This clause of Part 1 is applicable except as follows:

7.1 *Addition:*

Circular saws and circular knives shall be marked with an indication of the direction of rotation. This shall be clearly indicated by a raised or sunk arrow on the fixed guard or by any other means no less visible and indelible.

7.13.1 *Addition:*

For circular saws, the instruction sheet shall also include:

— information on the correct use of dust collection equipment;

— the maximum and minimum diameter, the thickness range and other characteristics of the blades which can be fitted to the tool;

— the rated no-load speed of the working spindle.

7.13.2 *Addition:*

Instructions shall also include the substance of the following:

— Do not use blades which are deformed or cracked.

— Do not use blades made of high speed steel.

— Do not use blades which do not comply with the characteristics specified in these instructions.

— Do not stop the blades by lateral pressure on the disc.

— Ensure that movable guards operate freely without jamming.

— Do not lock the moving guard in the open position.

— Ensure that any retraction mechanism of the guard system operates correctly.

— Remove plug from the mains supply before replacement of the blade, making adjustments, or other maintenance work.

— Using manufacturer data:

- ensure that the diameter, thickness and other characteristics of the blade are suitable for the tool;
- ensure that the blade is suitable for the spindle speed of the tool.

— For circular saws, do not use blades the body of which is thicker or the set of which is smaller than the thickness of the riving knife.

— Ensure that the riving knife is adjusted so that:

- the distance between the riving knife and the toothed rim of the saw blade is not more than 5 mm;
- the toothed rim does not extend more than 5 mm beyond the lower edge of the riving knife.

— Always use the riving knife except when plunging in the middle of the work piece.

Additional subclause:

7.13.101 The instruction sheet shall also include the following: “Hearing protection should be worn when using circular saws”.

8 Protection against electric shock

This clause of Part 1 is applicable.

9 Starting

This clause of Part 1 is applicable.

10 Input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable.

12 Leakage current

This clause of Part 1 is applicable.

13 Environmental requirements

This clause of Part 1 is applicable except as follows:

Subclause 13.1 is not applicable to circular knives.

13.1.2 *Replacement:*

For circular saws, the tests under working conditions, orientation within the cabin and material to be worked shall be in accordance with the following:

Material	Chipboard 19 mm × 800 mm × 400 mm
Feed-speed	At a brisk pace without overloading the tool
Depth of cut	30 mm below guide plate or as close to this value as is possible
Width of cut-off	10 mm minimum, as set by the rip fence
Tool bit/cutter/ abrasive	New blade, as recommended by the manufacturer for chipboard, at the start of each test period
Integral collection (if any)	Emptied during each 2 minute rest time
Orientation	Across the width of the cabin with the airflow from the left to the right of the operator (see Figure 105)
Test cycle	Three cuts per min across 400 mm width for 10 min, then 2 min rest time (total 12 min)
Test period	Five complete cycles (total 1 h)

13.2.3 *Replacement of paragraphs 1, 2 and 3*

Circular saws are tested under load under the conditions shown in Table 101:

Table 101 — Test conditions for circular saws

Orientation	Cutting a horizontal piece of chipboard 800 mm x 400 mm x 19 mm supported on resilient material and fixed to a bench
Tool bit	New blade as recommended by the manufacturer for cutting chipboard
Feed force	Just sufficient to cut at a brisk pace
Test cycle	Cutting off approximately 10 mm wide strips (set by rip fence) across the 400 mm width of the chipboard

Circular knives are tested at no load.

13.2.4 *Addition:*

For circular knives the blade shall be vertical.

13.3.7 *Replacement of paragraph 1:*

Circular saws and circular knives are tested under the conditions specified in 13.2.3 and 13.2.4.

Paragraph 3 is not applicable.

14 Moisture resistance

This clause of Part 1 is applicable.

15 Insulation resistance and electric strength

This clause of Part 1 is applicable.

16 Endurance

This clause of Part 1 is applicable.

17 Abnormal operation

This clause of Part 1 is applicable.

18 Mechanical hazards

This clause of Part 1 is applicable except as follows:

18.1 *Replacement:*

Circular saws and circular knives shall be equipped with an adequate guarding system which cannot be removed without the aid of a tool.

The guarding system for circular saws shall comply with the requirements of 18.101, 18.102, 18.103 and 18.104.

