UL 60745-2-2

STANDARD FOR SAFETY

Hand-Held Motor-Operated Electric Tools – Safety – Part 2-2: Particular Requirements for Screwdrivers and Impact Wrenches

UL Standard for Safety for Hand-Held Motor-Operated Electric Tools – Safety – Part 2-2: Particular Requirements for Screwdrivers and Impact Wrenches, UL 60745-2-2

Second Edition, Dated March 26, 2004

Summary of Topics

This revision of ANSI/UL 60745-2-2 dated November 25, 2019 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

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 25, 2019 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 13, 2019.

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Second Edition
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Underwriters Laboratories Inc.
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Hand-Held Motor-Operated Electric Tools – Safety – Part 2-2: Particular Requirements for Screwdrivers and Impact Wrenches

March 26, 2004

(Title Page Reprinted: November 25, 2019)

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

This amendment is an adoption of IEC Amendment 1 (2008) to publication IEC 60745-2-2, Second Edition (2005).

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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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. To submit a proposal for change, please send the following information to inquiries@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.

To purchase CSA Group Standards and related publications, visit CSA Group’s Online Store at store.csagroup.org or call toll-free 1-800-463-6727 or 416-747-4044.

This ANSI/UL Standard for Safety consists of the Second Edition including revisions through November 25, 2019. The most recent designation of ANSI/UL 60745-2-2 as a Reaffirmed American National Standard (ANS) occurred on November 25, 2019. 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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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. 60745-2-2 and the second edition of UL 60745-2-2. This standard is based on IEC 60745-2-2, second edition.

The first edition of this standard was designated CAN/CSA-C22.2 No. 745-2-2/UL 745-2-2. This Standard CAN/CSA-C22.2 No. 60745-2-2/UL 60745-2-2, second edition, supersedes:

a) the first edition CAN/CSA-C22.2 No. 745-2-2/UL 745-2-2 published in 1995; and

b) CAN/CSA-C22.2 No. 745-4-2/UL 745-4-2, (requirements for battery tools and battery packs are now incorporated into the requirements of CAN/CSA-C22.2 No. 60745-2-2, second edition, and UL 60745-2-2, second edition).

The standard number has been aligned to correspond with the equivalent IEC 60745-2-2 standard.

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

Annex 2.DVL was originally provided as supplemental information and was considered editorial, Type DE. The annex is now considered no longer necessary, and has been deleted.

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 the International Electrotechnical Commission (IEC) publication 60745-2-2 (Hand-Held Motor-Operated Electric Tools – Safety – Part 2-2: Particular Requirements for Screwdrivers and Impact Wrenches) 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.

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

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – PART 2-2: PARTICULAR REQUIREMENTS FOR SCREWDRIVERS AND IMPACT WRENCHES

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.

2) The formal decisions or agreements of 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 IEC 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.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

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 60745-2-2 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.

Main changes include Clause 12: Heating, introducing slightly different test cycles, Clause 17: Endurance, introducing both a no-load test and a practical test, and Clause 14: Supply connection and external flexible cords, in respect to minimum cable specifications. Subclause 2.2.23 has been removed, as the definitions of "normal load" are now generally covered by Part 1.

This consolidated version of IEC 60745-2-2 consists of the second edition (2003) [documents 61F/461/FDIS and 61F/485/RVD] and its amendment 1 (2008) [documents 61F/732/FDIS and 61F/752/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 2-2 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.

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

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.

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.

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HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – Part 2-2: PARTICULAR REQUIREMENTS FOR SCREWDRIVERS AND IMPACT WRENCHES

1 Scope

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

Addition:

This standard applies to screwdrivers and impact wrenches.

1DV D1 ***Modification: Replace the third paragraph of Clause 1 of the Part 2 with the following:***

This standard applies to screwdrivers, impact wrenches, and ratchet drivers.

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 screwdriver:Tool intended for tightening and loosening screws, nuts, and the like and not equipped with an impacting 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

3.103DV D1 ***Addition: Add the following definition to Clause 3 of the Part 2:***

3.103DV.1 ratchet driver:Tool intended for tightening and loosening screws, nuts, and the like and equipped with a ratcheting mechanism. Some ratchet drivers are equipped with a means for switching the direction of rotation

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*

– **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:

12.1DV D1 *Modification: Add the following to Clause 12.1 of the Part 1:*

The temperature-rise limit specified for the external enclosure does not apply to the enclosure of the ratchet head and reversing control of ratchet drivers.

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 manufacturers 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.

12.4DV D1 ***Modification: Replace the second paragraph of Clause 12.4 of the Part 2 with the following:***

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

12.5DV D1 ***Modification: Add the following to Clause 12.5 of the Part 1:***

The temperature-rise limit specified for the external enclosure does not apply to the enclosure of the ratchet head and reversing control of ratchet drivers.

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 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.

17.2DV D1 ***Modification: Add the following sentence:***

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

17.2DV.1 D1 ***Modification: Replace the third paragraph of Clause 17.2 of the Part 2 with the following:***

For impact wrenches and ratchet drivers, replace the test of part 1 as follows:

17.2DV.2 D1 ***Modification: Replace the fourth paragraph of Clause 17.2 of the Part 2 with the following:***

Impact wrenches and ratchet drivers 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.

17.2DV.3 D1 ***Modification: Replace the eighth paragraph of Clause 17.2 of the Part 2 with the following:***

After this, the impact wrenches and ratchet drivers 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.

18 Abnormal operation

This clause of part 1 is applicable.

19 Mechanical hazards

This clause of part 1 is applicable.

20 Mechanical strength

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

20.5 This subclause is not applicable for impact wrenches.

20DV D1 *Modification:*

Delete Clause 20 of this Part 2.

21 Construction

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

21.32 This subclause is not applicable for impact wrenches.

21DV D1 *Modification:*

Delete Clause 21 of this Part 2.

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:*

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.

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).

24.4DV D1 *Modification: Replace Clause 24.4 of the Part 2 with the following:*

This subclause of the 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.