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NZEC 2:1993

NEW ZEALAND ELECTRICAL CODE OF PRACTICE

for

ELECTRICAL INSTALLATIONS

IN DAMP SITUATIONS

Issued by the Office of
The Chief Electrical Inspector,
Energy and Resources Division, Ministry of Commerce

THE ELECTRICITY ACT 1992

APPROVAL OF ELECTRICAL CODE OF PRACTICE

FOR

ELECTRICAL INSTALLATIONS IN DAMP SITUATIONS

Pursuant to Section 36 of the Electricity Act 1992 ("the Act")

On the 1st day of February 1993, the Secretary of Commerce issued the Electrical Code of Practice for Electrical Installations in Damp Situations ("the Code")

On the 4th day of February 1993, pursuant to Section 38 of the Act the Secretary published in the Gazette a notice of intention to apply to me for approval of the code, and there has been consultations with such persons (or their representatives) as will be affected by the Code and they have had the opportunity to consider possible effects and comment on those effects.

I have considered the comments concerning those effects and where necessary amendments were made to the Code.

Therefore Pursuant to Section 38 of the Act, I, John Luxton, Minister of Energy, have this day approved the Code as attached to this approval, which Code shall come into force on the 1st day of April 1993.

Dated this 18th day of March 1993.

John Luxton
Minister of Energy.

COMMITTEE REPRESENTATION

This Code of Practice was prepared by the Ministry of Commerce, Chief Electrical Inspector's Office with reference to the following organisations:

New Zealand Electrical Contractors' Association Inc.
Electrical Supply Engineers' Association of NZ
New Zealand Electrical Institute
Electrical Inspectors' Association
Institution of Professional Engineers of New Zealand

ACKNOWLEDGEMENT

The source material for this Code was derived from the following documentation, Australian Standard AS 3000, IEC Standards 364-7-701 and 364-7-702.

REVIEW

This Code of Practice will be revised as occasions arise. Suggestions for improvement of this Code are welcome. They should be sent to the Chief Electrical Inspector's Office, Ministry of Commerce, P O Box 1473, WELLINGTON.

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INTRODUCTION

Damp situations are areas in which moisture is either permanently present, or intermittently present to such an extent as to impair the effectiveness or safety of an installation conforming with the requirements for ordinary situations. Owing to the different nature of these installations, specific requirements are set out in this Code as to the position of electrical fittings and electrical appliances that can be installed by introducing the method of zoned areas.

The essential purpose of this Code is to draw specific attention to the electrical regulations which are particularly relevant to these installations, to give some details on methods of application, and to give some additional requirements which have been deemed desirable to meet the special circumstances involved.

In general, electrical safety is ensured by the implementation of two considerations. Firstly, the location of electrical Fittings and electrical appliances in these areas. Secondly, the design of electrical fittings and electrical appliances and their installation in accordance with measures recommended for the area.

SECTION 1

SCOPE, APPLICATION, REFERENCED DOCUMENTS, INTERPRETATIONS, GLOSSARY AND NUMBERING

1.1 SCOPE

This Code of Practice applies to the installation of electrical fittings or electrical appliances in situations where water is recognised to be permanently or intermittently present in the form of ice, liquid, or vapour. These requirements are intended to:

- (a) Prevent the ingress of moisture to electrical fittings or electrical appliances by means of suitable location and the use of suitable enclosures or fittings; and
- (b) Protect against the increased susceptibility of the human body to electric shock in situations where the hands, feet or body are likely to be wet.

Conventionally the resistance of the human body is determined with the skin being dry or moist with perspiration but not wet. Considerably reduced body resistance is to be expected in locations where parts of the body are immersed in water.

1.2 APPLICATION

This Code applies to the following recognised damp situations:

- (a) in or near swimming and spa pools of the fixed or collapsible type; and
- (b) areas within bathrooms, showers, laundries, washrooms, kitchens and similar locations containing baths, showers or fixed basins; and
- (c) in or near fountains or water features; and
- (d) areas within controlled atmosphere rooms such as freezers or cold rooms; and
- (e) areas where hosing down operations occur.

1.3 REFERENCED DOCUMENTS

The following standard is referred to in this Code:

AS 1939 Classification of degrees of protection provided by enclosures.

