NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60364-7-710

Première édition
First edition
2002-11

Installations électriques des bâtiments –

Partie 7-710:
Règles pour les installations ou emplacements spéciaux – Locaux à usages médicaux

Electrical installations of buildings –

Part 7-710:
Requirements for special installations or locations – Medical locations

Numéro de référence
Reference number
CEI/IEC 60364-7-710:2002

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60364-7-710

Première édition
First edition
2002-11

Installations électriques des bâtiments –

Partie 7-710:
Règles pour les installations ou emplacements spéciaux – Locaux à usages médicaux

Electrical installations of buildings –

Part 7-710:
Requirements for special installations or locations – Medical locations

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE R

Pour prix, voir catalogue en vigueur
For price, see current catalogue

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS OF BUILDINGS –

Part 7-710: Requirements for special installations or locations – Medical locations

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60364-7-710 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

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

FDIS	Report on voting
64/1268/FDIS	64/1275/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 committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

INTRODUCTION

The requirements of this part of IEC 60364 supplement, modify or replace certain of the general requirements as contained in parts 1 to 6 of IEC 60364.

The clause numbering following 710 are those of the corresponding parts or clauses from parts 1 to 6 of IEC 60364.

The absence of reference to a part or a clause means that parts 1 to 6 of IEC 60364 are applicable.

In medical locations it is necessary to ensure the safety of patients likely to be subjected to the application of medical electrical equipment. For every activity and function in a medical location, the particular requirements for safety have to be considered. Safety can be achieved by ensuring the safety of the installation and the safe operation and maintenance of medical electrical equipment connected to it. The use of medical electrical equipment on patients undergoing intensive care (of critical importance) has called for enhanced reliability and safety of electrical installations in hospitals so as to improve the safety and continuity of supplies which is met by application of this standard. Variations of the standard to further enhance safety and reliability are acceptable.

ELECTRICAL INSTALLATIONS OF BUILDINGS –

Part 7-710: Requirements for special installations or locations – Medical locations

710 Medical locations

710.1 Scope

The particular requirements of this part of IEC 60364 apply to electrical installations in medical locations so as to ensure safety of patients and medical staff. These requirements, in the main, refer to hospitals, private clinics, medical and dental practices, health care centres and dedicated medical rooms in the work place.

NOTE 1 It may be necessary to modify the existing electrical installation, in accordance with this standard, when a change of utilization of the location occurs. Special care should be taken where intracardiac procedures are performed in existing installations.

NOTE 2 Where applicable this standard can also be used in veterinary clinics. The requirements of this part do not apply to medical electrical equipment.

NOTE 3 For medical electrical equipment, refer to the IEC 60601 series.

710.2 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 60364-4-41:2001, *Electrical installations of buildings – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60364-5-55:2001, *Electrical installations of buildings – Part 5-55: Selection and erection of electrical equipment – Other equipment*

IEC 60364-6-61:2001, *Electrical installations of buildings – Part 6-61: Verification – Initial verification*

IEC 60601-1:1988, *Medical electrical equipment – Part 1: General requirements for safety*
Amendment 2 (1995)

IEC 60601-1-1:2000, *Medical electrical equipment – Part 1: General requirements for safety – Collateral standard: Safety requirements for medical electrical systems*

IEC 60617-1:1985, *Graphical symbols for diagrams – Part 1: General information, general index – Cross-reference tables*

IEC 60617-11(DB)[1], *Graphical symbols for diagrams – Part 11: Architectural and topographical installation plans and diagrams*

IEC 61082-1:1991, *Preparation of documents used in electrotechnology – Part 1: General requirements*

---

1 DB = Data Base.

IEC 61557-8:1997, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems*

IEC 61558-2-15:1999, *Safety of power transformers, power supply units and similar – Part 2-15: Particular requirements for isolating transformers for the supply of medical locations*

710.3 Definitions

For the purposes of this part of IEC 60364, the following definitions apply.

710.3.1
medical location
location intended for purposes of diagnosis, treatment (including cosmetic treatment), monitoring and care of patients

NOTE To ensure protection of patients from possible electrical hazards, additional protective measures need to be applied in medical locations. The type and description of these hazards can vary according to the treatment being administered. The manner in which a room is to be used necessitates some division into different areas for differing medical procedures.

