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Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery — Safety

Part 3-6: Particular requirements for transportable diamond drills with liquid system

National foreword

This British Standard is the UK implementation of EN 62841-3-6:2014. It is identical to IEC 62841-3-6:2014. It supersedes BS EN 61029-2-6:2010, which will be withdrawn on 21 August 2019.

NOTE: The BS EN 62841 series supersedes the BS EN 60745 series, the BS EN 61029 series and parts of the BS EN 60335 series (for lawn and garden machinery). BS EN 62841-1:2015 supersedes BS EN 60745-1:2009 and BS EN 61029-1:2009. A withdrawal date for BS EN 60745-1:2009 and BS EN 61029-1:2009 will be fixed upon publication of all standards in the BS EN 62841-2 and BS EN 62841-3 series.

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This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery - Safety - Part 3-6: Particular requirements for transportable diamond drills with liquid system (IEC 62841-3-6:2014)

Outils électroportatifs à moteur, outils portables et machines pour jardins et pelouses - Sécurité - Partie 3-6: Exigences particulières pour les forets diamantés transportables avec système liquide
(CEI 62841-3-6:2014)

Elektrische motorbetriebene handgeführte Werkzeuge, transportable Werkzeuge und Rasen- und Gartenmaschinen - Sicherheit - Teil 3-6: Besondere Anforderungen für transportable Diamantbohrmaschinen mit Flüssigkeitssystem
(IEC 62841-3-6:2014)

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Foreword

The text of document 116/165/FDIS, future edition 1 of IEC 62841-3-6, prepared by IEC/TC 116 "Safety of motor-operated electric tools" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62841-3-6:2014.

A draft amendment, which covers common modifications to IEC 62841-3-6:2014, was prepared by CLC/TC 116 "Safety of motor-operated electric tools" and approved by CENELEC.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-05-02
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2018-05-02

EN 62841-3-6:2014 supersedes EN 61029-2-6:2010.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62841-3-6 are prefixed “Z”.

This European Standard is divided into four parts:

Part 1: General requirements which are common to most electric motor operated tools (for the purpose of this standard referred to simply as tools) which could come within the scope of this standard;

Part 2, 3 or 4: Requirements for particular types of tools which either supplement or modify the requirements given in Part 1 to account for the particular hazards and characteristics of these specific tools.

This Part 3-6 is to be used in conjunction with EN 62841-1:201X [1)]. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

Subclauses, tables and figures which are additional to those in Part 1 are numbered starting from 101.

Compliance with the clauses of Part 1 together with this Part 3-6 provides one means of conforming with the essential health and safety requirements of the Directive concerned.

Warning: Other requirements and other EU Directives can be applicable to the products falling within the scope of this standard.

This European Standard follows the overall requirements of EN ISO 12100.

NOTE In this standard the following print types are used:
- requirements proper; in roman type
- *test specifications: in italic type;*
- explanatory matter: 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.

———————

1) At draft stage.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Annex ZZ
(informative)

Coverage of Essential Requirements of Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant Essential Requirements as given in EU Directive 2006/42/EC (Machinery Directive).

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directives concerned.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

CONTENTS

1 Scope 5
2 Normative references 5
3 Terms and definitions 5
4 General requirements 5
5 General conditions for the tests 6
6 Radiation, toxicity and similar hazards 6
7 Classification 6
8 Marking and instructions 6
9 Protection against access to live parts 7
10 Starting 7
11 Input and current 7
12 Heating 8
13 Resistance to heat and fire 8
14 Moisture resistance 8
15 Resistance to rusting 8
16 Overload protection of transformers and associated circuits 8
17 Endurance 8
18 Abnormal operation 9
19 Mechanical hazards 9
20 Mechanical strength 10
21 Construction 10
22 Internal wiring 11
23 Components 11
24 Supply connection and external flexible cords 11
25 Terminals for external conductors 11
26 Provision for earthing 11
27 Screws and connections 11
28 Creepage distances, clearances and distances through insulation 11
Annexes 14
Annex I (normative) Measurement of noise and vibration emissions 14
Annex K (normative) Battery tools and battery packs 16
Bibliography 17

Figure 101 – Example of a diamond drill with liquid system 12
Figure 102 – Test arrangement to check efficiency of the liquid collection device 13

Table 4 – Required performance levels 9
Table I.101 – Test conditions for noise and vibration 14
Table I.102 – Concrete formulation (per cubic metre) 15
Table I.103 – Depth of holes for the test 15

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

Part 3-6: Particular requirements for transportable diamond drills with liquid system

1 Scope

This clause of Part 1 is applicable except as follows:

Addition:

This part of IEC 62841 applies to transportable **diamond drills**, intended to be connected to a liquid system. Liquid system may include liquid from a pipe or container.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

Addition:

3.101
diamond drill
manually fed tool with liquid system designed to drill stone and concrete by means of diamond core bits. The tool at least consists of a **drill unit** and a **drill stand** to which it is fixed. The **drill stand** is either attached to the workpiece to be drilled by means of fasteners, vacuum or other suitable devices (see Figure 101) or the **drill stand** is secured to an appropriate support such as a scaffolding

3.102
drill unit
device consisting of a motor and a fitting for the drill bit

3.103
drill stand
device for supporting the **drill unit** in its operating position

3.104
liquid collection device
device to collect liquid and slurry when drilling

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:*

An auxiliary handle, if provided, and the ***drill stand*** *are regarded as needed for normal use.*

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:*

Diamond drills shall be marked with:

– rated no-load speed.

8.14.1.1 *Addition:*

101) Diamond drill safety warnings

a) **When performing drilling that requires the use of water, route the water away from the operator's work area or use a liquid collection device.** *Such precautionary measures keep the operator's work area dry and reduce the risk of electrical shock.*

b) **Operate power tool by insulated grasping 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.*

c) **Wear hearing protection when diamond drilling.** *Exposure to noise can cause hearing loss.*

d) **When the bit is jammed, stop applying downward pressure and turn off the tool.** *Investigate and take corrective actions to eliminate the cause of the bit jamming.*

e) **When restarting a diamond drill in the workpiece check that the bit rotates freely before starting.** *If the bit is jammed, it may not start, may overload the tool, or may cause the diamond drill to release from the workpiece.*

f) **When securing the drill stand with anchors and fasteners to the workpiece, ensure that the anchoring used is capable of holding and restraining the machine during use.** *If the workpiece is weak or porous, the anchor may pull out causing the drill stand to release from the workpiece.*

g) **When securing the drill stand with a vacuum pad to the workpiece, install the pad on a smooth, clean, non-porous surface. Do not secure to laminated surfaces such as tiles and composite coating.** *If the workpiece is not smooth, flat or well affixed, the pad may pull away from the workpiece.*

NOTE The above warning applies only if the tool is intended to be used with a vacuum pad.

h) **Ensure there is sufficient vacuum before and during drilling.** *If the vacuum is insufficient, the pad may release from the workpiece.*

NOTE The above warning applies only if the tool is intended to be used with a vacuum pad

i) **Never perform drilling with the machine secured by the vacuum pad only, except when drilling downwards.** *If the vacuum is lost, the pad will release from the workpiece.*

NOTE The above warning applies only if the tool is intended to be used with a vacuum pad.

j) **When drilling through walls or ceilings, ensure to protect persons and the work area on the other side.** *The bit may extend through the hole or the core may fall out on the other side.*

k) **Do not use this tool for overhead drilling with water supply.** *Water entering the power tool will increase the risk of electric shock.*

NOTE The above warning is only needed for tools that cannot be used for drilling overhead.

l) **When drilling overhead, always use the liquid collection device specified in the instructions. Do not allow water to flow into the tool.** *Water entering the power tool will increase the risk of electric shock.*

NOTE The above warning is only needed for tools that can be used for drilling overhead.

8.14.2 a) *Addition:*

101) Information about which diamond core bits can be used with the machine;

102) Instruction to and information about how to mount the tool to the **drill stand**;

103) Information about how to install the diamond core bit to the tool and, if applicable, information about diamond core bit assembly;

104) Instruction to and information about how to anchor the **drill stand** in all applicable positions;

105) For tools using vacuum fixing devices:

- Instruction to and information about how to check the surface where the **drill stand** shall be fixed;
- Instruction to additionally secure the **drill stand** when drilling in orientations other than vertically down, by using appropriate accessories or means and information how to achieve this;
- Information regarding minimum vacuum level necessary for safe operation and how to control it during the drilling operation;
- Information regarding the maximum core bit diameter suitable for use with vacuum fixing;

106) For tools that can be used for drilling overhead with a **liquid collection device**:

- Information about the minimum and maximum diamond core bit diameter that can be used with the **liquid collection device**.

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 except as follows:

14.3.101 Diamond drills which are intended to be used for drilling overhead in accordance with 8.14.2 a) 104) and using a **liquid collection device** shall prevent electric shock due to excessive liquid spillage.

Compliance is checked by the following test.

