

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Hand-held motor-operated electric tools – Safety –
Part 2-1: Particular requirements for drills and impact drills
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Outils électroportatifs à moteur – Sécurité –
Partie 2-1: Règles particulières pour perceuses et perceuses à percussion

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**HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS –
SAFETY –****Part 2-1: Particular requirements for drills and impact drills**

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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International Standard IEC 60745-2-1 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 consolidated version of IEC 60745-2-1 consists of the second edition (2003) [documents 61F/451/FDIS and 61F/471/RVD] and its amendment 1 (2008) [documents 61F/731/FDIS and 61F/751/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 2.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

The French version of this standard has not been voted upon.

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

This part 2-1 is to be used in conjunction with the third edition of IEC 60745-1. When this standard states “addition”, “modification” or “replacement”, the relevant text in part 1 is to be adapted accordingly.

With amendment 1, this Part 2 is established on the basis of the fourth edition (2006) of IEC 60745-1, *Hand-held motor-operated electric tools – Safety – Part 1: General requirements*.

Main changes include editorial modifications to match with the fourth edition of IEC 60745-1 and the addition of a new safety warning to Clause 8: Marking and instructions.

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

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in smaller roman type.

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 committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result 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 2-1: Particular requirements for drills and impact drills

1 Scope

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

Addition:

This standard applies to drills and impact drills.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

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

Additional definitions:

3.101 drill

tool specifically designed to bore holes in various materials such as metal, plastics, wood, etc.

3.102 impact drill

drill specifically designed to bore holes in concrete, stone and other materials. It is similar, in appearance and construction, to a drill, but has a built-in percussion system which gives an axial percussion movement to rotating output spindle

It may have a device for rendering the percussion system inoperative, so that it may be used as a conventional drill.

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:

5.5 *Addition:*

For drills which have both a mechanical means of setting different ranges of speed and an electronic means of setting the speed within a given range, the mechanical device is adjusted to the lowest range possible and the electronic device is adjusted to the highest setting within the given range.

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:

Drills and impact drills shall be marked with the following:

- rated no-load speed in revolutions per minute;
- maximum capacity, in millimetres, of the chuck.

8.12.1.1 Addition:

Drill safety warnings

- **Wear ear protectors when impact drilling.** *Exposure to noise can cause hearing loss.*
NOTE The above warning applies only to impact drills and may be omitted for drills other than impact drills.
- **Use auxiliary handle(s), if supplied with the tool.** *Loss of control can cause personal injury.*
- **Hold 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.*

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 Addition:

Tools are operated continuously 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.

12.3 Addition:

The temperature-rise limit specified for the external enclosure does not apply to the enclosure of the impact mechanism.

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.

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17 Endurance

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

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17.2 Replacement for impact drills:

Impact drills are operated 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 supply voltage equal to 1,1 times rated voltage and then for 12 h at a supply voltage equal to 0,9 times rated voltage. 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.

During this test, replacement of the carbon brushes is allowed, and the tool is oiled and greased as in normal use.

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

The impact drills are then mounted vertically in a test apparatus as shown in Figure 101 and are operated at rated voltage or at the mean value of the rated voltage range, 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 impact drills are 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.

During the tests, an axial force, just enough to ensure steady operation of the impact mechanism, is applied to the impact drill through a resilient medium.

If the impact mechanism fails mechanically during the test without causing an accessible part to become live, it may be replaced by a new one.

During these tests, overload protection devices shall not operate.

NOTE 1 Monitoring of external temperatures will help avoid mechanical failures.

NOTE 2 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.

18 Abnormal operation

This clause of Part 1 is applicable.

19 Mechanical hazards

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

19.1 Addition:

Chuck keys shall be so designed that they drop easily 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.

19.101 The force on the hand due to static stalling torque shall not be excessive.

Compliance is checked by the following test.

Static stalling torque or slip torque of a clutch is measured on the locked output spindle of the tool in the cold condition (M_R).

The tool is connected to rated voltage. The mechanical gears are adjusted to the lowest speed. Electronic regulators are adjusted to their maximum speed setting. The tool switch is to be in the full "on" position. The mean value of the torque measured shall not exceed the relevant maximum value in Figure 102 and Figure 103.

20 Mechanical strength

This clause of Part 1 is applicable.

21 Construction

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

21.18 Addition:

A switch lock-on device, if any, shall be located outside the grasping area, or so designed that it is not likely to be unintentionally locked on by the user's hand during intended left- or right-handed operation. This grasping area is considered to be the contact area between either hand and the tool while the index finger of that hand is resting on the switch actuator of the tool.

Compliance is checked by inspection or by the following test.

For a switch with a lock-on device within the grasping area, the lock-on device shall not be actuated by a straight-edged utensil when the utensil is made to pass back and forth across the device in any direction. The straight-edged utensil may be of any convenient length sufficient to bridge the surface of the lock-on device and any surface adjacent to the lock-on device.

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

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

23.3 Replacement:

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Overload protection devices shall be of the non-self-resetting type unless the tool is equipped with a momentary switch with no provision for being locked in the "on" position.

