

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Hand-held motor-operated electric tools – Safety –**  
**Part 2-3: Particular requirements for grinders, polishers and disk-type sanders**

**Outils électroportatifs à moteur – Sécurité –**  
**Partie 2-3: Règles particulières pour les meuleuses, lustreuses et ponceuses du**  
**type à disque**



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**Outils électroportatifs moteur – Sécurité –  
Partie 2-3: Règles particulières pour les meuleuses, lustreuses et ponceuses du  
type à disque**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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**HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS –  
SAFETY –****Part 2-3: Particular requirements for grinders,  
polishers and disk-type sanders**

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**The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.**

International Standard IEC 60745-2-3 has been prepared by subcommittee 61F: Safety of hand-held motor-operated electric tools, of IEC technical committee 61: Safety of household and similar electrical appliances.

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 latest edition of IEC 60745-1, *Hand-held motor-operated electric tools – Safety – Part 1: General requirements*, and its amendments. It was established on the basis of the third edition (2001) of that standard.

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

This part 2 supplements or modifies the corresponding clauses of IEC 60745-1, so as to convert that publication into the IEC standard: Safety for grinders, polishers and disk-type sanders.

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.

IEC 60745 consists of the following parts, under the general title *Hand-held motor-operated electric tools – Safety*:

- Part 1: General requirements
- Part 2-1: Particular requirements for drills and impact drills
- Part 2-2: Particular requirements for screwdrivers and impact wrenches
- Part 2-3: Particular requirements for grinders, polishers and disk-type sanders
- Part 2-4: Particular requirements for sanders and polishers other than disk type
- Part 2-5: Particular requirements for circular saws and circular knives
- Part 2-6: Particular requirements for hammers
- Part 2-7: Particular requirements for spray guns for non-flammable liquids
- Part 2-8: Particular requirements for shears and nibblers
- Part 2-9: Particular requirements for tappers
- Part 2-11: Particular requirements for reciprocating saws (jig and sabre saws)
- Part 2-12: Particular requirements for concrete vibrators
- Part 2-13: Particular requirements for chain saws
- Part 2-14: Particular requirements for planers
- Part 2-15: Particular requirements for hedge trimmers and grass shears
- Part 2-16: Particular requirements for tackers
- Part 2-17: Particular requirements for routers and trimmers
- Part 2-18: Particular requirements for strapping tools

- Part 2-19: Particular requirements for jointers
- Part 2-20: Particular requirements for band saws
- Part 2-21: Particular requirements for drain cleaners

The amendment modifies the present part 2-3 to ensure its conformity with the fourth edition (2006) of IEC 60745-1, *Hand-held motor-operated electric tools – Safety – Part 1: General requirements*.

The committee has decided that the contents of the base publication and its amendments 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

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## HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY –

### Part 2-3: Particular requirements for grinders, polishers and disk-type sanders

#### 1 Scope

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

##### ~~1.1 Addition:~~

~~This standard applies to grinders, with a rated speed not exceeding a peripheral speed of the accessory of 80 m/s at rated capacity, polishers and disk-type sanders, including angle, straight and vertical. This standard applies to tools with a rated capacity not exceeding 230 mm.~~

~~This standard does not apply to random-orbit polishers and random-orbit sanders. These are covered by IEC 60745-2-4.~~

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

##### Addition:

This standard applies to grinders, polishers and disk-type sanders, including angle, straight and vertical tools, with a rated capacity not exceeding 230 mm. For grinders, the rated speed does not exceed a peripheral speed of the accessory of 80 m/s at rated capacity.

This standard does not apply to dedicated cut-off machines which are covered by IEC 60745-2-22.

This standard does not apply to random-orbit polishers and random-orbit sanders which are covered by IEC 60745-2-4.

#### 2 Normative references

This clause of Part 1 is applicable except as follows:

##### Addition:

ISO 603-12:1999, *Bonded abrasive products – Dimensions – Part 12: Grinding wheels for deburring and fettling on a straight grinder*

ISO 603-14:1999, *Bonded abrasive products – Dimensions – Part 14: Grinding wheels for deburring and fettling/snagging on an angle grinder*

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

ANSI B7.1:2000, *Safety Requirements for the Use, Care and Protection of Abrasive Wheels*

### 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

##### **disk-type sander**

tool, constructed like a grinder, intended for sanding

##### 3.102.1

##### **angle disk-type sander**

tool with the rotating spindle at a right angle to the motor shaft, intended for lateral sanding

