BS EN 60745-2-2:2010

BSI Standards Publication

Hand-held motor-operated electric tools — Safety

Part 2-2: Particular requirements for screwdrivers and impact wrenches

National foreword

This British Standard is the UK implementation of EN 60745-2-2:2010. It is derived from IEC 60745-2-2:2003, incorporating amendment 1:2008. It supersedes BS EN 60745-2-2:2003+A1:2009, which will be withdrawn on 1 February 2013.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by ⟨A1⟩ ⟨A1⟩.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags ⟨C⟩ ⟨C⟩.

The UK participation in its preparation was entrusted to Technical Committee CPL/116, Portable motor-operated tools.

A list of organizations represented on this committee can be obtained on request to its secretary.

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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Compliance with a British Standard cannot confer immunity from legal obligations.

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Amendments/corrigenda issued since publication

Date	Text affected

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Supersedes EN 60745-2-2:2003 + A1:2009 + A11:2007 + A12:2009

English version

Hand-held motor-operated electric tools - Safety - Part 2-2: Particular requirements for screwdrivers and impact wrenches

(IEC 60745-2-2:2003, modified + A1:2008)

Outils électroportatifs à moteur - Sécurité - Partie 2-2: Règles particulières pour les visseuses et les clés à chocs (CEI 60745-2-2:2003, modifiée + A1:2008)

Handgeführte motorbetriebene Elektrowerkzeuge - Sicherheit - Teil 2-2: Besondere Anforderungen für Schrauber und Schlagschrauber (IEC 60745-2-2:2003, modifiziert + A1:2008)

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of the International Standard IEC 60745-2-2:2003, prepared by SC 61F (transformed into IEC TC 116, Safety of hand-held motor-operated electric tools), together with the common modifications prepared by the Technical Committee CENELEC TC 61F (transformed into TC 116) was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60745-2-2 on 2002-12-01.

A number of amendments to EN 60745-2-2 have since been voted on and published as amendments A11, A1 and A12.

A further draft amendment (FprAD) including improvements to the vibration test code was submitted to the Unique Acceptance Procedure.

The combined texts were approved by CENELEC as a new edition of EN 60745-2-2 on 2010-02-01.

This European Standard supersedes EN 60745-2-2:2003 + A11:2007 + A1:2009 + A12:2009.

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

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-02-01

This standard is divided into two parts:

Part 1: General requirements which are common to most hand-held 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: 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 European Standard has been prepared under a mandate given to CEN and CENELEC by the European Commission and the European Free Trade Association and supports the essential health and safety requirements of the Machinery Directive 2006/42/EC. See Annex ZZ.

Compliance with the clauses of Part 1 together with this Part 2 provides one means of conforming with the essential health and safety requirements of the Directives concerned.

CEN/TC 255 is producing standards for non-electric screwdrivers and impact wrenches (EN 792-6).

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

The standard follows the overall requirements of EN ISO 12100-1 and EN ISO 12100-2.

This Part 2-2 is to be used in conjunction with EN 60745-1:2009. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

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

Annexes, subclauses, tables and figures which are additional to those in IEC 60745-2-2 are prefixed “Z”.

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

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

Endorsement notice

The text of the International Standard IEC 60745-2-2:2003 + A1:2008 was approved by CENELEC as a European Standard with agreed common modifications.

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY –

Part 2-2: Particular requirements for screwdrivers and impact wrenches

1 Scope

〈A1〉 This clause of Part 1 is applicable, except as follows:

Addition:

This standard applies to screwdrivers and impact wrenches.〈A1〉

1.1 *Addition:*

This standard applies to screwdrivers and impact wrenches.

2 Normative references

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

Additional normative reference:

EN ISO 28927-2:200X [1], *Hand-held portable power tools – Test methods for evaluation of vibration emission – Part 2: Wrenches, nut runners and screwdrivers* (ISO 28927-2:200X [1])〈C〉

〈A1〉 3 Terms and definitions 〈A1〉

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

Additional definitions:

3.101
screwdriver
tool intended for tightening and loosening screws, nuts, and the like and not equipped with an impact mechanism but which may have a device for depth setting or setting the torque or means for switching off the rotation

3.102
impact wrench
tool intended for tightening and loosening screws, nuts, and the like and equipped with a rotary impact mechanism. Some impact wrenches are equipped with a means for depth setting and may have a means for setting the torque or switching off the rotation

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable.

