

19 Abnormal operation

19.S.103 Battery operated energizers having a rated voltage of less than 12 V are operated under **normal operation** when supplied with an input voltage of 13,2 V DC.

*During the test, the **energizer** shall be connected to the voltage source via a 1 Ω series resistor.*

*This test is only applicable if the supply may be connected without modification of the **energizer**.*

Add the following clause.

22 Construction

22.S.101 For **battery-operated energizers**, parts in a battery compartment that become accessible when replacing batteries, even with the aid of a **tool**, shall not be **live parts**.

*Compliance is checked by inspection, measurement and by the tests specified for **double insulation** or **reinforced insulation**.*

22.S.102 Battery-operated energizers shall be provided with means to prevent the user from being subjected to an electric shock due to the **energizer** output voltage, when connecting a battery to the **energizer**.

Compliance is checked by inspection.

NOTE Examples of such means are:

- a switch that isolates the terminals for the connection of the battery;
- a control that enables the output voltage to be reduced to zero;
- insulated crocodile clips or similar devices.

22.S.103 The **clearance** between parts of opposite polarity for connecting the battery in **battery operated energizers** shall not be less than 2 mm, when the **energizer** is fitted with conductors as in normal use.

Compliance is checked by measurement.

25 Supply connection and external flexible cords

Add the following new subclauses.

25.7 Addition:

This requirement is not applicable to the flexible leads or flexible cord connecting external batteries or a **battery box** to a **battery-operated energizer**.

25.23 *Addition:*

In **battery-operated energizers**, if the battery is placed in a box, the flexible lead or flexible cord connecting the box with the **energizer** is considered to be an **interconnection cord**.

25.S.101 *Addition:*

The conductors in flexible leads or flexible cords used to connect the battery in **battery-operated energizers** shall have a nominal cross-sectional area of not less than 0,75 mm².

Annex AA (informative)

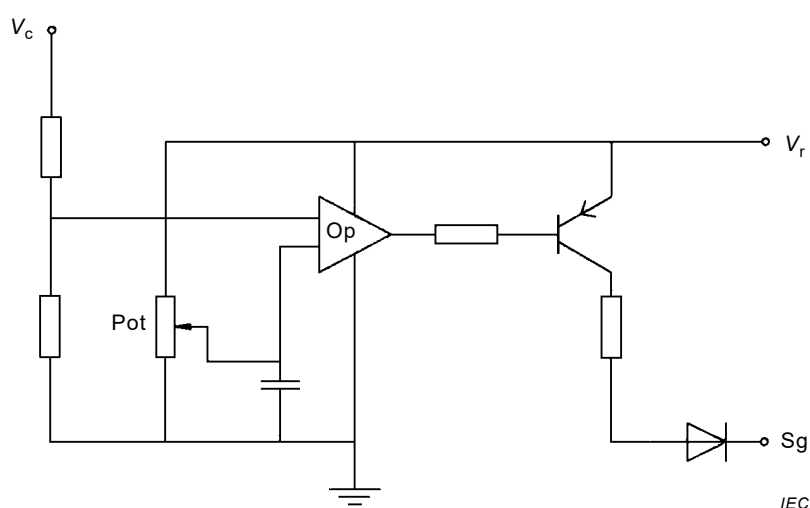
Circuit for the independent control of the switching speed of the major impulse-switching device

A suitable circuit for external independent control of the switching speed of semiconductor devices used as the major impulse-switching device in the **energizer**, in accordance with the eighth dashed item of 19.101, is shown in Figure AA.1.

The circuit is used to reference the gate signal of the major impulse-switching device to the voltage across this device so that it can be triggered at the same point in the charging cycle.

The reference voltage should be of such a value that the comparator is adjustable over the whole range of the **energizer** charging voltage, thereby allowing the switching speed to be set at any desired frequency.

The input impedance of the comparator circuit should be such that it does not influence the results of the test.



Key

- V_c charging voltage
- V_r reference voltage
- S_g gate signal
- Pot switching speed adjustor
- Op comparator

**Figure AA.1 – Circuit for the independent control of the switching speed
of the major impulse-switching device**

Annex BB (normative)

Instructions for installation and connection of electric fences

BB.1 Instructions for electric animal fences

For the purpose of these instructions, the term **connecting leads** means electric conductor, used to connect the **energizer** to the **electric fence** or the **earth electrode**.

Electric animal fences and their ancillary equipment shall be installed, operated and maintained in a manner that minimizes danger to persons, animals or their surroundings.

Electric animal fence constructions that are likely to lead to the entanglement of animals or persons shall be avoided.

WARNING: Avoid contacting electric fence wires especially with the head, neck or torso. Do not climb over, through or under a multi-wire electric fence. Use a gate or a specially designed crossing point.

