INTERNATIONAL STANDARD

IEC 60364-7-701

Second edition
2006-02

Low-voltage electrical installations –

Part 7-701: Requirements for special installations or locations – Locations containing a bath or shower

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 7-701: Requirements for special installations or locations – Locations containing a bath or shower

FOREWORD

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International Standard IEC 60364-7-701 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

This second edition cancels and replaces the first edition published in 1984, and constitutes a technical revision.

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

– Extension of the requirements of zone 3 for the whole area of the room containing a bath tub or a shower basin and consequently deletion of any reference to zone 3.
– Applicability of the requirements of this part when fixed prefabricated bath or shower units are installed.
– Clarification of requirements concerning the local equipotential bonding.
– Introduction of particular requirements for specific switchgear, accessories and current-using-equipment installed in zone 1 and 2.

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

FDIS	Report on voting
64/1494/FDIS	64/1513/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 following standards belong to the IEC 60364-7 series, under the general title *Low voltage electrical installations – Part 7: Requirements for special installations or locations*:

Part 7-704: Construction and demolition site installations[1]

Part 7-705: Agricultural and horticultural premises[1]

Part 7-706: Conducting locations with restricted movement[1]

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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- withdrawn;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.

[1] To be published.

700.1 Introduction

The requirements of this part of IEC 60364 supplement, modify or replace certain of the general requirements of the other parts of IEC 60364.

The clause numbering of Part 7-701 follows the pattern and corresponding references of IEC 60364. The numbers following the particular number of Part 7-701 are those of the corresponding parts, or clauses of IEC 60364.

The absence of reference to a part, a clause or a subclause means that the corresponding general requirements are applicable.

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 7-701: Requirements for special installations or locations – Locations containing a bath or shower

701 Locations containing a bath or shower

701.1 Scope

The particular requirements of this part of IEC 60364 apply to the electrical installations in locations containing a fixed bath (bath tub) or shower and to the surrounding zones as described in this standard.

This standard does not apply to emergency facilities, e.g. emergency showers used in industrial areas or laboratories.

NOTE 1 For locations containing a bath or shower for medical treatment, special requirements may be necessary.

NOTE 2 For prefabricated bath and/or shower units, see also IEC 60335-2-105.

NOTE 3 In Germany, the term locations may be interpreted as rooms of buildings.

701.2 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, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

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

IEC 61558-2-5, *Safety of power transformers, power supply units and similar – Part 2-5: Particular requirements for shaver transformers and shaver supply units*

701.30 Assessment of general characteristics

701.30.1 General

When applying this standard, the zones specified in 701.30.2 to 701.30.4 shall be taken into account. For fixed prefabricated bath or shower units, the zones are applied to the situation when the bath or shower basin is in its usable configuration(s).

Horizontal or inclined ceilings, walls with or without windows, doors, floors and fixed partitions may limit the extent of locations containing a bath or shower as well as their zones. Where the dimensions of fixed partitions are smaller than the dimensions of the relevant zones, e.g. partitions having a height lower than 225 cm, the minimum distance in horizontal and vertical direction shall be taken into account (see Figures 701.1 and 701.2).

For electrical equipment in parts of walls or ceilings limiting the zones specified in 701.30.2 to 701.30.4, but being part of the surface of that wall or ceiling, the requirements for the respective zone apply.

NOTE In Ireland, a zone 3 exists within 2400 mm horizontally from zone 2, and 750 mm above zones 1 and 2.

701.30.2 Description of zone 0

Zone 0 is the interior of the bath tub or shower basin, see Figure 701.1.

For showers without basin, the height of zone 0 is 10 cm and its surface extent has the same horizontal extent as zone 1, see Figure 701.2.

NOTE 1 In Spain, for showers without basin, the height of zone 0 is 5 cm.

NOTE 2 In Germany this requirement is not relevant.

701.30.3 Description of zone 1

Zone 1 is limited

a) by the finished floor level and the horizontal plane corresponding to the highest fixed shower head or water outlet or the horizontal plane lying 225 cm above the finished floor level, whichever is higher,

NOTE 1 In Belgium, Denmark, Hungary and Italy, if the bottom of the bath tub or shower basin is located higher than 15 cm from the floor level, the horizontal plane is located 225 cm above the bottom of bath tub or shower basin.

NOTE 2 In the Netherlands 225 cm is replaced by 260 cm.

