



UL 60745-2-6

STANDARD FOR SAFETY

Hand-Held Motor-Operated Electric Tools – Safety
– Part 2-6: Particular Requirements for Hammers

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UL Standard for Safety for Hand-Held Motor-Operated Electric Tools – Safety – Part 2-6: Particular Requirements for Hammers, UL 60745-2-6

Second Edition, Dated March 26, 2004

Summary of Topics

The revisions dated November 7, 2018 are being issued to reaffirm approval of UL 60745-2-6 as an American National Standard. No changes in requirements are involved.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL and CSA are committed to updating this harmonized standard jointly. However, the revision pages dated November 7, 2018 will not be jointly issued by UL and CSA as these revision pages address UL ANSI approval dates only.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated September 7, 2018.

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CSA Group
CAN/CSA-C22.2 No. 60745-2-6-04
Second Edition
(IEC 60745-2-6:2003, MOD)



Underwriters Laboratories Inc.
UL 60745-2-6
Second Edition

Hand-Held Motor-Operated Electric Tools – Safety – Part 2-6: Particular Requirements for Hammers

March 26, 2004

(Title Page Reprinted: November 7, 2018)

This national standard is based on publication IEC 60745-2-6, Second Edition (2003).

This amendment is an adoption of IEC Amendment 2 (2008) to publication IEC 60745-2-6, Second Edition (2005).

Amendment 2:2008 (IDT) to National Standard of Canada



ANSI/UL 60745-2-6-2009 (R2018)



Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as “CSA Group”) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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Amendment 2:2008 to International Standard IEC 60745-2-6:2005 has been adopted without modification (IDT) as Amendment 2:2008 to CAN/CSA-C22.2 No. 60745-2-6-04. The French version of this Amendment is incorporated in the French edition of CAN/CSA-C22.2 No. 60745-2-6-04. This Amendment was reviewed by the CSA Subcommittee on Portable Electric Tools, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. The technical content of the IEC and ISO publications is kept under constant review by IEC and ISO. To submit a proposal for change, please send the following information to inquires@csagroup.org and include “Proposal for change” in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the Second Edition including revisions through November 7, 2018. The most recent designation of ANSI/UL 60745-2-6 as a Reaffirmed American National Standard (ANS) occurred on November 7, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL’s On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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CONTENTS

Preface	5
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FOREWORD	9
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1 Scope	11
2 Normative references	11
3 Terms and Definitions	11
4 General requirements	11
5 General conditions for the tests	11
6 Void	11
7 Classification	11
8 Marking and instructions	12
9 Protection against access to live parts	12
10 Starting	12
11 Input and current	12
12 Heating	12
13 Leakage current	12
14 Moisture resistance	12
15 Electric strength	12A
16 Overload protection of transformers and associated circuits	13
17 Endurance	13
18 Abnormal operation	13
19 Mechanical hazards	14
20 Mechanical strength	14
21 Construction	15
22 Internal wiring	15
23 Components	15
24 Supply connection and external flexible cords	16
25 Terminals for external conductors	16
26 Provision for earthing	16
27 Screws and connections	16
28 Creepage distances, clearances and distances through insulation	16
29 Resistance to heat, fire and tracking	16
30 Resistance to rusting	16
31 Radiation, toxicity and similar hazards	16

Annexes

Annex K – (normative) – Battery Tool and Battery Packs

Annex L – (normative) – Battery Tools and Battery Packs Provided with Mains Connection or Non-Isolated Sources

Bibliography

No Text on This Page

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Preface

This is the common CSA and UL standard for hand-held motor-operated electric tools. It is the second edition of CAN/CSA-C22.2 No. 60745-2-6 and the second edition of UL 745-2-6. This standard is based on edition 2 of IEC 60745-2-6.

This common standard was prepared by the Canadian Standards Association (CSA) and Underwriters Laboratories Inc. (UL).

This standard was reviewed by the CSA Subcommittee on Portable Electric Tools, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

This standard has been approved as a National Standard of Canada by the Standards Council of Canada and has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

A UL standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

Where reference is made to a specific number of samples to be tested, the specified number shall be considered a minimum quantity.

Level of harmonization

This standard adopts the IEC text with national differences. This standard is published as an equivalent standard for CSA and UL. An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one literal interpretation has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

GENERAL

The previous version of CAN CSA C22.2 No. 60745-2-6-04/UL 60745-2-6 included a national difference to IEC Clause 8.12.1. The national difference was deleted in this version of CAN CSA C22.2 No. 60745-2-6-04/UL 60745-2-6.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

National Differences from the text of International Electrotechnical Commission (IEC) Publication IEC 60745-2-6, Hand-Held Motor-Operated Electrical Tools – Safety – Part 2-3: Particular Requirements for Hammers, copyright 2006-03, are indicated by the following notation:

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

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DE – These are National Differences based on **editorial comments or corrections**.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – PART 2-6: PARTICULAR REQUIREMENTS FOR HAMMERS

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60745-2-6 has been prepared by sub-committee 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 60745-2-6 consists of the second edition (2003) [documents 61F/463/FDIS and 61F/487/RVD], its amendment 1 (2006) [documents 61F/622/FDIS and 61F/630/RVD] and its amendment 2 (2006) [documents 61F/734/FDIS and 61F/754/RVD].

