IEC 60364-7-710

Edition 2.0 2021-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Installations électriques à basse tension –
Partie 7-710: Exigences pour les installations ou emplacements spéciaux – Locaux à usages médicaux

IEC 60364-7-710:2021-05(en-fr)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.020; 91.140.50

ISBN 978-2-8322-9592-2

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

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

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 60364-7-710 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock. It is an International Standard.

This second edition cancels and replaces the first edition published in 2002. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the scope provides improved information to the application of this document;
b) some terms and definitions have been revised;
c) the validity of the respective parts of the IEC 60364 series has been verified and clauses updated;
d) Clause 710.30 has been extended;

e) Clause 710.41 has been updated;

f) Clause 710.413 has been renumbered as Clause 710.411;

g) in 710.411 insulation fault location systems have been added;

h) Clause 710.421 has been extended to include arc fault detection devices;

i) Clause 710.44 has been added;

j) Clause 710.51 has been updated and now covers distribution boards and electrical operating areas;

k) Clause 710.514, has been extended and includes separate subclauses on diagrams, documentation and operating instructions;

l) Subclauses 710.531 to 710.537 have been added;

m) Clause 710.55 has been updated;

n) Clause 710.56 has been added;

o) Clause 710.6, Verification, has been revised;

p) Annex A was deleted, and the contents integrated into 710.560.4;

q) former Annex B is now Annex A and has been updated;

r) an informative Annex B on guidance concerning electromagnetic interferences (EMI) in installations of buildings has been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
64/2480/FDIS	64/2482/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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

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 document.

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

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

INTRODUCTION

For the purpose of this part of IEC 60364 (IEC 60364-7-710) the requirements of the general Parts 1 to 6 and Part 8 of IEC 60364 apply.

The IEC 60364-7-7XX parts of IEC 60364 contain particular requirements for special installations or locations which are based on the requirements of the general parts of IEC 60364 (IEC 60364-1 to IEC 60364-6 and IEC 60364-8). These IEC 60364-7-7XX parts are considered in conjunction with the requirements of the general parts.

The particular requirements of this part of IEC 60364 supplement, modify or replace certain of the requirements of the general parts of IEC 60364 being valid at the time of publication of this part. The absence of reference to the exclusion of a part or a clause of a general part means that the corresponding clauses of the general part are applicable (undated references).

Requirements of other 7XX parts being relevant for installations covered by this part also apply. This part may therefore also supplement, modify or replace certain of these requirements valid at the time of publication of this part.

The clause numbering of this part follows the pattern and corresponding references of IEC 60364. The numbers following the particular number of this part are those of the corresponding parts, or clauses of the other parts of the IEC 60364 series, valid at the time of publication of this part, as indicated in the normative references of this document (dated references).

If requirements or explanations additional to those of the other parts of the IEC 60364 series are needed, the numbering of such items appears as 710.101, 710.102, 710.103, etc.

In the case where new or amended general parts with modified numbering were published after this part was issued, the clause numbers referring to a general part in this Part 710 may no longer align with the latest edition of the general part. Dated references should be observed.

The particular requirements of this document apply to the electrical installations in medical locations.

The clause numbering following 710 are those of the corresponding parts or clauses of IEC 60364. The absence of reference to a part or a clause means that all parts of IEC 60364 are applicable.

In medical locations patients are likely to be subjected to the application of medical electrical (ME) equipment. Measures for the safety of patients and medical staff need to be enhanced due to:

i) the reduction in body resistance, since the skin is often cut or broken;

ii) the risk associated with loss of supply, especially to life supporting equipment;

iii) the increased risk of electric shock due to the presence of liquids, such as blood, saline and water (e.g. for irrigation).

Items (i) and (ii) affect the patient, whereas item (iii) affects the patient and medical staff.

For every activity and function in a medical location, the particular requirements for safety, including protection against electric shock and continuity of supply, need to be considered.

Safety can be achieved by the application of this document and the safe operation and maintenance of ME equipment.