NOTE 3 In the Czech Republic and in Spain the zone 2 is considered above the zone 1 as far as the ceiling or the horizontal plane lying 300 cm above the finished floor level, whichever is higher.

b) by the vertical surface:

- circumscribing the bath tub or shower basin (see Figure 701.1),
- at a distance of 120 cm from the centre point of the fixed water outlet on the wall or ceiling for showers without basin (see Figure 701.2).

Zone 1 does not include zone 0.

The space under the bath tub or shower is considered to be zone 1.

NOTE 4 In Spain, and for showers without basin, where the water outlet is fixed the vertical limit is fixed at 60 cm around the water outlet.

NOTE 5 In Spain, the space under the bath tub or shower basin accessible without the use of a tool is considered to be zone 1. If it is accessible only with the use of a tool, it is considered to be neither zone 0, nor 1 nor 2.

701.30.4 Description of zone 2

Zone 2 is limited

a) by the finished floor level and the horizontal plane corresponding to the highest fixed shower head or water outlet or the horizontal plane lying 225 cm above the finished floor level, whichever is higher,

NOTE 1 In the Netherlands, 225 cm is replaced by 260 cm.

b) by the vertical surface at the boundary of zone 1 and the parallel vertical surface at a distance of 60 cm from the zone 1 border (see Figure 701.1).

For showers without basin, there is no zone 2 but an increased zone 1 is provided by the horizontal dimension of 120 cm mentioned in the second dash of 701.30.3 b) (see Figure 701.2).

NOTE 2 In Spain, zone 2 exists in any case.

701.4 Protection for safety

701.414 Protective measure: extra-low-voltage provided by SELV and PELV

701.414.1 General

Protection against direct contact in zones 0, 1 and 2 shall be provided for all electrical equipment by:

– barriers or enclosures affording a degree of protection of at least IPXXB or IP2X, or

– insulation capable of withstanding a test voltage of 500 V a.c. r.m.s for 1 min.

NOTE In Belgium and Italy, PELV is not permitted.

Annex B Obstacles and placing out of reach

701.B.2 Obstacles

Protection against direct contact by means of obstacles is not permitted.

701.B.3 Placing out of reach

Protection against direct contact by placing out of reach is not permitted.

701.415 Additional protection

701.415.1 Additional protection: residual current protective devices (RCDs)

In rooms containing a bath or shower, one or more residual current protective devices (RCDs) with a rated residual operating current not exceeding 30 mA shall provide protection of all circuits. The use of such RCDs is not required for circuits:

– with the protective measure "protection by electrical separation" if any circuit supplies one single current using equipment;

– with the protective measure "SELV or PELV".

NOTE 1 In the Czech Republic, Germany, Hungary and Slovenia, additional protection by a residual current protective device with a rated residual operating current not exceeding 30 mA is not required for circuits supplying fixed installed water heating appliances only.

NOTE 2 In Belgium, Italy, Russia and Spain, PELV is not permitted.

NOTE 3 In Spain, these requirements do not apply outside:

- zones 0, 1 and 2;
- the zone limited by the boundary of the zone 2 and the vertical surface at a distance of 240 cm from the zone 2 border, with a height of 225 cm above the finished floor level; and
- the space placed above zone 2, up to the ceiling or a height of 3 m, whichever is lower.

701.415.2 Additional protection: supplementary protective equipotential bonding

Modify:

Local supplementary equipotential bonding according to 415.2 shall be established, connecting the protective conductor to the exposed-conductive-parts and accessible extraneous-conductive-parts within a room containing a bath tub and/or a shower.

Supplementary equipotential bonding may be erected outside or inside rooms containing a bath or shower, preferably close to the point of entry of extraneous-conductive-parts into such rooms.

The cross-sectional area of these local protective equipotential bonding conductors shall be in accordance with 543.1.3 of IEC 60364-5-54.

The following are examples of possible extraneous-conductive-parts:

– metallic parts of water supply systems and metallic parts of waste water systems;
– metallic parts of heating systems and metallic parts of air conditioning systems;
– metallic parts of gas supply systems;
– accessible structural metallic parts.

Plastic sheathed metal pipes are not required to be connected to the local supplementary equipotential bonding provided they are not accessible in the location and unless they are connected to accessible conductive parts which are not themselves bonded.

NOTE 1 In the USA, all metallic non-current carrying parts of the electrical system, including those that are plastic sheathed, shall be connected to the supplementary equipotential bonding system.

