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INTERNATIONAL STANDARD

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Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 3-4: Particular requirements for transportable bench grinders

Outils électroportatifs à moteur, outils portables et machines pour jardins et pelouses – Sécurité – Partie 3-4: Exigences particulières pour les tourets à meuler transportables

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Outils électroportatifs à moteur, outils portables et machines pour jardins et pelouses – Sécurité – Partie 3-4: Exigences particulières pour les tourets à meuler transportables

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 3-4: Particular requirements for transportable bench grinders

FOREWORD

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International Standard IEC 62841-3-4 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
116/258/FDIS	116/275/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.

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This Part 3-4 is to be used in conjunction with the first edition of IEC 62841-1:2014.

This Part 3-4 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for transportable bench grinders.

Where a particular subclause of Part 1 is not mentioned in this Part 3-4, that subclause applies as far as relevant. 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 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.

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.

The contents of the corrigendum of December 2016 have been included in this copy.

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ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 3-4: Particular requirements for transportable bench grinders

1 Scope

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

Addition:

This part of IEC 62841 applies to transportable **bench grinders** that can be equipped with one or two **accessories** as follows:

– type 1 grinding wheels in accordance with ISO 603-4:1999 with a diameter not exceeding 310 mm and a thickness not exceeding 55 mm;
– wire brushes with a diameter not exceeding 310 mm and a thickness not exceeding 55 mm;
– polishing wheels with a diameter not exceeding 310 mm;

and with a peripheral speed of any **accessory** between 10 m/s and 50 m/s.

NOTE Polishing wheels are also known as buffing wheels.

2 Normative references

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

Addition:

ISO 603-4:1999, *Bonded abrasive products – Dimensions – Part 4: Grinding wheels for surface grinding/peripheral grinding*

3 Terms and definitions

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

3.101
bench grinder
tool designed to grind, clean, polish or debur metal or similar materials by means of one or two rotating **accessories** fixed to one or two **tool spindles**, see Figure 101, where the workpiece is held by hand and possibly assisted by a **work rest**

3.102
tool spindle
drive spindle of a **bench grinder** which supports the **accessories** and provides the rotation

3.103
work rest
surface or device intended to support or to guide the workpiece

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4 General requirements

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

4.101 *D* is understood to be the maximum diameter of the **accessory** to be used on each **tool spindle**. Unless otherwise specified, **tool spindle** specific requirements dependent on *D* shall be based on the value of *D* for the relevant **tool spindle**.

Throughout the remaining part of this document, unless otherwise explicitly stated, whenever a requirement or a reference is made to “force” as multiple of *D*, the force shall be expressed in newtons (N) and *D* shall be expressed in millimetres (mm).

5 General conditions for the tests

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

5.17 *Addition:*

*The mass of the tool shall include the **guards**, **work rests** and transparent screens. Any additional parts such as leg sets or carrying means that are required in accordance with the instructions for the safe use of the tool shall be included in the mass.*

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:*

Tools shall be marked with:

– **rated no-load speed** of the **tool spindle**(s).

8.2 *Addition:*

Tools shall be marked with the following safety warnings:

– “⚠ **WARNING** Always wear eye protection” or the symbol M004 of ISO 7010 or the following safety sign:

– a warning near any polishing spindle (i.e. a spindle without a **guard**) never to use a grinding wheel or wire brush on the polishing side of the tool, if applicable.

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8.3 *Addition:*

Bench grinders shall be marked with the minimum and maximum diameter of the **accessory** to be used on each **tool spindle**.

Bench grinders shall be marked with the direction of rotation of the **tool spindle**, indicated in a visible location on the tool in the vicinity of the **tool spindle**, by an arrow raised or recessed or by any other means no less visible and indelible.

8.14.1 *Addition:*

The additional safety instructions as specified in 8.14.1.101 shall be given. This part may be printed separately from the "General power tool safety warnings".

8.14.1.101 Safety instructions for bench grinders

Bench grinder safety warnings

a) **Do not use a damaged accessory. Before each use, inspect the accessory such as abrasive wheels for chips and cracks and wire brushes for loose or cracked wires. 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.*

NOTE 1 For tools that are not intended for wire brushes, the phrase "and wire brushes for loose or cracked wires" is omitted.

b) **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.*

c) **Be aware that wire bristles are thrown by the wire brush even during ordinary operation. Do not overstress the wires by applying excessive load to the wire brush.** *The wire bristles can easily penetrate light clothing and/or skin.*

NOTE 2 The above safety warning applies only to tools intended to be used with wire brushes.

d) **Never grind on the sides of a grinding wheel.** *Grinding on the side can cause the wheel to break and fly apart.*

8.14.2 a) *Addition:*

101) Information about details and type of the **accessory**(ies) recommended for each **tool spindle**, e.g. the maximum thickness of the **accessory** and the diameter of the hole in the **accessory**;

102) Instruction to use only **accessories** with a diameter according to the relevant marking as required by 8.3;

103) Instruction to ensure that the **bench grinder** is always stable and secure (e.g. fixed to a bench) and instruction how to fix the tool to a workbench or the like;

104) Instructions on the correct mounting of wheels and ensuring that wheels are free of defects before use, including instructions for performing a ring test for cracks.