Variations of this document to further enhance safety and reliability are acceptable.

Annex C provides a statement about the inclusion of text concerning particular conditions that are existing in certain countries and that state exceptions to the respective subclauses.

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

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 provide safety of patients and medical staff. These requirements refer to:

– hospitals and clinics or equivalent institutions (including equivalent transportable and mobile locations);

which, subject to assessment (710.30), can also include:

– sanatoriums and health clinics;
– dedicated locations in homes for senior citizens and aged care homes, where patients receive medical care;
– medical centres, outpatients' clinics and departments, casualty wards;
– other outpatients' institutions (industrial, sports and others);
– medical and dental practices;
– dedicated medical rooms in the workplace;
– other locations where medical electrical equipment is used;
– veterinary clinics;
– rooms in existing installations where a change of utilization for medical applications occur.

This list is not exhaustive.

The requirements of this document do not apply to ME equipment or ME systems.

NOTE 1 ME equipment and ME systems are covered by IEC 60601 (all parts).

NOTE 2 In the USA, the requirements of NFPA 70®, National Electrical Code® in general and specifically article 517 (Healthcare Facilities) apply.

710.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-826, *International Electrotechnical Vocabulary – Part 826: Electrical installations* (available at http://www.electropedia.org)

IEC 60364-1:2005, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60364-4-41:2005*, Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*
IEC 60364-4-41:2005/AMD1:2017

IEC 60364-4-42:2010, *Low-voltage electrical installations – Part 4-42: Protection for safety – Protection against thermal effects*
IEC 60364-4-42:2010/AMD1:2014

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*
IEC 60364-4-44:2007/AMD1:2015
IEC 60364-4-44:2007/AMD2:2018

IEC 60364-5-51:2005, *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60364-5-52:2009, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

IEC 60364-5-53:2019, *Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Devices for protection for safety, isolation, switching, control and monitoring*
IEC 60364-5-53:2019/AMD1:2020

IEC 60364-5-56:2018, *Low-voltage electrical installations – Part 5-56: Selection and erection of electrical equipment – Safety services*

IEC 60364-6:2016, *Low voltage electrical installations – Part 6: Verification*

IEC 60947-6-1, *Low-voltage switchgear and controlgear – Part 6-1: Multiple function equipment – Transfer switching equipment*

IEC 61439 (all parts), *Low-voltage switchgear and controlgear assemblies*

IEC 61557-8:2014, *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 61557-9:2014, *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 9: Equipment for insulation fault location in IT systems*

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

710.3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-826, IEC 60364-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

710.3.1
medical location
location intended for purposes of diagnosis, treatment, monitoring and care of patients

710.3.2
patient
living being (person or animal) undergoing a medical, surgical or dental procedure

[SOURCE: IEC 60601-1:2005, 3.76, modified – The note has been deleted.]

710.3.3
medical electrical equipment
ME equipment
electrical equipment having an applied part or transferring energy to or from the patient or detecting such energy transfer to or from the patient and which is

a) provided with not more than one connection to a particular supply mains, and
b) intended by its manufacturer to be used in the diagnosis, treatment, or monitoring of a patient, or for compensation or alleviation of disease, injury or disability

Note 1 to entry: ME equipment includes those accessories as defined by the manufacturer that are necessary to enable the normal use of the ME equipment.

[SOURCE: IEC 60601-1:2005, 3.63, modified – Notes 2, 3, 4 and 5 have been deleted.]

710.3.4
applied part
part of ME equipment that in normal use necessarily comes into physical contact with the patient for ME equipment or an ME system to perform its function

[SOURCE: IEC 60601-1:2005, 3.8, modified – The notes have been deleted.]

710.3.5
medical electrical system
ME system

combination, as specified by its manufacturer, of items of equipment, at least one of which is ME equipment to be inter-connected by functional connection or by use of a multiple socket-outlet

[SOURCE: IEC 60601-1:2005, 3.64, modified – The note has been deleted.]

