



SLOVENSKI STANDARD
SIST EN 61029-1:1999
01-julij-1999

Safety of transportable motor operated electric tools - Part 1: General requirements (IEC 61029-1:1990, modified)

Safety of transportable motor-operated electric tools -- Part 1: General requirements

Sicherheit transportabler motorbetriebener Elektrowerkzeuge -- Teil 1: Allgemeine Anforderungen

Sécurité des machines-outils électriques semi-fixes -- Partie 1: Prescriptions générales

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN 61029-1:1995

SIST EN 61029-1:1999
<https://standards.iteh.ai/catalog/standards/sist/29c2b08c-7b8a-4272-8ff3-8fab974ca676/sist-en-61029-1-1999>

ICS:

25.140.20 01\ dā } æ\ [åæ Electric tools

SIST EN 61029-1:1999 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61029-1:1999

<https://standards.iteh.ai/catalog/standards/sist/29c2b68c-7b8a-4272-8ff3-8fab974ca676/sist-en-61029-1-1999>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61029-1

November 1995

ICS 25.140.20

Descriptors: Transportable motor-operated electric tools, safety requirements, protection against electric shock, fire protection, protection against mechanical hazards

English version

Safety of transportable motor-operated electric tools Part 1: General requirements

(IEC 1029-1 : 1990, modified)

Sécurité des machines-outils électriques
semi-fixes
Partie 1: Règles générales
(CEI 1029-1 : 1990, modifiée)

Sicherheit transportabler motorbetriebener
Elektrowerkzeuge
Teil 1: Allgemeine Anforderungen
(IEC 1029-1 : 1990, modifiziert)

iTeh STANDARD PREVIEW

This European Standard was approved by CENELEC on 1994-07-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

This European Standard has been prepared by Technical Committee CENELEC TC 61F, Hand-held and transportable electric motor operated tools.

The draft, consisting of the text of the International Standard IEC 1029-1 : 1990 with common modifications, was submitted to the Unique Acceptance Procedure (UAP) in March 1993 and was approved by CENELEC as EN 61029-1 on 1994-07-05.

NOTE. Finland and Sweden have no obligation to implement this European Standard.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-05-15
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-12-01

As far as certification is concerned, CENELEC Memorandum 6 applies.

Part 1 of this standard together with related Parts 2 give directly or by reference the complete requirements for a specific type of transportable tool considered in the scope. CEN have proposed standards for a wide range of industrial machines which may extend to transportable machines. Although CEN and CENELEC have where appropriate used common solutions to provide uniform levels of production, persons using this standard should check the scope of both this and the corresponding CEN standard to ensure that the correct standard is used.

The relevant essential safety requirements of the following European directives are covered by this standard:

- 73/23/EEC — Low Voltage Directive;
- 89/392/EEC — Machinery Directive.

Annexes designated 'normative' are part of the body of the standard. Annexes designated 'informative' are given only for information. In this standard, annexes A, B, C and D are normative and annexes IA and ZA are informative.

The reference of subclauses, notes and annexes which are in addition to those in IEC 1029-1 is prefixed with the letter Z.

Contents

	Page
Foreword	2
Introduction	3
1 Scope	3
2 Definitions	4
3 General requirement	10
4 General notes on tests	10
5 Rating	13
6 Classification	13
7 Marking	13
8 Protection against electric shock	21
9 Starting	23
10 Input and current	24
11 Heating	24
12 Leakage current	30
13 Environmental requirements	32
14 Protection against ingress of foreign bodies and moisture resistance	32
15 Insulation resistance and electric strength	34
16 Endurance	36
17 Abnormal operation	37
18 Stability and mechanical hazards	39
19 Mechanical strength	41
20 Construction	42
21 Internal wiring	48
22 Components	49
23 Supply connection and external flexible cables and cords	52
24 Terminals for external conductors	57
25 Provision for earthing	64
26 Screws and connections	66
27 Creepage distances, clearances and distances through insulation	68
28 Resistance to heat, fire and tracking	72
29 Resistance to rusting	74
30 Radiation	74
Figures	75
Annexes	
A (normative) Normative references	81
B (normative) Thermal cut-outs and overload releases	82
C (normative) Electronic circuits	83
D (normative) Measurement of creepage distances and clearances	91
IA (informative) Circuit for measuring leakage currents	96
ZA (informative) Rules for routine tests	98

SAFETY OF TRANSPORTABLE MOTOR-OPERATED ELECTRIC TOOLS

Part 1: General requirements

INTRODUCTION

This European Standard is divided into two parts:

Part 1: General requirements, comprising clauses of a general character.