〈C〉 6 Environmental requirements

This clause of Part 1 is applicable except as follows:〈C〉

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[1] At draft stage.

〈C〉 **6.1.2.4** *Modification:*

Screwdrivers are suspended. The bit holder shall be horizontal.

Impact wrenches are held and used as specified in 6.1.2.5.

6.1.2.5 *Modification:*

Screwdrivers are tested at no-load.

Impact wrenches are tested under load. The load is applied by means of a brake system, so that the socket driving the brake rotates at a test speed of $(45 \pm 5)\ min^{-1}$ and the impact mechanism is caused to operate continuously. The brake as shown in Figure Z101 is supported on a resilient material and mounted on a bench such that the geometric centre of the tool is 1 m above the reflecting plane. The details of the brake system are given in EN ISO 28927-2:200X, Annex C.

To prevent chattering noise from items 2, 3 and 5 of the brake shown in EN ISO 28927-2:200X, Figures C.1 and C.2, these parts may be insulated between each other by material such as rubber.

The feed force shall be just sufficient to obtain a stable operation.

The measurement time shall be approximately 10 s.

6.2 Vibration

6.2.4.2 Location of measurement

Addition:

Figures Z102 and Z103 show the positions for different screwdrivers and impact wrenches

6.2.6.3 Operating conditions

Modification:

Table Z101 — Operating conditions for screwdrivers without impact mechanism

Orientation	Screwdrivers are tested at no-load. The screwdriver is hold horizontally during the test.
Tool bit	Tool bit of medium length and size.
Grip force	Hold the machine with normal gripping force, avoiding excessive gripping force.
Test cycle	One test cycle is given when the tool is switched on for no load at max. speed for more than 10 s and then switched off again. The measurement is conducted during 10 s within this period.

NOTE As it is difficult to measure load applications of screwdrivers in laboratories and results have shown that the load has no influence on the vibration results, the measurements are conducted with no-load only. 〈C〉

〈C〉 **Table Z102 — Operating conditions for screwdrivers with impact mechanism and impact wrenches**

Orientation	The tools are tested under load. Either a hexagon head bolt is screwed into a nut or a hexagon nut is screwed onto a bolt using a steel plate as part of a test fixture according to Figure Z104. The test fixture shall be either mounted on the floor or on a concrete block at least the size of the test fixture with a minimum thickness of 200 mm. NOTE Figure Z104 shows an example for mounting the test fixture. The bolts or nuts are of the biggest capacities of the tool under test. The screw case is a hard joint with one steel washer under the head. The initial setting of the bolt or nut shall provide 10 mm of exposed length from the steel plate to provide the run up. The test fixture shall not turn or move during the test. The steel plate shall be long enough to accept 5 fixings with a clearance between each fixing of at least the dimension of the head of the bolt or nut or a dimension distance which does not cause interference with the adjacent fixing.
Tool bit	Hex head sockets of the size and depth needed for the bolts or nuts defined above.
Feed force	Provide sufficient grip and feed force to maintain safe control. Avoid excessive grip and feed force.
Test cycle	The test cycle will be one fixing for the specified bolt or nut for a period of run down and 5 s from first impact (one test series contains five cycles). The measurement starts from switch on of the tool with the socket / bit engaged with the bolts or nuts to the end of 5 s of impact with continuous operation. This includes the time to cover run up of 10 mm.

6.2.7.2 Declaration of the vibration total value

Addition:

The vibration total value a_h of the handle with the highest emission and the uncertainty K shall be declared and:

– for screwdrivers usable without impact
the work mode description “screw driving without impact”;

– for screwdrivers with impact mechanism and impact wrenches
the work mode description “impact tightening of fasteners of the maximum capacity of the tool”. 〈C〉

7 Classification

This clause of Part 1 is applicable.

8 Marking and instructions

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

8.12.1.1 *Addition*

– **Hold power tool by insulated gripping surfaces, when performing an operation where the fastener may contact hidden wiring or its own cord**. *Fasteners 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:

12.4 *Replacement:*

The tool is operated intermittently for 30 cycles or until temperatures stabilise, whichever is achieved first, each cycle comprising a period of continuous operation of 30 s and a rest period of 90 s with the tool switched off, the tool loaded during the periods of operation by means of a brake adjusted so as to attain rated input or rated current. The temperature rises are measured at the end of the “on” period. At the manufacturer’s option the tool may be operated continuously until thermal stabilisation.

