

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery –  
Part 2-1: Particular requirements for hand-held drills and impact drills**

**Outils électroportatifs à moteur, outils portables et machines pour jardins et pelouses –  
Partie 2-1: Exigences particulières pour les perceuses portatives et les perceuses à percussion**



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**IEC 62841-2-1 edition 1.1 contains the first edition (2017-06) [documents 116/321/FDIS and 116/330/RVD] and its amendment 1 (2021-11) [documents 116/519/FDIS and 116/525/RVD].**

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



International Standard IEC 62841-2-1 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

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

This Part 2-1 is to be used in conjunction with the first edition of IEC 62841-1 (2014).

This Part 2-1 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for hand-held drills and impact drills.

Where a particular subclause of Part 1 is not mentioned in this Part 2-1, 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 the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under [webstore.iec.ch](https://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.

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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.

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

## Part 2-1: Particular requirements for hand-held drills and impact drills

### 1 Scope

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

*Addition:*

This part of IEC 62841 applies to hand-held **drills** and **impact drills**, including **diamond core drills**. This ~~standard~~ document also applies to **drills** that can be used for driving screws by attaching screwdriver bits.

This ~~standard~~ document does not apply to rotary hammers, **screwdrivers**, **impact wrenches** and **ratchet drivers** even if they can be used as a **drill**.

NOTE 101 Rotary hammers are covered by IEC 62841-2-6.

NOTE 102 Screwdrivers, impact wrenches and ratchet drivers are covered by IEC 62841-2-2.

### 2 Normative references

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

*Addition:*

ISO 185:2005, *Grey cast irons – Classification*

ISO 630-2:2011, *Structural steels – Part 2: Technical delivery conditions for structural steels for general purposes*

### 3 Terms and definitions

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

*Additional definitions:*

#### 3.101

##### **drill**

tool equipped with either a typical three jaw chuck or a machine taper, specifically designed to bore holes in various materials such as metal, plastics, wood, etc.

Note 1 to entry: Besides drill bits, it is possible that other **accessories** such as bits for deburring and screwdriving are used with **drills**.

#### 3.102

##### **impact drill**

tool equipped with a chuck specifically designed to bore holes in concrete, stone and other materials, being similar in appearance and construction, to a **drill**, but which has a built-in percussion system which gives an axial percussion movement to rotating output spindle

Note 1 to entry: Some **impact drills** have a device for rendering the percussion system inoperative, so that they can be used as a conventional **drill**.

Note 2 to entry: Besides drill bits, it is possible that other **accessories** such as bits for deburring and screwdriving are used with **impact drills**.

### 3.103

#### **diamond core drill**

**drill** or **impact drill** designed to be equipped with a diamond core drill bit with or without a **liquid system** to drill into materials such as concrete or brick, see Figure I.103

## 4 General requirements

This clause of Part 1 is applicable.

## 5 General conditions for the tests

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

### 5.17 Addition:

*The mass of the tool includes the drill chuck and the auxiliary handle, if any.*

## 6 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

## 7 Classification

<https://standards.iteh.ai/catalog/standards/sist/be69c4da-5046-4018-b342-387a0dee59a8/iec-62841-2-1-2017>

This clause of Part 1 is applicable.

## 8 Marking and instructions

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

### 8.1 Addition:

**Drills** and **impact drills** shall be marked with the following:

- **rated no-load speed.**

### ~~8.3 Addition:~~

~~Chucks of **drills** and **impact drills** shall be marked with the maximum capacity of the chuck.~~

### 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 Drill safety warnings

##### 1) Safety instructions for all operations

- a) **Wear ear protectors when impact drilling.** *Exposure to noise can cause hearing loss.*

NOTE 1 The above warning applies only to **impact drills** and is omitted for **drills**.

- b) **Use the auxiliary handle(s).** *Loss of control can cause personal injury.*

NOTE 2 The above warning applies only to tools that are provided with auxiliary handle(s).

- c) **Brace the tool properly before use.** *This tool produces a high output torque and without properly bracing the tool during operation, loss of control may occur resulting in personal injury.*

NOTE 3 The above warning applies only for tools with a maximum output torque greater than 100 Nm measured in accordance with 19.102.

