
Generatorji impulzov za električne ograje - Varnostne zahteve za omrežno napajane generatorje impulzov za električne ograje (IEC 61011:1989; spremenjen)

Electric fence energizers – Safety requirements for mains – operated electric fence energizers (IEC 61011:1989, corrigendum jun.1993, modified)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61011:1999](https://standards.iteh.ai/catalog/standards/sist/82502af9-321d-4f04-821c-f2f76f4597f6/sist-en-61011-1999)

<https://standards.iteh.ai/catalog/standards/sist/82502af9-321d-4f04-821c-f2f76f4597f6/sist-en-61011-1999>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61011:1999

<https://standards.iteh.ai/catalog/standards/sist/82502af9-321d-4f04-821c-f2f76f4597f6/sist-en-61011-1999>

UDC : 631.273.3:621.311.62:620.1:614.8

Descriptors: Electrical installation, electric fence, supply mains, battery, accumulator, safety requirement

English version

Electric fence energizers
Safety requirements for mains-operated
electric fence energizers
(IEC 1011 : 1989, modified)

Electrificateurs de clôtures
Règles de sécurité pour électrificateurs de
clôtures fonctionnant sur le réseau
(CEI 1011 : 1989, modifiée)

Elektrozaungeräte Sicherheitsbestimmungen
für Elektrozaungeräte mit Netzanschluß
(IEC 1011:1989, modifiziert)

This European Standard was approved by CENELEC on 10 December 1991. 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.

(standards.iteh.ai)

SIST EN 61011:1999

<https://standards.iteh.ai/catalog/standards/sist/82502af9-321d-4f04-821c-f2f76f4597f6/sist-en-61011-1999>

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

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 1011 : 1989 could be accepted without textual changes, has shown that some common modifications were necessary for the acceptance as European Standard. The reference document, together with the common modifications prepared by the CENELEC Reporting Secretariat SR 61H, was submitted to the CENELEC members for formal vote.

The text of the draft was approved by CENELEC as EN 61011 on 10 December 1991.

The following dates were fixed:

- latest date of publication
of an identical national
standard (dop) 1993-01-01
- latest date of withdrawal
of conflicting national
standards (dow) 1993-07-01

For products which have complied with the relevant national standard before 1993-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1998-07-01.

Annexes which are in addition to those in IEC 1011 are numbered ZA, ZB etc. Appendices and annexes designated 'normative' are part of the body of the standard. Appendices and annexes designated 'informative' are given only for information. In this standard, appendices A, B, C, E and F and annexes ZA (special national conditions) and ZC (cross references) are normative, annex ZB (A-deviations) is informative.

NOTE. In this document, the following print types are used

- requirements proper: in roman type,
- *test specifications: in italic type; (standards.itech.ai)*
- explanatory matter: in smaller roman type.

Clause	Page
1. Scope	4
2. Definitions	4
3. General requirement	8
4. General notes on tests	9
5. Rating	12
6. Classification	12
7. Marking	12
8. Protection against electric shock	15
9. Void	18
10. Output characteristics	18
11. Heating	19
12. Void	23
13. Electrical insulation and leakage current at operating temperature	23
14. Radio and television interference suppression	25
15. Moisture resistance	25
16. Insulation resistance and electric strength	27
17. Resistance to atmospheric surges	30
18. Endurance	32
19. Abnormal operation	33
20. Void	34
21. Mechanical strength	34
22. Construction	36
23. Internal wiring	43
24. Components	44
25. Supply connection and external flexible cables and cords	49
26. Terminals for external conductors	55
27. Void	62
28. Screws and connections	62
29. Creepage distances, clearances and distances through insulation	65
30. Resistance to heat, fire and tracking	68
31. Resistance to rusting	71
32. Void	72
FIGURES	73
APPENDIX A - Thermal controls and overload releases	83
APPENDIX B - Electronic circuits	84
APPENDIX C - Measurement of creepage distances and clearances ..	93
APPENDIX D - Void	98
APPENDIX E - Instructions for the installation and operation of electric fences and electric fence energizers	98
APPENDIX F - Circuit for measuring leakage currents	102
ANNEX ZA (normative) Special national conditions	104
ANNEX ZB (informative) A-Deviations	105
ANNEX ZC (normative) Publication references	106

ELECTRIC FENCE ENERGIZERS

Safety requirements for mains-operated electric fence energizers

1. Scope

- 1.1 This standard applies to mains-operated electric fence energizers which are not designed for connection to other sources of energy.

Requirements for battery-operated electric fence energizers suitable for connection to the supply mains, for example those incorporating batteries and facilities for charging these batteries from the supply mains, are given in EN 61011-1.

Requirements for battery-operated electric fence energizers not suitable for connection to the supply mains are given in EN 61011-2.