The impact mechanism may be disabled during the test to prevent damage to the brake.

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.

17 Endurance

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

17.2 *Replacement:*

For screwdrivers, the test of Part 1 is applicable.

For impact wrenches, replace the test of Part 1 as follows:

Impact wrenches are operated intermittently for 12 h at a 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 tool may be switched on and off by means of a switch other than that incorporated in the tool.

Each cycle of operation comprises an "on" period of 100 s at no load and a resting period of 20 s with the tool switched "off", the "off" periods being included in the specified operating time.

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

After this, the impact wrenches are operated intermittently for 12 h at a supply voltage equal to 1,1 times rated voltage, then for 12 h at a supply voltage equal to 0,9 times rated voltage.

Each cycle of operation comprises a tool impacting for a period of 1 s and a resting period of 9 s with the tool switched "off", the "off" periods being included in the specified operating time.

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

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.

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 are applied, the rest periods being excluded from the specified operating time.

During these tests, overload protection devices shall not operate.

18 Abnormal operation

This clause of Part 1 is applicable.

19 Mechanical hazards

This clause of Part 1 is applicable.

20 Mechanical strength

〈A1〉 This clause of Part 1 is applicable, except as follows:

20.5 This subclause is not applicable for impact wrenches. 〈A1〉

21 Construction

〈C〉 This clause of Part 1 is applicable except as follows:

21.Z1 This subclause of Part 1 is not applicable. 〈C〉

〈C〉

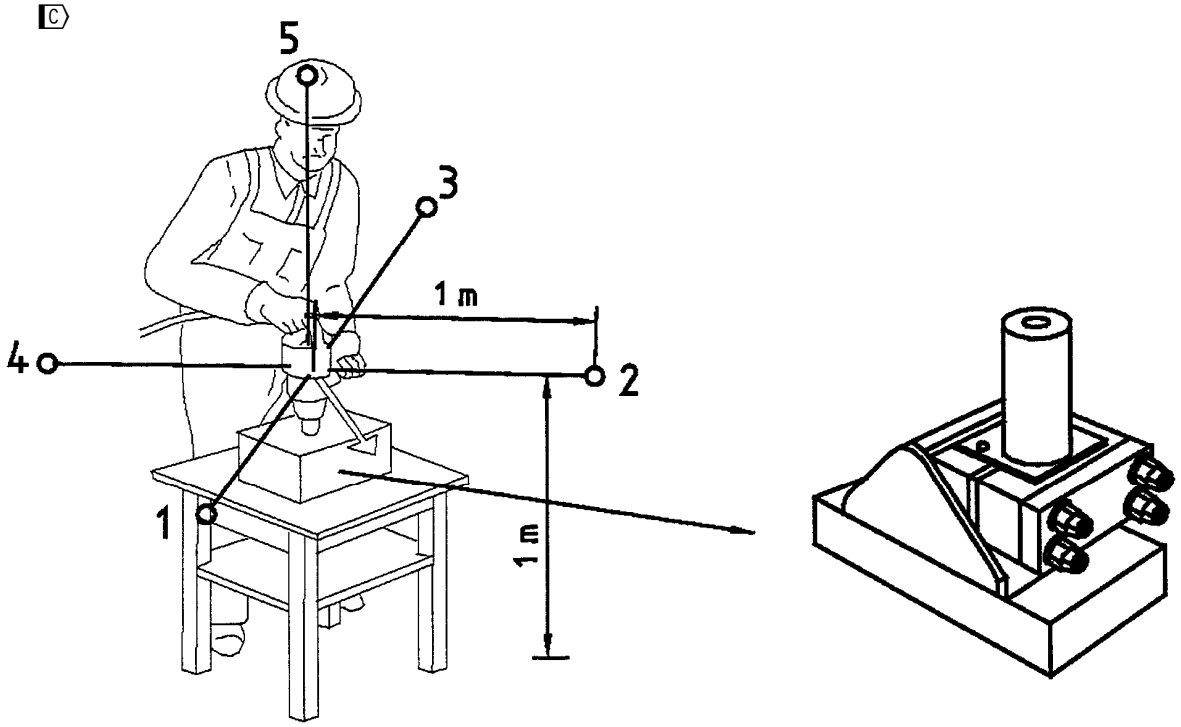


Figure Z101 — Brake 〈C〉

〈C〉

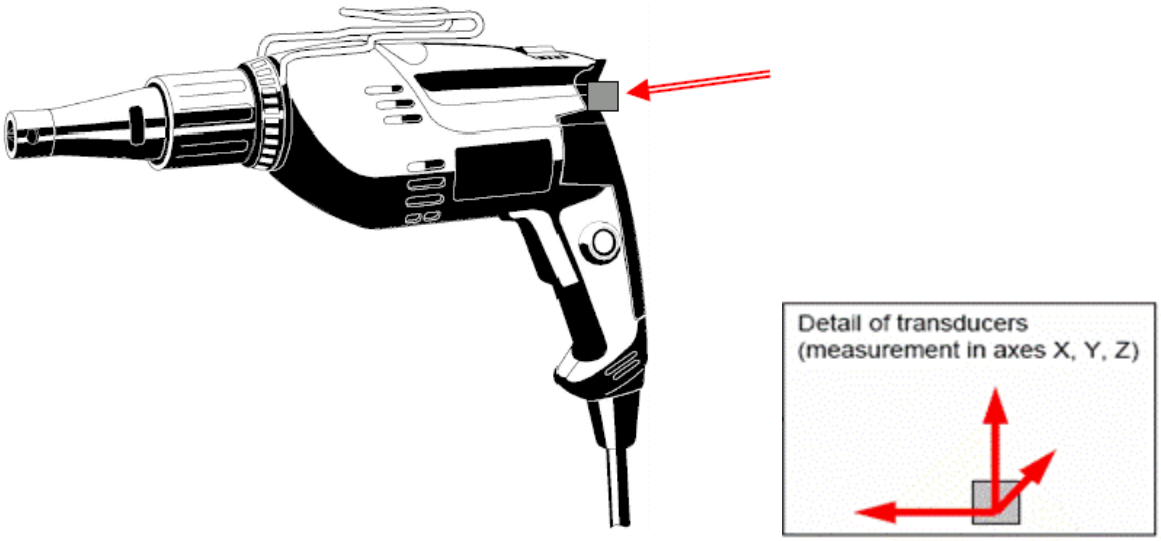
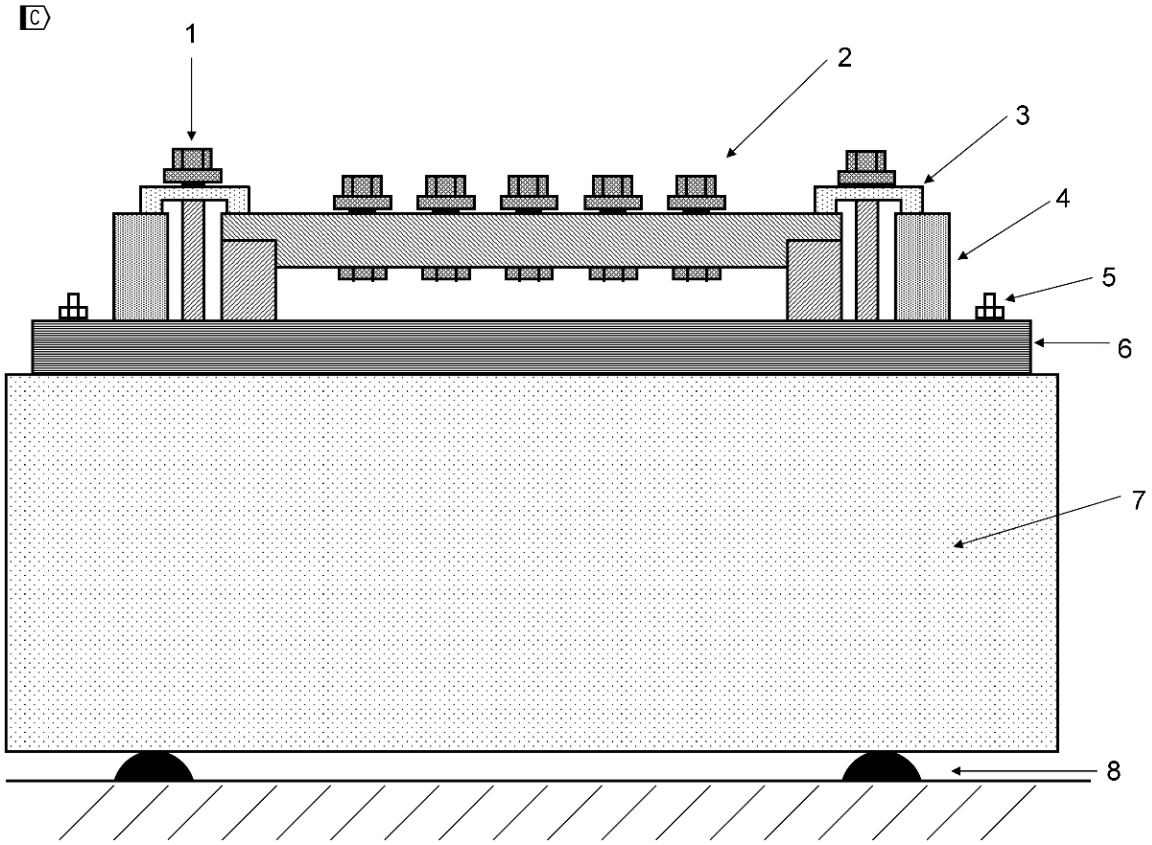