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Compliance is checked by inspection.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable.

25 Terminals for external conductors

This clause of Part 1 is applicable.

26 Provision for earthing

This clause of Part 1 is applicable.

27 Screws and connections

This clause of Part 1 is applicable.

28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.

29 Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

30 Resistance to rusting

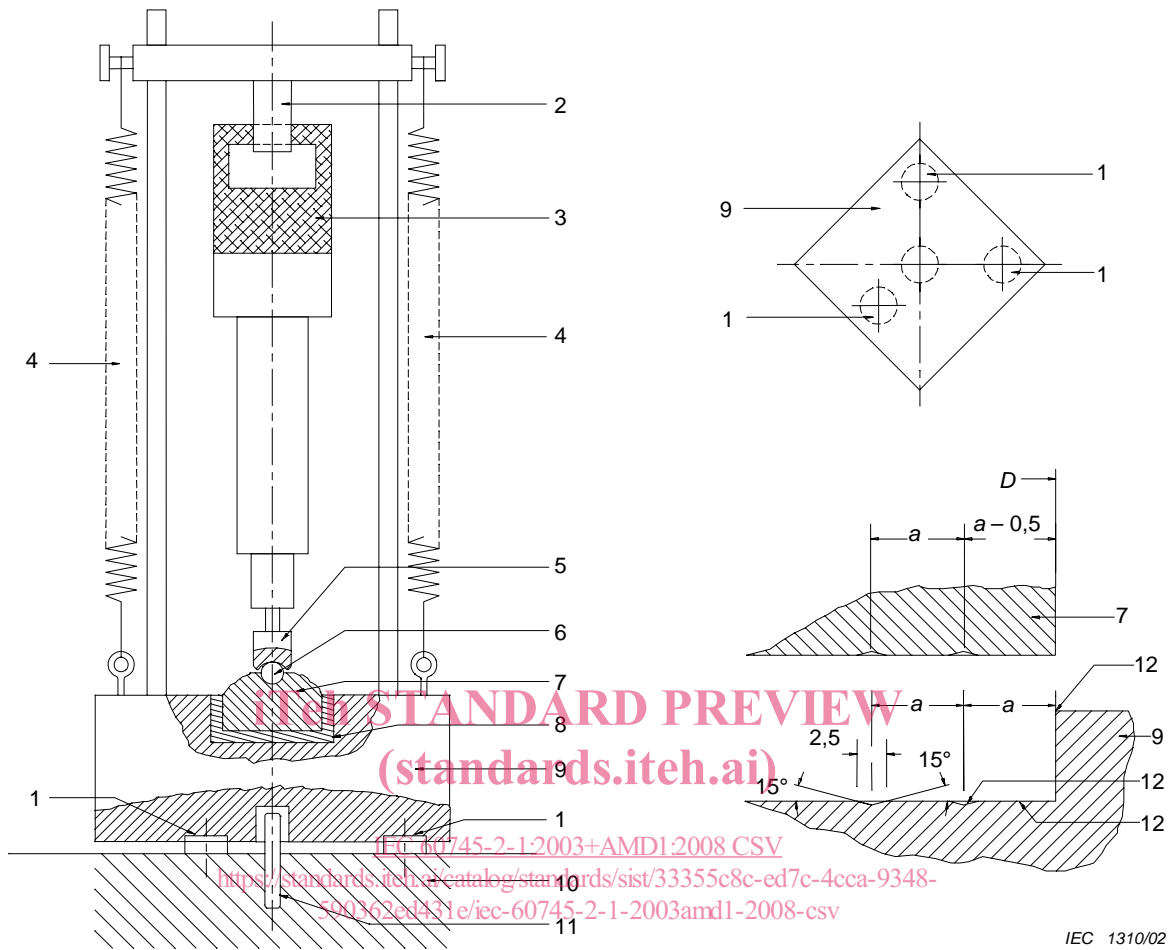
This clause of Part 1 is applicable.

31 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

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IEC 1310/02
Dimensions in millimetres

Key

- 1 Synthetic rubber disk or material having similar properties, shore hardness 70 deg. to 80 deg., thickness 10 mm, diameter 75 mm
- 2 Polyamide-lined yoke, adapted to suit the grip of the tool
- 3 Sample
- 4 Mechanical or pneumatical springs applying a force to the sample
- 5 Punch
- 6 Hardened steel ball with diameter 38 mm
- 7 Hardened steel transfer plate of mass M_2 and diameter D , grooved on underside as shown in detail
- 8 Synthetic rubber disk or material having similar properties, shore hardness 70 deg. to 80 deg, thickness 6 mm to 7 mm, fitting closely in cavity
- 9 Steel base at mass M_1 , with circular cavity having a diameter 1 mm greater than that of the transfer plate, bottom of cavity grooved, as shown in detail
- 10 Concrete block supported by compacted ballast of earth
- 11 Steel peg to prevent any horizontal movement
- 12 Burnished surface and edge

NOTE When submitting a tool, the applicant may supply, if necessary, a suitable punch and shank, the total mass of which is less than that specified in the following table, for the steady operation of the impact mechanism.