710.3.2
patient
living being (person or animal) undergoing medical or dental investigation or treatment

(adapted from 2.12.4 of IEC 60601-1)

NOTE The person under treatment for cosmetic purposes may be considered, as far as this standard is concerned, as a patient.

710.3.3
medical electrical equipment
electrical equipment, provided with not more than one connection to a particular supply mains and intended to diagnose, treat or monitor the patient under medical supervision and which

– makes physical or electrical contact with the patient, and/or
– transfers energy to or from the patient, and/or
– detects such energy transfer to or from the patient.

NOTE The equipment includes those accessories defined by the manufacturer as being necessary to enable normal use of the equipment.

710.3.4
applied part
part of the medical electrical equipment which in normal use

– necessarily comes into physical contact with the patient for the equipment to perform its function, or
– can be brought into contact with the patient, or
– needs to be touched by the patient

(adapted from 2.1.5 of amendment 2 to IEC 60601-1)

710.3.5
group 0
medical location where no applied parts are intended to be used

710.3.6
group 1
medical location where applied parts are intended to be used as follows:

– externally;
– invasively to any part of the body, except where 710.3.7 applies

710.3.7
group 2
medical location where applied parts are intended to be used in applications such as intracardiac procedures, operating theatres and vital treatment where discontinuity (failure) of the supply can cause danger to life

NOTE An intracardiac procedure is a procedure whereby an electrical conductor is placed within the heart of a patient or is likely to come into contact with the heart, such conductor being accessible outside the patient's body. In this context, an electrical conductor includes insulated wires such as cardiac pacing electrodes or intracardiac ECG electrodes, or insulated tubes filled with conducting fluids.

710.3.8
medical electrical system
combination of items of equipment, at least one of which is an item of medical electrical equipment and inter-connected by functional connection or use of a multiple portable socket-outlet

NOTE The system includes those accessories which are needed for operating the system and are specified by the manufacturer.

710.3.9
patient environment
any volume in which intentional or unintentional contact can occur between patient and parts of the system or between patient and other persons touching parts of the system (for illustration see Figure 710A)

NOTE This applies when the patient’s position is pre-determined, if not, all possible patient positions should be considered.

710.3.10
main distribution board
board in the building which fulfils all the functions of a main electrical distribution for the supply building area assigned to it and where the voltage drop is measured for operating the safety services

710.3.11
medical IT system
IT electrical system having specific requirements for medical applications

710.30 Assessment of general characteristics

The classification of a medical location shall be made in agreement with the medical staff, health organization concerned or body responsible for the safety of workers in accordance with national regulations. In order to determine the classification of a medical location, it is necessary that the medical staff indicate which medical procedures will take place within the location. Based on the intended use, the appropriate classification for the location shall be determined (the possibility that certain medical locations may be used for different purposes which necessitate a higher group should be addressed by risk management).

NOTE 1 Classification of a medical location should be related to the type of contact between applied parts and the patient, as well as the purpose for which the location is used (see Annex B).

NOTE 2 Applied parts are defined by the particular standards for medical electrical equipment.

710.31 Purposes, supplies and structure

710.312.2 Types of system earthing

The TN-C system is not allowed in medical locations and medical buildings downstream of the main distribution board.

710.313 Power supply

710.313.1 General

In medical locations the distribution system should be designed and installed to facilitate the automatic change-over from the main distribution network to the electrical safety source feeding essential loads (according to IEC 60364-5-55, clause 556).

710.4 Protection for safety

710.41 Protection against electric shock

710.411 Protection against both direct and indirect contact

710.411.1 SELV and PELV

When using SELV and/or PELV circuits in medical locations of group 1 and group 2, the nominal voltage applied to current-using equipment shall not exceed 25 V r.m.s. a.c. or 60 V ripple free d.c. Protection by insulation of live parts according to 412.1 of IEC 60364-4-41 and by barriers or enclosures according to 412.2 of the same standard is essential.