*The **drill unit** runs vertically upwards at rated voltage under no-load condition with the **liquid collection device** installed. If the **liquid collection device** is designed to be connected to a liquid vacuum device, then such a device shall be attached. The test is conducted twice, the drill being fitted once with the minimum and once with the maximum diameter of the diamond core bit as specified for the **liquid collection device** in accordance with 8.14.2 a) 106).*

The test arrangement is shown in Figure 102.

The liquid flow of approximately 1,0 % NaCl solution shall be in the range of 1 l/min to 1,5 l/min. The running time shall be 15 min. The measuring time starts when the core bit is filled with liquid.

During the test the leakage current as in Clause C.3 is monitored. The leakage current shall not exceed:

- *2 mA for a class II tool;*
- *5 mA for a class I tool.*

Following this test, the tool shall meet the electric strength test of Clause D.2 between live parts and accessible parts after being allowed to dry for 24 h at ambient temperature.

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 of the fifth paragraph:*

Diamond drills *are operated for 12 h at a voltage equal to 1,1 times rated voltage or the upper limit of the rated voltage range, and then for 12 h at a supply voltage equal to 0,9 times rated voltage or the lower limit of the rated voltage range. The 12 h of operation need not be continuous. During the test, the tool is placed in three different positions, the operating time, at each test voltage, being approximately 4 h for each position.*

18 Abnormal operation

This clause of Part 1 is applicable except as follows:

18.8 Table 4 *Replacement:*

Table 4 – Required performance levels

Type and purpose of SCF	Minimum Performance Level (PL)
Power switch - prevent unwanted switch-on	a
Power switch - provide desired switch-off	b
Provide desired direction of rotation	Not a **SCF**
Any electronic control to pass the test of 18.3	a
Overspeed prevention to prevent output speed above 130 % of rated (no-load) speed	a
Prevent exceeding thermal limits as in clause 18	a
Prevent self-resetting as required in 23.3	a
Limiting device to comply with 19.103	c

19 Mechanical hazards

This clause of Part 1 is applicable except as follows:

19.1 *Addition:*

Rotating elements such as clutches, spindles, extensions, etc., except core bits, shall be:

– without projecting parts and be of round or hexagonal shape;

Compliance is checked by inspection.

or

– protected with a fixed or self-adjusting guard.

Compliance is checked by applying test probe B of IEC 61032:1997 with a force not exceeding 5 N to any guard fitted. It shall not be possible to contact rotating elements with the test probe.

19.7 This subclause of Part 1 is not applicable.

19.8 This subclause of Part 1 is not applicable.

19.101 Diamond drills shall be provided with a **drill stand** and a **drill unit**.

The **drill stand** shall have provisions for mounting the **drill stand** to the workpiece to be drilled or to an appropriate support.

The **drill unit** shall have provisions for attaching it to the **drill stand** in all working positions. The machine shall be so designed that unintentional loosening of the **drill unit** from the **drill stand** is prevented.

Compliance is checked by inspection.

19.102 Vacuum devices for fixing the **diamond drill** shall be provided with a means that informs the user of the actual vacuum.

Compliance is checked by inspection.

19.103 Vacuum devices for fixing the **diamond drill** shall be able to withstand the forces during the drilling process including the situation of a jammed drill bit.

Compliance is checked by the following test which simulates the bit becoming jammed in the work piece.

*The **diamond drill** shall be fixed with the vacuum device to a 12 mm steel plate. The vacuum shall be adjusted to the minimum level specified in accordance with 8.14.2 a) 105).The output spindle of the **diamond drill** is coupled to a stalling device. If the tool is equipped with a gear selection, the gear resulting in the highest torque shall be chosen. If the tool is equipped with an adjustable clutch, this shall be adjusted to the highest torque setting. The tool shall come to full speed and then stopped by the stalling device within 45° to 90° of spindle rotation. The stall is maintained for 3 s. Following this test, the tool is maintained in the stalled position and the power switch is then operated on and off 3 times.*

During the test, the operator(s) shall be outside the radius of the tool in case the vacuum system comes loose.

*During the test, the **drill stand** shall not come loose and shall not rotate by more than 10°.*

20 Mechanical strength

This clause of Part 1 is applicable except as follows:

20.5 This subclause of Part 1 is not applicable.

21 Construction

This clause of Part 1 is applicable except as follows:

21.18.2.1 This subclause of Part 1 is not applicable.

21.30 *Replacement:*

If handles or grasping surfaces as specified in the instruction manual are provided for manual feeding, they shall be insulated between the grasping areas used in normal use and the accessible parts that become live due to contact with the output shaft.

Compliance is checked by inspection and a test in accordance with 20.3.2 on the handles and grasping surfaces, followed by an electric strength test in accordance with Clause D.2 using 1 250 V a.c. between the handles and grasping surfaces in contact with foil and the output shaft of the tool.