8.14.2 b) *Addition:*

101) Instruction to adjust the spark arrestor and the **work rest** frequently so as to compensate for wear of the wheel;

102) Instruction to keep the distance between the spark arrestor/**work rest** and the wheel as small as possible and in any case not greater than 2 mm;

103) Instruction to replace the worn wheel when these gaps are no longer able to be maintained;

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104) For tools with two spindles: instruction to always use the tool with **accessories** on both spindles in order to limit the risk of contact with the rotating spindle;

105) Instruction to always use the **guard**, **work rest**, transparent screen and spark arrestor as required for the **accessory**(ies);

106) For tools with a vertically adjustable or inclinable **work rest**: instruction on how to properly adjust and secure the **work rest** angle in relation to the wheel;

107) Instructions on how to perform grinding functions safely;

108) Instruction to replace damaged or deeply grooved wheels;

109) Instruction where to lift and support the **bench grinder** during transportation;

110) Instruction to always adjust the **work rest** so that the angle between the **work rest** and the tangent of the **accessory** is always greater than 85°.

8.14.2 c) *Addition:*

101) Instructions for handling and storage of grinding wheels and wire brushes, if applicable.

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.

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17 Endurance

This clause of Part 1 is applicable.

18 Abnormal operation

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

18.5 *Addition:*

For **bench grinders** operated by three phase motors, the tests of 18.5.1 and 18.5.2 may be replaced by the test of 18.5.3.

18.5.3 *Addition:*

If the test of 18.5.3 is applied, the tool shall be tested for a period of 5 min.

18.8 Electronic circuits providing safety critical functions

Replacement of Table 4 by the following:

Table 4 – Required performance levels

Type and purpose of SCF	Minimum Performance Level (PL)
For tools intended to be used with grinding wheels or wire brushes, **power switch** – prevent unwanted switch-on	a
For tools intended to be used with grinding wheels or wire brushes, **power switch** – provide desired switch-off	a
For tools not intended to be used with grinding wheels or wire brushes, **power switch** – prevent unwanted switch-on	Not an **SCF**
For tools not intended to be used with grinding wheels or wire brushes, **power switch** – provide desired switch-off	Not an **SCF**
Any electronic control to pass the test of 18.3	a
For tools intended to be used with grinding wheels, over-speed prevention to prevent output speed above 120 % of **rated no-load speed**	c
For tools not intended to be used with grinding wheels, over-speed prevention to prevent output speed above 130 % of **rated no-load speed**	a
Provide desired direction of rotation	b
Prevent exceeding thermal limits as in Clause 18	a
Prevent self-resetting as required in 23.3	a

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 **accessories** shall be so positioned or enclosed to provide adequate protection against personal injury. The guarding of **accessories** is covered in 19.1.101 through 19.1.103.

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For grinding wheels and wire brushes, a **guard** in accordance with 19.1.101 and 19.1.102, a **work rest** in accordance with 19.102 and a transparent screen in accordance with 19.1.103 shall be provided.

For polishing wheels, a **guard**, a **work rest** and a transparent screen are not required.

Guards for **accessories** shall not be removable without the aid of a tool.

19.1.101 Guards

The **guard** shall cover the periphery and the sides of the **accessory**, flanges and the end of the **tool spindle**, except a portion of the **accessory** as allowed in 19.1.102 and indicated in Figure 102.

The **guard** shall be designed so that the **tool spindle** cannot be fitted with an **accessory** greater than 1,07 times the maximum diameter marked on the tool.

The **guard** shall be constructed so that removal of the peripheral protecting member is not necessary for replacement of the **accessory**.

Compliance is checked by inspection and by measurement.

19.1.102 Openings in the guard

For grinding wheels and for wire brushes, the opening angle in the **guard** shall not exceed 65° above the horizontal plane passing through the centre of the wheel. The total opening angle shall not exceed 90°. See Figure 102.

Compliance is checked by inspection and by measurement.

19.1.103 Transparent screens

Transparent screens shall be adjustable and have the minimum dimensions as specified in Figure 103.