Compliance is checked by inspection.

This requirement does not apply to tools with a peripheral speed of the blade of less than 5 m/s. For these tools, the relevant requirements are under consideration.

Provided they are as effective and reliable as those specified, other means of achieving the necessary degrees of safety are allowed.

18.3 *Addition:*

Circular saws shall have at least two handles to control the tool.

For saws the mass of which is less than or equal to 6 kg, the motor casing if suitably shaped may be considered one of the handles.

An accessory intended to be used with a drill to convert it into a circular saw shall have at least one handle.

Compliance is checked by inspection.

18.6 *Addition:*

This subclause of Part 1 does not apply.

Additional subclauses:

18.101 In order to prevent inadvertent contact of the operator's hand or fingers with the toothed rim of the saw blade, or with rotating parts on the handle side of the saw above the guide plate, these parts shall be screened by means of a guard or guards.

18.101.1 For saws of the types shown in Figures 101, 102 and 103 a fixed guard shall screen the toothed rim of the saw blade radially at least down to the root of the saw teeth. For the purpose of this requirement the diameter of the root of the saw teeth is considered to be not more than 0,9 times the diameter of the smallest saw blade specified in the instruction sheet.

18.101.2 Plunge type saws as shown in Figure 104 shall be equipped with a guard into which the saw blade and the riving knife automatically retract when not in use. The guard shall cover the toothed rim of the saw blade at least down to the root of the teeth for all possible depths of cut. For the purpose of this requirement the diameter of the root of the saw teeth is considered to be not more than 0,9 times the diameter of the smallest saw blade specified in the instruction sheet.

This requirement does not apply between the guide plate and the lower side of the motor, but the opening must not be wider than necessary.

The guard shall automatically lock in the closed position when the saw is not in use, whilst gripped by its handles and held in any position liable to occur in normal use and with the guide plate not in contact with the work piece.

18.101.3 All apertures including chip outlets, shall be so designed and arranged as to comply with the requirements of 18.101.1.1 or 18.101.1.2.

Compliance is checked by the following tests and measurements:

The tests are carried out with the movable guard closed.

All apertures in the guard shall be tested with the rigid test probe "a" of Figure 106. At no angle of the test probe shall it be possible to touch the toothed rim of the saw blade at any depth of cut. Neither shall it be possible to touch the rotating parts on the handle side of the saw with the saw set at maximum depth of cut.

The accessibility of the toothed rim of the saw blade at the front of the saw shall be checked as follows: The rigid test probe "b" of Figure 107 is so positioned that its longitudinal axis is parallel to the axis of the saw spindle and is centrally aligned about the plane of the saw blade. When the saw is set for any depth of right angled cut it shall not be possible to touch the toothed rim of the saw blade with the test probe when it is moved laterally towards the saw blade.

For circular saws having an inclinable guide plate the test with the rigid test probe "a" (Figure 106) to check the accessibility between the front part of the guard and the guide plate is not made. However, at the toothed rim of the saw blade, the distance between the lateral side of the guard and the guide plate, or the top of any flanged edge on the guide plate, shall be less than 3 mm for the maximum cutting angle at maximum depth of cut when measured at right angles to the guide plate as shown in Figure 108.

18.102 Saws of the types shown in Figures 101, 102 and 103 shall below the guide plate (working side of the saw) have a movable guard which when the saw is not in use shall screen both sides of the saw blade radially down to the root of the teeth.

For the purpose of this requirement the diameter of the root of the saw teeth is considered to be not more than 0,9 times the diameter of the smallest saw blade specified in the instruction sheet. This guard shall return automatically to its closed position when the saw is not in use and it shall not be lockable in the open position.

For saws of the types shown in Figures 101 and 102 there may be an opening angle of not more than 10° at the front of the guard, as shown in Figure 107, when the tool is set for maximum depth of cut and the guide plate is positioned at right angles to the saw blade.

18.102.1 For saws of the types shown in Figures 102 and 103 where the movable guard needs to pass the saw blade and/or riving knife, including its holder, the aperture in the movable guard provided for this purpose shall be kept as small as possible.

With the movable guard in its closed position, the distance “a” between the outer circumference of the guard and the periphery of the toothed rim of the largest saw blade specified in the instruction sheet and the width “b” of the aperture shall comply with the values specified in the table given in Figure 109.

