UL 60745-2-16

STANDARD FOR SAFETY

Hand-Held Motor-Operated Electric Tools – Safety – Part 2-16: Particular Requirements for Tackers

UL Standard for Safety for Hand-Held Motor-Operated Electric Tools – Safety – Part 2-16: Particular Requirements for Tackers, UL 60745-2-16

First Edition, Dated November 18, 2009

Summary of Topics

The revisions of ANSI/UL 60745-2-16 dated July 27, 2018 incorporate the following and reflects the latest ANSI approval date:

> ***Addition Of Clause 3.111DV To Define Light-Duty Tools And Addition Of Clause 19.101DV To Modify Current Mechanical Hazard Test Requirements To Address Tools Considered Light Duty***

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 January 26, 2015 will not be jointly issued by UL and CSA as these revision pages only address UL ANSI approval dates.

Please note that the national difference document incorporates all of the U.S. national differences for UL 60745-2-16

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated October 25, 2017 and May 18, 2018.

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.

No Text on This Page

CSA Group
CAN/CSA-C22.2 No. 60745-2-16-09
First Edition
(IEC 60745-2-16:2008, MOD)

Underwriters Laboratories Inc.
UL 60745-2-16
First Edition

Hand-Held Motor-Operated Electric Tools – Safety – Part 2-16: Particular Requirements for Tackers

November 18, 2009

(Title Page Reprinted: July 27, 2018)

This national standard is based on publication IEC 60745-2-16, Second Edition (2008).

ANSI/UL 60745-2-16-2018

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.

ISBN 978-1-55491-232-2 © 2009 Canadian Standards Association

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 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.

To purchase CSA Group Standards and related publications, visit CSA Group's Online Store at shop.csa.ca or call toll-free 1-800-463-6727 or 416-747-4044.

This ANSI/UL Standard for Safety consists of the First Edition including revisions through July 27, 2018.

The most recent designation of ANSI/UL 60745-2-16 as an American National Standard (ANSI) occurred on July 27, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. 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.

To purchase UL Standards, visit UL's Standards Sales Site at http://www.shopulstandards.com/HowToOrder.aspx or call toll-free 1-888-853-3503.

No Text on This Page

CONTENTS

Bibliography

Preface

This is the harmonized CSA Group and UL standard for Hand-Held Motor-Operated Electric Tools – Safety – Part 2-16: Particular Requirements for Tackers. It is the first edition of CAN/CSA-C22.2 No. 60745-2-16, and the first edition of UL 60745-2-16. This harmonized standard has been jointly revised on July 27, 2018. For this purpose, CSA Group and UL are issuing revision pages dated July 27, 2018.

This harmonized standard is based on IEC Publication 60745-2-16: second edition Hand-Held Motor-Operated Electric Tools – Safety – Part 2-16: Particular requirements for tackers issued February 2008. IEC 60745-2-16 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL).

This standard was reviewed by the CSA Subcommittee on Safety of Hand-Held Motor-Operated 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 considered suitable for use for conformity assessment within the stated scope of the Standard.

This standard has been approved as a National Standard of Canada by the Standards Council of Canada.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Application of Standard

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

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.

Level of harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for CSA Group 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.

All national differences from the IEC text are included in the CSA Group and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

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 interpretation of the literal text 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.

IEC Copyright

For CSA Group, the text, figures, and tables of International Electrotechnical Commission Publication 60745-2-16, Hand-Held Motor-Operated Electric Tools – Safety – Part 2-16: Particular Requirements for Tackers, copyright 2008, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword is not a part of the requirements of this standard but is included for information purposes only.

NATIONAL DIFFERENCES

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.

In the CSA Group and UL publications of this standard, National Differences from the text of International Electrotechnical Commission (IEC) Publication 60745-2-16, Hand-Held Motor-Operated Electrical Tools – Safety – Part 2-16: Particular Requirements for Tackers, copyright 2008 are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

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**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add – An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify – A modification is an altering of the existing base IEC text such as the addition, replacement, or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete – A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – Part 2-16: Particular requirements for tackers

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as ″IEC Publication(s)″). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and nongovernmental 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 60745-2-16 has been prepared by subcommittee 61F: Safety of hand-held motor-operated electric tools, of IEC technical committee 61: Safety of household and similar electrical appliances.

The text of this standard is based on the following documents:

The text of this standard is based on the following documents:

FDIS	Report on voting
61F/703/FDIS	61F/711/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This second edition cancels and replaces the first edition published in 1993 and constitutes a technical revision. Main changes include Clause 8: Markings and instructions, introducing detailed safety warnings; Clause 11: Input and current, introducing specification for rated current and input; Clause 12: Heating, with a modified test cycle; Clause 17: Endurance, with testing based on actuation numbers rather than on time; Clause 18: Abnormal operation, introducing an overload test of Part 1 slightly modified for tackers; Clause 19: Mechanical hazards, with requirements for actuating the tool dependant on the kind of actuation system.