710.3.6
patient environment
any volume in which intentional or unintentional contact can occur between a patient and parts of the ME equipment or ME system or between a patient and other persons touching parts of the ME equipment or ME system

Note 1 to entry: For illustration see Figure 710.1.

Note 2 to entry: This applies where the patient's position is pre-determined.

[SOURCE: IEC 60601-1:2005, 3.79, modified – The notes have been added.]

710.3.7
group 0
medical location where ME equipment or ME systems are not intended to be used

710.3.8
group 1
medical location where ME equipment or ME systems are intended to be used externally or invasively on any part of the patient and where discontinuity of the electrical supply, such as protection against electric shock, does not represent a risk to the safety of the patient

710.3.9
group 2
medical location where ME equipment or ME systems are intended to be used intrusively, externally or invasively to any part of the patient and where discontinuity of the electrical supply, such as protection against electric shock, represents a risk to the safety of the patient

710.3.10
medical IT system
electric IT system fulfilling all specific additional requirements of group 2 medical locations

Note 1 to entry: All specific requirements for medical locations of group 2 are reflected.

710.3.11
main distribution board
distribution board that fulfils all the functions of a main electrical distribution for the supplied area assigned to it and where the voltage is measured for operating the electric supply system for safety services

710.3.12
electric source for safety services
electric source intended to be used as part of an electric supply system for safety services

[SOURCE: IEC 60050-826:2004, 826-10-05]

710.3.13
medical insulation monitoring device
MED-IMD
specific insulation monitoring device (IMD) dedicated to monitor medical IT systems

[SOURCE: IEC 61557-8:2014, 3.1.22, modified – "of a group 2 medical location" has been deleted]

710.3.14
insulation fault location system
IFLS
device or combination of devices used for insulation fault location in IT systems, where the insulation fault location system is used in addition to an insulation monitoring device and is used to locate insulation faults

Note 1 to entry: An IFLS injects a locating current between the electrical system and earth.

[SOURCE: IEC 61557-9:2014, 3.1.1]

710.3.15
uninterruptible power system
UPS
combination of convertors, switches and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of input power failure

Note 1 to entry: Continuity of load power occurs when voltage and frequency are within rated steady-state and transient tolerance bands, and with distortion and interruptions within the limits specified for the output port. Input power failure occurs when voltage and frequency are outside rated steady-state and transient tolerance bands, or with distortion or interruptions outside the limits specified for the UPS.

[SOURCE: IEC 62040-1:2017, 3.101]

710.30 Assessment of general characteristics

Add:

The designer, in conjunction with medical staff and the person(s) responsible for medical safety, shall consider what effects discontinuity of the electric supply will have on the ME equipment or ME systems including:

– the duration of the discontinuity (failure) of the electrical supply;
– the effect of any supply interruption on the treatment, monitoring or examination, including if any procedure repetition is hazardous to the patient or if it is impossible to repeat the examination results.

A comprehensive assessment shall be performed to identify the proper electrical supply requirements for the ME equipment, ME systems and supporting electrical equipment intended to be used.

Having identified these requirements, the appropriate classification for the medical location shall be determined. In order to determine the extent of a medical location, all possible patient positions shall be considered.

Where assessment shows any given location that falls into both group 1 or group 2 categories, the location shall be classified as group 2.

NOTE 1 For the classification of electric supply systems for safety services, see IEC 60364-5-56 and 710.560.4.1.

NOTE 2 Guidance on the allocation of a group number and classification of electric supply systems for safety services for medical locations is shown in Annex A.

710.31 Purposes, supplies and structure

710.312.2 Types of system earthing

Add:

A TN-C system shall not be used downstream of the main distribution board.

710.313 Supplies

710.313.1 General

Add:

710.313.1.101 Supplies for electric supply systems for safety services and standby systems in medical locations of group 1 and group 2

In medical locations of group 1 and group 2, the distribution system shall be designed and installed to facilitate the automatic transfer switching or automatic change-over equipment from the main distribution network to the electric source for safety services feeding essential loads (see IEC 60364-5-56). Consideration shall be given to all other essential medical and non-medical loads.

