

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Low-voltage electrical installations –  
Part 5-56: Selection and erection of electrical equipment – Safety services**

**Installations électriques des bâtiments –  
Partie 5-56: Choix et mise en œuvre des matériels électriques – Services de  
sécurité**



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

**Part 5-56: Selection and erection of electrical equipment –  
Safety services**

## FOREWORD

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International Standard IEC 60364-5-56 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

This second edition of IEC 60364-5-56 comes about as a result of changes to Clause 556, *Safety services*, of IEC 60364-5-55 (2001), as modified by its amendment 1 (2001).<sup>1</sup>

This new part replaces Clause 556 of IEC 60364-5-55:2001. Clause 556 is to be withdrawn at the time of publication of this new Part 56.

The main changes with regard to the previous edition are listed below:

- 1) Many more definitions are included, e.g. response time, central power supply system, low power supply system, preferential circuit and escape route.

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<sup>1</sup> The first edition of IEC 60364-5-56, which was published in 1980, together with its amendment (1998), was withdrawn when its contents were incorporated into the first edition of IEC 60364-5-55.

- 2) Automatic supplies are now classified according to the maximum changeover times, for example a supply classified as short break means an automatic supply is available within 0,5 s.
- 3) Safety sources that can operate in parallel are specifically recognized in 560.6.9.
- 4) Requirements are now given for batteries used for safety sources for central and low power supply sources.
- 5) Drawings are now required, such as a single-line diagram, drawings showing the location of equipment and a list of equipment permanently connected to the safety power supply.
- 6) Operating instructions are now required.
- 7) Detailed requirements are now given for emergency escape lighting applications, direct current circuits and fire protection applications.
- 8) Additional requirements for initial verification and periodic inspection and testing are now included in the standard.
- 9) Two annexes are now included (Annex A and Annex B) giving guidance for emergency lighting and guidance for fire protection equipment, respectively.

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

FDIS	Report on voting
64/1677/FDIS	64/1686/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The reader's attention is drawn to the fact that Annex C lists all of the "in-some-country" clauses on differing practices of a less permanent nature relating to the subject of this standard.

A list of all parts in the IEC 60364 series, under the general title *Low-voltage electrical installations*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

## LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

### Part 5-56: Selection and erection of electrical equipment – Safety services

#### 560.1 Scope

This part of IEC 60364 covers general requirements for safety services, selection and erection of electrical supply systems for safety services and electrical safety sources.

Standby electrical supply systems are outside the scope of this part. This part does not apply to installations in hazardous areas (BE3), for which requirements are given in IEC 60079-14.

#### 560.2 Normative references

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

IEC 60331 (all parts), *Tests for electric cables under fire conditions – Circuit integrity*

IEC 60332-1-2, *Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame*

IEC 60364-4-43:2008, *Low-voltage electrical installations – Part 4-43: Protection for safety – Protection against overcurrent*

IEC 60702-1, *Mineral insulated cables and their terminations with a rated voltage not exceeding 750 V – Part 1: Cables*

IEC 60702-2, *Mineral insulated cables and their terminations with a rated voltage not exceeding 750 V – Part 2: Terminations*

IEC 62040-1-1, *Uninterruptible power systems (UPS) – Part 1-1: General and safety requirements for UPS in operator access areas*

IEC 62040-1-2, *Uninterruptible power systems (UPS) – Part 1-2: General and safety requirements for UPS used in restricted access locations*

IEC 62040-3, *Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements*

ISO 8528-12, *Reciprocating internal combustion engine driven alternating current generating sets – Part 12: Emergency power supply to safety services*

CIE S 020/ISO 30061:2007, *Emergency lighting*



### 560.3 Terms and definitions

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

#### 560.3.1

##### **electrical supply system for safety services**

supply system intended to maintain the operation of essential parts of an electrical installation and equipment:

- for the health and safety of persons and livestock, and/or
- to avoid damage to the environment and to other equipment

NOTE 1 The supply system includes the source and the electrical circuits up to the terminals of electrical equipment.