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

This part 2 is to be used in conjunction with the latest edition of IEC 60745-1. It was established on the basis of the fourth edition (2006) of that standard.

NOTE 1 When ″Part 1″ is mentioned in this standard, it refers to IEC 60745-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60745-1, so as to convert that publication into the IEC standard: Particular requirements for tackers.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states ″addition″, ″modification″ or ″replacement″, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

A list of all parts of the IEC 60745 series, under the general title: *Hand-held motor-operated electric tools – Safety*, can be found on the IEC website.

The committee has decided that the contents of this publication 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.

DV.1 DE *Add the following after the third IEC Foreword note:*

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – PART 2-16: PARTICULAR REQUIREMENTS FOR TACKERS

1 Scope

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

Addition:

This standard applies to tackers intended for general use. This standard does not apply to tackers intended for industrial production applications.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

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

3.101 **tacker:** tool in which energy is applied to loaded fasteners, e.g. metal pins, nails or staples, for the purpose of driving the latter into wood, plastic, fabric or similar material

3.102 **actuation system:** use of a trigger, workpiece contact and/or other operating control, separately or in some combination or sequence, to actuate the tool

3.103 **single sequential actuation:** actuation system in which there is more than one operating control to be activated in a specific sequence to actuate the tool. Additional actuation is possible, when a specific operating control, other than a workpiece contact, is released and re-activated

3.104 **full sequential actuation:** actuation system in which there is more than one operating control to be activated in a specific sequence to actuate the tool. Additional actuation is only possible, when all operating controls are released and re-activated in the same sequence

3.105 **contact actuation:** actuation system in which there is more than one operating control and the operating controls can be activated in any sequence to actuate the tool. Additional actuation is possible, when any operating control is released and re-activated

3.106 **selective actuation:** actuation system that allows discrete selection of two or more of the following actuation systems: single sequential actuation, full sequential actuation or contact actuation. One or more of the selections is single sequential actuation or full sequential actuation

3.107 **automatic reversion actuation:** actuation system with more than one operating control that can be activated in any sequence to actuate the tool. Regardless of the initial sequence, the actuation system is designed to automatically revert to single sequential actuation, full sequential actuation, neutral or off

3.108 **actuate:** to cause movement of the tool component(s) intended to drive a fastener

3.109 **operating control:** control that separately, or as part of an actuation system, is able to cause the actuation of a tool

3.110 **workpiece contact:** operating control element or assembly on the tool intended to be activated by the material to be fastened

3.111DV D2 *Addition: Add Clause 3.111DV to Clause 3 of the Part 2:*

pinner: tool capable of driving headless fasteners up to 51 mm in length and with a maximum gauge of 23 (0,64 mm) diameter

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:

5.101 Tests that are to be conducted by operating the tool without fasteners may subject the tool to abnormal stresses. In order to avoid this, a suitable test fixture may be supplied or a different method of operation suggested.

6 Void

7 Classification

This clause of Part 1 is applicable.

8 Marking and instructions

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

8.1 Addition:

– for tools with selective actuation or automatic reversion actuation: markings indicating which actuation system is enabled at any time.

8.12.1 Addition:

The specific tool safety warnings for tackers are given in 8.12.1.101. The term tacker in these warnings may be replaced by a specific tool designation, such as stapler, nailer, etc.

8.12.1.101 **Safety instructions for tackers**

Tacker safety warnings

– Always assume that the tool contains fasteners. *Careless handling of the tacker can result in unexpected firing of fasteners and personal injury.*

– Do not point the tool towards yourself or anyone nearby. *Unexpected triggering will discharge the fastener causing an injury.*

– Do not actuate the tool unless the tool is placed firmly against the workpiece. *If the tool is not in contact with the workpiece, the fastener may be deflected away from your target.*

– Disconnect the tool from the power source when the fastener jams in the tool. *While removing a jammed fastener, the tacker may be accidentally activated if it is plugged in.*

No Text on This Page

– Use caution while removing a jammed fastener. *The mechanism may be under compression and the fastener may be forcefully discharged while attempting to free a jammed condition.*

NOTE This warning may be omitted for tackers that do not utilize a stored potential energy to drive the fasteners.

– When fastening electrical cables, make sure the cables are not energized. Hold the tacker only by insulated gripping surfaces. Use only fasteners designed for electrical cable installations. Inspect that the fastener has not damaged the insulation of the electrical cables. *A fastener that damages the insulation of electric cables can lead to electric shock and fire hazards.*

NOTE This warning to be provided for tackers suitable for fixing electric cables.