NOTE 2 In Finland, Great Britain and Switzerland, because of the main equipotential bonding in a building, there is no need for the additional equipotential bonding.

In cases where in a building is no main equipotential bonding, the following extraneous-conductive-parts which enter into rooms containing a bath or shower shall be part of the supplementary equipotential bonding:

– parts of fresh water supply systems and waste water systems;
– parts of heating systems and air conditioning systems;
– parts of gas supply systems.

NOTE 3 In Spain, these requirements do not apply outside:

- Zones 0, 1 and 2;
- the zone limited by the boundary of the zone 2 and the vertical surface at a distance of 240 cm from the zone 2 border, with a height of 225 cm above the finished floor level; and
- the space placed above zone 2, up to the ceiling or a height of 3 m, whichever is lower.

Annex C Protective measures for application only when the installation is controlled or under the supervision of skilled or instructed persons

701.C.1 Non-conducting location

Protection against indirect contact by using the measure “Non-conducting location” is not permitted.

701.C.2 Protection by earth-free local equipotential bonding

Protection against indirect contact by earth-free equipotential bonding is not permitted.

701.413 Protective measure: electrical separation

701.413.1 General

To add:

Protection by electrical separation shall only be used for

– circuits supplying one item of current-using equipment; or
– one single socket-outlet.

For electric floor heating systems, see 701.753.

701.5 Selection and erection of electrical equipment

701.512.2 External influences

To add:

Erected electrical equipment (see 701.512.4 and 701.55) shall have at least the following degrees of protection:

– in zone 0: IPX7;

– in zone 1: IPX4;

NOTE 1 In Spain, equipment other than lighting installed in the zone above zone 1 (e.g. acoustical signal devices for care homes) should have at least a degree of protection IPX4.

– in zone 2: IPX4.

This requirement does not apply to shaver supply units complying with IEC 61558-2-5 installed in zone 2 and where direct spray from showers is unlikely.

Electrical equipment exposed to water jets e.g. for cleaning purposes in a public bath shall have a degree of protection at least IPX5.

NOTE 2 In Finland, if the room is directly connected to sauna, electrical equipment in the room outside zone 0, 1 and 2, shall have a degree of protection at least IPX1.

701.512.3 Protection of wiring systems according to external influences

To add:

The following requirements apply:

a) Wiring systems supplying electrical equipment in zones 0, 1 or 2 and erected on parts of walls which are limiting these zones shall be mounted either on the surface or embedded within a wall at a minimum depth of 5 cm.

Wiring systems supplying current-using equipment in zone 1 shall be erected:

– either vertically from above or horizontally through the wall on the rear of the appliance when the fixed equipment is mounted above the bath tub (e.g. water heating appliances),

– either vertically rising from below or horizontally through the adjacent wall when the equipment is placed in the space below the bath tub.

NOTE 1 In Czech Republic, the erection of wiring systems on the surface of walls or partitions is permitted only for exceptional cases (temporary installations and for short connections to fixed appliances).

b) All other embedded wiring systems including their accessories in parts of walls or partitions which limit a zone 0, 1 or 2 shall be at least 5 cm deep from the zone limiting wall surface.

NOTE 2 In Hungary, this requirement only applies to zone 0 and 1.

c) Where a) or b) are not fulfilled, wiring systems may be erected either if:

– the circuits are protected either by one of the protective measures SELV or PELV or electrical separation; or

NOTE 3 In Belgium, Italy and Spain, PELV is not permitted.

– the circuits are protected by additional protection according to 412.5 of IEC 60364-4-41 provided by RCDs with a rated residual operating current not exceeding 30 mA. Such circuits shall contain a protective conductor; or

– embedded cable or conductors incorporating an earthed metallic covering which complies with the requirements for a protective conductor of the circuit concerned, or the cables or conductors are enclosed in earthed conduit, trunking or ducting satisfying the requirements of this standard for a protective conductor, or of insulated concentric construction is used; or

NOTE 4 In Belgium and in Czech Republic not applicable.

NOTE 5 In Czech Republic not applicable, however cables insulation of which satisfies 413.2 are permitted.

– embedded cable or conductors provided with mechanical protection, e.g. metallic conduit that is likely to prevent penetration of the cable by nails, screws, drills and the like is used.

NOTE 6 In France, metal sheath is not permitted.