NOTE 2 Examples of safety services include:

- emergency (escape) lighting;
- fire pumps;
- fire rescue services lifts;
- alarm systems, such as fire alarms, CO alarms and intruder alarms;
- evacuation systems;
- smoke extraction systems;
- essential medical systems.

#### 560.3.2

##### **electrical source for safety services**

electrical source intended to be used as part of an electrical supply system for safety services

#### 560.3.3

##### **electrical circuit for safety services**

electrical circuit intended to be used as part of an electrical supply system for safety services

#### 560.3.4

##### **standby electrical supply system**

supply system intended to maintain, for reasons other than safety, the functioning of an electrical installation or parts thereof, in case of interruption of the normal supply

#### 560.3.5

##### **standby electrical source**

electrical source intended to maintain, for reasons other than safety, the supply to an electrical installation or parts thereof, in case of interruption of the normal supply

#### 560.3.6

##### **emergency lighting**

lighting provided for use when the supply to the normal lighting fails

[CIE S 0 20/ISO 30061:2007, definition 4.1]

#### 560.3.7

##### **emergency lighting luminaire**

luminaire which may or may not be provided with its own electrical source for safety services and which is used for safety or emergency lighting

#### 560.3.8

##### **escape sign luminaire**

luminaire that indicates and assists the identification of escape routes



**560.3.9****maintained mode**

operating mode of a lighting system in which the emergency lighting lamps are energized at all times when normal or emergency lighting is required

**560.3.10****non-maintained mode**

operating mode of a lighting system in which the emergency lighting lamps are in operation only when the supply to the normal lighting fails

**560.3.11****response time**

time that elapses between the failure of the normal power supply and the auxiliary power supply energizing the equipment

**560.3.12****central power supply system (unlimited power)**

system which supplies the required emergency power to essential safety equipment without any limitation in power output

**560.3.13****central low-power supply system (low power output)**

central power supply system with a limitation of the power output of the system at 500 W for 3 h or 1 500 W for 1 h

NOTE A low-power supply system normally comprises a maintenance-free battery and a charging and testing unit.

**560.3.14****escape route**

path to follow for access to a safe area in the event of an emergency

**560.3.15****preferential circuit**

safety source derived directly from the incoming supply to the building intended to supply safety services which, in case of emergency, shall remain in operation for as long as possible

NOTE An example of such a safety service is sprinkler pumps.

**560.3.16****minimum illuminance**

Illuminance for emergency lighting at the end of the rated operating time

**560.3.17****safety service**

electrical system for electrical equipment provided to protect or warn persons in the event of a hazard, or essential to their evacuation from a location

**560.4 Classification**

**560.4.1** An electrical supply system for safety services is either:

- a non-automatic supply, the starting of which is initiated by an operator, or
- an automatic supply, the starting of which is independent of an operator.

An automatic supply is classified as follows, according to the maximum changeover time:

- no-break: an automatic supply which can ensure a continuous supply within specified conditions during the period of transition, for example as regards variations in voltage and frequency;

- very short break: an automatic supply available within 0,15 s;
- short break: an automatic supply available within 0,5 s;
- average break: an automatic supply available within 5 s;
- medium break: an automatic supply available within 15 s;
- long break: an automatic supply available in more than 15 s.

**560.4.2** The essential equipment for safety services shall be compatible with the changeover time in order to maintain the specified operation.

## **560.5 General**

**560.5.1** Safety services may be required to operate at all relevant times including during main and local supply failure and through fire conditions. To meet these requirements, specific sources, equipment, circuits and wiring are necessary. Some applications also have particular requirements, as in 560.5.2 and 560.5.3.

**560.5.2** For safety services required to operate in fire conditions, the following additional two conditions shall be fulfilled:

- an electrical source for safety supply shall be selected in order to maintain a supply of adequate duration, and
- all equipment of safety services shall be provided, either by construction or by erection, with protection ensuring fire resistance of adequate duration.

NOTE The electrical safety supply source is generally additional to the normal supply source, for example the public supply network.

**560.5.3** Where automatic disconnection of supply is used as a protective measure against electric shock, non-disconnection on the first fault is preferred. In IT systems, insulation monitoring devices shall be provided which give an audible and visible indication in the event of a first fault.