– Do not use this tacker for fastening electrical cables. *It is not designed for electric cable installation and may damage the insulation of electric cables thereby causing electric shock or fire hazards.*

NOTE This warning is to be provided for tackers not suitable for fixing electric cables.

8.12.2 b) *Addition:*

101) types and dimensions, or manufacturer's reference numbers, of the recommended fasteners;

102) information on the operation and the operating controls of the tool;

103) information on how to operate the tool safely in order to minimise the risk of personal injury to the operator or other person who may be in the vicinity;

104) information whether or not the tacker is suitable for fixing electric cables;

105) if applicable, information on the fasteners to be used for fixing electric cables.

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, except as follows:

Replacement:

The rated current shall be within ± 20% of the measured current. The rated input may be calculated from the rated current.

For tools marked with one or more rated voltage ranges, the test is made at both the upper and lower limits of the ranges, unless the marking or the rated power input is related to the mean value of the relevant voltage range, in which case the test is made at a voltage equal to the mean value of that range.

Compliance is checked by the following test.

The tool is operated without fasteners at a rate of one actuation every 1 s or as limited by tool design. The measured current is the r.m.s. value over a period of 10 s.

12 Heating

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

12.2 Modification:

The tool is operated without fasteners for 10 cycles or until temperatures stabilise, whichever is achieved first. Each cycle consists of the tool operating at a rate of one actuation every 1 s or as limited by tool design for 1 min and a rest period of 3 min with the tool switched off. 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.

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:

The tool is operated without fasteners at the cycle rate as specified in 12.2 for 10 000 actuations at a voltage equal to 1,1 times rated voltage and then for another 10 000 actuations at a 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.

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

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.

During these tests, overload protection devices shall not operate.

During the test, replacement of any mechanical components that fail without impairing safety is allowed.

18 Abnormal operation

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

18.12 Replacement:

A class I tool employing class II construction (see 5.10) or a class II tool shall be able to operate under extreme overload conditions without impairing protection against electric shock.

Compliance is checked by the following test on a separate sample.

All fuses, thermal cut-outs, and overload protectors and the like specified in 18.1 that are accessible to the user without the aid of a tool shall be shorted.

The sample is connected to a minimum 12 kVA circuit. The armature/rotor of the tool is stalled or, for solenoid designs, the solenoid is continuously energised, for 15 min or until the tool open-circuits or flame appears. If either condition occurs, immediately de-energise the tool and if flame appears, extinguish with CO_2 extinguisher. The leakage current between live parts and accessible parts, measured in accordance with Clause 13, is monitored throughout the test and after the test until leakage current has stabilized or decreases. Leakage current shall not exceed 2 mA.

After the tool is cooled to room temperature, an electric strength test per Clause 15 is performed between live parts and accessible parts as follows:

- *– if a tool does not operate after 15 min, apply a 1 500 V electric strength test;*
- *– if a tool operates after 15 min, apply a 2 500 V electric strength test.*

19 Mechanical hazards

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

19.101 The tool shall be provided with a user-operated trigger such that the tool cannot be actuated when the trigger is in a released position (i.e. in an ″off″ position) and either:

a) have a workpiece contact so that it is not possible to operate the tool unless both the trigger and the workpiece contact have been activated, or

b) be so designed that the fasteners have a speed in free air at the point they leave the tool no greater than 15 m/s, and have a mass no greater than 0,3 g.

In addition, it shall not be possible to eject fasteners consecutively without first either operating the trigger or the workpiece contact.

Compliance is checked by inspection, measurement and by practical tests in all possible positions of use of the tool.

19.101DV D2 *Modification: Replace Clause 19.101 of the Part 2 with the following:*

The tool shall be provided with a user-operated trigger such that the tool cannot be actuated when the trigger is in a released position (i.e. in an ″off″ position) and:

a) have a workpiece contact so that it is not possible to operate the tool unless both the trigger and the workpiece contact have been activated; or

b) be so designed that the fasteners have a speed in free air at the point they leave the tool no greater than 15 m/s, and have a mass no greater than 0,3 g; or

c) be a pinner operated by a dual activation device which operates by two sequential, dissimilar actions.

19.102 The tool shall either:

– be manufactured with an actuation system meeting the requirements of single sequential, full sequential, selective or automatic reversion actuation, or

– have a workpiece contact designed such that, in addition to the force due to its weight distribution, the tool shall be pressed against the workpiece with a force of at least 50% of the tool weight, this force need not exceed 5 N, to activate the release of the fastener. The mass of the tool is measured without supply cord and fasteners.

Compliance is checked by measurement and manual test, while the tacker is placed on a horizontal surface in such orientation that the workpiece contact activation is in the vertical direction.

19.102DV D2 *Modify Clause 19.102 of this Part 2 by replacing the first sentence with the following:*

Tools required to have a workpiece contact shall either: