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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Hand-held motor-operated electric tools – Safety – Part 2-22: Particular requirements for cut-off machines

Outils électroportatifs à moteur – Sécurité – Partie 2-22: Règles particulières pour les tronçonneuses à disques

IEC 60745-2-22:2011

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY –

Part 2-22: Particular requirements for cut-off machines

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This part of International Standard IEC 60745 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

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

FDIS	Report on voting
116/57/FDIS	116/62/RVD

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

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

This Part 2 is to be used in conjunction with the fourth edition of IEC 60745-1 (2006): *Hand-held motor-operated electric tools – Safety – Part 1: General requirements,* and its amendments.

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

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

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

NOTE 2 The following numbering system is used:

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

– additional annexes are lettered AA, BB, etc.

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

– requirements: in roman type;

– *test specifications: in italic type*;

– notes: in smaller roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

Subclauses, tables and figures which are additional to those in Part 1 are numbered starting from 101; additional annexes are lettered AA, BB, etc.

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

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

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

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY –

Part 2-22: Particular requirements for cut-off machines

1 Scope

This clause of Part 1 is applicable as follows:

Addition:

This standard applies to **cut-off machines** fitted with

– one **bonded reinforced wheel** of Type 41 or Type 42, or

– one or more **diamond cut-off wheels** with the peripheral gaps, if any, not exceeding 10 mm

and with

– a **rated speed** not exceeding a peripheral speed of the wheel of 100 m/s at **rated capacity** and

– a rated wheel capacity range of 55 mm to 410 mm.

These machines are intended to cut materials such as metals, concrete, masonry, glass and tile.

This standard does not apply to:

– grinders, sanders, or polishers, even if they can be converted to a **cut-off machine**, which are covered by IEC 60745-2-3;

– circular saws which are covered by IEC 60745-2-5.

2 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

ISO 603-15:1999, *Bonded abrasive products – Dimensions – Part 15: Grinding wheels for cutting-off on stationary or mobile cutting-off machines*

ISO 603-16:1999, *Bonded abrasive products – Dimensions – Part 16: Grinding wheels for cutting-off on hand-held power tools*

3 Terms and definitions

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

3.101
blotter
thin piece of an easily compressible material, between the abrasive product and **flange**

3.102
flange
collar, disc, or plate between or against which wheels are mounted

3.102.1
flange outside diameter
outside diameter of the contact surface of a **flange**

3.102.2
backing flange
part that contacts and provides support to the back side of the wheel and is located on the spindle between wheel and tool

3.102.3
locking flange
part that supports the front side of the wheel and secures and clamps the wheel to the spindle and the **backing flange**

3.103
cut-off machine
tool driving a rotating spindle, with a **guide plate** or **guide roller** or similar means, on which a **bonded reinforced wheel** or **diamond wheel** is mounted and used for peripheral grinding

3.104
rated capacity

maximum intended diameter of the rotating accessory to be fitted on the tool as recommended by the manufacturer's instruction

3.105
rated speed

maximum attainable speed as designated by the manufacturer, with any recommended accessory installed, at rated voltage or at the upper limit of the rated voltage range

3.106
wheel guard
device which partly encloses the wheel and gives protection to the operator

3.107
guide plate
flat plate on the machine which rests on the material to be cut

3.108
guide roller
roller on the machine which rests on the material to be cut

3.109
bonded reinforced wheel
wheels for different applications in accordance with ISO 603-15 and ISO 603-16

3.110
diamond wheel
metal wheels with a continuous or segmented abrasive rim

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable.

6 Void

7 Classification

This clause of Part 1 is applicable.

8 Marking and instructions

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

8.1 *Addition:*

Tools shall also be marked with:

- **rated speed** in revolutions per minute;
- **rated capacity** in mm;
- tools provided with a threaded spindle shall be marked with spindle thread size;
- "⚠ **WARNING** Always wear eye protection" or the sign M004 of ISO 7010 or the following safety sign:

The eye protection symbol may be modified by adding other personal protective equipment such as ear protection, dust mask, etc.

8.101 Tools shall also be marked with an indication of direction of rotation of the spindle. This shall be indicated by an arrow, raised or sunk, or by any other means no less visible and indelible.