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

This clause of Part 1 is applicable.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows:

24.4 *Replacement of the first paragraph:*

Supply cords shall be not lighter than heavy polychloroprene sheathed flexible cable (code designation 60245 IEC 66) or equivalent.

25 Terminals for external conductors

This clause of Part 1 is applicable.

26 Provision for earthing

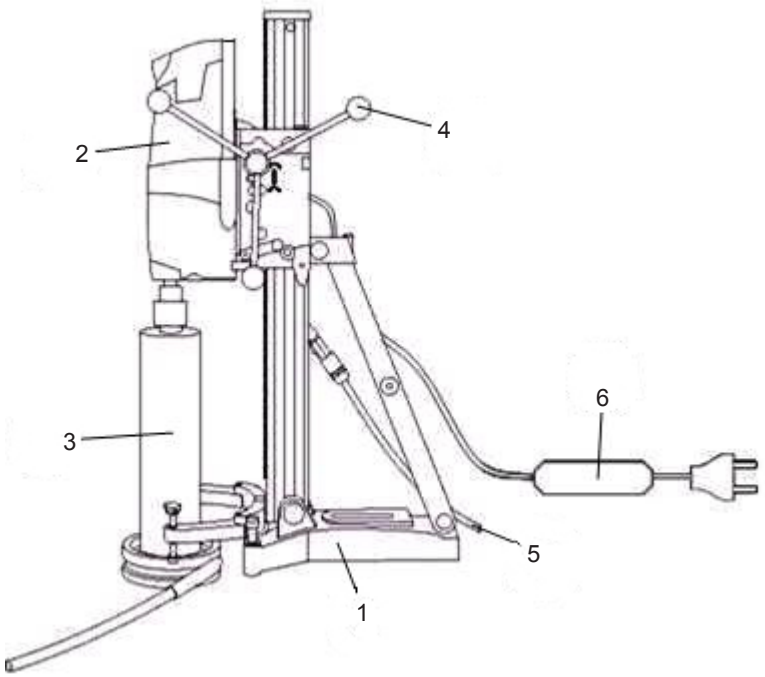
This clause of Part 1 is applicable.

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.



Key

1 **drill stand**

2 **drill unit**

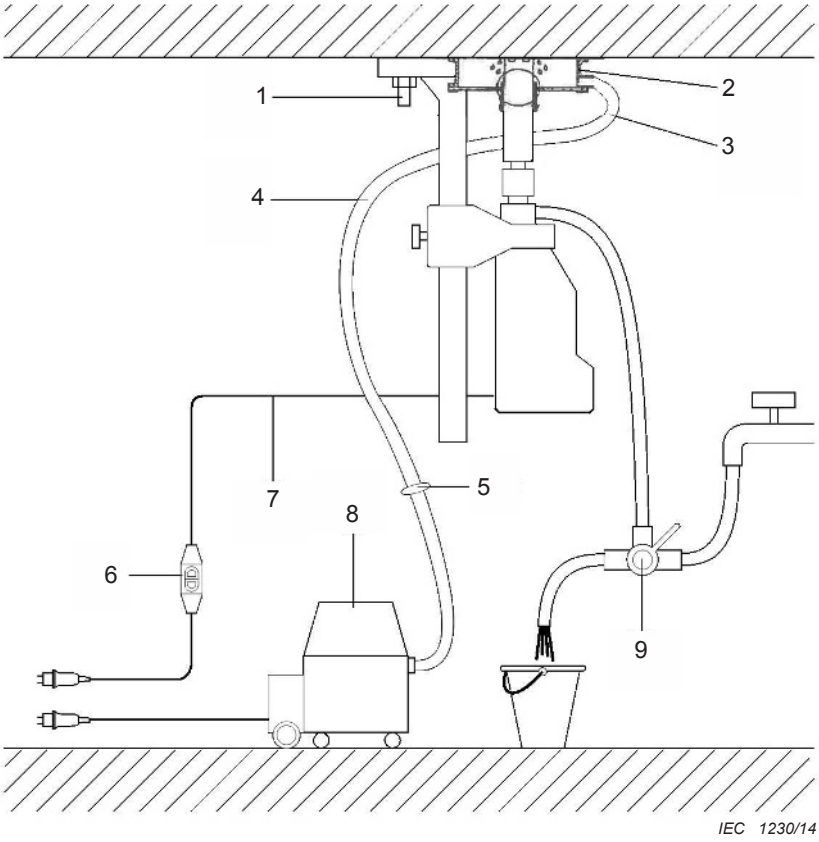
3 diamond core bit

4 headstock spindle to move the **drill unit** up and down

5 liquid system

6 RCD (residual current device), if any

Figure 101 – Example of a diamond drill with liquid system



Key

1 **drill stand** fixed with bolts
2 **liquid collection device**
3 connection to liquid aspirator
4 liquid outlet hose
5 adapter for wet vacuum cleaner
6 RCD (Residual Current Device), if any
7 supply cord
8 vacuum cleaner for wet operations
9 liquid supply with three way outlet valve