2. Definitions

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

- 2.2 The following definitions apply for the purposes of this standard:

1. *Rated voltage* denotes the input voltage assigned to the energizer by the maker.

2. *Rated voltage range* denotes the input voltage range assigned to the energizer by the maker, expressed by its lower and upper limits.

3. *Working voltage* denotes the maximum voltage to which the part under consideration can be subjected when the energizer is operating at its rated voltage and under normal operating conditions.

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

4. *Rated input* denotes the input power under normal operating conditions assigned to the energizer by the maker.

5. *Rated current* denotes the current assigned to the energizer by the maker.

If no current is assigned to the energizer, the rated current for the purpose of this standard is determined by calculation from the rated input and the rated voltage or by measuring the current when the energizer is operating at rated voltage under normal operating conditions.

6. *Rated frequency* denotes the frequency assigned to the energizer by the maker.

7. *Rated frequency range* denotes the frequency range assigned to the energizer by the maker, expressed by its lower and upper limits.

8. *Power supply cord* denotes a flexible cable or cord, for supply purposes, fixed to, or assembled with, the energizer according to one of the following methods:

Type X attachment denotes a method of attachment such that the flexible cable or cord can easily be replaced, without the aid of special purpose tools, by a flexible cable or cord not requiring any special preparation.

Type M attachment denotes a method of attachment such that the flexible cable or cord can easily be replaced, without the aid of special purpose tools, by a special cable or cord with, for example, a moulded-on cord guard or crimped terminations.

Type Y attachment denotes a method of attachment such that the flexible cable or cord can only be replaced with the aid of special purpose tools normally available only to the manufacturer or his agents.

A Type Y attachment may be used either with common flexible cables or cords, or with special cables or cords.

9. *Supply leads* denotes a set of wires connected to the energizer in the factory, intended for the connection to fixed wiring, in a special junction box or compartment within, or attached to, the energizer.

10. *Basic insulation* denotes the insulation applied to live parts to provide basic protection against unintended electric shock.

Basic insulation does not necessarily include insulation used exclusively for functional purposes. An electric shock from the output terminals is not considered as an unintended electric shock.

11. *Supplementary insulation* denotes an 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.

12. *Double insulation* denotes insulation comprising both basic insulation and supplementary insulation.

13. *Reinforced insulation* denotes a 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.

The term "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.

14. *Electric fence energizer* denotes an apparatus which is intended to deliver periodically voltage impulses to a fence connected to it.

In this standard, this term is abbreviated for convenience to "energizer".

15. Void

16. Void

17. *Supply mains* denotes a power source having a nominal voltage exceeding extra low voltage and which is not used solely to supply an energizer.

18. *Mains-operated energizer* denotes an energizer designed for direct connection to the supply mains.

19. *Fence* denotes a barrier for animals, comprising one or more conductors, such as metal wires, rods, or rails.

20. *Fence circuit* denotes all conductive parts or components within an energizer, which are connected or intended to be connected galvanically to the output terminals.

21. *Live part* denotes a conductive part which may cause an electric shock.

22. *Class II energizer* denotes an energizer 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Such an energizer may be one of the following types:

- a) an energizer having a durable and substantially continuous enclosure of insulating material which envelops 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 an energizer is called an insulation-encased Class II energizer;
- b) an energizer 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 an energizer is called a metal-encased Class II energizer;
- c) an energizer which is a combination of the Types a) and b).

The enclosure of an insulation-encased Class II energizer may form a part or the whole of the supplementary insulation or of the reinforced insulation.

For functional purposes, a Class II energizer is normally provided with means for connection to earth in the fence circuit.

Class II energizers may have parts operating at safety extra-low voltage.

23. *Extra-low voltage* denotes a voltage, supplied from a source within the energizer and when the energizer 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.

24. *Safety extra-low voltage* denotes a 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.

When safety extra-low voltage is obtained from the supply mains, it must be through a safety isolating transformer or a converter with separate windings.

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

25. *Safety isolating transformer* denotes a 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, an energizer or other equipment at safety extra-low voltage.

26. *Non-detachable part* denotes a part which can only be removed with the aid of a tool.

27. *Detachable part* denotes a part which can be removed without the aid of a tool.

28. *Thermal cut-out* denotes a device which, during abnormal operation, limits the temperature of an energizer, or of parts of it, by automatically opening the circuit in which it is connected or by reducing the current, and which is so constructed that its setting cannot be altered by the user.

29. *Non-self-resetting thermal cut-out* denotes a thermal cut-out which requires resetting by hand, or replacement of a part, in order to restore the current.

30. *Tool* denotes a screwdriver, a coin or any other object which may be used to operate a screw or similar fixing means.

31. *Creepage distance* denotes the shortest path between two conductive parts, or between a conductive part and the bounding surface of the energizer, measured along the surface of the insulating material.