An **electric animal fence** shall not be supplied from two separate **energizers** or from independent **fence circuits** of the same **energizer**.

For any two separate **electric animal fences**, each supplied from a separate **energizer** independently timed, the distance between the wires of the two **electric animal fences** shall be at least 2,5 m. If this gap is to be closed, this shall be effected by means of electrically non-conductive material or an isolated metal barrier.

Barbed wire or razor wire shall not be electrified by an **energizer**.

A non-electrified **fence** incorporating barbed wire or razor wire may be used to support one or more off-set electrified wires of an **electric animal fence**. The supporting devices for the electrified wires shall be constructed so as to ensure that these wires are positioned at a minimum distance of 150 mm from the vertical plane of the non-electrified wires. The barbed wire and razor wire shall be earthed at regular intervals.

Follow the energizer manufacturer's recommendations regarding earthing.

A distance of at least 10 m shall be maintained between the **energizer earth electrode** and any other earthing system connected parts such as the power supply system protective earth or the telecommunication system earth.

Connecting leads that are run inside buildings shall be effectively insulated from the earthed structural parts of the building. This may be achieved by using insulated high voltage cable.

Connecting leads that are run underground shall be run in conduit of insulating material or else insulated high voltage cable shall be used. Care shall be taken to avoid damage to the **connecting leads** due to the effects of animal hooves or tractor wheels sinking into the ground.

Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.

Connecting leads and **electric animal fence** wires shall not cross above overhead power or communication lines.

Crossings with overhead power lines shall be avoided wherever possible. If such a crossing cannot be avoided it shall be made underneath the power line and as nearly as possible at right angles to it.

If **connecting leads** and **electric animal fence** wires are installed near an overhead power line, the clearances shall not be less than those shown in Table BB.1.

Table BB.1 – Minimum clearances from power lines for electric animal fences

Power line voltage V	Clearance m
≤ 1 000	3
> 1 000 and ≤ 33 000	4
> 33 000	8

If **connecting leads** and **electric animal fence** wires are installed near an overhead power line, their height above the ground shall not exceed 3 m.

This height applies to either side of the orthogonal projection of the outermost conductors of the power line on the ground surface, for a distance of

- 2 m for power lines operating at a nominal voltage not exceeding 1 000 V;
- 15 m for power lines operating at a nominal voltage exceeding 1 000 V.

Electric animal fences intended for deterring birds, household pet containment or training animals such as cows need only be supplied from low output **energizers** to obtain satisfactory and safe performance.

In **electric animal fences** intended for deterring birds from roosting on buildings, no **electric fence** wire shall be connected to the **energizer earth electrode**. A warning sign shall be fitted to every point where persons may gain ready access to the conductors.

Where an **electric animal fence** crosses a public pathway, a non-electrified gate shall be incorporated in the **electric animal fence** at that point or a crossing by means of stiles shall be provided. At any such crossing, the adjacent electrified wires shall carry warning signs.

Any part of an **electric animal fence** that is installed along a public road or pathway shall be identified at frequent intervals by warning signs securely fastened to the **fence** posts or firmly clamped to the **fence** wires.

The size of the warning sign shall be at least 100 mm × 200 mm.

The background colour of both sides of the warning sign shall be yellow. The inscription on the sign shall be black and shall be either

- the symbol of Figure BB.1, or
- the substance of “CAUTION: **Electric fence**”.

The inscription shall be indelible, inscribed on both sides of the warning sign and have a height of at least 25 mm.

Ensure that all mains-operated, ancillary equipment connected to the **electric animal fence circuit** provides a degree of isolation between the **fence circuit** and the supply mains equivalent to that provided by the **energizer**.

NOTE Ancillary equipment that complies with the requirements relating to isolation between the **fence circuit** and the supply mains in Clauses 14, 16 and 29 of the standard for the **electric fence energizer** is considered to provide an adequate level of isolation.

Protection from the weather shall be provided for the ancillary equipment unless this equipment is certified by the manufacturer as being suitable for use outdoors, and is of a type with a minimum degree of protection IPX4.

BB.2 Instructions for electric security fences not supplied from a security energizer group

For the purpose of these instructions, the term:

- **connecting leads** means electric conductor, used to connect the **energizer** to the **electric fence** or the **earth electrode**;
- **physical barrier** means a barrier not less than 1,5 m high intended to prevent inadvertent contact with the **pulsed conductors** of the **electric fence**;
- **secure area** means an area where a person is not separated from **pulsed conductors** below 1,5 m by a **physical barrier**;
- **public access area** means any area where persons are protected from inadvertent contact with **pulsed conductors** by a **physical barrier**;
- **pulsed conductors** means conductors that are subjected to high voltage pulses by the **energizer**.