- d) **Hold the power tool by insulated gripping surfaces, 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 4 For **drills** that can also be used as screwdrivers, the words "or fasteners" are added after "cutting accessory".

## 2) Safety instructions when using long drill bits

- a) **Never operate at higher speed than the maximum speed rating of the drill bit.** *At higher speeds, the bit is likely to bend if allowed to rotate freely without contacting the workpiece, resulting in personal injury.*
- b) **Always start drilling at low speed and with the bit tip in contact with the workpiece.** *At higher speeds, the bit is likely to bend if allowed to rotate freely without contacting the workpiece, resulting in personal injury.*
- c) **Apply pressure only in direct line with the bit and do not apply excessive pressure.** *Bits can bend causing breakage or loss of control, resulting in personal injury.*

### 8.14.2 a) Additional items:

- 101) For **diamond core drills**: maximum diamond core bit diameter;
- 102) For tools with a maximum output torque greater than 100 Nm measured in accordance with 19.102: instructions on how to brace the tool;
- 103) For applications which produce a considerable amount of dust, such as impact and diamond core drilling: instruction on how to collect the dust.

## 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:

### 12.2.1 Replacement:

***Drills and impact drills** are operated continuously until thermal equilibrium is reached with the impact mechanism, if any, disengaged, while the torque applied to the spindle is 80 % of the torque necessary to attain **rated input** or **rated current**.*

#### 12.5 Addition:

*For **impact drills**, the temperature-rise limit specified for the external enclosure does not apply to the enclosure of the impact mechanism.*

### 13 Resistance to heat and fire

This clause of Part 1 is applicable.

### 14 Moisture resistance

This clause of Part 1 is applicable.

### 15 Resistance to rusting

This clause of Part 1 is applicable.

### 16 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

### 17 Endurance

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

#### 17.2 Replacement for **impact drills**:

*An **impact drill** is operated intermittently with no-load and, if the impact mechanism can be engaged and disengaged at will, the impact mechanism shall remain disengaged for 12 h at a voltage equal to 1,1 times the highest **rated voltage** or 1,1 times the upper limit of the **rated voltage range** and then for 12 h at a supply voltage equal to 0,9 times the lowest **rated voltage** or 0,9 times the lower limit of the **rated voltage range**. The 12 h of operation need not be continuous. The speed is adjusted to the highest value of the highest range.*

*Each cycle of operation comprises an “on” period of 100 s and an “off” period of 20 s, the “off” periods being included in the specified operating time.*

*During the test, the tool is placed in three different positions, the operating time, at each voltage, being approximately 4 h for each position.*

NOTE 101 The change of position is made to prevent abnormal accumulation of carbon dust in any particular place. Examples of the three positions are horizontal, vertically up and vertically down.

*The same tool is then mounted vertically in a test apparatus. The apparatus is designed to apply sufficient axial force to the tool, through a resilient medium that absorbs impacts and vibration, to ensure steady operation of the impact mechanism. An example of a test apparatus is shown in Figure 101. The tool is then operated at **rated voltage** for four periods of 6 h each, the interval between these periods being at least 30 min; if the impact mechanism can be engaged and disengaged at will, the impact mechanism shall remain engaged.*

*During these tests, the tool is operated intermittently, each cycle comprising a period of operation of 30 s and a rest period of 90 s during which the tool remains switched off.*

*The tool may be switched on and off by means of a switch other than that incorporated in the tool.*

*During these tests, replacement of the carbon brushes is allowed, and the tool is oiled and greased as in **normal use**. If mechanical failure occurs and does not impair compliance with this standard, the part that failed may be replaced.*

*If the temperature rise of any part of the tool exceeds the temperature rise determined during the test of 12.1, forced cooling or rest periods may be applied, the rest periods being excluded from the specified operating time. If forced cooling is applied, it shall not alter the air flow of the tool or redistribute carbon deposits.*

*During these tests, overload protection devices incorporated in the tool shall not activate.*

NOTE 102 Monitoring of external temperatures will help avoid mechanical failures.