Part 2: Particular requirements, dealing with particular types of tools.

The clauses of these particular requirements supplement or modify the corresponding clauses in part 1.

Where the text of part 2 indicates an "addition" to or a "replacement" of the relevant requirement, test specification or explanation of part 1, these changes are made to the relevant text of part 1, which then becomes part of the standard. Where no change is necessary, the words "This clause of part 1 is applicable" are used in part 2.

(standards.iteh.ai)

This standard only applies when a part 2 for a particular type of tool exists. Part 1 alone does not apply.

1 Scope

1.1 This standard applies to electric motor-operated or magnetically-driven tools, intended for indoor and for outdoor use, which have all the following characteristics:

- a) easily moved by one person, simple devices to facilitate transportation may be incorporated, e.g. handles, wheels and the like;
- b) used in a safe stationary position with or without fixing, e.g. fast clamping devices, bolting and the like;
- c) used under the control of an operator;
- d) not intended for continuous production or production line use;
- e) intended to be connected to electric supply by a flexible cord and a plug;
- f) maximum rated voltage not exceeding 250 V single-phase, a.c. or d.c., or 440 V three-phase, a.c.;
- g) maximum rated input not exceeding 2 500 W, for single-phase a.c. or d.c., and 4 000 W for three-phase a.c.

NOTES

1 These tools are commonly known as "transportable motor-operated electric tools", hereinafter referred to, in the text, as tools. Examples of these tools are given in the footnote.*

2 Additional special driving mechanisms for cooling pumps and dust-exhaust devices are allowed.

3 When tools are used in locations where special conditions prevail, for example explosive atmospheres or areas where hazards arising from dust and fire are likely to occur, special precautionary measures or special types of construction are necessary.

4 Multifunction tools that have clearly separate modes of operation are required to comply separately with the requirements applicable to each specific mode of operation.

5 This standard does not apply to

- electric motor-operated household and similar electrical appliances according to EN 60335-1;
- hand-held electric motor-operated tools according to EN 50144-1;
- electrical equipment for industrial machine-tools according to EN 60204-1; <https://standards.iteh.ai/catalog/standards/sist/29c2b68c-7b8a-4272-8f3-86b974ca676/sist-en-61029-1-1999>
- small low voltage transformer operated bench tools intended for model making, e.g. radio controlled model aircraft or cars, etc.;
- food preparation machines.

2 Definitions

For the purpose of this International Standard, the following definitions apply.

NOTE - Where the terms "voltage" and "current" are used, they imply the r.m.s. value unless otherwise specified.

* Circular saws, band saws, planers, thicknessers, radial arm saws, spindle moulders, fret saws, jig saws, mitre/chop saws, wood lathes, belt sanders, disc sanders, thicknessers-planers, chain mortisers, multipurpose machines, combing machines, metal lathes, bench grinders, bench drilling machines, pipe threaders, pipe benders, pipe saws, key cutting machines, sharpening machines, sheet metal shears, concrete drills, concrete saws, wood shredders, pipe cleaners.

2.1 rated voltage: Voltage (for three-phase supply, the voltage between phases) assigned to the tool by the manufacturer.

2.2 rated voltage range: Voltage range assigned to the tool by the manufacturer, expressed by its lower and upper limits.

2.3 working voltage: Maximum voltage to which the part under consideration can be subjected when the tool is operating at its rated voltage and under normal conditions of use.

NOTES

1 Normal conditions of use include changes of voltage within the tool imposed by likely occurrences such as the operation of a circuit breaker or the failure of a lamp.

2 When determining the working voltage, the effect of possible transient voltages on the supply mains is ignored.

2.4 rated input: Input at rated voltage or the mean of the rated voltage range assigned to the tool by the manufacturer.

SIST EN 61029-1:1999

[https://standards.iteh.ai/catalog/standards/sist/29c2b68c-7b8a-4272-8ff3-](https://standards.iteh.ai/catalog/standards/sist/29c2b68c-7b8a-4272-8ff3-8cb974ca676/sist-en-61029-1-1999)

2.5 rated current: Current at rated voltage or at the mean of the rated voltage range assigned to the tool by the manufacturer.

NOTE - If no current is assigned to the tool, the rated current for the purpose of this standard is determined by calculation from the rated input and the rated voltage and/or by measuring the current when the tool is operating at rated voltage under normal load and at normal operating temperature.

2.6 rated frequency: Frequency assigned to the tool by the manufacturer.

2.7 rated frequency range: Frequency range assigned to the tool by the manufacturer, expressed by its lower and upper limits.

2.8 rated no-load speed: No-load speed at rated voltage or at the upper limit of the rated voltage range, assigned to the tool by the manufacturer.