##### 3.102.2

##### **straight disk-type sander**

tool with the rotating spindle in-line with the motor shaft, intended for peripheral or lateral sanding

##### 3.102.3

##### **vertical disk-type sander**

tool with the rotating spindle in-line with the motor shaft, intended for lateral sanding

#### 3.103

##### **flange**

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

##### 3.103.1

##### **unrecessed flange**

flange fixed to the machine spindle having an unrecessed flat surface against which a threaded hole abrasive product is screwed, e.g. a cup wheel, a cone or a plug

##### 3.103.2

##### **recessed flange**

flange fixed to the machine spindle having a recessed flat surface

##### 3.103.3

##### **flange outside diameter**

outside diameter of the contact surface of a flange

##### 3.103.4

##### **backing flange**

contacts and provides support to the back side of the wheel and is located on the spindle between wheel and tool

##### 3.103.5

##### **locking flange**

supports the front side of the wheel and secures and clamps the wheel to the spindle and the backing flange

#### 3.104

##### **grinder**

tool driving a rotating spindle on which a bonded abrasive product is mounted

**3.104.1****angle grinder**

tool with the rotating spindle at a right angle to the motor shaft, intended for peripheral and lateral grinding

**3.104.2****straight grinder**

tool with the rotating spindle in-line with the motor shaft, either equipped with an abrasive wheel intended for peripheral grinding or equipped with a collet or chuck intended for use with mounted wheels, points or burrs

**3.104.3****vertical grinder**

tool with the rotating spindle in-line with the motor shaft, intended for lateral grinding

**3.105****mounted wheels**

various shapes and sizes that may be either organic or inorganic bonded abrasives and are mounted on a mandrel or threaded onto a mandrel

**3.106****polisher**

tool equipped with a rotating disk or pad intended for polishing

**3.106.1****angle polisher**

tool with the rotating spindle at a right angle to the motor shaft, intended for peripheral and lateral polishing

**3.106.2****straight polisher**

tool with the rotating spindle in-line with the motor shaft, intended for peripheral polishing

**3.106.3****vertical polisher**

tool with the rotating spindle in-line with the motor shaft, intended for lateral polishing

**3.107****rated capacity**

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

**3.108****~~rated speed~~**

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

**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

**3.109****wheel guard**

device which partly encloses the abrasive wheel and gives protection to the operator

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**3.110**

**wheel types**

wheels for different applications in accordance with ISO 603-12, ISO 603-14, ISO 603-16 or ANSI B 7.1

**3.111**

**minor fragment**

particles less than 1/16 of the mass of the abrasive wheel

**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:

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~~8.1 Addition:~~

~~Tools shall also be marked with:~~

- ~~— rated speed in revolutions per minute. Tools designed for operation at more than one rated speed shall be marked with the rated speed for each of the speed settings in such a way that it is clear which speed corresponds with each of the settings;~~
- ~~— rated capacity in mm;~~
- ~~— 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;~~
- ~~— 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<sup>4</sup>.~~

**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 the spindle thread size;
-  **WARNING** Always wear eye protection” or sign M004 of ISO 7010 or the following safety sign:

<sup>4</sup>The future safety sign M004 is currently in DIS stage as ISO 7010:2003/DAMd6.



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

#### 8.6 Addition:

n.....rated speed

#### ~~8.12.1 Addition:~~

~~For the following safety instructions specified in 8.12.1.101 to 8.12.1.107, the terms like grinding/grinder, sanding/sander, wire brushing/wire brush, polishing/polisher or cutting-off/cut-off tool, are selected as recommended by the manufacturer. These terms in the warnings and headings must be consistently used or deleted based on the selected operations. The “and”/“or” conjunctions may be used as appropriate.~~

~~If the power tool is recommended only for one of the listed operations, the heading of that section is to be used for all warnings.~~

#### 8.12.1 Addition:

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For the following safety instructions (specified in 8.12.1.101 to 8.12.1.107, terms such as grinding/grinder, sanding/sander, wire brushing/wire brush, polishing/polisher or cutting-off/cut-off tool are selected as recommended by the manufacturer. These terms in the warnings and headings shall be consistently used or deleted based on the selected operations. The “and”/“or” conjunctions may be used as appropriate.

If the power tool is recommended only for one of the listed operations, the heading of that section is to be used for all warnings.

#### 8.12.1.101 Safety instructions for all operations

##### Safety Warnings Common for Grinding, Sanding, Wire Brushing, Polishing or Abrasive Cutting-Off Operations:

NOTE In the above heading, those operations not applicable may be omitted.