18.102.2 For saws with a tow-guard, as shown in Figure 103, the movable guard shall automatically lock in the closed position when the saw is not in use, the guide plate is not in contact with the workpiece and the saw is gripped by its handles and held in any position liable to occur in normal use.

18.102.3 For all types of saw having a blade diameter not exceeding 200 mm, the closing time of the movable guard system from the maximum opening position or from the position corresponding to maximum cutting depth shall not exceed 0,2 s. For saws having a blade diameter exceeding 200 mm, the closing time in seconds shall not be more than the diameter expressed in metres. During the measurement, the saw is set for a right angled cut and for maximum cutting depth with the guide plate in the horizontal position and the saw not inverted.

Compliance with the requirements of 18.102, 18.102.1, 18.102.2 and 18.102.3 is checked by inspection and by measurement and for 18.102.3 by the following test:

The movable guard considered to be closed when it is not possible to touch the teeth of the saw blade with test probe “a” (see Figure 106).

18.103 Circular saws shall be equipped with a riving knife.

18.103.1 The riving knife shall, within the cutting depth, be in alignment with the plane of the saw blade and positioned so as to pass freely through the cutting groove and shall not tilt towards the blade.

18.103.2 The riving knife and its holder shall be designed to allow the adjustment of the riving knife, for all saw blade diameters resulting in cutting depths between 100 % and 90 % of the rated cutting depth, to comply with the following conditions (see also Figure 110):

a) Below the guide plate the radial distance between the riving knife and the toothed rim of the saw blade shall not at any point exceed 5 mm at the depth of cut set.

b) The tip of the riving knife shall be at a posiition between the tooth peak and 5 mm from the tooth peak.

c) During the operation of the circular saw, the position of the riving knife shall not change.

Compliance is checked by inspection and by measurement.

18.103.3 For saws with a rated cutting depth exceeding 55 mm the riving knife and its holder shall be so designed that when the cutting depth is adjusted the riving knife automatically continues to comply with the requirement of 18.103.2.

Compliance is checked by inspection and by measurement.

18.103.4 The riving knife shall not be thicker than the width of the cutting groove nor thinner than the saw blade body.

18.103.5 The riving knife shall be resilient and made of steel with a hardness between 35 and 48 HRC. Its tip shall be rounded with a radius not less than 2 mm and its edges shall not be sharp.

18.103.6 The width of the riving knife, measured at the guide plate level for the maximum cutting depth of the saw, shall be at least equal to 1/8 of the diameter of the saw blade. At the fixing point level, the riving knife shall have a rigidity equivalent to that of a plane section knife the width of which is maintained equal to 1/8 of the diameter of the blade up to this level (e.g. by means of additional clamping).

The faces of the riving knife shall be plane, smooth and parallel and shall be slightly chamfered on the edge facing the saw blade.

Compliance is checked by inspection and by measurement.

18.103.7 The saw shall be so designed that it cannot rest on the riving knife when placed on a horizontal plane in all its stable positions with the movable guard in the closed position.

Compliance is checked by inspection and by measurement.

18.104 The guide plate shall have the following dimensions (see also Figure 111):

$L \geq 1{,}6\ D$

$Z \geq 0{,}7\ D$

$H \geq 0{,}15\ D$ [1)]

$F \geq$ 0,2 D or 38 mm (whichever is the larger)

$X \leq F - 10$ mm [2)]

D: is the maximum diameter of the saw blade specified in the instruction sheet.

NOTES:
1) For saws provided for special applications (e.g. cutting along a wall) the dimension H may be smaller.
2) Only applies if a recess in the **guide plate** is intended as a cutting line indicator.

Compliance is checked by measurement.

18.105 The outer diameter of the contact area of flanges used to secure the saw blade shall be at least equal to 0,15 times the rated blade diameter and at least one of the flanges must be locked or keyed to the output spindle.

When flanges of different diameters are used the inner diameter of the larger flange shall be at least 3 mm smaller than the outer diameter of the smaller flange in order to prevent undue deformation.

Compliance is checked by measurement and by inspection.

18.106 Provision shall be made to enable the operator to lock the output spindle in order to replace the saw blade without difficulty.

Such provisions are for example:

— spindle lock;

— flattened off surfaces on the shaft or flanges;

— a hole in the saw blade.