8.6 *Addition:*

n ..... **rated speed**

8.12.1.1 *Addition:*

8.12.1.1.101 Safety instructions for abrasive cutting-off operations

Cut-off machine safety warnings

a) **The guard provided with the tool must be securely attached to the power tool and positioned for maximum safety, so the least amount of wheel is exposed towards the operator. Position yourself and bystanders away from the plane of the rotating wheel.** *The guard helps to protect operator from broken wheel fragments and accidental contact with wheel.*

b) **Use only bonded reinforced or diamond cut-off wheels for your power tool.** *Just because an accessory can be attached to your power tool, it does not assure safe operation.*

NOTE Use the wording “bonded reinforced” or “diamond” as applicable depending on the designation of the tool.

c) **The rated speed of the accessory must be at least equal to the maximum speed marked on the power tool.** *Accessories running faster than their rated speed can break and fly apart.*

d) **Wheels must be used only for recommended applications. For example: do not grind with the side of cut-off wheel.** *Abrasive cut-off wheels are intended for peripheral grinding, side forces applied to these wheels may cause them to shatter.*

e) **Always use undamaged wheel flanges that are of correct diameter for your selected wheel.** *Proper wheel flanges support the wheel thus reducing the possibility of wheel breakage.*

f) **Do not use worn down reinforced wheels from larger power tools.** *Wheels intended for a larger power tool are not suitable for the higher speed of a smaller tool and may burst.*

NOTE The above warning does not apply for tools only designated to be used with **diamond wheels**.

g) **The outside diameter and the thickness of your accessory must be within the capacity rating of your power tool.** *Incorrectly sized accessories cannot be adequately guarded or controlled.*

h) **The arbour size of wheels and flanges must properly fit the spindle of the power tool.** *Wheels and flanges with arbour holes that do not match the mounting hardware of the power tool will run out of balance, vibrate excessively and may cause loss of control.*

i) **Do not use damaged wheels. Before each use, inspect the wheels for chips and cracks. If power tool or wheel is dropped, inspect for damage or install an undamaged wheel. After inspecting and installing the wheel, position yourself and bystanders away from the plane of the rotating wheel and run the power tool at maximum no load speed for one minute.** *Damaged wheels will normally break apart during this test time.*

j) **Wear personal protective equipment. Depending on application, use face shield, safety goggles or safety glasses. As appropriate, wear dust mask, hearing protectors, gloves and shop apron capable of stopping small abrasive or workpiece fragments.** *The eye protection must be capable of stopping flying debris generated by various operations. The dust mask or respirator must be capable of filtrating particles generated by your operation. Prolonged exposure to high intensity noise may cause hearing loss.*

k) **Keep bystanders a safe distance away from work area. Anyone entering the work area must wear personal protective equipment.** *Fragments of workpiece or of a broken wheel may fly away and cause injury beyond immediate area of operation.*

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

m) **Position the cord clear of the spinning accessory.** *If you lose control, the cord may be cut or snagged and your hand or arm may be pulled into the spinning wheel.*

n) **Never lay the power tool down until the accessory has come to a complete stop.** *The spinning wheel may grab the surface and pull the power tool out of your control.*

o) **Do not run the power tool while carrying it at your side.** *Accidental contact with the spinning accessory could snag your clothing, pulling the accessory into your body.*

p) **Regularly clean the power tool’s air vents.** *The motor’s fan will draw the dust inside the housing and excessive accumulation of powdered metal may cause electrical hazards.*

q) **Do not operate the power tool near flammable materials.** *Sparks could ignite these materials.*

r) **Do not use accessories that require liquid coolants.** *Using water or other liquid coolants may result in electrocution or shock.*

NOTE The above warning does not apply for power tools specifically designed for use with a liquid system.

8.12.1.1.102 Further safety instructions for abrasive cutting-off operations

Kickback and related warnings

Kickback is a sudden reaction to a pinched or snagged rotating wheel. Pinching or snagging causes rapid stalling of the rotating wheel which in turn causes the uncontrolled power tool to be forced in the direction opposite of the wheel's rotation at the point of the binding.

For example, if an abrasive wheel is snagged or pinched by the workpiece, the edge of the wheel that is entering into the pinch point can dig into the surface of the material causing the wheel to climb out or kick out. The wheel may either jump toward or away from the operator, depending on direction of the wheel's movement at the point of pinching. Abrasive wheels may also break under these conditions.

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

a) **Maintain a firm grip on the power tool and position your body and arm to allow you to resist kickback forces. Always use auxiliary handle, if provided, for maximum control over kickback or torque reaction during start-up.** *The operator can control torque reactions or kickback forces, if proper precautions are taken.*

b) **Never place your hand near the rotating accessory.** *Accessory may kickback over your hand.*

c) **Do not position your body in line with the rotating wheel.** *Kickback will propel the tool in direction opposite to the wheel's movement at the point of snagging.*

d) **Use special care when working corners, sharp edges etc. Avoid bouncing and snagging the accessory.** *Corners, sharp edges or bouncing have a tendency to snag the rotating accessory and cause loss of control or kickback.*

e) **Do not attach a saw chain, woodcarving blade, segmented diamond wheel with a peripheral gap greater than 10 mm or toothed saw blade.** *Such blades create frequent kickback and loss of control.*

f) **Do not "jam" the wheel or apply excessive pressure. Do not attempt to make an excessive depth of cut.** *Overstressing the wheel increases the loading and susceptibility to twisting or binding of the wheel in the cut and the possibility of kickback or wheel breakage.*