In medical locations of group 2, exposed-conductive-parts of equipment (e.g. operating theatre luminaires), shall be connected to the equipotential bonding conductor.

710.412 Protection against direct contact

710.412.3 Obstacles

Protection by obstacles is not permitted.

710.412.4 Placing out of reach

Protection by placing out of reach is not permitted.

Only protection by insulation of live parts or protection by barriers or enclosures are permitted.

710.413 Protection against indirect contact

710.413.1 Automatic disconnection of supply

710.413.1.1 General

710.413.1.1.1 Disconnection of supply

In medical locations of group 1 and group 2, the following shall apply:

– for IT, TN and TT systems, the conventional touch voltage U_L shall not exceed 25 V ($U_L \leq 25$ V);

– for TN and IT systems, table 41C of IEC 60364-4-41 shall apply.

NOTE Disconnection of supply when overload or short-circuit conditions occur, can be achieved by different design methods within the procedures of the general rules in order to satisfy the required safety level.

710.413.1.3 TN systems

In final circuits of group 1 rated up to 32 A residual current devices with a maximum residual operating current of 30 mA shall be used (additional protection).

In medical locations of group 2, protection by automatic disconnection of supply by means of residual current protective devices with the rated residual-operating-current not exceeding 30 mA shall only be used on the following circuits:

– circuits for the supply of operating tables;
– circuits for X-ray units;

  NOTE The requirement is mainly applicable to mobile X-ray units brought into group 2 locations.

– circuits for large equipment with a rated power greater than 5 kVA;
– circuits for non-critical electrical equipment (non life support).

Care shall be taken to ensure that simultaneous use of many items of such equipment connected to the same circuit cannot cause unwanted tripping of the residual current protective device (RCD).

In medical locations of group 1 and group 2, where RCDs are required by this subclause, only type A or type B shall be selected, depending on the possible fault-current arising.

NOTE It is recommended that TN-S systems are monitored to ensure the insulation level of all live conductors.

710.413.1.4 TT systems

In medical locations of group 1 and group 2, the requirements of TN systems (see 710.413.1.3) apply and in all cases residual current protective devices shall be used.

710.413.1.5 Medical IT system

NOTE 1 In the United States such a system is identified as an “Isolated Power System”.

In group 2 medical locations, the medical IT system shall be used for circuits supplying medical electrical equipment and systems intended for life support, surgical applications and other electrical equipment located in the "patient environment", excluding equipment listed in 713.413.1.3.

For each group of rooms serving the same function, at least one separate medical IT system is necessary. The medical IT system shall be equipped with an insulation monitoring device in accordance with IEC 61557-8 with the following specific requirements:

– the a.c. internal impedance shall be at least 100 kΩ;
– the test voltage shall not be greater than 25 V d.c.;
– the injected current, even under fault conditions, shall not be greater than 1 mA peak;
– indication shall take place at the latest when the insulation resistance has decreased to 50 kΩ. A test device shall be provided;

NOTE 2 In Germany, an indication is required if the earth or wiring connection is lost.

NOTE 3 The necessary additional requirements on IMDs given above are at this time not covered in the equipment standard IEC 61557-8. They will be removed from this publication as soon as they have been treated in the relevant equipment standard.

For each medical IT system, an acoustic and visual alarm system incorporating the following components shall be arranged at a suitable place so that it can be permanently monitored (audible and visual signals) by the medical staff:

– a green signal lamp to indicate normal operation;
– a yellow signal lamp which lights when the minimum value set for the insulation resistance is reached. It shall not be possible for this light to be cancelled or disconnected;

– an audible alarm which sounds when the minimum value set for the insulation resistance is reached. This audible alarm may be silenced.
– the yellow signal shall go out on removal of the fault and when the normal condition is restored.

Where only one equipment is supplied from one single dedicated IT transformer, the latter can be installed without an insulation monitoring device.

Monitoring of overload and high temperature for the medical IT transformer is required.

710.413.1.6 Supplementary equipotential bonding

710.413.1.6.1 In each medical location of group 1 and group 2, supplementary equipotential bonding conductors shall be installed and connected to the equipotential bonding bus bar for the purpose of equalizing potential differences between the following parts, located in the "patient environment":

– protective conductors;
– extraneous-conductive-parts;
– screening against electrical interference fields, if installed;
– connection to conductive floor grids, if installed;
– metal screen of the isolating transformer, if any.