Compliance is checked by inspection.

18.107 The total mass of a circular saw intended to be operated by one person shall not exceed 16 kg.

The total mass is the mass of the tool fitted with a flexible cord of 1,5 m in length together with the heaviest accessory mentioned in the instruction sheet.

Compliance is checked by inspection and measurement.

19 Mechanical strength

This clause of Part 1 is applicable except as follows:

19.1 *Addition:*

The test of 19.3 is not made.

19.2 *Addition:*

The test is made also on the guarding system.

After the test the guarding system shall still comply with the requirements of 18.102 and 18.103 and no breakage shall be visible by the naked eye.

20 Construction

This clause of Part 1 is applicable except as follows:

20.11 *Addition:*

Circular saws and circular knives shall be fitted with a mains switch such that the motor is switched off automatically as soon as the actuating member of the switch is released. The switch shall require two separate sequential operations before the blade will operate.

Circular saws and circular knives are considered to be tools where there is a risk of accidental starting or continued operation.

Compliance is checked by inspection.

20.21 *Addition:*

Circular saws are considered to be tools for which this clause of Part 1 applies.

Additional subclause:

20.101 Circular saws and circular knives shall not be designed for use unrestrained in the inverted position. This requirement may be fulfilled if the tool has no suitable stable position when inverted.

Compliance is checked by inspection.

21 Components

This clause of Part 1 is applicable.

22 Internal wiring

This clause of Part 1 is applicable.

23 Supply connection and external flexible cables and cords

This clause of Part 1 is applicable.

24 Terminals and external conductors

This clause of Part 1 is applicable.

25 Provision for earthing

This clause of Part 1 is applicable.

26 Screws and connections

This clause of Part 1 is applicable.

27 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.

28 Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

29 Resistance to rusting

This clause of Part 1 is applicable.

30 Radiation

This clause of Part 1 is applicable.