g) **When wheel is binding or when interrupting a cut for any reason, switch off the power tool and hold the power tool motionless until the wheel comes to a complete stop. Never attempt to remove the wheel from the cut while the wheel is in motion otherwise kickback may occur.** *Investigate and take corrective action to eliminate the cause of wheel binding.*

h) **Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.** *The wheel may bind, walk up or kickback if the power tool is restarted in the workpiece.*

i) **Support panels or any oversized workpiece to minimize the risk of wheel pinching and kickback.** *Large workpieces tend to sag under their own weight. Supports must be placed under the workpiece near the line of cut and near the edge of the workpiece on both sides of the wheel.*

j) **Use extra caution when making a "pocket cut" into existing walls or other blind areas.** *The protruding wheel may cut gas or water pipes, electrical wiring or objects that can cause kickback.*

8.12.2 a) *Addition:*

101) Permitted wheel construction (diamond or bonded reinforced, if diamond segmented, maximum peripheral gap between segments is 10 mm, only with a negative rake angle, see Figure 101), wheel diameter and wheel thickness

102) Explanation of the term "bonded reinforced wheel" or type designation, if applicable

8.12.2 b) *Addition:*

101) Proper use of **blotters**, when they are provided with a bonded reinforced product

102) Mounting of accessories and use of the correct **flanges**, use and care of the abrasive product. For reversible **flanges**, the correct method of fitting the **flanges**

103) Instruction for the mounting and securing of the guard identifying allowable adjustments to ensure maximum protection of the operator

104) Instruction to the operator on the use of all the different types of wheels specified in the instructions in accordance with 8.12.2 a) 101), e.g. bonded wheel, **diamond wheel**

105) Proper support for the workpiece

106) If the **guide roller** or **guide plate** is removable or adjustable, instructions on its use and settings

8.12.2 c) *Addition:*

101) Storage and handling of accessories

9 Protection against access to live parts

This clause of Part 1 is applicable.

10 Starting

This clause of Part 1 is applicable.

11 Input and current

This clause of Part 1 is applicable.

12 Heating

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

12.4 *Replacement:*

The tool is operated for 30 min. The temperature rises are measured at the end of the 30 min.

13 Leakage current

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is applicable.

15 Electric strength

This clause of Part 1 is applicable.

16 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable.

18 Abnormal operation

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

18.10 *Addition:*

When evaluating the tool in accordance with 18.10, an electronic soft start or a restart prevention device need not operate.

18.10.4 *Addition:*

During these tests, the speed of the spindle shall not exceed 120 % of the ***rated speed****. The accessory in accordance with 8.12.2 a) 101) that results in the maximum speed shall be installed.*

19 Mechanical hazards

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

19.4 *Addition:*

For tools provided with a detachable **guide plate** or **guide roller**(s), two handles are required for a **rated capacity** exceeding 100 mm.

The motor casing, if suitably shaped, may be considered as a second handle.

Compliance is checked by inspection.

19.6 *Replacement:*

The tool shall be designed so as to prevent excessive speed under normal use. The speed of the tool shall not exceed the **rated speed** under any operating condition.

Compliance is checked by inspection and by measuring the speed after the tool is operated for a period of 5 min. The permitted accessory that produces the maximum speed shall be installed.

If the tool is provided with a load sensitive speed control, then an accessory need not be installed to load the tool to find maximum speed.

19.101 Tools shall be provided with a **wheel guard** to protect the user during normal use against:

– accidental contact with the abrasive product;
– ejection of fragments of the abrasive product;
– sparks and other debris.

The guard shall fulfil the following requirements:

- to change the wheel, it shall not be necessary to remove the guard from the tool;
- be designed to facilitate easy replacement of the wheel. For this purpose, parts of the guard may be opened without the aid of a tool provided these parts remain attached to the guard together with any fasteners. An example of such guard is shown in Figure 102;
- be designed so that the risk of an accidental contact between the operator and the wheel during normal use is minimized e.g. by a possibility of adjustment;

To prevent the installation of an oversized wheel, the clearance between the inside of the guard and the periphery of a new abrasive product shall in at least one location be 8 mm maximum for tools with a **rated capacity** not exceeding 130 mm and 10 mm maximum for tools with a **rated capacity** exceeding 130 mm.

A minimum opening for the plunging movement of the motor with respect to the upper guard may be provided between the **guide plate** and the lower side of the motor.

For tools designed for **bonded reinforced wheels**, the guard shall cover the periphery and both sides of the abrasive wheel for at least 175°, except that the guard need not cover the spindle end, nut and the **locking flange**. See Figure 102.

For tools designed only for **diamond wheels**, the guard shall cover

– the periphery and the spindle side for at least 175°;
– at least the outer 20 % of the maximum recommended wheel radius of the side where the nut and **locking flange** are located for at least 175°.

Compliance is checked by inspection and by measurement.