1.4 INTERPRETATIONS

- 1.4.1 Damp situation - means a situation in which moisture is either permanently present, or intermittently present to such an extent as to be likely to impair the effectiveness or safety of an installation.

- 1.4.2 Degree of protection - the extent of protection provided by an enclosure against access to live parts, for ingress of solid foreign objects or the ingress of water and verified by standardized test methods in accordance with AS 1939.
- 1.4.3 Fountain - means a jet or jets of water made to spout for ornamental purposes.
- 1.4.4 IP Code - means a coding system to indicate the degree of protection provided by an enclosure against access to live parts from ingress of solid foreign objects, or the ingress of water and other liquids.
- 1.4.5 Pool - means any swimming pool, spout bath, plunge pool, wading pool, spa pool, swirl pool, therapeutic pool and other types of pool where a person is in direct contact with the water.
- 1.4.6 Water feature - means a pond or artificial river or similar decorative container or containers.
- 1.4.7 Zones - are volumes based on the dimensions of both horizontal and vertical planes.

1.5 GLOSSARY OF ABBREVIATIONS USED IN THIS CODE

AS	Australian Standard
C	Celsius
IP	Ingress protection code
mA	Milliamperes
mm	Millimetres
mm ²	Square millimetres
MIMS	Mineral insulated metal sheathed cable
l	Litres
PVC	Poly vinyl chloride
RCD	Residual current device

1.6 NUMBERING SYSTEM OF THIS CODE

- 1.6.1 Sections are numbered from 1 to 7.
- 1.6.2 Subsections are numbered by one full stop between two numbers.(eg: 1.6).
- 1.6.3 Clauses are numbered by two full stops between three numbers.(eg: 4.18.3).
- 1.6.4 Subclauses are numbered by three full stops between four numbers.(eg: 3.2.1.1).

- 1.6.5 Paragraphs contain numbering punctuated by one or more full stops together with a parenthesised letter.
- 1.6.6 Subparagraphs are represented by lower case roman numerals enclosed in parenthesis following paragraphs.

SECTION 2

COMMON REQUIREMENTS IN ALL DAMP SITUATIONS

2.1 FITTINGS

The covers of fittings and electrical appliances installed in any damp situation shall be arranged so that removal of the covers cannot be effected without the use of a tool.

2.2 MOUNTING

Fittings and electrical appliances installed in damp situations shall be either-

- (a) mounted on a block of durable insulated non-hygroscopic material;
- or
- (b) installed such that water cannot enter either the wiring or fitting itself.

2.3 LAMPHOLDERS

Lampholders installed in any damp situation shall be either:-

- (a) of the double-insulated type; or
- (b) of any other type which precludes the possibility of any external metal portion becoming alive by having the metal work effectively earthed.

2.4 FIXED ELECTRICAL APPLIANCE

Fixed electrical appliances installed in zones 0, 1, 2 or 3 shall be designed and constructed for the location and conditions, with a minimum degree of protection complying to;

Zone 0 : IPX8 or of special construction for the situation.

Zone 1 : IPX5

Zone 2 : IPX4

Zone 3 : IPX2

2.5 SWITCHBOARD

No switchboard or distribution board shall be installed in zones 0, 1, 2 or 3.

2.6 CONTROL PANELS

No control panel shall be installed in zone 0 or 1 and no control panel shall be installed in zone 2 or 3 unless protected against the ingress of moisture, complying with a minimum degree of protection IPX6.

The access to any control panel shall not be obstructed by any structure of the building or any non-removable fixture.

2.7 SWITCHES

No pendant switch or other switch connected to a flexible cord shall be used in any damp situation.

2.8 SOCKET-OUTLETS IN CUPBOARDS

For the purposes of this Code a cupboard with doors which can be secured in the closed position is not regarded as a damp situation.

SECTION 3

POOL INSTALLATIONS

3.1 GENERAL

In addition to Sections 1 and 2, the requirements of this section are intended to:

- (a) Protect electrical fittings from the corrosive effects of chemicals used in the treatment of water in pools; and
- (b) Counter the increased risks of using electrical fittings and electrical appliances in areas where the body is partially or completely immersed in water.

- 3.1.1 A transportable plug-in spa pool shall be protected by the use of a RCD affording personal protection having a residual operating current not exceeding 30mA, or an isolating transformer affording personal protection. The supply lead shall be a heavy duty flexible cord, in one continuous length.