2.9 detachable flexible cord: Flexible cord, for supply or other purposes, intended to be connected to the tool by means of a suitable appliance coupler.

NOTE - Cord sets are covered by EN 60799. Appliance couplers for household and similar general purposes by EN 60320-1.

2.10 power supply cord: Flexible cord, for supply purposes, fixed to, or assembled with, the tool according to one of the following methods:

- **type X attachment:** Method of attachment such that the flexible cord can easily be replaced, without the aid of special purpose tools, by a flexible cord not requiring any special preparation;
- **type M attachment:** Method of attachment such that the flexible cable or cord can easily be replaced, without the aid of special purpose tools, by a special cord with, for example, a moulded-on cord or crimped terminations.

2.11 basic insulation: Insulation applied to live parts to provide basic protection against electric shock.

NOTE - Basic insulation does not necessarily include insulation used exclusively for functional purposes.

2.12 supplementary insulation: Independent insulation applied in addition to the basic insulation, in order to ensure protection against electric shock in the event of a failure of the basic insulation.

2.13 double insulation: Insulation comprising both basic insulation and supplementary insulation.

SIST EN 61029-1:1999
<https://standards.iteh.ai/catalog/standards/sist/29c2b68c-7b8a-4272-8f83-8fab974ca676/sist-en-61029-1-1999>

2.14 reinforced insulation: Single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation under the conditions specified in this standard.

NOTE - The term "single insulation system" does not imply that the insulation must be one homogeneous piece. It may comprise several layers which cannot be tested singly as supplementary or basic insulation.

2.15 class I tool: Tool in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective (earthing) conductor in the fixed wiring of the installation in such a way that accessible conductive parts cannot become live in the event of a failure of the basic insulation.

NOTES

1 For tools intended for use with a flexible cord, the provision includes a protective conductor as part of the flexible cord.

2 Class I tools may have parts with double insulation or reinforced insulation or parts operating at safety extra-low voltage.

2.16 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.

Such a tool may be of one of the following types:

a) a tool having a durable and substantially continuous enclosure of insulating material which envelopes all metal parts, with the exception of small parts, such as nameplates, screws and rivets, which are isolated from live parts by insulation at least equivalent to reinforced insulation; such a tool is called an insulation-encased class II tool;

b) a tool having a substantially continuous metal enclosure, in which double insulation is used throughout, except for those parts where reinforced insulation is used, because the application of double insulation is manifestly impracticable; such a tool is called a metal-encased class II tool;

c) a tool which is a combination of types a) and b).

ITeH STANDARD PREVIEW
(standards.iteh.ai)

2.17 class III tool: Tool in which protection against electric shock relies on supply at safety extra-low voltage (SELV) and in which voltages higher than those of SELV are not generated.

NOTE - Tools intended to be operated at safety extra-low voltage and having internal circuits which operate at a voltage other than safety extra-low voltage (SELV), are not included in the classification and are subject to additional requirements; these requirements are under consideration.

2.18 extra-low voltage: Voltage supplied from a source within the tool and, when the tool is operated at its rated voltage, not exceeding 42 V between conductors and between conductors and earth or, for three-phase supply, not exceeding 24 V between conductors and neutral, the extra-low voltage circuit being separated from other circuits by basic insulation only.

2.19 safety extra-low voltage (SELV): Nominal voltage not exceeding 42 V between conductors and between conductors and earth or, for three-phase supply, not exceeding 24 V between conductors and neutral, the no-load voltage not exceeding 50 V and 29 V respectively.

NOTES

1 When SELV is obtained from the supply mains, it must be through a safety isolating transformer or a convertor with separate windings.

2 The voltage limits specified are based on the assumption that the safety isolating transformer is operated at its rated supply voltage.

- 3 The d.c. value is under consideration.
- 4 Limitations to voltages lower than 50 V a.c. should be specified in the particular standards, especially when direct contact with live parts is involved.
- 5 Separation from the mains by protective impedance is excluded.

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

2.21 normal load: Load to be applied to a tool so that the stress imposed corresponds to that occurring under normal conditions of use, any marking of short-time or intermittent operation being observed and, unless otherwise specified, heating elements, if any, being operated as in normal use.

iTeh STANDARD PREVIEW

NOTE - The normal load is based on the rated voltage or on the upper limit of the rated voltage range.

2.22 rated operating time: Operating time assigned to the tool by the manufacturer.

2.23 continuous operation: Operation under normal load for an unlimited period.

2.24 short-time operation: Operation under normal load for a specified period, starting from cold, the intervals between each period of operation being sufficient to allow the tool to cool down approximately to room temperature.