NOTE 7 In Germany the specifications for wiring systems as mentioned under item a) and for the remaining wall thickness as mentioned under b) and c) are applicable not only in certain zones but in the total location with a measure of at least 6 cm.

701.512.4 Erection of switchgear, controlgear and accessories according to external influences

NOTE 1 In Ireland, wall-mounted switches, and socket-outlets except in shaver outlets, are prohibited in bathrooms.

The following switchgear and controlgear are permitted within the zones:

Zone 0:

– none.

Zone 1:

– junction boxes and fittings for the supply of current-using equipment permitted in zone 0 and 1 by 701.55;

– accessories, including socket-outlets, of circuits protected by SELV or PELV with a rated voltage not exceeding 25 V a.c. or 60 V d.c. The source of supply shall be installed outside zones 0 and 1.

NOTE 2 In Czech Republic, accessories of circuits protected by SELV with a rated voltage not exceeding 12 V a.c. or 30 V d.c. only are permitted. The source of supply shall be installed outside zones 0, 1 and 2.

NOTE 3 In Belgium, France and Slovenia, only accessories of circuits protected by SELV with a rated voltage not exceeding 12 V a.c. or 30 V d.c. are permitted. The source of supply shall be installed outside zones 0, 1 and 2 .

NOTE 4 In Italy, only switches of circuits protected by SELV with a rated voltage not exceeding 12 V a.c. or 30 V d.c. are permitted. The source of supply shall be installed outside zones 0, 1 and 2 .

NOTE 5 In Spain, switches and fixed apparatus of circuits protected by SELV with a rated voltage not exceeding 12 V a.c. or 30 V d.c. only are permitted. The source of supply shall be installed outside zones 0, 1 and 2.

NOTE 6 In Italy and Spain PELV system is not permitted.

Zone 2:

– accessories other than socket-outlets;

– accessories, including socket-outlets, of circuits protected by SELV or PELV. The source of supply shall be installed outside zones 0 and 1.

NOTE 7 In Spain, switches or socket-outlets circuits protected by SELV or PELV with a rated voltage not exceeding 12 V a.c. or 30 V d.c. only are permitted. The source of supply shall be installed outside zones 0, 1 and 2.

NOTE 8 In Italy, only switches of circuits protected by SELV with a rated voltage not exceeding 12 V a.c.. or 30 V d.c. only are permitted. The source of supply shall be installed outside zones 0,1 and 2.

NOTE 9 In Belgium, France, Italy and Spain PELV system is not permitted.

– shaver supply units according to IEC 61558-2-5;
– accessories, including socket-outlets, for signalling and communications equipment, provided such equipment is protected by SELV or PELV.

For the erection of switchgear, controlgear and accessories, the requirements of 701.512.3b) with regard to the matter of the remaining wall thickness remain applicable.

NOTE 10 In the UK, socket-outlets are prohibited within a distance of 240 cm of zone 2.

NOTE 11 In Ireland, sockets-outlets and wall switches are prohibited within a distance of 240 cm from zone 2.

NOTE 12 In Norway, where IT-distribution systems are used, circuits supplying fixed installed current-using equipment shall be provided with switches that disconnect all live conductors.

701.55 Current-using equipment

To add:

In zone 0, current-using equipment shall only be erected provided that the equipment simultaneously:

– complies with the relevant standard and is suitable for use in that zone according to the manufacturer's instructions for use and mounting,
– is fixed and permanently connected, and
– is protected by SELV with a rated voltage not exceeding 12 V a.c. or 30 V d.c.

In zone 1, only fixed and permanently connected current-using equipment shall be installed. The equipment shall be suitable for installation in zone 1 according to the manufacturer's instruction for use and mounting. Such equipment is:

– whirlpool units;
– shower pumps;
– equipment protected by SELV or PELV with a rated voltage not exceeding 25 V a.c. or 60 V d.c., e.g. luminaires;

NOTE 1 In Italy, PELV is not permitted.

– ventilation equipment;
– towel rails;
– water heating appliances;
– luminaires.

NOTE 2 In Denmark and Spain, ventilation equipment, towel rails and luminaires non protected by SELV or PELV with a rated voltage exceeding 12 V a.c. or 30 V d.c. shall be installed outside zones 0 and 1.