- a) **This power tool is intended to function as a grinder, sander, wire brush, polisher or cut-off tool. Read all safety warnings, instructions, illustrations and specifications provided with this power tool. Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury.**
- b) ~~Operations such as grinding, sanding, wire brushing, polishing or cutting-off are not recommended to be performed with this power tool. Operations for which the power tool was not designed may create a hazard and cause personal injury.~~

~~NOTE List only those operations that were not included in the first warning. If all listed operations are recommended, then this warning may be omitted but all subsequent warnings must be given without an exclusion.~~

**Operations such as grinding, sanding, wire brushing, polishing or cutting-off are not recommended to be performed with this power tool. Operations for which the power tool was not designed may create a hazard and cause personal injury.**

NOTE List only those operations that were not included in the first warning. If all listed operations are recommended, then this warning may be omitted, but all subsequent warnings are to be given without exclusion.

- c) **Do not use accessories which are not specifically designed and recommended by the tool manufacturer.** *Just because the accessory can be attached to your power tool, it does not assure safe operation.*
- d) **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.*
- e) **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.*
- f) **The arbour size of wheels, flanges, backing pads or any other accessory must properly fit the spindle of the power tool.** *Accessories 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.*
- g) **Do not use a damaged accessory. Before each use inspect the accessory such as abrasive wheels for chips and cracks, backing pad for cracks, tear or excess wear, wire brush for loose or cracked wires. If power tool or accessory is dropped, inspect for damage or install an undamaged accessory. After inspecting and installing an accessory, position yourself and bystanders away from the plane of the rotating accessory and run the power tool at maximum no-load speed for one minute. Damaged accessories will normally break apart during this test time.**
- h) **Wear personal protective equipment. Depending on application, use face shield, safety goggles or safety glasses. As appropriate, wear dust mask, hearing protectors, gloves and workshop 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 filtering particles generated by your operation. Prolonged exposure to high intensity noise may cause hearing loss.*
- i) **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 accessory may fly away and cause injury beyond immediate area of operation.*
- ~~j) **Hold 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 shock the operator.**~~
- 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.**
- NOTE** The above warning may be omitted if polishing is the only recommended operation.
- NOTE** The above warning may be omitted if polishing or sanding are the only recommended operations.
- k) **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 accessory.*
- l) **Never lay the power tool down until the accessory has come to a complete stop.** *The spinning accessory may grab the surface and pull the power tool out of your control.*
- m) **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.*
- n) **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.*
- o) **Do not operate the power tool near flammable materials.** *Sparks could ignite these materials.*
- p) **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.

### 8.12.1.102 Further safety instructions for all operations

#### Kickback and Related Warnings

Kickback is a sudden reaction to a pinched or snagged rotating wheel, backing pad, brush or any other accessory. Pinching or snagging causes rapid stalling of the rotating accessory which in turn causes the uncontrolled power tool to be forced in the direction opposite of the accessory'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 the area where power tool will move if kickback occurs.** *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 or toothed saw blade.** *Such blades create frequent kickback and loss of control.*

### 8.12.1.103 Additional safety instructions for grinding and cutting-off operations

NOTE If grinding and cut-off operations are not recommended by the manufacturer, this section may be omitted.

#### Safety Warnings Specific for Grinding and Abrasive Cutting-Off Operations:

- a) **Use only wheel types that are recommended for your power tool and the specific guard designed for the selected wheel.** *Wheels for which the power tool was not designed cannot be adequately guarded and are unsafe.*
- b) ~~**The guard must be securely attached to the power tool and positioned for maximum safety, so the least amount of wheel is exposed towards the operator. The guard helps to protect operator from broken wheel fragments and accidental contact with wheel.**~~

~~NOTE—The above warning may be omitted for die grinders and grinders or cut-off grinders with rated capacity of less than 55mm.~~

**The guard must be securely attached to the power tool and positioned for maximum safety, so the least amount of wheel is exposed towards the operator. The guard helps to protect the operator from broken wheel fragments, accidental contact with wheel and sparks that could ignite clothing.**

NOTE The above warning may be omitted for grinders or cut-off grinders with a rated capacity of less than 55 mm.

- c) **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.*
- d) **Always use undamaged wheel flanges that are of correct size and shape for your selected wheel.** *Proper wheel flanges support the wheel thus reducing the possibility of wheel breakage. Flanges for cut-off wheels may be different from grinding wheel flanges.*