Figure 102 – Test arrangement to check efficiency of the liquid collection device

Annexes

The annexes of Part 1 are applicable except as follows.

Annex I
(normative)

Measurement of noise and vibration emissions

I.2 Noise test code (grade 2)

This clause of Part 1 is applicable except as follows:

I.2.4 Installation and mounting conditions of the power tools during noise tests

Replacement:

Diamond drills are installed and mounted as specified under “Test set-up” in Table I.101.

Table I.101 – Test conditions for noise and vibration

Test set-up	The **drill stand** with the **drill unit** is fixed on a concrete block (specified in Table I.102) having the minimum dimensions 500 mm x 500 mm and 200 mm in height and supported on resilient material. The fixing shall be done in accordance with 8.14.2 a). The machine settings (speed, liquid supply, impact, etc.) shall be correctly adjusted for drilling into concrete with the type and diameter of the core drill bit used for the test, as described in accordance with 8.14.2 a). The **liquid collection device**, if any, shall be in place during the operation of the tool as described in accordance with 8.14.2 a). For the noise test, the concrete block, its support and the tool shall be so oriented that the geometric centre of the tool is approximately 1 m above the reflecting plane. The centre of the concrete block shall be located under the top microphone.
Orientation	Drilling vertically down into the concrete block. The drilled core holes may overlap for the cases, where the concrete block is thick enough to enable dead end core holes.
Tool bit	Core bit, for application with liquid supply, with approximately 75 % of the maximum core bit diameter as specified in accordance with 8.14.2 a) 101). The depth of hole shall be according to Table I.103. Before the test the drill bit shall be sharpened on a sharpening plate and then one hole shall be drilled to give the drill bit a normal sharpness.
Feed force	The feed force applied to the tool shall be determined as follows: Drill with the tool increasing the feed force until either the speed is significantly reduced by the load or a torque limiting device operates. Reduce the feed force slightly until a feed force is reached enabling stable operation. Use this feed force for the test.
Preparation	The start of drilling may cause problems, because the core bit is not guided. Prior to testing, the holes shall be prepared to a depth of 5 mm.
Test cycle	The measurement starts, when the drill bit has contact with the concrete block (in 5 mm depth), and stops at a drilling depth specified in Table I.103, or when the maximum drilling depth of the individual core drill bit is reached, whatever is less.

Table I.102 – Concrete formulation (per cubic metre)

<table>
<tr><th>Cement</th><th>Water</th><th colspan="2">Aggregate [b]</th></tr>
<tr><td rowspan="5">330 kg</td><td rowspan="5">183 l [a]</td><td colspan="2">1 844 kg</td></tr>
<tr><td>Particle size</td><td>Fraction (%)</td></tr>
<tr><td>0 mm to 2 mm</td><td>38 ± 3</td></tr>
<tr><td>0 mm to 8 mm</td><td>50 ± 5</td></tr>
<tr><td>0 mm to 16 mm</td><td>80 ± 5</td></tr>
<tr><td colspan="4">0 mm to 32 mm 100
Compressive strength after 28 days to be 40 N/mm^2.
[a] The water/cement mass ratio shall be 0,55 ± 0,02 (the mass tolerance of cement and water is ± 10 % to enable the concrete manufacturer to ensure compressive strength with local cement).
[b] Very hard aggregates such as flint or granite and very soft aggregates such as limestone shall not be used.</td></tr>
</table>

Table I.103 – Depth of holes for the test

Diameter of diamond core bit [mm]	≤ 35	> 35
Depth of hole [mm]	100	200

I.2.5 Operating conditions

Addition:

Diamond drills are tested under load in accordance with Table I.101.

I.3 Vibration

This clause of Part 1 is not applicable.

Annex K
(normative)

Battery tools and battery packs

K.1 *Addition:*

All clauses of this Part 3-6 apply unless otherwise specified in this annex.

K.14.3.101 This subclause is not applicable.

K.17.2 This subclause is not applicable.

K.24.4 This subclause is not applicable.

Bibliography

The bibliography of Part 1 is applicable.

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