701.753 Electric floor heating systems

To add:

For electric floor heating systems, only heating cables according to relevant product standards or thin sheet flexible heating elements according to the relevant equipment standard shall be erected provided that they have either a metal sheath or a metal enclosure or a fine mesh metallic grid. The fine mesh metallic grid, the metal sheath or the metal enclosure shall be connected to the protective conductor of the supply circuit. Compliance with the latter requirement is not mandatory if the protective measure SELV is provided for the floor heating system.

For electric floor heating systems the protective measure "protection by electrical separation" is not permitted.

All dimensions are in centimeters

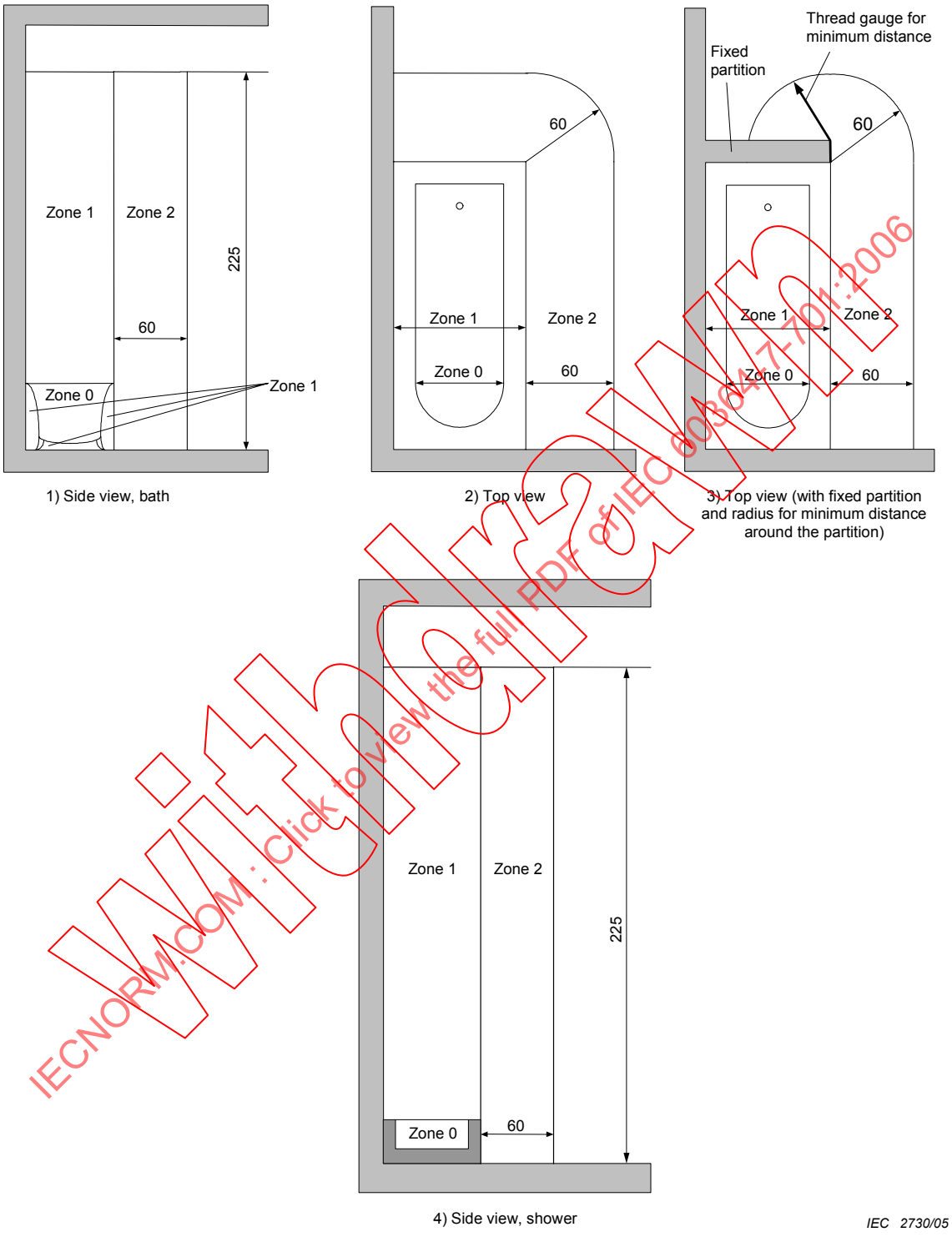

Figure 701.1 – Dimensions of zones in locations containing a bath tub or shower with a basin