Electric security fences and their ancillary equipment shall be installed, operated and maintained in a manner that minimizes danger to persons, and reduces the risk of persons receiving an electric shock unless they attempt to penetrate the **physical barrier**, or are in the **secure area** without authority.

Electric security fence constructions that are likely to lead to the entanglement of persons shall be avoided.

Gates in **electric security fences** shall be capable of being opened without the person receiving an electric shock.

An **electric security fence** shall not be supplied from two separate **energizers** or from independent **fence circuits** of the same **energizer**.

For any two separate **electric security fences**, each supplied from a separate **energizer**, the distance between the wires of the two separate **electric security fences** shall be at least 2,5 m. If this gap is to be closed, this shall be effected by means of a physical barrier of high voltage insulating material or earthed conducting material such that the two separate **electric security fences** cannot be contacted at the same time.

A spacing of 2,5 m shall be maintained between uninsulated **connecting leads** supplied from separate **energizers**. This spacing may be less where

- the connecting leads are covered by insulating sleeving rated to at least 10 kV at mains frequency; or
- the connecting leads consist of insulated cables rated to at least 10 kV at mains frequency.

Barbed wire or razor wire shall not be electrified by an **energizer**.

For earthing recommendations, follow the relevant national standard for **electric security fence** earthing. If this does not exist then follow the **energizer** manufacturer's instructions and recommendations.

The distance between any **electric security fence earth electrode** and other earth systems shall be not less than 2 m, except when associated with a graded earth mat.

Where possible, the distance between any electric **security fence earth electrode** and other earth systems should preferably be at least 10 m.

Exposed conductive parts of the **physical barrier** shall be effectively earthed.

Where an **electric security fence** passes below bare power line conductors, the highest metallic element shall be effectively earthed for a distance of not less than 5 m on either side of the crossing point.

Connecting leads that are run inside buildings shall be effectively insulated from the earthed structural parts of the building. This may be achieved by using insulated high voltage cable.

Connecting leads that are run underground shall be run in conduit of insulating material or else insulated high voltage cable shall be used. Care shall be taken to avoid damage to the **connecting leads** due to the effects of vehicle wheels sinking into the ground.

Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.

Connecting leads and **electric security fence** wires shall not cross above overhead power or communication lines.

Crossings with overhead power lines shall be avoided wherever possible. If such a crossing cannot be avoided, it shall be made underneath the power line and as nearly as possible at right angles to it.

If **connecting leads** and **electric security fence** wires are installed near an overhead power line, the clearances shall not be less than those shown in Table BB.2.

Table BB.2 – Minimum clearances from power lines for electric security fences not supplied from a security energizer group

Power line voltage V	Clearance m
≤ 1 000	3
> 1 000 and ≤ 33 000	4
> 33 000	8

If **connecting leads** and **electric security fence** wires are installed near an overhead power line, their height above the ground shall not exceed 3 m.

This height applies to either side of the orthogonal projection of the outermost conductors of the power line on the ground surface, for a distance of

- 2 m for power lines operating at a nominal voltage not exceeding 1 000 V;
- 15 m for power lines operating at a nominal voltage exceeding 1 000 V.

Electric security fences shall be identified by prominently placed warning signs.

The warning signs shall be legible from the **secure area** and the **public access area**.

Each side of the **electric security fence** shall have at least one warning sign.

Warning signs shall be placed

- at each gate;
- at each access point;
- at intervals not exceeding 10 m;
- adjacent to each sign relating to chemical hazards for the information of the emergency services.

Any part of an **electric security fence** that is installed along a public road or pathway shall be identified at frequent intervals by warning signs securely fastened to the **fence** posts or firmly clamped to the **fence** wires.

The size of the warning sign shall be at least 100 mm × 200 mm.

The background colour of both sides of the warning sign shall be yellow. The inscription on the sign shall be black and shall be either

- the symbol of Figure BB.1, or
- the substance of “CAUTION: **Electric fence**”.

The inscription shall be indelible, inscribed on both sides of the warning sign and have a height of at least 25 mm.

Ensure that all mains operated, ancillary equipment connected to the **electric security fence circuit** provides a degree of isolation between the **fence circuit** and the supply mains equivalent to that provided by the **energizer**.

NOTE 2 Ancillary equipment that complies with the requirements relating to isolation between the **fence circuit** and the supply mains in Clauses 14, 16 and 29 of the standard for the **electric fence energizer** is considered to provide an adequate level of isolation.

Mains supply wiring shall not be installed in the same conduit as signalling leads associated with the **electric security fence** installation.

Protection from the weather shall be provided for the ancillary equipment unless this equipment is certified by the manufacturer as being suitable for use outdoors, and is of a type with a minimum degree of protection IPX4.