NOTE Fixed conductive non-electrical patient supports such as operating theatre tables, physiotherapy couches and dental chairs should be connected to the equipotential bonding conductor unless they are intended to be isolated from earth.

710.413.1.6.2 In medical locations of group 2, the resistance of the conductors, including the resistance of the connections, between the terminals for the protective conductor of socket-outlets and of fixed equipment or any extraneous-conductive-parts and the equipotential bonding bus bar shall not exceed 0,2 Ω.

NOTE This resistive value can also be determined by the use of a suitable cross-sectional area of the conductor.

710.413.1.6.3 The equipotential bonding bus bar shall be located in or near the medical location. In each distribution board or in its proximity, an additional equipotential bonding bar shall be provided to which the supplementary equipotential bonding conductor and protective earth conductor shall be connected. Connections shall be so arranged that they are clearly visible and easily disconnected individually.

710.422 Fire protection

National legislation providing additional requirements may exist.

710.5 Selection and erection of electrical equipment

710.51 Common rules

710.512 Operational conditions and external influences

710.512.1 Operating conditions

710.512.1.1 Transformers for medical IT systems

Transformers shall be installed in close proximity to, inside or outside, the medical location and placed in cabinets or enclosures to prevent unintentional contact with live parts.

The rated voltage U_n on the secondary side of transformers shall not exceed 250 V a.c.

710.512.1.6 Medical IT systems for group 2 medical locations

Transformers shall be in accordance with IEC 61558-2-15, with the following additional requirements:

The leakage current of the output winding to earth and the leakage current of the enclosure, when measured in no-load condition and the transformer supplied at rated voltage and rated frequency, shall not exceed 0,5 mA.

Single-phase transformers shall be used to form the medical IT systems for portable and fixed equipment and the rated output shall not be less than 0,5 kVA and shall not exceed 10 kVA.

If the supply of three-phase loads via an IT system is also required, a separate three-phase transformer shall be provided for this purpose with output line-to-line voltage not exceeding 250 V.

710.512.2 External influences

NOTE Where appropriate, attention should be given to prevention of electromagnetic interference.

710.512.2.1 Explosion risk

NOTE 1 Requirements for medical electrical equipment for use in conjunction with flammable gases and vapours are contained of IEC 60601-1.

NOTE 2 Where hazardous conditions are likely to occur (e.g. in the presence of flammable gases and vapours), special precautions may be required.

NOTE 3 Prevention of build-up of static electricity is recommended.

Electrical devices (e.g. socket-outlets and switches) shall be installed at a distance of at least 0,2 m horizontally (centre to centre) from any medical gas-outlets, so as to minimize the risk of ignition of flammable gases.

710.514.5 Diagrams, documentation and operating instructions

Plans of the electrical installation together with records, drawings, wiring diagrams and modifications thereto, as well as instructions for operation and maintenance, shall be provided for the user.

NOTE Drawings and wiring diagrams should be in accordance with IEC 60617-1, IEC 60617-2, IEC 60617-3, IEC 60617-6, IEC 60617-7, IEC 60617- 8 and IEC 61082-1.

The relevant documents are in particular:

– block diagrams showing the distribution system of the normal power supply and power supply for safety services in a single-line representation. These diagrams shall contain information on the location of the sub-distribution boards within the building;
– main and sub-distribution board block diagrams showing switchgear and controlgear and distribution boards in a single-line representation;
– architectural diagrams according to IEC 60617-11;
– schematic diagrams of controls;
– instructions for operation, inspection, testing and maintenance of storage batteries and power sources for safety services;
– computational verification of compliance with the requirements of standards (e.g. with 710.413.1);
– list of loads permanently connected to the power supply for safety services indicating the normal currents and, in the case of motor-operated loads, the starting currents;

– a logbook containing a record of all tests and inspections which require to be completed prior to commissioning.

710.52 Wiring systems

Any wiring system within group 2 medical locations shall be exclusive to the use of equipment and fittings in that location.