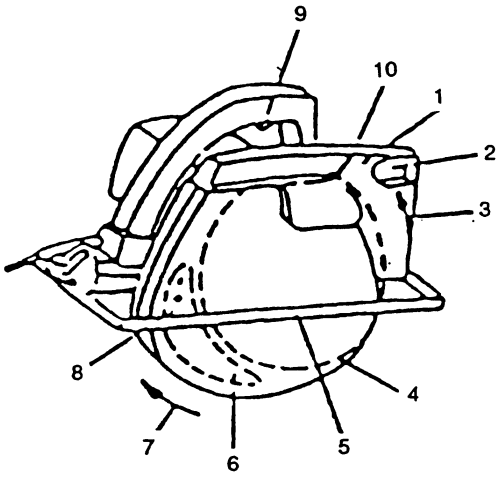


Figure 101 — Circular saw with outer pendulum guard

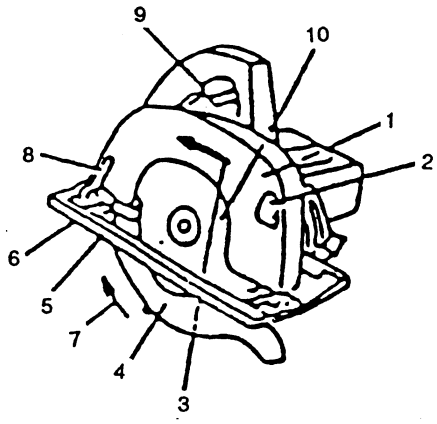


Figure 102 — Circular saw with inner pendulum guard

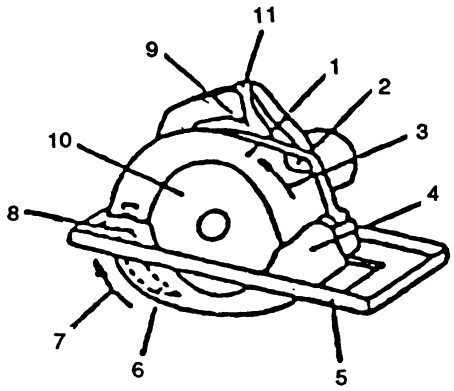


Figure 103 — Circular saw with tow guard

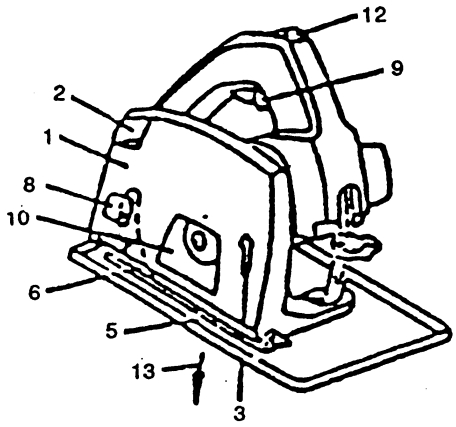


Figure 104 — Plunge type saw

1	Fixed guard
2	Connection point for dust and chip collection equipment
3	Indication of direction of rotation saw blade
4	Movable guard
5	Guide plate
6	Riving knife
7	Direction of opening of movable guard
8	Holder for riving knife
9	Switch
10	Saw blade
11	Lever for unlocking tow-guard lock
12	Lever for unlocking plunge lock
13	Direction of plunging movement

The actual design does not need to correspond with the drawings shown above.

