IEC 62841-2-12

Edition 1.0 2024-02
EXTENDED VERSION

INTERNATIONAL STANDARD

colour inside

This extended version of IEC 62841-2-12:2024:2024 includes the content of the references made to IEC 62841-1:2014

Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety –
Part 2-12: Particular requirements for hand-held concrete vibrators



IEC 62841-2-12:2024-02 EXV(en)



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Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 2-12: Particular requirements for hand-held concrete vibrators

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 2-12: Particular requirements for hand-held concrete vibrators

FOREWORD

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This extended version (EXV) of the official IEC Standard provides the user with the comprehensive content of the Standard.

IEC 62841-2-12:2024 EXV includes the content of IEC 62841-2-12:2024, and the references made to IEC 62841-1:2014.

The specific content of IEC 62841-2-12:2024 is displayed on a blue background.

IEC 62841-2-12 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
116/692/FDIS	116/733/RVD

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

The language used for the development of this International Standard is English.

This document is to be used in conjunction with IEC 62841-1:2014.

This document supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for hand-held concrete vibrators.

Where a particular subclause of IEC 62841-1 is not mentioned in this document, that subclause applies as far as reasonable. Where this document states "addition", "modification" or "replacement", the relevant text in IEC 62841-1 is to be adapted accordingly.

The following print types are used:

– requirements: in roman type;
– *test specifications: in italic type;*
– **terms defined in Clause 3: in bold type**;
– notes: in small roman type.

Subclauses, notes, tables and figures which are additional to those in IEC 62841-1 are numbered starting from 101.

Subclauses, notes, tables and figures in Annex K and Annex L which are additional to those in the main body of this document are numbered starting from 301.

A list of all parts in the IEC 62841 series, published under the general title *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 36 months from the date of publication.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION to IEC 62841-1:2014

Individual countries may wish to consider the application of this Part 1 of IEC 62841, so far as is reasonable, to tools not mentioned in an individual part of IEC 62841-2, IEC 62841-3 or IEC 62841-4 and to tools designed on new principles.

Examples of standards dealing with non-safety aspects of **hand-held tools, transportable tools and lawn and garden machinery** are

– standards dealing with EMC aspects;

– standards dealing with environmental aspects.

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 1: General requirements

1 Scope

This International Standard deals with the safety of electric motor-operated or magnetically driven:

– **hand-held tools** (IEC 62841-2);
– **transportable tools** (IEC 62841-3);
– **lawn and garden machinery** (IEC 62841-4).

The above listed categories are hereinafter referred to as “tools” or “machines”.

The **rated voltage** is not more than 250 V for single-phase a.c. or d.c. tools, and 480 V for three-phase a.c. tools. The **rated input** is not more than 3 700 W.

The limits for the applicability of this standard for battery tools are given in K.1 and L.1.

This standard deals with the hazards presented by tools which are encountered by all persons in the **normal use** and reasonably foreseeable misuse of the tools.

Tools with electric heating elements are within the scope of this standard.

Requirements for motors not isolated from the supply, and having **basic insulation** not designed for the **rated voltage** of the tools, are given in Annex B. Requirements for rechargeable battery-powered motor-operated or magnetically driven tools and the battery packs for such tools are given in Annex K. Requirements for such tools that are also operated and/or charged directly from the mains or a non-isolated source are given in Annex L.

Hand-held electric tools, which can be mounted on a support or working stand for use as fixed tools without any alteration of the tool itself, are within the scope of this standard and such combination of a **hand-held tool** and a support is considered to be a **transportable tool** and thus covered by the relevant Part 3.

This document applies to hand-held **concrete vibrators**.

This standard does not apply to:

– tools intended to be used in the presence of explosive atmosphere (dust, vapour or gas);
– tools used for preparing and processing food;
– tools for medical purposes;

NOTE 1 IEC 60601 series covers a variety of tools for medical purposes.

– tools intended to be used with cosmetics or pharmaceutical products;
– heating tools;

NOTE 2 IEC 60335-2-45 covers a variety of heating tools.

– electric motor-operated household and similar electrical appliances;

NOTE 3 IEC 60335 series covers a variety of electric motor-operated household and similar electrical appliances.

– electrical equipment for industrial machine-tools;

NOTE 4 IEC 60204 series deals with electrical safety of machinery.

– small low voltage transformer operated bench tools intended for model making, e.g. the making of radio controlled model aircraft or cars, etc.

NOTE 5 In the United States of America, the following conditions apply:

This standard deals with tools used in non-hazardous locations in accordance with the National Electrical Code, NFPA 70.

NOTE 6 In Canada, the following conditions apply:

This standard deals with tools used in non-hazardous locations in accordance with the Canadian Electric Code, Part 1, CSA C22.1, and General Requirements – Canadian Electrical Code, Part II, CAN/CSA-C22.2 No. 0.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60061, *Lamp caps and holders together with gauges for the control of interchangeability and safety*, available at http://std.iec.ch/iec60061

IEC 60065:2001, *Audio, video and similar electronic apparatus – Safety requirements*[1]
Amendment 2:2010
Amendment 1:2005

IEC 60068-2-75:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC/TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

IEC 60127 (all parts), *Miniature fuses*

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60238, *Edison screw lampholders*

IEC 60245 (all parts), *Rubber insulated cables – Rated voltages up to and including 450/750 V*

IEC 60252-1, *AC motor capacitors – Part 1: General – Performance, testing and rating – Safety requirements – Guidance for installation and operation*

IEC 60320 (all parts), *Appliance couplers for household and similar general purposes*

IEC 60320-1, *Appliance couplers for household and similar general purposes – Part 1: General requirements*

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1 There exists a consolidated version (Edition 7.2:2011) which includes IEC 60065:2001 and its Amendment 1 (2005) and Amendment 2 (2010).

IEC 60335-1:2010, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60417, *Graphical symbols for use on equipment,* available at http://www.graphical-symbols.info/graphical-symbols/equipment/db1.nsf/$enHome?OpenForm

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*[2]
Amendment 1:1999
Amendment 2:2013

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-2-13:2010, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*

IEC 60695-10-2:2003, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test*

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730-1:2010, *Automatic electrical controls for household and similar use – Part 1: General requirements*

IEC 60825-1:2007, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 60884 (all parts), *Plugs and socket-outlets for household and similar purposes*

IEC 60906-1, *IEC system of plugs and socket-outlets for household and similar purposes – Part 1: Plugs and socket-outlets 16 A 250 V a.c.*

IEC 60990:1999, *Methods of measurement of touch current and protective conductor current*

IEC 60998-2-1, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

IEC 60998-2-2, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units*

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm^2 up to 35 mm^2 (included)*

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[2] There exists a consolidated version (Edition 2.2:2013) which includes IEC 60529:1989 and its Amendment 1 (1999) and Amendment 2 (2013).

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*[3]
Amendment 1:2007
Amendment 2:2010

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61056-1, *General purpose lead-acid batteries (valve-regulated types) – Part 1: General requirements, functional characteristics – Methods of test*

IEC 61058-1:2000, *Switches for appliances – Part 1: General requirements*[4]
Amendment 1:2001
Amendment 2:2007

IEC 61210, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

IEC 61540:1997, *Electrical accessories – Portable residual current devices without integral overcurrent protection for household and similar use (PRCDs)*[5]
Amendment 1:1998

IEC 61558-1, *Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests*

IEC 61558-2-4, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*

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3 There exists a consolidated version (Edition 3.2:2010) which includes IEC 61000-4-3:2006 and its Amendment 1 (2007) and Amendment 2 (2010).

4 There exists a consolidated version (Edition 3.2:2008) which includes IEC 61058-1:2000 and its Amendment 1 (2001) and Amendment 2 (2007).

5 There exists a consolidated version (Edition 1.1:1999) which includes IEC 61540:1997 and its Amendment 1 (2001).

IEC 61558-2-16, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units*

IEC 61951-1, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 1: Nickel-cadmium*

IEC 61951-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2: Nickel-metal hydride*

IEC 61960, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications*

IEC 61984, *Connectors – Safety requirements and tests*

IEC 62133, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications*

IEC 62233, *Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure*

IEC 62471, *Photobiological safety of lamps and lamp systems*

IEC/TR 62471-2:2009, *Photobiological safety of lamps and lamp systems – Part 2: Guidance on manufacturing requirements relating to non-laser optical radiation safety*

IEC 62841-1:2014, *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety – Part 1: General requirements*

ISO 1463, *Metallic and oxide coatings – Measurement of coating thickness – Microscopical method*

ISO 2178, *Non-magnetic coatings on magnetic substrates – Measurement of coating thickness – Magnetic method*

ISO 2768-1, *General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 3744, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

ISO 3864-2, *Graphical symbols – Safety colours and safety signs – Part 2: Design principles for product safety labels*

ISO 3864-3, *Graphical symbols – Safety colours and safety signs – Part 3: Design principles for graphical symbols for use in safety signs*

ISO 4871:1996, *Acoustics – Declaration and verification of noise emission values of machinery and equipment*

ISO 5347 (all parts), *Methods for the calibration of vibration and shock pick-ups*

ISO 5349-1, *Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 1: General requirements*

ISO 5349-2, *Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 2: Practical guidance for measurement in the workplace*

ISO 7000:2012, *Graphical symbols for use on equipment – Index and synopsis*

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

ISO 7574-4, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – Part 4: Methods for stated values for batches of machines*

ISO 8041, *Human response to vibration – Measuring instrumentation*

ISO 9772:2012, *Cellular plastics – Determination of horizontal burning characteristics of small specimens subjected to a small flame*

ISO 11201, *Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO 11203, *Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level*

ISO 12100, *Safety of machinery – General principles for design – Risk assessment and risk reduction*

ISO 13849-1, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

ISO 13850, *Safety of machinery – Emergency stop – Principles for design*

ISO/TR 11690-3, *Acoustics – Recommended practice for the design of low-noise workplaces containing machinery – Part 3: Sound propagation and noise prediction in workrooms*

ISO 16063-1, *Methods for the calibration of vibration and shock transducers – Part 1: Basic concepts*

EN 12096, *Mechanical vibration – Declaration and verification of vibration emission values*

ASTM B 258, *Standard specification for standard nominal diameters and cross-sectional areas of AWG sizes of solid round wires used as electrical conductors*

UL 969, *Standard for marking and labeling systems*

NOTE 1 In the United States of America, the following normative reference applies:

US, Code of Federal Regulations (CFR) Title 21, *Food and Drugs*.

NOTE 2 In Canada, the following normative reference applies:

C.R.C., c. 1370, Radiation Emitting Devices Regulations

NOTE 3 In Europe (EN 62841-1), the following normative references apply:

CR 1030-1, *Hand-arm vibration – Guidelines for vibration hazards reduction – Part 1: Engineering methods by design of machinery*

EN ISO 11688-1, *Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning (ISO/TR 11688-1)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

Where the terms voltage and current are used, they imply the r.m.s. values, unless otherwise specified.

Where in this standard the expressions “with the aid of a tool”, “without the aid of a tool”, and “requires the use of a tool”, are used, the word “tool” means a hand tool, for example a screwdriver, which may be used to operate a screw or other fixing means.

3.1
accessible part
conductive part or surface of insulating materials that can be touched by means of the test probe B of IEC 61032:1997

3.2
accessory
device that is attached only to the output mechanism of the tool

3.3
adjustable guard
guard which is adjustable as a whole or which incorporates adjustable part(s). For manually adjustable guards, the adjustment remains fixed during a particular operation

3.4
all-pole disconnection
disconnection of all supply conductors except the protective earthing (grounding) conductor by a single initiating action

3.5
attachment
device attached to the housing or other component of the tool and which may or may not be attached to the output mechanism and does not modify the **normal use** of the tool within the scope of this standard

3.6
basic insulation
insulation applied to **live parts** to provide protection against electric shock. Insulation applied to **live parts** not intended to provide electric shock protection is considered to be insulation for functional purposes, such as magnet wire insulation

3.7
battery
assembly of one or more **cells** intended to provide electrical current to the tool

3.8
class I tool
tool in which protection against electric shock does not rely on basic, double or **reinforced insulation** only, but which includes an additional safety precaution in that conductive **accessible parts** are connected to the protective earthing conductor in the fixed wiring of the installation in such a way that conductive **accessible parts** cannot become live in the event of a failure of the **basic insulation**

Note 1 to entry: Also considered as **class I tools** are tools with **double insulation** and/or **reinforced insulation** throughout, but also having an earthing terminal or earthing contact.

3.9
class II tool
tool in which protection against electric shock does not rely on **basic insulation** only, but in which additional safety precautions, such as **double insulation** or **reinforced insulation**, are provided, there being no provision for protective earthing or reliance upon installation conditions

3.10
class III tool
tool in which protection against electric shock relies on supply at **safety extra-low voltage**, and in which voltages higher than those of **safety extra-low voltages** are not generated

3.11
class II construction
part of a tool for which protection against electric shock relies upon **double insulation** or **reinforced insulation**

3.12
class III construction
part of a tool for which protection against electric shock relies upon **safety extra-low voltage**, and in which voltages higher than those of **safety extra-low voltage**s are not generated

3.13
clearance
shortest distance between two conductive parts, or between a conductive part and the outer surface of the enclosure, considered as though metal foil were pressed into contact with accessible surfaces of insulating material, measured through air

Note 1 to entry: Examples of **clearances** are given in Annex A.

3.14
control device
device used by the user to adjust and/or regulate an electrical or mechanical function of the tool

3.15
creepage distance
shortest path between two conductive parts, or between a conductive part and the outer surface of the enclosure, considered as though metal foil were pressed into contact with accessible surfaces of insulating material, measured along the surface of the insulating material

Note 1 to entry: Examples of **creepage distances** are given in Annex A.

3.16
detachable part
part which can be removed or opened without the aid of a tool, or a part which is removed in accordance with the instruction for use, except externally accessible brush caps, even if removal requires the use of a tool

Note 1 to entry: A non-detachable part is covered by the requirements of 21.22.

3.17
double insulation
insulation system comprising both **basic insulation** and **supplementary insulation**

3.18
electronic circuit
circuit incorporating at least one **electronic component**

3.19
electronic component
part in which conduction is achieved principally by electrons moving through a vacuum, gas or semiconductor, with the exclusion of neon indicators

Note 1 to entry: Examples of **electronic components** are diodes, transistors, triacs and monolithic integrated circuits. Resistors, capacitors and inductors are not considered **electronic components**.

3.20
explosion
failure that occurs, when an enclosure opens violently and major components are forcibly expelled in a manner that could result in injury

3.21
extra-low voltage
voltage supplied from a source within the tool and, which, when the tool is supplied at **rated voltage**, does not exceed 50 V between conductors and between conductors and earth

3.22
fixed guard
guard affixed in such a manner (e.g. by screws, nuts, welding) that it can only be opened or removed with the use of tools or by destruction of the affixing means

3.23
guard
physical barrier, designed as part of the tool, to provide protection

3.24
hand-held tool
tool intended to do mechanical work, with or without provisions for mounting on a support, and so designed that the motor and the machine form an assembly which can easily be brought to the place of operation, and which is either held or supported by hand or suspended during operation

Note 1 to entry: **Hand-held tools** include tools provided with a flexible shaft, the motor being either fixed or portable.

3.25
inherent operating cycle
repetitive operation of a tool designed in such a way that the complete cycle duration cannot be altered by the operator

3.26
interconnection cord
external flexible cord provided for electrical connections between two parts of a tool

3.27
lawn and garden machinery
tool for garden maintenance

3.28
liquid system
system that employs water or a water-based liquid from an external or integral supply that is used to perform the intended function of the tool

3.29
live part
any conductor or conductive part intended to be energized in **normal use**, including a neutral conductor

3.30
mean time to dangerous failure
$MTTF_d$
expectation of the mean time to dangerous failure

3.31
momentary power switch
power switch that does not remain in the “on” position when the actuating device is released

3.32
non-self-resetting thermal cut-out
thermal cut-out which requires a manual operation for resetting, or replacement of a part, in order to restore the current

Note 1 to entry: Manual operation also includes operation of the **power switch**.

3.33
non-isolated source
voltage source in which the output is not isolated from the mains supply by means of a **safety isolating transformer**

3.34
normal operation
conditions under which the tool is operated in **normal use** when it is connected to the power supply

3.35
normal use
use of a tool for which it is designed, taking into account the manufacturer’s instructions

3.36
power switch
device that electrically activates the primary function of the tool in the “on” position and deactivates the same function of the tool in its “off” position

3.37
protective device
device, the operation of which prevents a hazardous situation under abnormal operation conditions

3.38
protective impedance
impedance connected between **live parts** and accessible conductive parts, and of value so that the current is limited to a safe value

3.39
rated current
current assigned to the tool by the manufacturer

3.40
rated frequency
frequency assigned to the tool by the manufacturer

3.41
rated frequency range
frequency range assigned to the tool by the manufacturer, expressed by its lower and upper limits

3.42
rated input
input in watts assigned to the tool by the manufacturer

3.43
rated no-load speed
no-load speed assigned to the tool by the manufacturer

3.44
rated voltage
voltage assigned to the tool by the manufacturer. For three-phase supply, it is the voltage between phases

3.45
rated voltage range
voltage range assigned to the tools by the manufacturer, expressed by its lower and upper limits

3.46
reinforced insulation
insulation of **live parts** which provides a degree of protection against electric shock equivalent to **double insulation**

Note 1 to entry: Examples of **reinforced insulation** are a single layer or several layers which cannot be tested singly as **basic insulation** or **supplementary insulation**.

3.47
residual current device
RCD
device intended to detect a diversion of current from a circuit in a way that may expose the user to an electric shock; in such conditions the device opens the circuit

Note 1 to entry: Such a device is also known as portable **residual current device** (PRCD), ground fault circuit interrupter (GFCI) or earth leakage circuit breaker (ELCB).

3.48
safety critical function
SCF
function(s) required by this standard, the loss of which would cause the tool to function in such a manner as to expose the user to a risk that is in excess of the risk that is permitted by this standard under abnormal conditions

3.49
safety extra-low voltage
voltage not exceeding a peak value of 42,4 V between conductors and between conductors and earth, the no-load voltage not exceeding a peak value of 50 V, in an electric circuit which has galvanic separation from the supplying electric power system by such means as a **safety isolating transformer** or a converter with separate windings, the insulation of which complies with **double insulation** or **reinforced insulation** requirements

3.50
safety isolating transformer
transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to **double insulation** or **reinforced insulation**, and which is intended to supply a distribution circuit, a tool or other equipment at **safety extra-low voltage**

3.51
self-resetting thermal cut-out
thermal cut-out which automatically restores the current after the relevant part of the tool has cooled down to a given value

3.52
supplementary insulation
independent insulation applied in addition to the **basic insulation**, in order to provide protection against electric shock in the event of a failure of the **basic insulation**

3.53
supply cord
flexible cord, for supply purposes, which is fixed to the tool

3.54
temperature limiter
temperature-sensing device, the operating temperature of which may be either fixed or adjustable, and which, during **normal operation**, operates by opening or closing a circuit when the temperature of the controlled part reaches a predetermined value

Note 1 to entry: This does not reverse this operation of opening or closing a circuit during the **normal operation** of the tool.

3.55
thermal cut-out
device which, during abnormal operation, limits the temperature of the controlled part by automatically opening the circuit, or by reducing the current, the setting of which cannot be altered by the user

3.56
thermal link
thermal cut-out which operates only once, and then requires partial or complete replacement

3.57
thermostat
temperature-sensing device, the operating temperature of which may be either fixed or adjustable; and which, during **normal operation**, keeps the temperature of the controlled part between certain limits by automatically opening and closing a circuit

3.58
transportable tool
tool that has the following characteristics:

a) intended to be taken to various designated working areas. The tool performs work on the material that is either brought to the tool, the tool is mounted to the workpiece or the tool is placed in proximity of the workpiece;

b) intended to be moved by one or two people, with or without simple devices to facilitate transportation, e.g. handles, wheels and the like;

c) used in a stationary position set up on a bench, table, floor or incorporating a device that performs the function of a bench or table, with or without fixing, e.g. fast clamping devices, bolting and the like, or mounted to the workpiece;

d) used under the control of an operator;

e) either the workpiece or the tool is fed or introduced manually;

f) not intended for continuous production or production line use;

g) if mains operated, supplied with a flexible **supply cord** and plug

3.59
type X attachment
method of attachment of the **supply cord** specified by the manufacturer so that it can easily be replaced

3.60
type Y attachment
method of attachment of the **supply cord** such that any replacement is intended to be made by the manufacturer, its service agent or similar qualified person

3.61
type Z attachment
method of attachment of the **supply cord** so that it cannot be replaced without breaking or destroying the tool

3.62
user maintenance
maintenance operation(s) which are intended to be carried out by the user in accordance with the instruction manual

3.63
working voltage
maximum voltage, without the effect of transient voltages, to which the part under consideration is subjected when the tool is supplied at its **rated voltage** and operating with **rated input** or **rated current**

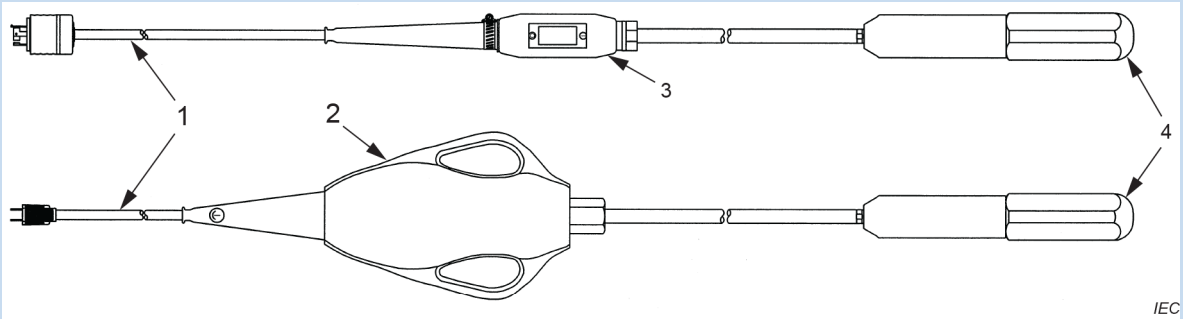
3.101
concrete vibrator
hand-held tool intended for compacting concrete with an active part (vibrator bottle) that performs low-amplitude vibrations into the mass of concrete to be vibrated

Note 101 to entry: **Concrete vibrators** are typically of one of the following designs:

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

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

3.102
normal load
load obtained when the tool is operated continuously, the hose and vibrator bottle being attached to the tool as for **normal use**



Key

1 **supply cord**
2 power converter and **power switch** with handle
3 part containing the **power switch**
4 vibrator bottle with motor

Figure 101 – Typical design a) of a concrete vibrator