UL 60745-2-12

STANDARD FOR SAFETY

Hand-Held Motor-Operated Electric Tools – Safety – Part 2-12: Particular Requirements For Concrete Vibrators

UL Standard for Safety for Hand-Held Motor-Operated Electric Tools – Safety – Part 2-12: Particular Requirements For Concrete Vibrators, UL 60745-2-12

Second Edition, Dated March 21, 2005

Summary of Topics

This revision to ANSI/UL 60745-2-12 dated November 6, 2020 is being issued to make an editorial update to the Title page and Preface to reflect that the published Standard includes IEC Amendment 1 (2008). 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 6, 2020 will not be issued by CSA since the revisions address UL only administrative changes.

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.

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Hand-Held Motor-Operated Electric Tools – Safety – Part 2-12: Particular Requirements For Concrete Vibrators

March 21, 2005

(Title Page Reprinted: November 6, 2020)

This standard is based on IEC 60745-2-12, Second Edition (2003) and its amendment 1 (2008).

Approved American National Standard

ANSI/UL 60745-2-12-2008 (R2019)

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. 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 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.

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This ANSI/UL Standard for Safety consists of the Second Edition including revisions through November 6, 2020. The most recent designation of ANSI/UL 60745-2-12 as a Reaffirmed American National Standard (ANS) occurred on April 9, 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 – Safety – Part 2–12: Particular Requirements For Concrete Vibrators*. It is the second edition of CAN/CSA-C22.2 No. 60745-2-12 and the second edition of UL 60745-2-12. This standard is an adoption of IEC 60745-2-12, second edition, issued 2003, as revised by Amendment 1, issued 2008.

The standard number has been aligned to correspond with the equivalent IEC 60745-2-12 standard. At the time of publication, IEC 60745-2-12:2003 is available from IEC in English only.

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 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 has been approved as a National Standard of Canada by the Standards Council of Canada (SCC).

This standard 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.

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 no national differences. This standard is published as an identical standard for CSA and UL. An identical standard is a standard that is exactly the same in technical content except for national differences resulting from conflicts in codes and governmental regulations. 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.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – Part 2-12: Particular Requirements for concrete vibrators

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) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

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

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

International Standard IEC 60745-2-12 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 second edition cancels and replaces the first edition published in 1982, of which it constitutes a technical revision.

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

FDIS	Report on voting
61F/511/FDIS	61F/522/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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 2-12 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 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.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be:

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY – PART 2-12: PARTICULAR REQUIREMENTS FOR CONCRETE VIBRATORS

1 Scope

This clause of part 1 is applicable except as follows:

Addition:

This standard applies to concrete vibrators.

2 Normative references

This clause of part 1 is applicable.

3 Terms and Definitions

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

3.2.9 *Replacement:*

normal load:

load obtained when the tool is operated continuously, the hose and vibrator bottle being attached to the tool as for normal use. During the operation the vibrator bottle is immersed centrally in a container filled with an amount of water corresponding to at least 50 times the volume of the vibrator bottle.

The dimensions of the container are such that the diameter is about 50 % of the height of the water inside the container.

The height of the container is such that no water can splash out during the test.

Addition:

3.101 concrete vibrator: tool intended for compacting concrete. The active part (vibrator bottle) of the vibrator performs low-amplitude vibrations and is immersed into the mass of concrete to be vibrated. Concrete vibrators may be of one of the following designs:

a) the motor and the vibrating mechanism are inside the vibrator bottle to which the part containing the mains switch or a power converter and switch handle assembly is connected by means of a long flexible hose containing the interconnecting cable. The long flexible hose may be used as the handle (see Figure 101);

b) only the vibrator mechanism is only inside the vibrator bottle to which a separate portable unit, comprising the motor the handle and the mains switch, is connected by means of a long flexible hose containing a flexible shaft (see Figure 102).

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.

9 Protection against access to live parts

This clause of part 1 is applicable.