2.25 intermittent operation: Operation in a series of specified identical cycles, each cycle being composed of a period of operation under normal load followed by a rest period with the tool running idle or switched off.

2.26 non-detachable part: Part which can only be removed with the aid of a tool.

NOTE - 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" occur, the word "tool" means a screwdriver, a coin or any other object which may be used to operate a screw or similar fixing means.

2.27 detachable part: Part which can be removed without the aid of a tool.

2.28 thermal cut-out: Device which, during abnormal operation, limits the temperature of a tool, or of parts of it, by automatically opening the circuit or by reducing the current, and which is so constructed that its setting cannot be altered by the user.

2.29 non-self-resetting thermal cut-out: Thermal cut-out which requires resetting by hand, or replacement of a part, in order to restore the current.

2.30 creepage distance: Shortest path between two conductive parts, or between a conductive part and the bounding surface of the tool, measured along the surface of the insulating material.

2.31 clearance: Shortest distance between two conductive parts, or between a conductive part and the bounding surface of the tool, measured through air.

NOTE - The bounding surface of the tool is the outer surface of the enclosure, considered as though metal foil were pressed into contact with accessible surfaces of insulating material.

2.32 all-pole disconnection: For single-phase a.c. tools and for d.c. tools, disconnection of both supply conductors by a single switching action or, for tools to be connected to more than two supply conductors, disconnection of all supply conductors, except the earthed (grounded) conductor, by a single switching action.

NOTE - The protective earthing conductor is not a supply conductor.

2.33 accessible part or accessible surface: Part or surface which can be touched by means of the standard test finger shown in figure 1.

NOTES

1 For accessible metal parts, it includes any other metal part which is in electrical contact with such parts.

2 The term body includes all accessible metal parts, shafts of handles, knobs, grips and the like and metal foil in contact with all surfaces of insulating material; it does not include inaccessible metal parts.

2.34 power circuit: Circuit which contains electrical equipment intended for generation, transformation, distribution or consumption of electric energy.

2.35 control circuit: Auxiliary circuit which is used to control electrical equipment.

2.36 control device: Device, for example push-buttons, selector switches, which is used to control, by hand, the function of the tool.

3 General requirement

3.1 Tools shall be so designed and constructed that in normal use they function safely so as to cause no danger to persons or to the surroundings, even in the event of such careless use which is likely to occur in normal service.

In general, compliance is checked by carrying out all the relevant tests.

NOTES

Z1 The material used for the construction of the tool should not introduce additional hazards during use or disposal of the tool.

Z2 The risks due to noise and vibration should be reduced to the lowest level practicable, taking into account the appropriate European standards.

Z3 If laser equipment is supplied as part of the tool there should be no risk to health due to its use, taking into account the appropriate European standards.

4 General notes on tests

4.1 Tests according to this standard are type tests.

<https://standards.iteh.ai/catalog/standards/sist/29c2b68c-7b8a-4272-8f3-8fab974ca676/sist-en-61029-1-1999>

4.2 Unless otherwise specified, tests are carried out on a single test sample as delivered, the said sample withstanding all the relevant tests.

NOTES

1 Where the tool is designed for varying supply voltages, for both a.c. and d.c. and for different speeds, etc., then more than one sample may be required.

2 When testing a tool in accordance with EN 60529 a further test sample is required when the type of protection concerned involves a higher degree of severity than IP20.

3 Testing of components may necessitate the submission of additional samples of the said components. When the submission of such samples is necessary, they should be submitted together with the tool.

4.3 Unless otherwise specified, tests are carried out in the order of the clauses in which they are given in this standard.

Prior to testing, the tool shall be operated at rated voltage or at the lower limit of its rated voltage range in order to verify that it is in working order.

4.4 The tests are carried out with the tool, or any movable part of it, placed in the most unfavourable position that may occur in normal use.

4.5 If the test results are influenced by the temperature of the ambient air, the room temperature is, in general, maintained at $20\text{ °C} \pm 5\text{ °C}$. If, however, the temperature attained by any part is limited by a temperature sensitive device, or is influenced by the temperature at which a change of state occurs, for example the temperature of boiling water, the room temperature is, in case of doubt, maintained at $23\text{ °C} \pm 2\text{ °C}$.

4.6 Tools for a.c. only are tested with a.c., at rated frequency, if marked; those for d.c. only are tested with d.c. and those for a.c./d.c. are tested at the more unfavourable supply.

Tools for a.c. which are not marked with rated frequency or are marked with a frequency range of 50 Hz to 60 Hz are tested with either 50 Hz or 60 Hz, whichever is the national frequency.