Figure Z102 – Position of transducer for screwdrivers

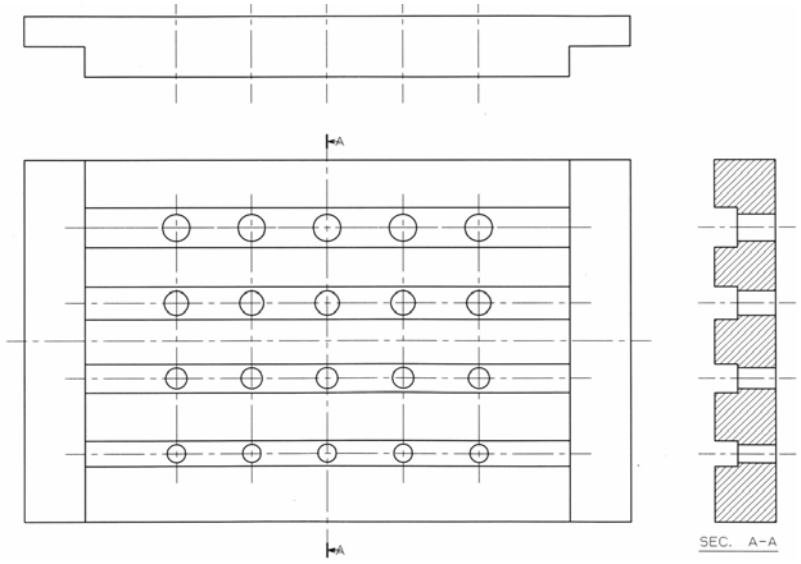
Figure Z103 – Positions of transducers for impact wrenches 〈C〉



Key

1. bolt
2. loading device (bolts or nuts, washers, steel plate)
3. steel block (clamp)
4. steel block (support)
5. anchor
6. steel plate
7. concrete block or floor
8. resilient material (in the case a block is used)

a) Typical example of the test fixture



b) Loading device steel plate

Figure Z104 – Test fixture options for screwdrivers with impact mechanism and impact wrenches

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

〈A1〉 This clause of Part 1 is applicable, except as follows:

23.3 *Replacement:*

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.

Compliance is checked by inspection.〈A1〉

24 Supply connection and external flexible cords

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

24.4 *Replacement of paragraphs 1 and 2:*

For impact wrenches, the lightest cable which can be used is:

– heavy polychloroprene sheathed flexible cable (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.

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.

Annexes

The annexes of Part 1 are applicable except as follows.

Annex K
(normative)

Battery tools and battery packs

[A1] **K.1** *Addition:*

All clauses of this Part 2 apply unless otherwise specified in this annex.

K.8.12.1.1 *Replacement of this subclause of Part 2:*

– **Hold power tool by insulated gripping surfaces, when performing an operation where the fastener may contact hidden wiring**. *Fasteners contacting a "live" wire may make exposed metal parts of the power tool "live" and could give the operator an electric shock.*[A1]

K.12.4 *Replacement*:

This sub-clause of Part 2 is not applicable.

K.17.2 *Replacement*:

This sub-clause of Part 2 is not applicable.

K.24.4 *Replacement*:

This sub-clause of Part 2 is not applicable.

Annex L
(normative)

Battery tools and battery packs provided with mains connection or non-isolated sources

[A1] **L.1** *Addition:*

All clauses of this Part 2 apply unless otherwise specified in this annex.[A1]

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Bibliography

The bibliography of Part 1 is applicable.

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〈C〉 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 EC Directive 2006/42/EC (Machinery Directive).

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

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

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