710.53 Switchgear and controlgear

710.53.1 Protection of wiring systems in medical locations of group 2

Overcurrent protection against short-circuit and overload current is necessary for each final circuit. Overload current protection is not allowed in the feeder circuits upstream and downstream of the transformer of medical IT-system. Fuses may be used for short-circuit protection.

710.55 Other equipment

710.55.1 Lighting circuits

In medical locations of group 1 and group 2, at least two different sources of supply shall be provided for some of the luminaires by two circuits. One of the two circuits shall be connected to the safety service.

In escape routes, alternate luminaires shall be connected to the safety service (see 710.556).

710.55.3 Socket-outlet circuits in the medical IT system for medical locations of group 2

At each patient's place of treatment, e.g. bedheads, the configuration of socket-outlets shall be as follows:

– either a minimum of two separate circuits feeding socket-outlets shall be installed; or

– each socket-outlet shall be individually protected against overcurrent.

Where circuits are supplied from other systems (TN-S or TT systems) in the same medical location, socket-outlets connected to the medical IT system shall either:

– be of such construction that prevents their use in other systems, or

– be clearly and permanently marked.

710.556 Safety services

710.556.5.2 Sources

Classification of safety services are given in Annex A.

710.556.5.2.1 General requirements for safety power supply sources of group 1 and group 2

710.556.5.2.1.1 In medical locations, a power supply for safety services is required which, in case of a failure of the normal power supply source, shall be energized to feed the equipment stated in 710.556.5.2.2.1, 710.556.5.2.2.2 and 710.556.5.2.2.3 with electrical energy for a defined period of time and within a pre-determined changeover period.

710.556.5.2.1.2 If the voltage at the main distribution board drops in one or several line conductors by more than 10 % of the nominal voltage, a safety power supply source shall assume the supply automatically.

The supply transfer should be achieved with a delay in order to cater for auto re-closure of circuit-breakers of incoming supplies (short-time interruptions).

710.556.5.2.1.3 For interconnecting cables between the individual components and sub-assemblies of safety power supply sources, see 710.52.

NOTE The circuit which connects the power supply source for safety services to the main distribution board should be considered a safety circuit.

710.556.5.2.1.4 Where socket-outlets are supplied from the safety power supply source they shall be readily identifiable.

710.556.5.2.2 Detailed requirements for safety power supply services

710.556.5.2.2.1 Power supply sources with a change-over period less than or equal to 0,5 s

In the event of a voltage failure of one or more line conductors at the distribution board, a special safety power supply source shall maintain luminaires of operating theatre tables and other essential luminaires, e.g. endoscopes, for a minimum period of 3 h. It shall restore the supply within a changeover period not exceeding 0,5 s.

710.556.5.2.2.2 Power supply sources with a change-over period less than or equal to 15 s

Equipment according to 710.556.7.5 and 710.556.8 shall be connected within 15 s to a safety power supply source capable of maintaining it for a minimum period of 24 h, when the voltage of one or more line conductors at the main distribution board for the safety services has decreased by more than 10 % of the nominal value of supply voltage and of a duration greater than 3 s.

NOTE The duration of 24 h can be reduced to a minimum of 3 h if the medical requirements and the use of the location, including any treatment, can be concluded and if the building can be evacuated in a time which is well within 24 h.

710.556.5.2.2.3 Power supply sources with a changeover period greater than 15 s

Equipment other than those covered by 710.556.5.2.2.1 and 710.556.5.2.2.2, which is required for the maintenance of hospital services, may be connected either automatically or manually to a safety power supply source capable of maintaining it for a minimum period of 24 h. This equipment may include, for example:

– sterilization equipment;
– technical building installations, in particular air conditioning, heating and ventilation systems, building services and waste disposal systems;
– cooling equipment;
– cooking equipment;
– storage battery chargers.