The operation of adjusting the screen shall not modify the adjustment of other parts of the **bench grinder**.

The screen shall be made of transparent material having an appropriate resistance against shattering, such as polycarbonate or laminated glass which is held in place by an interlayer, between its two or more layers of glass.

For all **bench grinders**, the screens shall be mounted in such a way that the symmetrical axis of the screen coincides with the vertical median plane of the working part of the grinding wheel or the wire brush.

Compliance is checked by inspection.

19.6 *Replacement:*

The tool shall be designed so as to prevent excessive speed under **normal use**. The no-load speed of the **tool spindle** at **rated voltage** shall not exceed the **rated no-load speed**.

*Compliance is checked by measuring the speed of the **tool spindle** after the tool has been operating for 5 min at no-load.*

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19.7 *Addition:*

If a working stand is provided with a **bench grinder**, or is specifically identified in accordance with 8.14.2, the requirements of 19.7 are also applicable to the combination of the **bench grinder** and the working stand.

19.7.101 **Bench grinders** shall be provided with means to facilitate the fixing of the tool to a bench, e.g. by providing holes in the base of the tool.

Compliance is checked by inspection.

19.8 This subclause is applicable for **bench grinders**, if provided with:

– wheels; or

– a pedestal with wheels.

19.101 Spark arrestor

For grinding wheels, a spark arrestor to limit the ejection of sparks and pieces of wheel from the wheel **guard** shall be provided.

The spark arrestor shall be situated at the upper part of the wheel **guard** in line with the periphery of the wheel and cover all the width of the wheel **guard**.

The spark arrestor shall be adjustable to within 2 mm of the surface of the wheel for all wheel diameters between the maximum wheel diameter and 90 % of the smallest wheel diameter in accordance with 8.3, see dimension *E* in Figure 102.

Compliance is checked by inspection and by measurement.

19.102 Work rest

The **work rest** shall not extend around the side of the wheel and cover at least the width of the wheel **guard**. The **work rest** shall only be radially adjustable to within 2 mm of the peripheral surface of the wheel for all wheel diameters between the maximum wheel diameter and 90 % of the smallest wheel diameter in accordance with 8.3, see dimension *F* in Figure 102.

The plane of the **work rest** surface shall either be fixed or be capable of adjustment only so as to form an angle of not less than 85° to the tangent of the wheel with the smallest diameter wheel in accordance with 8.3. See Figure 104.

If the **work rest** is adjustable in height, it shall be possible to achieve this angle at any height setting.

Any required adjustment of the **work rest** shall be capable of being performed without the aid of a tool.

Compliance is checked by inspection, by measurement and by manual test in accordance with 8.14.2 b).

19.103 Flanges

Bench grinders shall be provided with flanges for mounting grinding wheels to the **tool spindle**. Flanges shall comply with the minimum dimensions in relation to the maximum diameter *D* of the wheel, as specified in Table 101.

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Table 101 – Minimum flange dimensions (see Figure 105)

Maximum wheel diameter	d_f mm	r mm	T mm
$D \leq 100$ mm	34	6	1,5
100 mm $< D \leq$ 125 mm	42	8	1,5
125 mm $< D \leq$ 150 mm	52	9	1,5
150 mm $< D \leq$ 200 mm	68	12	1,5
200 mm $< D \leq$ 250 mm	85	15	1,5
250 mm $< D \leq$ 310 mm	100	17	1,5

Compliance is checked by measurement.

19.104 Torque test for flanges

The flanges required by 19.103 shall be designed so that they are of adequate strength.

Compliance is checked by the following test.

The abrasive wheel is replaced by a flat steel plate of sufficient thickness to be clamped between the flanges, having the same bore diameter of the wheel and which extends beyond the flanges.

The clamping nut shall be tightened with a first test torque according to Table 102. A feeler gauge of thickness 0,05 mm shall be used to check whether the flanges are in contact with the plate all around the circumference. It shall not be possible to push the feeler gauge between the flange and the surface of the plate by more than 1 mm at any point around the circumference of the flange, excluding any chamfer.

The test is then repeated using the second test torque according to Table 102.

Table 102 − Test torque for flanges

Thread		First test torque	Second test torque
Metric	UNC	Nm	Nm
8		2	8
10	3/8	4	15
12	½	7,5	30
14		11	45
16	5/8	17,5	70
20	¾	35	140
> 20	> ¾	75	300

19.105 Direction of accessory rotation

The periphery of all **accessories** shall move in a downward direction with respect to the operator's position.

Compliance is checked by inspection.

19.106 Eccentricity of the tool spindle and flange

The eccentricity of the **tool spindle** shall be less than 0,1 mm.

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