10 Starting

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

10.1 *Addition:*

The test is made at an ambient temperature of (10 ± 1) °C after the concrete vibrator has been kept at this temperature for at least 2 h.

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 at normal load for 30 min. The temperature rises are measured at the end of the 30 min.

13 Leakage current

This clause of part 1 is applicable.

14 Moisture resistance

14.1 *Replacement of the first paragraph:*

For design a) as defined in 3.101, the enclosure of all parts and the cable entry shall be IPX7.

During the relevant test of this subclause, the part containing the switch or the power converter and switch handle assembly is placed in the normal position of use, the hose, if any, being attached correctly to it.

For design b) as defined in 3.101, the motor unit shall be IPX4.

During the relevant test of this subclause, the motor unit is placed in the most unfavourable position occurring during normal use.

The isolating transformer or the motor-generator shall be IPX4.

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 under the conditions specified for normal load for two periods of 12 h at 1,1 times rated voltage and for two periods of 12 h at 0,9 times rated voltage. The resting time between each of these periods of 12 h shall be at least 2 h.

The tool may be switched on and off by means of a switch other than that incorporated in the tool.

During this test, 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, 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, except as follows:

18.12 This subclause is not applicable.

18.101 *The concrete vibrator is assembled as in normal use and is operated at rated voltage or the at the upper limit of the voltage range, starting from room temperature, the hose and the vibrator bottle being held vertically in free air.*

The period of operation is:

2 min	*for concrete vibrators provided with a mains switch such that the motor is switched off automatically as soon the actuating member of the switch is released;*
15 min	*for other concrete vibrators, including those with an arrangement to lock the mains switch in the ON position.*

The test is considered to be terminated when a protective device, if any, operates.

After the concrete vibrator has been allowed to cool down to approximately room temperature, it shall withstand an electric strength test as specified in 15.2. For concrete vibrators having the motor in the bottle, the test voltage across basic insulation is, however, reduced to 1 000 V for tools other than those of class III.

19 Mechanical hazards

This clause of part 1 is applicable.

20 Mechanical strength

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

20.3 *Addition:*

This test is done only with parts containing the motor or the mains switch which are held in the hand or are operated by hand in normal use.

20.5 This subclause is not applicable.

20.101 The mechanical connections between the hose and the part containing the mains switch and those between the hose and the vibrator bottle shall be reliable.

Compliance is checked by applying, on the concrete vibrator assembled as in normal use, between the vibrator bottle and the part containing the mains switch, for 1 min, a pull in newtons (N) equal to 200 times the mass of the vibrator bottle in kilograms, but not exceeding 1 200 N.

During the test, the electrical connections shall not be exposed to mechanical stress. After the test, the hose shall not have moved noticeably at the places where it is fixed to the part containing the mains switch and to the vibrator bottle.

Moreover, the concrete vibrator shall withstand an electric strength test as specified in 15.2. For concrete vibrators having the motor in the bottle, the test voltage across basic insulation is, however, reduced to 1 000 V for tools other than those of class III.

21 Construction

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

21.16 *Addition:*

The circuits supplying motors and other components inside parts which, in normal use, are either immersed in the mixture to be vibrated or held in the hand or operated by hand, shall meet the requirements for tools with water supply.

Instead of an isolating transformer, a motor-generator providing the same degree of isolation from the electric mains as an isolating transformer may be used.

The rated output voltage of an isolating transformer or a motor generator shall not exceed:

– 120 V at frequencies not exceeding 60 Hz;

– 250 V at frequencies exceeding 60 Hz.

Compliance is check by inspection.

21.32 This subclause is not applicable.

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 at least heavy polychloroprene sheathed flexible cable (IEC 60245 IEC 66).

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

A supply cord shall be Type SOW, STW, or equivalent, that is oil and weather resistant in accordance with the National Electrical Code, NFPA 70, and the Canadian Electric Code, Part 1, CSA C22.1.