710.556.7 Safety lighting circuits

710.556.7.5 Safety lighting

In the event of mains power failure, the necessary minimum illuminance shall be provided from the safety services source for the following locations. The changeover period to the safety source shall not exceed 15 s:

– escape routes;
– lighting of exit signs;
– locations for switchgear and controlgear for emergency generation sets and for main distribution boards of the normal power supply and for power supply for safety services;
– rooms in which essential services are intended. In each room at least one luminaire shall be supplied from the power source for safety services;
– rooms of group 1 medical locations. In each room at least one luminaire shall be supplied from the power supply source for safety services;
– rooms of group 2 medical locations. A minimum of 50 % of the lighting shall be supplied from the power source for safety services.

NOTE The values for minimum illuminance can be given by national and/or local regulations

710.556.8 Other services

Services other than lighting which require a safety service supply with a changeover period not exceeding 15 s may include, for example, the following:

– selected lifts for firemen;
– ventilating systems for smoke extraction;
– paging systems;
– medical electrical equipment used in group 2 medical locations which serves for surgical or other measures of vital importance. Such equipment will be defined by responsible staff;
– electrical equipment of medical gas supply including compressed air, vacuum supply and narcosis (anaesthetics) exhaustion as well as their monitoring devices;
– fire detection, fire alarms and fire extinguishing systems.

710.6 Verification

The dates and results of each verification shall be recorded.

710.61 Initial verification

The tests specified below under items a) to e) in addition to the requirements of IEC 60364-6-61, shall be carried out, both prior to commissioning and after alterations or repairs and before re-commissioning.

a) Functional test of insulation monitoring devices of medical IT systems and acoustical/visual alarm systems.
b) Measurements to verify that the supplementary equipotential bonding is in accordance with 710.413.1.6.1 and 710.413.1.6.2.
c) Verification of the integrity of the facilities required with 710.413.1.6.3 for equipotential bonding.
d) Verification of the integrity of the requirements of 710.556 for safety services.
e) Measurements of leakage current of the output circuit and of the enclosure of medical IT transformers in no-load condition.

710.62 Periodic verification

Periodic verification of items a) to e) of 710.61 shall be carried out in accordance with local/national regulations. If no local/national regulations exist, the following intervals are recommended:

a) functional testing of changeover devices: 12 months;

b) functional testing of insulation monitoring devices: 12 months;

c) checking, by visual inspection, settings of protective devices: 12 months;

d) measurement verifying the supplementary equipotential bonding: 36 months ;

e) verifying integrity of facilities required for equipotential bonding: 36 months;

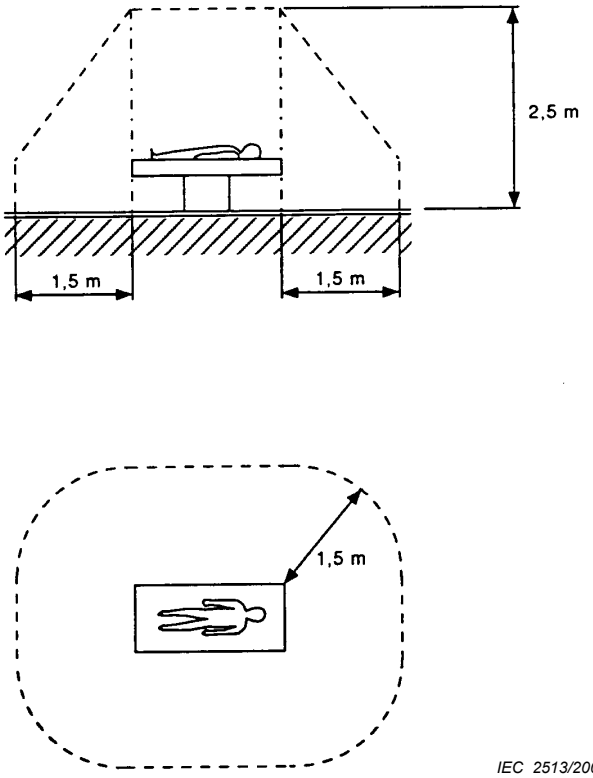
f) monthly functional testing of:

- safety services with batteries: 15 min;
- safety services with combustion engines: until rated running temperature is achieved; 12 months for “endurance run”;
- safety services with batteries: capacity test;
- safety services with combustion engines: 60 min;

In all cases at least 50 % to 100 % of the rated power shall be taken over.

g) measurement of leakage currents of IT transformers: 36 months;

h) checking of the tripping of RCDs at $I_{\Delta N}$: not less than 12 months.