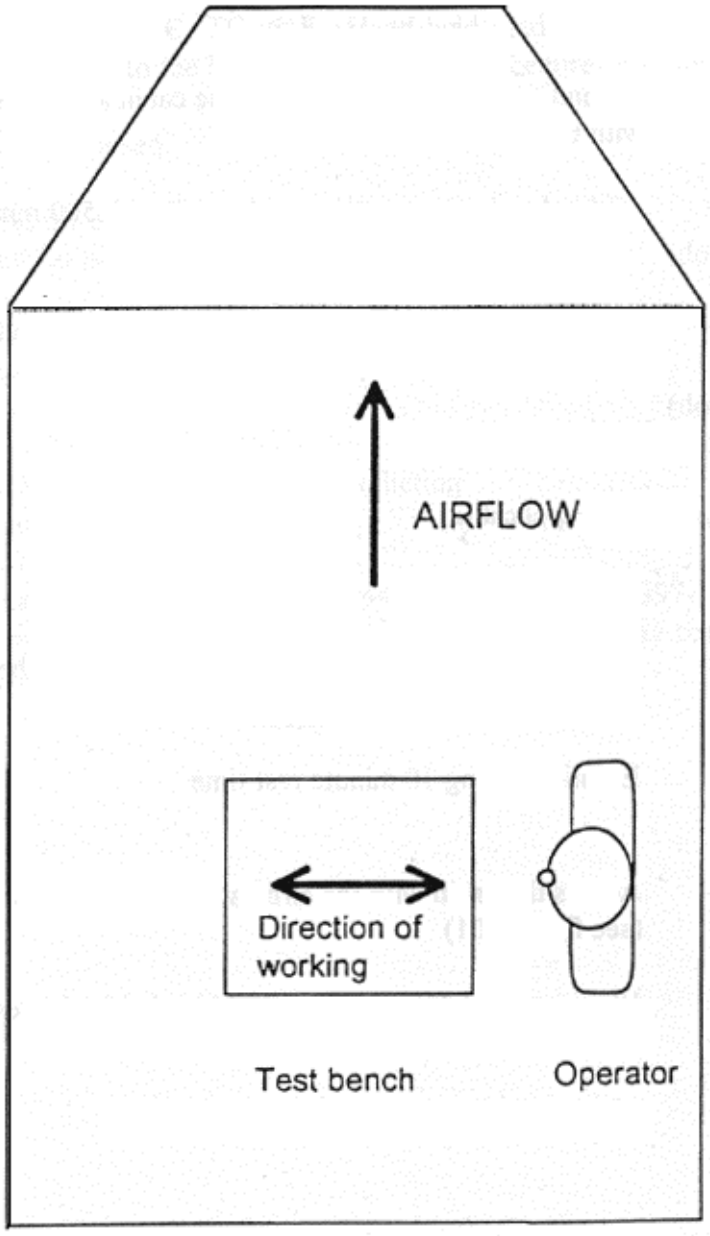
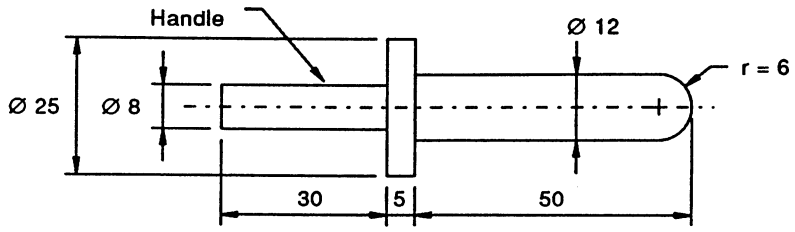
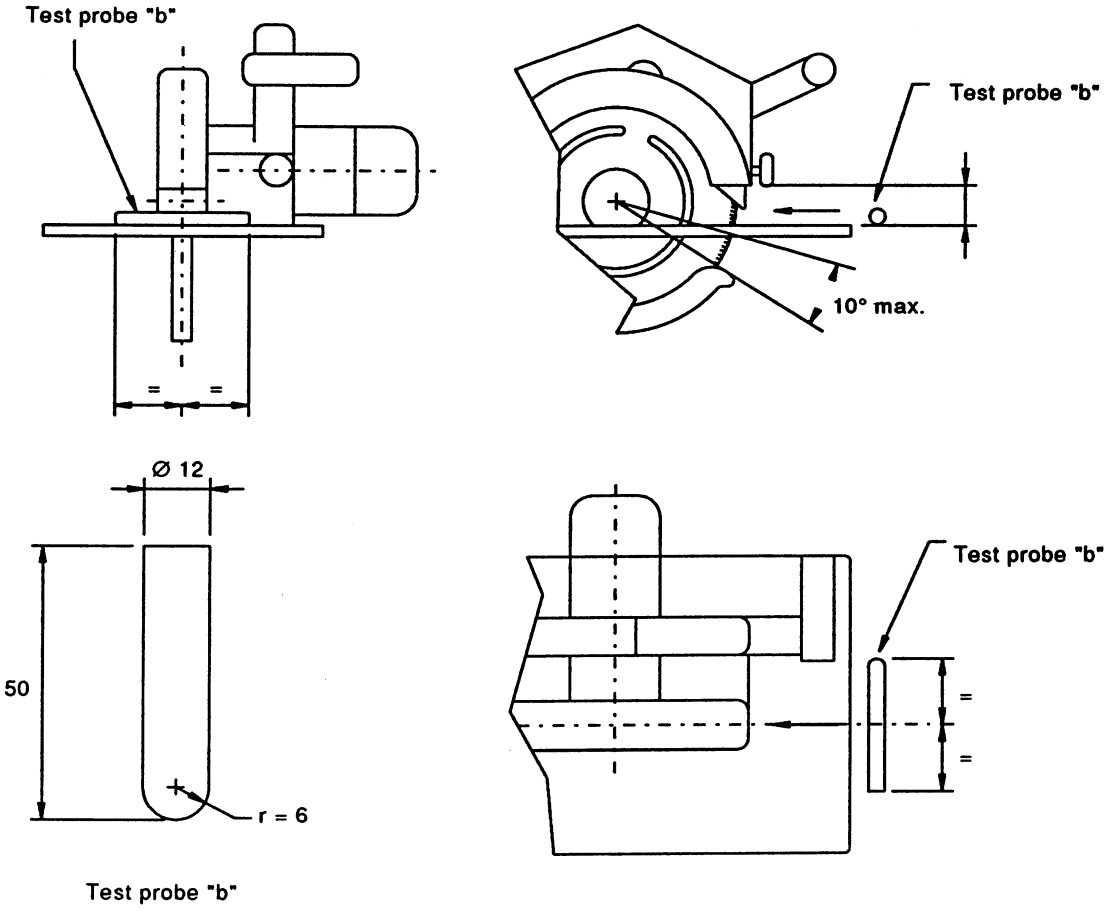