**560.5.4** Regarding control and bus systems, a failure in the control or bus system of a normal installation shall not adversely affect the function of safety services.

## **560.6 Electrical sources for safety services**

**560.6.1** The following electrical sources for safety services are recognized:

- storage batteries;
- primary cells;
- generator sets independent of the normal supply;
- a separate feeder of the supply network that is effectively independent of the normal feeder.

**560.6.2** Safety sources for safety services shall be installed as fixed equipment and in such a manner that they cannot be adversely affected by failure of the normal source.

**560.6.3** Safety sources shall be installed in a suitable location and be accessible only to skilled or instructed persons (BA5 or BA4).

**560.6.4** The location of the safety source shall be properly and adequately ventilated so that exhaust gases, smoke or fumes from the safety source cannot penetrate areas occupied by persons.

**560.6.5** Separate, independent feeders from a supply network shall not serve as electrical sources for safety services unless assurance can be obtained that the two supplies are unlikely to fail concurrently.

**560.6.6** The safety source shall have sufficient capability to supply its related safety service.

**560.6.7** A safety source may, in addition, be used for purposes other than safety services, provided the availability for safety services is not thereby impaired. A fault occurring in a circuit for purposes other than safety services shall not cause the interruption of any circuit for safety services.

#### **560.6.8 Special requirements for safety sources not capable of operation in parallel**

**560.6.8.1** Adequate precautions shall be taken to avoid the paralleling of sources.

NOTE This may be achieved by mechanical interlocking.

**560.6.8.2** Short-circuit protection and fault protection shall be ensured for each source.

#### **560.6.9 Special requirements for safety services having sources capable of operation in parallel**

NOTE 1 The parallel operation of independent sources normally requires the authorization of the supply undertaking. This may require special devices, for example to prevent reverse power.

Short-circuit protection and fault protection shall be ensured when the installation is supplied separately by either of the two sources or by both in parallel.

NOTE 2 Precautions may be necessary to limit current circulation in the connection between the neutral points of the sources, in particular the effect of third harmonics.

#### **560.6.10 Central power supply system**

Batteries shall be of vented or valve-regulated maintenance-free type and shall be of heavy duty industrial design, for example cells complying with IEC 60623 or the IEC 60896 series.

NOTE The minimum design life of the batteries at 20 °C should be 10 years.

#### **560.6.11 Low-power supply system**

The power output of a low-power supply system is limited to 500 W for a 3 h duration and 1500 W for a 1 h duration. Batteries can be of gas-tight or valve-regulated maintenance-free type and shall be of heavy duty industrial design, for example cells complying with IEC 60623 or the IEC 60896 series.

NOTE The minimum design life of the batteries at 20 °C should be 5 years.

#### **560.6.12 Uninterruptible power supply sources**

Where an uninterruptible power supply is used, it shall:

- a) be able to operate distribution circuit protective devices, and
- b) be able to start the safety devices when it is operating in the emergency condition from the inverter supplied by the battery, and
- c) comply with the requirements of 560.6.10, and
- d) comply with IEC 62040-1-1, IEC 62040-1-2 or IEC 62040-3, as applicable.

#### **560.6.13 Safety generating sets**

Where a safety generating set is used as a safety source, it shall comply with ISO 8528-12.

**560.6.14** The condition of the source for safety services (ready for operation, under fault conditions, feeding from the source for safety services) shall be monitored.

## **560.7 Circuits of safety services**

**560.7.1** Circuits of safety services shall be independent of other circuits.

NOTE This means that an electrical fault or any intervention or modification in one system must not affect the correct functioning of the other. This may necessitate separation by fire-resistant materials or different routes or enclosures.

**560.7.2** Circuits of safety services shall not pass through locations exposed to fire risk (BE2) unless they are fire-resistant. The circuits shall not, in any case, pass through zones exposed to explosion risk (BE3).

NOTE Where practicable, the passage of any circuit through locations presenting a fire risk should be avoided.

**560.7.3** According to 433.3 of IEC 60364-4-43, protection against overload may be omitted where the loss of supply may cause a greater hazard. Where protection against overload is omitted, the occurrence of an overload shall be monitored.