32. *Clearance* denotes the shortest distance between two conductive parts, or between a conductive part and the bounding surface of the energizer, measured through air.

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

33. *All-pole disconnection* denotes, for single-phase a.c. energizers and for d.c. energizers, disconnection of both supply conductors by a single initiating action or, for energizers to be connected to more than two supply conductors, disconnection of all supply conductors, by a single initiating action.

34. *Accessible part or accessible surface* denotes a part or surface which can be touched by means of the standard test finger shown in Figure 1.

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

36. *Impulse* denotes that part of the output voltage which, when measured with a load of 500 Ω , exceeds 12 V.

37. *Prospective peak voltage* denotes the peak output voltage of the impulse generator specified in Clause 17 that would be obtained with the energizer not connected to the test circuit.

38. *Disruptive discharge* relates to phenomena associated with the failure of insulation under electrical stress in which the discharge completely bridges the insulation under test reducing the voltage between the electrodes to zero or nearly to zero.

39. *Normal use* denotes conditions that apply to the energizer during installation and operation in accordance with the manufacturer's instructions, and including any conditions that may reasonably be expected to exist during use.

40. *Earth electrode* denotes a metal structure that is driven into the ground near an energizer and connected electrically to the earth terminal of the energizer, and that is independent of other earthing systems.

3. General requirement

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

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

4. General notes on tests

4.1 Tests according to this standard are type tests.

4.2 The tests are made on two energizers as delivered, one being subjected to all the tests with the exception of that of Clause 18, and the other to the tests of Clause 10 and Clause 18.

If any electronic component is damaged during the tests of Clause 17, the tests of Clause 19 are made twice, once before and once after the damaged components have been replaced by new components.

Energizers are considered not to comply with this standard if there is a failure in a sample in any of the tests concerned.

Three energizers are supplied for the tests, the third energizer being a spare for testing to Sub-clause 21.1, if required.

The testing of components may necessitate the submission of additional samples of these components.

4.3 The tests of Sub-clauses 17.2 to 17.4 are carried out before those of Clauses 15 and 16. Other tests are carried out in the order of clauses.

4.4 Tests are made under normal operating conditions as well as under fault conditions.

4.4.1 Normal operating conditions include:

1) Normal position of the energizer;

The position of the energizer is considered to be normal if the deviation from the position for which it is designed does not exceed 15°; If, however, the energizer is provided with means for adjustment to the normal position, such as a spirit-level, the energizer must be adjusted within ±2° to the normal position;

2) An ambient temperature of $(20 \pm 5)^\circ\text{C}$, unless otherwise specified;

<https://standards.iteh.ai/catalog/standards/sist/82502af9-321d-4f04-821c-f2f76f4597f6/sist-en-61011-1999>

3) The most unfavourable position of parts which are adjustable from the outside of the energizer without the aid of a tool;

4) Application to the input terminals of the most unfavourable supply voltage between 0.85 and 1.1 times rated supply voltage, or between 0.85 times the lower limit and 1.1 times the upper limit of the rated supply voltage range;

Energizers for a.c. only are tested with a.c., at rated frequency, those for d.c. only are tested with d.c. and those for a.c./d.c. are tested at the more unfavourable supply.

Energizers for a.c. marked with a frequency range of 50 Hz to 60 Hz are tested with either 50 Hz or 60 Hz, whichever is the more unfavourable.

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

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

- 5) *For energizers designed for d.c. only, if the polarity of the supply influences the operation of the energizer, the application of the more unfavourable polarity;*
- 6) *Connection to earth of the earthing terminal of the fence circuit.*

If there is no indication which of the output terminals is to be connected to earth, the terminal which gives the most unfavourable result is earthed.

4.4.2 *Fault conditions denote that, in addition to the normal operating conditions, fuses that are accessible to the user are short-circuited and each of the following conditions is produced in turn, associated with such other fault conditions that are an actual consequence of the condition chosen.*

- 1) *The energizer is placed in its most unfavourable position even if it is not likely to be installed in this position in normal use.*
- 2) *Parts intended for adjusting the energizer, other than those mentioned in item 3) of Sub-clause 4.4.1, are adjusted to their most unfavourable position, even if these parts are not intended to be adjusted by the user, unless they are effectively sealed against further adjustment.*
- 3) *The earth connection is removed from the earthing terminal of the fence circuit and connected to any other output terminal.*
- 4) *The output terminals are short-circuited.*
- 5) *Switches, relay-contacts and the like, which form part of the impulse device, are short-circuited or open-circuited, whichever is the more unfavourable.*
- 6) *Fuses that are accessible without the aid of tools, series spark gaps in the fence circuit, discharging valves and thermal relays are short-circuited.*

- 7) Except for electronic assemblies, any creepage distance or clearance between live parts of different polarity which is less than 5 mm for the fence circuit, or 2 mm or less for other circuits, is short-circuited, and any unlocked connection is loosened.
- 8) By investigation of the circuit diagram of the energizer, the circuit shall be so configured that a worst case output within the terms of Sub-clause 19.2 is produced.