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

It bears the edition number 2.2.

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

This Part 2-6 is to be used in conjunction with the third edition of IEC 60745-1: Safety of hand-held motor-operated electric tools – Part 1: General requirements. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

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

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

Subclauses, tables and figures which are additional to those in Part 1 are numbered starting from 101; additional annexes are lettered AA, BB, etc.

With amendment 2, 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, addition of a new safety warning to Clause 8: Marking and instructions, and clarifications in Annex K.

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 2-6: PARTICULAR REQUIREMENTS FOR HAMMERS

1 Scope

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

Addition:

This standard applies to hammers.

Tools covered by this standard include but are not limited to percussion and rotary hammers.

This standard applies to hammers.

Tools covered by this standard include but are not limited to percussion and rotary hammers.

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 percussion hammer : tool equipped with a built-in percussion system which is not influenced by the operator

3.102 rotary hammer : tool equipped with a built-in percussion system which is not influenced by the operator and also has the capability of rotational motion

3.103 rotary hammer with "drill only mode" : rotary hammer able to rotate only with the percussion system disengaged

4 General requirements

This clause of part 1 is applicable.

5 General conditions for the tests

This clause of part 1 is applicable.

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:

8.12.1.1 Addition:

Hammer safety warnings

- **Wear ear protectors.** *Exposure to noise can cause hearing loss.*
- **Use auxiliary handle(s), if supplied with the tool.** *Loss of control can cause personal injury.*
- **Hold power tools by insulated gripping surfaces, when performing an operation where the cutting tool 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:

12.4 Replacement:

The tool is operated intermittently until the temperature stabilises or for 30 cycles, whichever is achieved first, each cycle comprising a period of operation of 30 s and a rest period of 90 s with the tool switched off. During the periods of operation the tool is loaded by means of a brake adjusted so as to attain rated input or rated current, the hammer mechanism being disengaged or removed. At the manufacturer's option, the tool may also be operated continuously until thermal stabilisation. The temperature-rise limit specified for the external enclosure does not apply to the enclosure of the hammer 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.

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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:

Rotary hammers with "drill only mode" are operated at no-load with the impact mechanism disengaged for 12 h at a voltage equal to 1,1 times the rated voltage, and then for 12 h at a voltage equal to 0,9 times rated voltage.

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

All hammers, including hammers with drill only mode are mounted vertically in a test apparatus as shown in Figure 103 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.

During these tests, hammers 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 to ensure steady operation of the impact mechanism is applied to the hammer through a resilient medium.

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.

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

18 Abnormal operation

This clause of part 1 is applicable.

19 Mechanical hazards

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

Additional subclauses:

19.101 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.

19.102 The force on the hand due to the 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 (M_{Rmax}) in Figure 101 and Figure 102.

20 Mechanical strength

This clause of Part 1 is applicable except as follows:

20.3 Replacement:

Hammers up to 10 kg shall withstand being dropped three times in total on a concrete surface from a height of 1 m. For these three drops, the sample shall be tested in the three most unfavourable positions and the lowest point of the tool shall be 1 m above the concrete surface. For the test, separable accessories are not mounted.

Hammers exceeding 10 kg are subjected to three impacts that result from the tool being tipped over to strike a concrete surface. The tool is tipped with the longest accessory recommended by the manufacturer except when the recommended accessory is longer than 1 m. In this case, the tools are tested with a 1 m accessory. The tool is positioned in an upright position with the tip of the accessory resting on a concrete surface. The tool is then tipped in three different directions on to the concrete surface.

20.5 Replacement

Hammers are regarded as tools that are likely to cut into concealed wiring or their own cord. Therefore, handles and grasping surfaces, as specified in the instruction manual, shall have adequate mechanical strength in order to provide insulation between the grasping area and the output shaft.

Compliance is checked by the following test:

A separate sample, at the discretion of the manufacturer, is to be subjected to a single impact on each handle and each recommended grasping surface.

For hammers up to 10 kg, the impacts are carried out from a height of 1 m onto a concrete surface.

For hammers exceeding 10 kg, the impacts are carried out by tipping the tool over to strike the concrete surface. The tool is tipped with the longest accessory recommended by the manufacturer except when the recommended accessory is longer than 1 m. In this case, the tool is tested with a 1 m accessory.

The impacts are followed by an electric strength test according to Clause 15 using 1 250 V a.c. between the grasping surfaces in contact with foil and the output shaft of the tool.

21 Construction

This clause of Part 1 is applicable except as follows:

21.18 Addition:

Percussion hammers and rotary hammers operating in the percussion mode may have a switch with a locking arrangement to lock it in the "on" position. For these tools, the switch shall unlock automatically with a single motion without releasing the grasp on the tool.

Compliance is checked by inspection and by a manual test.

For rotary hammers, 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 a manual test.

For a switch with a lock-on button 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 edge of the utensil shall be of sufficient length 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.

24 Supply connection and external flexible cords

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

24.4 Modification:

Instead of the first paragraph, the following applies:

Supply cords shall be not lighter than 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.

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