BB.3 Instructions for electric security fences supplied from a security energizer group

For the purpose of these instructions the term:

- **connecting leads** means electric conductor, used to connect the **energizer** to the **electric fence** or the **earth electrode**;
- **physical barrier** means a barrier not less than 1,5 m high intended to prevent inadvertent contact with the **pulsed conductors** of the **electric fence**;
- **secure area** means an area where a person is not separated from **pulsed conductors** below 1,5 m by a **physical barrier**;
- **public access area** means any area where persons are protected from inadvertent contact with **pulsed conductors** by a **physical barrier**;
- **pulsed conductors** means conductors that are subjected to high voltage pulses by the **energizer**.

Electric security fences and their ancillary equipment shall be installed, operated and maintained in a manner that minimizes danger to persons, and reduces the risk of persons receiving an electric shock unless they attempt to penetrate the **physical barrier**, or are in the **secure area** without authority.

Electric security fence constructions that are likely to lead to the entanglement of persons shall be avoided.

Gates in **electric security fences** shall be capable of being opened without the person receiving an electric shock.

An **electric security fence** shall not be supplied from two separate **energizers** unless they are **type R security energizers** or **type S security energizers** configured and connected to operate in a **type R security energizer group** or **type S security energizer group**.

For any two separate **electric security fences**, each supplied from a separate **energizer**, the distance between the wires of the two separate **electric security fences** shall be at least 2,5 m. If this gap is to be closed, this shall be effected by means of a physical barrier of high voltage insulating material or earthed conducting material such that the two separate security fences cannot be contacted at the same time.

This gap can also be closed if the **electric security fences** are supplied by **type R security energizers** or **type S security energizers** that are part of a **type R security energizer group** or **type S security energiser group** configured and connected in accordance with the instructions.

A spacing of 2,5 m shall be maintained between uninsulated **connecting leads** supplied from separate **energizers**. This spacing may be less where

- the **connecting leads** are covered by insulating sleeving rated to at least 10 kV at mains frequency; or
- the **connecting leads** consist of insulated cables rated to at least 10 kV at mains frequency; or
- the **connecting leads** are powered by **energizers** that are part of a **type R security energizer group** or **type S security energizer group** configured and connected in accordance with the instructions.

Barbed wire or razor wire shall not be electrified by an **energizer**.

For earthing recommendations, follow the relevant national standard for **electric security fence** earthing. If this does not exist then follow the **energizer** manufacturer's instructions and recommendations.

The distance between any **electric security fence earth electrode** and other earth systems shall be not less than 2 m, except when associated with a graded earth mat.

Where possible, the distance between any electric **security fence earth electrode** and other earth systems should preferably be at least 10 m.

Exposed conductive parts of the **physical barrier** shall be effectively earthed.

Where an **electric security fence** passes below bare power line conductors, the highest metallic element shall be effectively earthed for a distance of not less than 5 m on either side of the crossing point.

Connecting leads that are run inside buildings shall be effectively insulated from the earthed structural parts of the building. This may be achieved by using insulated high voltage cable.

Connecting leads that are run underground shall be run in conduit of insulating material or else insulated high voltage cable shall be used. Care shall be taken to avoid damage to the **connecting leads** due to the effects of vehicle wheels sinking into the ground.

Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.

Connecting leads and **electric security fence wires** shall not cross above overhead power or communication lines.

Crossings with overhead power lines shall be avoided wherever possible. If such a crossing cannot be avoided, it shall be made underneath the power line and as nearly as possible at right angles to it.

If **connecting leads** and **electric security fence** wires are installed near an overhead power line, the clearances shall not be less than those shown in Table BB.3.

Table BB.3 – Minimum clearances from power lines for electric security fences supplied from a security energizer group

Power line voltage V	Clearance m
≤ 1 000	3
> 1 000 and ≤ 33 000	4
> 33 000	8

If **connecting leads** and **electric security fence** wires are installed near an overhead power line, their height above the ground shall not exceed 3 m.

This height applies to either side of the orthogonal projection of the outermost conductors of the power line on the ground surface, for a distance of

- 2 m for power lines operating at a nominal voltage not exceeding 1 000 V;
- 15 m for power lines operating at a nominal voltage exceeding 1 000 V.

Electric security fences shall be identified by prominently placed warning signs.

The warning signs shall be legible from the **secure area** and the **public access area**.

Each side of the **electric security fence** shall have at least one warning sign.

Warning signs shall be placed

- at each gate;
- at each access point;
- at intervals not exceeding 10 m;
- adjacent to each sign relating to chemical hazards for the information of the emergency services.

Any part of an **electric security fence** that is installed along a public road or pathway shall be identified at frequent intervals by warning signs securely fastened to the fence posts or firmly clamped to the fence wires.

The size of the warning sign shall be at least 100 mm × 200 mm.