NOTE Dimensions shown are not prescriptive.

Figure 710A – Example of patient environment (IEC 60601-1-1)

Annex A
(normative)

Classification of safety services for medical locations

Table A.1 – Classification of safety services necessary for medical locations
(see also to 556.1 of IEC 60364-5-55)

Class 0 (no-break)	Automatic supply available at no-break
Class 0,15 (very short break)	Automatic supply available within 0,15 s
Class 0,5 (short break)	Automatic supply available within 0,5 s
Class 15 (medium break)	Automatic supply available within 15 s
Class >15 (long break)	Automatic supply available in more than 15 s
NOTE 1 Generally it is unnecessary to provide a no-break power supply for medical electrical equipment. However, certain microprocessor-controlled equipment may require such a supply. NOTE 2 Safety services provided for locations having differing classifications should meet that classification which gives the highest security of supply. Refer to Annex B for guidance on the association of classification of safety services with medical locations. NOTE 3 The notation “within” implies “≤”.	

Annex B
(informative)

Examples for allocation of group numbers and classification for safety services of medical locations

A definitive list of medical locations showing their assigned groups is impracticable, as the use to which locations (rooms) might be put will differ between countries and even within a country. The accompanying list of examples is provided as a guide only.

Table B.1 – List of examples

Medical location		Group			Class	
		0	1	2	≤0,5 s	>0,5 s ≤15 s
1.	Massage room	X	X			X
2.	Bedrooms		X			
3.	Delivery room		X		X [a]	X
4.	ECG, EEG, EHG room		X			X
5.	Endoscopic room		X [b]			X [b]
6.	Examination or treatment room		X			X
7.	Urology room		X [b]			X [b]
8.	Radiological diagnostic and therapy room, other than mentioned under 21		X			X
9.	Hydrotherapy room		X			X
10.	Physiotherapy room		X			X
11.	Anaesthetic room			X	X [a]	X
12.	Operating theatre			X	X [a]	X
13.	Operating preparation room		X	X	X [a]	X
14.	Operating plaster room		X	X	X [a]	X
15.	Operating recovery room		X	X	X [a]	X
16.	Heart catheterization room			X	X [a]	X
17.	Intensive care room			X	X [a]	X
18.	Angiographic examination room			X	X [a]	X
19.	Haemodialysis room		X			X
20.	Magnetic resonance imaging (MRI) room		X			X
21.	Nuclear medicine		X			X
22.	Premature baby room			X	X [a]	X

[a] Luminaires and life-support medical electrical equipment which needs power supply within 0,5 s or less.

[b] Not being an operating theatre.

Explanations of terms listed in Table B.1

1. Massage room

2. General ward (bedrooms)

   Medically used room or group of rooms in which patients are accommodated for the duration of their stay in a hospital, or in any other medical establishment.

3. Delivery room

   Room in which the birth takes place.

4. Electrocardiography room (ECG), electroencephalography room (EEG), electrohysterography room (EHG)

5. Endoscopic room

   Room intended for application of endoscopic methods for the examination of organs through natural or artificial orifices.

   Examples of endoscopic methods are bronchoscopic, laryngoscopic, cystoscopic, gastroscopic and similar methods, if necessary performed under anaesthesia.

6. Examination or treatment room

7. Urology room (not being an operating theatre)

   Room in which diagnostic or therapeutic procedures are performed on the urogenital tract using medical electrical equipment, such as X-ray equipment, endoscopic equipment and high-frequency surgery equipment.

8. Radiological diagnostic room (radiological diagnostic and therapy room)

   Radiological diagnostic room.

   Room intended for the use of ionizing radiation for display of internal structures of the body by means of radiography or fluoroscopy or by the use of radio-active isotopes or for other diagnostic purposes.

   Therapy room.

   Room intended for the use of ionizing radiation to obtain therapeutic effects.