Figure 105 — Orientation of tool and operator



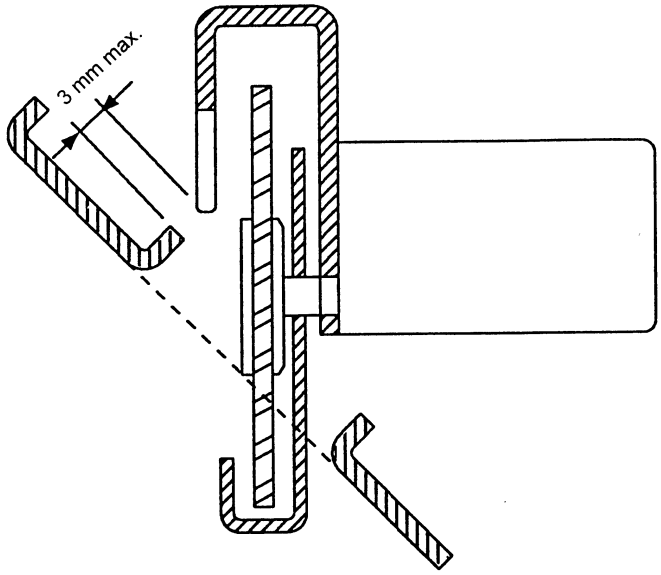
Dimensions in millimetres

Figure 106 — Test probe “a”



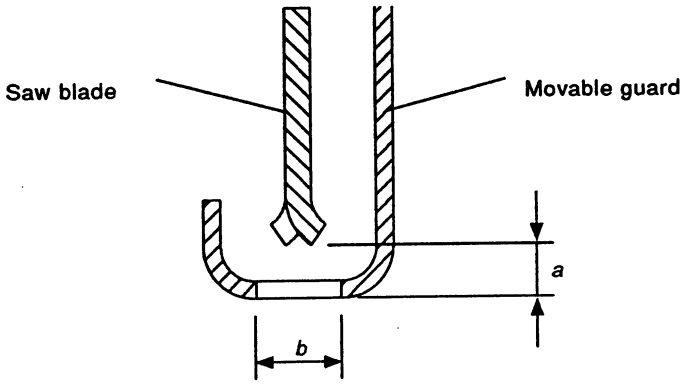
Dimensions in millimetres

Figure 107 — Test probe “b”



Dimensions in millimetres

Figure 108 — Circular saw with inclinable guide-plate



Width "b" mm	Distance "a" mm
up to 6	min. 3
between 6 and 12	min. $\frac{b}{2}$

Figure 109 — Aperture in movable guard

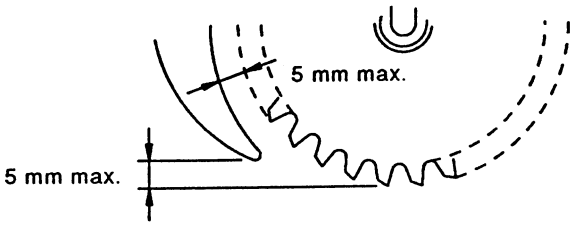
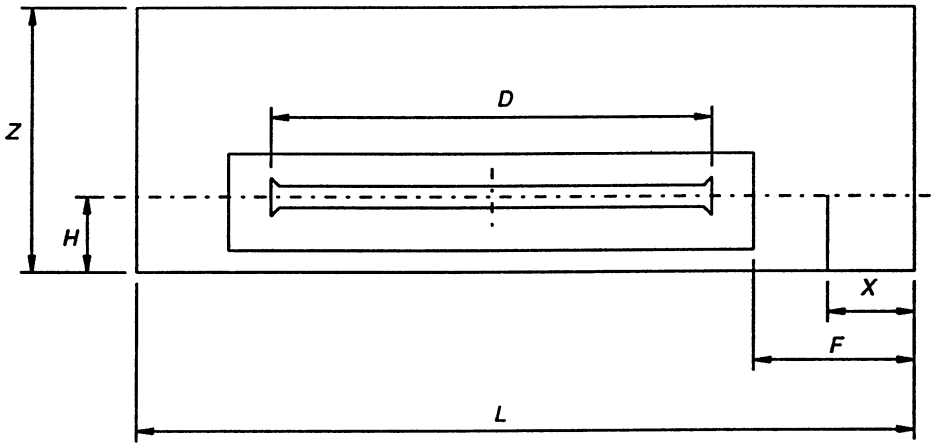


Figure 110 — Riving knife adjustment



D Diameter of the saw blade
L Length of the guide plate
Z Width of the guide plate
H Distance from the edge of the guide plate to the central plane of the saw blade
F Distance from the front edge of the guide plate to the nearest edge of the aperture for the blade in the guide plate
X Length of the recess in the plate, when provided (recess = *X* x *H*)

Figure 111 — Parameters of the guide plate

Annexes

The annexes of Part 1 are applicable.

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