24.101 The supply cable attached to the part containing the mains switch shall have a length:

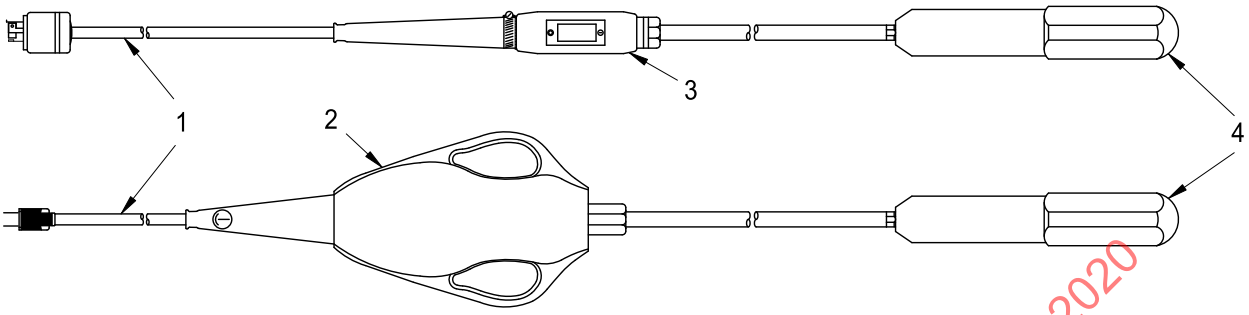
– of at least 5 m for designs a) as defined in 3.101;

– of not more than 0,5 m or of at least 5 m for design b) as defined in 3.101.

Compliance is checked by measuring the length of the cable, including any cord guard, between the plug and the point where the cable enters the part containing the mains switch.

Figure 101

Typical design a) of a concrete vibrator



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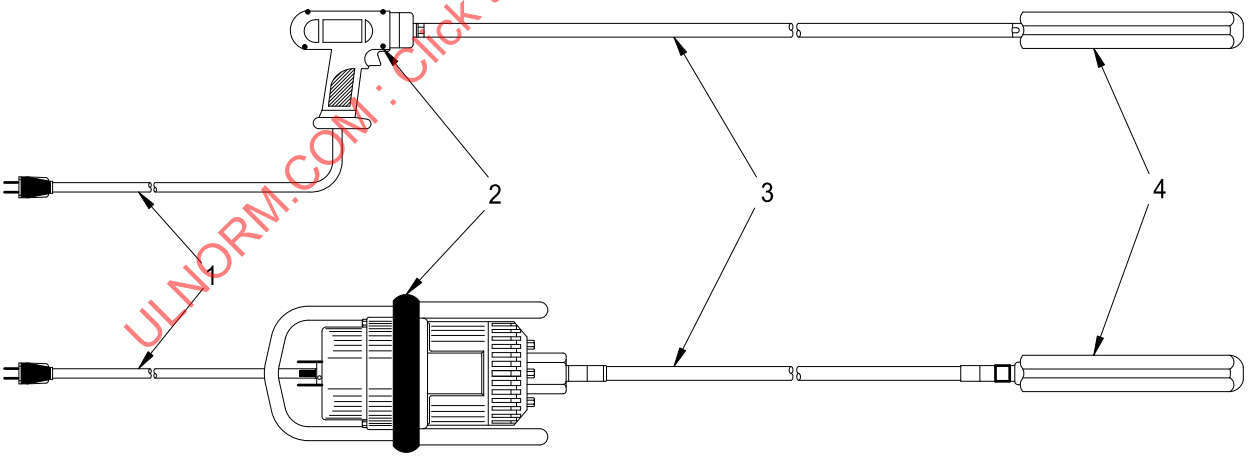
Key

1 Electric supply cable
2 Power converter and switch with handle
3 Part containing the mains switch
4 Vibrator bottle with motor

Figure 102

Typical design b) of a concrete vibrator



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Key

1 Electric supply cable
2 Motor unit with switch
3 Flexible shaft
4 Vibrator bottle

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.