Tools marked with a rated frequency range other than 50 Hz to 60 Hz are tested at the most unfavourable frequency within the range.

Tools designed for more than one rated voltage are tested at the most unfavourable voltage.

Unless otherwise specified, tools designed for one or more rated voltage ranges are tested at the most unfavourable voltage within the relevant range.

When it is specified, for tools marked with a rated voltage range, that the supply voltage is equal to the rated voltage multiplied by a factor, the supply voltage is equal to

- the upper limit of the rated voltage range multiplied by this factor, if greater than 1;
- the lower limit of the rated voltage range multiplied by this factor, if smaller than 1.

NOTE 1 - Where reference is made to the maximum or minimum rated input, the rated input related to the upper limit or lower limit respectively of the rated voltage range is meant.

When testing tools for d.c. only, the possible influence of polarity on the operation of the tools is taken into consideration.

NOTE 2 - If the tool is designed for more than one rated voltage or rated voltage range, it may be necessary to make some of the tests at the minimum, the mean and the maximum values of the rated voltage or the rated voltage range in order to establish the most unfavourable voltage.

4.7 Tools for which alternative heating elements or accessories are available are tested in accordance with the relevant part 2, with those elements or accessories which give the most unfavourable results, provided that the elements or accessories used are within the tool manufacturer's specification.

4.8 *If, in normal use, the heating element cannot be operated unless the motor is running, the element is tested with the motor running. If the heating element can be operated without the motor running, the element is tested with or without the motor running, whichever is the more unfavourable. Heating elements incorporated in the tool are connected to a separate supply unless otherwise specified, and tested according to EN 60335-1.*

4.9 *Unless otherwise specified, tools provided with a regulating device or similar control are tested with these controls adjusted to their most unfavourable setting, if the setting can be altered by the user.*

NOTES

1 *If the adjusting means of the control is accessible without the aid of a tool, this sub-clause applies whether the setting can be altered by hand or with the aid of a tool; if the adjusting means is not accessible without the aid of a tool, this sub-clause applies only if the setting can be altered by hand.*

2 *Adequate sealing is regarded as preventing alteration of the setting by the user.*

4.10 *When the conditions of normal load are specified in part 2, the tool is loaded according to these conditions, irrespective of any marking of short-time or intermittent operation, unless it is evident from the design of the tool that these conditions will not occur in normal use.*

When the conditions of normal load are not specified in part 2, the tool is loaded according to the manufacturer's instructions; in the absence of such instructions, the tool is operated continuously at a load such that rated input is attained.

For accessories performing a function which is within the scope of one part 2, the tests are made in accordance with that part 2.

For other accessories, the tests are made in accordance with the manufacturer's instructions; in the absence of such instructions, the tool is operated continuously at a load such that rated input is attained.

Electronic speed control devices are set for the highest speed.

NOTE - The introduction of tests to be made at other settings is under consideration.

4.11 *When the normal load or the loading conditions are not specified in a part 2, only the test at rated input applies.*

4.12 *If a torque is to be applied, the method of loading is chosen so as to avoid additional stresses, such as those caused by a side thrust. Additional loads necessary for the correct operation of the tool are, however, taken into consideration.*

4.13 *Tools intended to be operated at safety extra-low voltage are tested together with their supply transformer if this is normally sold with the tool.*

4.14 *For the purpose of clauses 8, 15, 23 and 25, parts separated from live parts by double insulation or reinforced insulation are not regarded as likely to become live in the event of an insulation fault; connection of accessible metal parts to an earthing terminal or earthing contact does not remove the necessity for carrying out these tests.*

4.15 *If class I tools have accessible conductive parts which are not connected to an earthing terminal and are not separated from live parts by an intermediate metal part which is connected to an earthing terminal, such parts are checked for compliance with the appropriate requirements specified for class II tools.*

4.16 *Unless otherwise specified, if class I or class II tools have parts operating at safety extra-low voltage, such parts are checked for compliance with the appropriate requirements specified for class III tools.*

4.17 *For tools incorporating electronic circuits, see annex C.*

5 Rating

5.1 The maximum rated voltage is

- 250 V for single-phase a.c. or d.c. tools;
- 440 V for three-phase tools.

Compliance is checked by inspection of the marking.

For class III tools the preferred values of the rated voltage are 24 V and 42 V.

6 Classification

Tools are classified

6.1 According to protection against electric shock:

- class I tools;
- class II tools;
- class III tools.

6.2 According to degree of protection against ingress of foreign bodies and moisture in accordance with EN 60529.

7 Marking

7.1 Tools shall be marked with

- rated voltage(s) or rated voltage range(s) in volts;