This configuration of the circuit may be achieved by:

- open-circuiting or short-circuiting of any one component, or
- external independent control of the switching speed of semiconductor devices used as the major pulse switching device, within the range 0.1 Hz to 2 times the supply frequency or 100 Hz whichever is the greater, or
- simulating the predicted malfunction of any electronic unit or functional circuit.

Functional circuit in the context of this test means a group of components (which may be an electronic unit) which act as a whole to provide a specific mode of circuit operations e.g. charge control circuit, output condition sense circuit etc. (In general the malfunction of individual components within the functional circuit may not bring about the worst case condition.)

Components (except the main switching device) directly related to the pulse Interval timing of the major switching device (if an electronic device) are exempt from the tests of Item 8) of Sub-clause 4.4.2.

iTeh STANDARD PREVIEW

- 4.5 Energizers provided with a regulating device or a similar control are tested with these controls adjusted to their most unfavourable setting, if the setting can be altered by the user.

SIST EN 61011:1999

<https://standards.iteh.ai/catalog/standards/sist/82502af9-321d-4f04-821c-2176439710/sist-en-61011-1999>

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

- 4.6 Unless otherwise specified, energizers intended to be supplied by means of a flexible cable or cord are tested with the appropriate flexible cable or cord connected to the energizer.
- 4.7 For the purposes of Sub-clauses 8.3, 16.3 and 25.8, 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.

4.8 *Unless otherwise specified, the measurement of voltages and currents is carried out with instruments which do not themselves appreciably affect the value to be measured.*

4.9 *For energizers incorporating electronic circuits, see Appendix B.*

5. Rating

5.1 The maximum rated supply voltage is 250 V.

Compliance is checked by inspection of the marking.

The requirements of this standard are based on the assumption that in normal use the voltage between the supply lines and earth does not exceed 254 V.

6. Classification

6.1 Energizers are classified according to protection against electric shock and according to degree of protection against harmful ingress of water.

Requirements with regard to the classification of energizers are given in Sub-clauses 10.1, 22.1 and 22.2.

7. Marking

7.1 Energizers shall be marked with:

- rated voltage(s) or rated voltage range(s), in volts;
- symbol for nature of supply;
- rated frequency or rated frequency range, in hertz, unless the energizer is designed for d.c. only;
- rated input, if greater than 25 W, in watts or kilowatts, or rated current in amperes;
- maker's or responsible vendor's name, trade mark or identification mark;
- maker's model or type reference;
- symbol for Class II construction;
- designation for degree of protection against harmful ingress of water not less than IPX4;

A first characteristic numeral may be used instead of an X if the relevant degree of protection with respect to persons is provided by the energizer.

- the European Standard number and/or the corresponding number of the national standard implementing the European Standard;
- the words "Read full instructions before use".



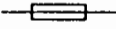



Additional markings are allowed, provided they do not give rise to misunderstanding.

7.2 If the energizer can be adjusted to suit different rated voltages the voltage to which it is adjusted shall be easily and clearly discernible.

For energizers where frequent changes in voltage setting are not required, this requirement is considered to be met if the rated voltage to which the energizer is adjusted can be determined from a wiring diagram fixed to the energizer; the wiring diagram may be on the inside of a cover which has to be removed to connect the supply conductors. This diagram may be on a card which is riveted to the cover, or on a paper or similar label secured by an adhesive, but it must not be on a label loosely attached to the energizer.

7.3 For energizers marked with more than one rated voltage or rated voltage range, the rated input for each of these voltages or ranges shall be marked, if greater than 25 W.

7.4 When symbols are used, they shall be as follows:

V	.....	volts
A	.....	amperes
Hz	.....	hertz
W	.....	watts
kW	.....	kilowatts
μF	.....	microfarads
min	.....	minutes
s	.....	seconds
	.....	alternating current
	.....	direct current
	.....	rated current of the appropriate fuse-link, in amperes
	.....	Class II construction
	.....	output (FENCE)
	.....	output (EARTH).

The symbol for nature of supply shall be placed next to the marking for rated voltage.

The dimensions of the symbol for Class II construction shall be such that the length of the sides of the outer square is about twice the length of the sides of the inner square. The length of the sides of the outer square shall not be less than 5 mm, unless the largest dimension of the energizer does not exceed 15 cm, in which case the dimensions of the symbol may be reduced, but the length of the sides of the outer square shall not be less than 3 mm.