## 18 Abnormal operation

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

### 18.8 Replacement of Table 4:

**Table 4 – Required performance levels**

Type and purpose of SCF	Minimum performance level (PL)
<b>Power switch</b> – prevent unwanted switch-on for tools with $M_{R,max} \leq 25$ Nm measured in accordance with 19.102	a
<b>Power switch</b> – prevent unwanted switch-on for tools with $M_{R,max} > 25$ Nm measured in accordance with 19.102	b
<b>Power switch</b> – provide desired switch-off for tools with $M_{R,max} \leq 25$ Nm measured in accordance with 19.102	b
<b>Power switch</b> – provide desired switch-off for tools with $M_{R,max} > 25$ Nm measured in accordance with 19.102	c
<b>Power switch</b> – provide desired switch-off for tools that require bracing in accordance with 8.14.1.101.	Shall be evaluated using the fault conditions of 18.6.1 without the loss of this <b>SCF</b>
Provide desired direction of rotation for tools that do not require bracing in accordance with 8.14.1.101	Not an <b>SCF</b>
Provide desired direction of rotation for tools that require bracing in accordance with 8.14.1.101	c
Any electronic control to pass the test of 18.3	a
<del>Prevent output speed from exceeding 130 % of <b>rated no-load speed</b> without accessories mounted</del>	<del>a</del>
For tools with a <b>rated no-load speed</b> of less than $3\,500\text{ min}^{-1}$ , prevent output speed from exceeding 150 % of <b>rated no-load speed</b> as measured in 19.6	a
For tools with a <b>rated no-load speed</b> of $3\,500\text{ min}^{-1}$ or greater, prevent output speed from exceeding 130 % of <b>rated no-load speed</b> as measured in 19.6	a
Prevent exceeding thermal limits as in 18.4	a
Prevent self-resetting as required in 23.3 for tools with $M_{R,max} \leq 25$ Nm measured in accordance with 19.102	a

Prevent self-resetting as required in 23.3 for tools with $M_{R,max} > 25$ Nm measured in accordance with 19.102	b
Limit the torque to comply with 19.102	c
Prevent unwanted lock-on of the <b>power switch</b> function for tools with $M_{R,max} \leq 25$ Nm measured in accordance with 19.102	b
Prevent unwanted lock-on of the <b>power switch</b> function for tools with $M_{R,max} > 25$ Nm measured in accordance with 19.102	c

## 19 Mechanical hazards

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

### 19.1 Addition:

*The test with probe B of IEC 61032:1997 does not apply to the chuck and any **accessory** that may be inserted.*

### 19.6 Replacement:

The no-load speed of the spindle at **rated voltage** shall not exceed 120 % of the **rated no-load speed**.

*Compliance is checked by measuring the speed of the spindle after the tool has been operating for 5 min at no-load. During the test, separable **accessories** are not mounted.*

**19.101** Chuck keys shall be so designed that they drop out of position when released. This requirement does not exclude the provision of clips for holding the key in place when not in use; metal clips fixed to the flexible cable or cord are not allowed.

*Compliance is checked by inspection and manual test.*

*The key is inserted in the chuck and, without tightening, the tool is turned such that the key is facing down. The key shall fall out within 2 s.*

### 19.102 Handles

#### 19.102.1 General

The design of the handle(s) shall be such that the operator can control the static stalling torque during the operation of the tool. Depending on the handle design, the stalling torque shall not exceed the relevant maximum values as indicated in Figures 104 to 107.

Figure 102 illustrates, for various handle designs, the location “S” where the operator naturally grasps the **power switch**. For **power switch** designs without a natural grasping location, “S” shall indicate the least favourable position on the **power switch** for the reactionary torque measurement. This location “S” is used in Figures 104 to 107 to determine the moment arm for the torque calculation.

Figure 103 illustrates, for various auxiliary handle with flange designs, the location “F” where the operator naturally grasps the handle at the flange. This location “F” is used in Figures 106 and 107 to determine the moment arm for the torque calculation.

*Compliance is checked by the tests specified in 19.102.2 and 19.102.34 and by the calculations in Figures 104 to 107.*