Consideration should also be given to the inrush current of any connected equipment.

NOTE This could also apply to group 0 medical locations.

710.313.1.102 Power supply for medical locations of group 2

In case of a single fault in the power supply, a total loss of power shall be prevented. This may be achieved by:

– provision of two independent supply lines, and/or
  - a UPS within the same fire section for supplying the medical IT system, or
  - a UPS that supplies a number of group 2 locations.

710.314 Division of installation

Add:

710.314.101

Final circuits for ME equipment and ME systems shall be for the exclusive use of such equipment.

710.41 Protection for safety – Protection against electric shock

710.410.3 General requirements

710.410.3.5

Replace with:

The protective measures of "obstacles" and "placing out of reach" shall not be used.

710.410.3.6

Replace with:

The protective measures of "non-conducting location", "protection by earth-free local equipotential bonding" and "electrical separation for the supply of more than one item of current-using equipment", shall not be used.

710.411 Protective measure: automatic disconnection of supply

710.411.3 Requirements for fault protection

710.411.3.2 Automatic disconnection in case of a fault

710.411.3.2.5

Replace with:

In medical locations of group 1 and group 2, where disconnection of the power supply cannot be achieved either by means of an overcurrent protection device in accordance with IEC 60364-4-41:2005, 411.3.2 and IEC 60364-4-41:2005/AMD1:2017, 411.3.2 or by means of a residual current protective device (RCD), the following applies.

– For IT, TN and TT systems, the permissible touch voltage U_L shall not exceed 25 V AC ($U_L \leq$ 25 V AC) or 60 V DC ($U_L \leq$ 60 V DC).
– In TN systems, 25 V AC ($U_L \leq$ 25 V AC) or 60 V DC ($U_L \leq$ 60 V DC) can be maintained using supplementary protective equipotential bonding.

The provisions described in IEC 60364-4-41:2005/AMD1:2017, Annex D, shall not be applied.

710.411.3.3 Further requirements for socket-outlets and for the supply of mobile equipment for use outdoors

Add:

Where a medical IT system is used, additional protection by means of a residual current protective device (RCD) shall not be used.

710.411.4 TN system

710.411.4.5

Add:

In group 1 and group 2 medical locations, protection with residual current protective devices (RCDs) for TN circuits shall be in accordance with IEC 60364-4-41:2005/AMD:2017, 411.3.2.

710.411.5 TT system

710.411.5.2

Add:

In medical locations of group 1 or group 2, residual current protective devices (RCDs) for TT circuits shall be in accordance with IEC 60364-4-41:2005, 411.3.2 and IEC 60364-4-41:2005/AMD1:2017, 411.3.2.

710.411.6 IT system

Add:

710.411.6.1.101 Medical IT systems

In group 2 medical locations, a medical IT system, including the requirements of 710.411.6.3.101 and 710.512.1.101, shall be used for final circuits and where the same final circuit is connected to ME equipment or an ME system, located within the patient environment. Exceptions can be made for final circuits for

– equipment with a rated power greater than 5 kVA,
– X-ray equipment,
– the supply of the motors of fixed operating tables.

In medical locations of group 2, the supply to final circuits for socket-outlets for ME equipment and ME systems used for life-support of the patient, shall not be automatically disconnected in the event of a first fault.

710.411.6.3.101 Medical insulation monitoring device

The medical IT system shall be equipped with a medical insulation monitoring device (MED-IMD) in accordance with IEC 61557-8:2014, Annex A and Annex B.

NOTE 1 In addition to information given by a remote insulation warning, the following events could be constantly displayed:

– status of the power supply lines for medical locations of group 2;
– circuit breaker tripping;
– other disorders that are important for the operation of the medical location;
– malfunction of communication systems;

with the possibility to forward all information to technical staff.