**560.7.4** Overcurrent protective devices shall be selected and erected so as to avoid an overcurrent in one circuit impairing the correct operation of circuits of safety services.

**560.7.5** Switchgear and controlgear shall be clearly identified and grouped in locations accessible only to skilled or instructed persons (BA5 or BA4).

**560.7.6** In equipment supplied by two different circuits with independent sources, a fault occurring in one circuit shall not impair the protection against electric shock, nor the correct operation of the other circuit. Such equipment shall be connected to the protective conductors of both circuits, if necessary.

**560.7.7** Safety circuit cables, other than metallic screened, fire-resistant cables, shall be adequately and reliably separated by distance or by barriers from other circuit cables, including other safety circuit cables.

NOTE For battery cables, special requirements may apply.

**560.7.8** Circuits for safety services, with the exception of wiring for fire rescue service lift supply cables, and wiring for lifts with special requirements, shall not be installed in lift shafts or other flue-like openings.

**560.7.9** In addition to a general schematic diagram, full details of all electrical safety sources shall be given. The information shall be maintained adjacent to the distribution board. A single-line diagram is sufficient.

**560.7.10** Drawings of the electrical safety installations shall be available showing the exact location of

- all electrical equipment and distribution boards, with equipment designations,
- safety equipment with final circuit designation and particulars and purpose of the equipment;
- special switching and monitoring equipment for the safety power supply (e.g. area switches, visual or acoustic warning equipment).

**560.7.11** A list of all the current-using equipment permanently connected to the safety power supply, indicating the nominal electrical power, nominal currents and starting currents and time for current-using equipment, shall be provided.

NOTE This information may be included in the circuit diagrams.

**560.7.12** Operating instructions for safety equipment and electrical safety services shall be available. They shall take into account all the particulars of the installation.

## **560.8 Wiring systems**

**560.8.1** One or more of the following wiring systems shall be utilized for safety services required to operate in fire conditions:

- mineral insulated cable complying with IEC 60702-1 and IEC 60702-2;
- fire-resistant cables complying with the appropriate part of IEC 60331 and with IEC 60332-1-2;
- a wiring system maintaining the necessary fire and mechanical protection.

Wiring systems shall be mounted and installed in such a way that the circuit integrity will not be impaired during the fire.

NOTE 1 Examples of a system maintaining the necessary fire and mechanical protection could be

- constructional enclosures to maintain fire and mechanical protection, or
- wiring systems in separate fire compartments.

NOTE 2 National legislation may exist.

**560.8.2** Wiring for control and bus systems of safety services shall be in accordance with the same requirements as the wiring which is to be used for the safety services. This does not apply to circuits that do not adversely affect the operation of the safety equipment.

**560.8.3** Precautions shall be taken to prevent excavation damage to buried safety circuits.

**560.8.4** Circuits for safety services which can be supplied by direct current shall be provided with two-pole overcurrent protection mechanisms.

**560.8.5** Switchgear and controlgear used for both a.c. and d.c. supply sources shall be suitable for both a.c. and d.c. operation.

## **560.9 Emergency escape lighting applications**

**560.9.1** Emergency escape lighting systems may be powered by a central power supply system or the emergency lighting luminaires may be self-contained. The supply to self-contained luminaires is excluded from the requirements of 560.9.1 to 560.9.4 inclusive.

Wiring systems for a centrally powered emergency lighting system shall retain the continuity of supply from the source to the luminaires for an adequate period in the event of a fire. This shall be achieved by using cables with a high resistance to fire, as detailed in 560.8.1 and 560.8.2, to transfer power through a fire compartment.

Within the fire compartment, the supplies to the luminaire shall either use cables with a high resistance to attack by fire or, for compartments having more than one emergency lighting luminaire, such luminaires shall be wired alternately from at least two separate circuits so that a level of illuminance is maintained along the escape route in the event of the loss of one circuit.

**560.9.2** Where alternate luminaires are supplied by separate circuits overcurrent protective devices shall be used so that a short-circuit in one circuit does not interrupt the supply to the adjacent luminaires within the fire compartment or the luminaires in other fire compartments.