9. Hydrotherapy room

   Room in which patients are treated by hydrotherapeutic methods. Examples of such methods are therapeutic treatments with water, brine, mud, slime, clay, steam, sand, water with gases, brine with gases, inhalation therapy, electrotherapy in water (with or without additions), massage thermotherapy and thermotherapy in water (with or without additions).

   Swimming pools for general use and normal bathrooms are not considered as hydrotherapy rooms.

10. Physiotherapy room

    Room in which patients are treated by physiotherapeutic methods.

11. Anaesthetic room

    Medically used room in which general inhalation anaesthetics are administered.

    NOTE The anaesthetic room comprises for instance the actual operating theatre, the operating preparation room, the operating plaster room and treatment room.

12. Operating theatre

    Room in which surgical operations are performed.

13. Operating preparation room

    Room in which patients are prepared for an operation, e.g. by administering anaesthetics.

14. Operating plaster room

    Room in which plaster of Paris or similar dressings are applied while anaesthesia is maintained.

    NOTE Such a room belongs to the operating room group and is usually spatially connected to it.

15. Operating recovery room

    Room in which the patient under observation recovers from the influence of anaesthesia

    NOTE Such a room is usually very close to the operating room group but not necessarily part of it.

16. Heart catheterization room

    Room intended for the examination or treatment of the heart using catheters. Examples of applied procedures are measurement of action potentials of the haemodynamics of the heart, drawing of blood samples, injection of contrast agents or application of stimulants.

17. Intensive care room

    Room in which bed patients are monitored independently of an operation by means of medical electrical equipment. Body actions may be stimulated if required.

18. Angiographic examination room

    Room intended for displaying arteries or veins, etc. with contrast media.

19. Haemodialysis room

    Room in a medical establishment intended to connect patients to medical electrical equipment in order to detoxicate their blood.

20. Magnetic resonance imaging (MRI)

21. Nuclear medicine

22. Premature baby room

Bibliography

IEC 60364-4-44:2001, *Electrical installations of buildings – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-51:2001, *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60364-5-52:2001, *Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

IEC 60364-5-53:2001, *Electrical installations of buildings – Part 5-53: Selection and erection of electrical equipment – Isolation, switching and control*

IEC 60364-5-54:2002, *Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and equipotential bonding*

IEC 60617-2(DB) *Graphical symbols for diagrams*

– *Part 2: Symbol elements, qualifying symbols and other symbols having general application*
– *Part 3: Conductors and connecting devices*
– *Part 6: Production and conversion of electrical energy*
– *Part 7: Switchgear, controlgear and protective devices*
– *Part 8: Measuring instruments, lamps and signalling devices*

IEC 60755:1983, *General requirements for residual current operated protective devices*

IEC 61008-1:1996, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*

IEC 61009-1:1996, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

Standards Survey

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

Customer Service Centre (CSC)

International Electrotechnical Commission
3, rue de Varembé
1211 Genève 20
Switzerland

or

Fax to: **IEC**/CSC at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

A Prioritaire

Nicht frankieren
Ne pas affranchir

Non affrancare
No stamp required

RÉPONSE PAYÉE

SUISSE

Customer Service Centre (CSC)
International Electrotechnical Commission
3, rue de Varembé
1211 GENEVA 20
Switzerland

Enquête sur les normes

La CEI ambitionne de vous offrir les meilleures normes possibles. Pour nous assurer que nous continuons à répondre à votre attente, nous avons besoin de quelques renseignements de votre part. Nous vous demandons simplement de consacrer un instant pour répondre au questionnaire ci-après et de nous le retourner par fax au +41 22 919 03 00 ou par courrier à l'adresse ci-dessous. Merci !

Centre du Service Clientèle (CSC)

Commission Electrotechnique Internationale
3, rue de Varembé
1211 Genève 20
Suisse

ou

Télécopie: **CEI**/CSC +41 22 919 03 00

Nous vous remercions de la contribution que vous voudrez bien apporter ainsi à la Normalisation Internationale.

Nicht frankieren
Ne pas affranchir

Non affrancare
No stamp required

A Prioritaire

RÉPONSE PAYÉE

SUISSE

Centre du Service Clientèle (CSC)
Commission Electrotechnique Internationale
3, rue de Varembé
1211 GENÈVE 20
Suisse