3.2 CLASSIFICATION OF POOL AREA

- 3.2.1 Pools with a water capacity shall be treated under the requirements for baths.

- 3.2.2 The following zones apply to pools (examples are given in Figures 1A and 1B, at pages 14 and 15):

- Zone 0 - is the interior of the pool.
- Zone 1 - is limited by a vertical plane 1.5 m from the edge of the pool, by the floor or the surface expected to be occupied by persons and the horizontal plane 2.5 m above the floor or surface; and
 - where a pool contains diving boards, spring boards, starting blocks or a chute, Zone 1 is limited by a vertical plane situated 1.5 m around the diving boards, spring boards and starting blocks and by the horizontal plane 2.5 m above the highest surface expected to be occupied by persons.
- Zone 2 - is limited by the vertical plane external to Zone 1 and a parallel plane 1.5 m from that zone; and
 - is limited by the floor or surface expected to be occupied by persons and the horizontal plane 2.5 m above the floor or surface.

- 3.2.3 A wading pool attached to a swimming pool shall be considered as an extension to the swimming pool.

3.3 WIRING SYSTEMS WITHIN THE POOL AREA

- 3.3.1 Fixed wiring originating or terminating within a pool area.
- (a) Fixed wiring originating or terminating within a pool area shall be:
 - (i) elastomer or thermoplastic insulated and sheathed cables or flexible cords; and
 - (ii) installed in non-metallic enclosures not inferior to rigid PVC conduit with glued fittings, or in flexible PVC conduit or corrugated PVC conduit with appropriate fittings to prevent the ingress of moisture.
 - (b) All joints in cables shall be suitably enclosed to prevent the ingress of moisture, including possible siphoning of the pool water through the wiring enclosure. Access to such joints shall require the use of tools. Any joints in cables and any associated junction boxes shall be installed in accordance with the following requirements:
 - (i) in Zone 1, the joint or junction box shall be located at a height of not less than 0.45 m above either -
 - (a) the maximum water level of the pool; or
 - (b) any floor where a person may stand within the pool area.
 - (ii) outside Zone 1, the wiring enclosure shall be sealed with a waterproof seal in a position above maximum water level and between the pool and the cable joint.
 - (iii) it shall not be possible for water to siphon from the pool to any joints or junction boxes within the structure.
- 3.3.2 Fixed wiring passing through the pool area.
- (a) Fixed wiring not originating or terminating within the pool area, but passing through the pool zones, shall be installed in non-metallic enclosures not inferior to rigid PVC conduit with glued fittings or flexible PVC conduit with appropriate fittings to prevent the ingress of water.
 - (b) Joints in cables. Any joints in cables and associated junction boxes located within the pool area shall be provided with waterproof seals, shall be or sealed with a permanent waterproof setting compound.
- 3.3.3 Flexible cords used for the connection of electrical appliances and luminaries or fittings within the pool installation shall not be inferior to ordinary duty sheathed flexible cord.

3.4 WIRING ABOVE THE POOL AREA

Low and extra-low voltage overhead line conductors shall not be installed at a height of less than 5.0 m above any diving platform or structure on which a person may stand or climb, and in any case not less than 5.0 m above the water level of a pool.

High voltage overhead line conductors shall not be installed above a pool area.

3.5 MEANS OF CONNECTION

3.5.1 Fittings associated with pool installations, such as luminaires, filter pumps and the like, which are located in pool Zone 1, shall be permanently connected.

3.5.2 Threaded metallic parts of electrical appliances and fittings, shall be constructed of suitable corrosion resistant material.

3.6 FITTINGS

3.6.1 Fittings installed in the pool area shall be protected against the ingress of moisture with a minimum degree of protection IPX4.

This requirement need not apply where fittings that are installed are:

- (a) Shielded by a fixed, continuous physical barrier of not less than 1 m high measured from the water container of the pool; and
- (b) Not less than 0.5 m from the outer edge of the barrier.

3.6.1.1 Fittings associated with outdoor pools but located outside of the pool area shall be suitably protected against the weather.

3.6.2 Socket-outlets shall not be installed within pool Zones 0 or 1.

In Zone 2 socket-outlets shall be:

- (a) (i) located (for an in-ground pool) at a height of not less than 0.45 m above the maximum water level of the pool or above the coping of the pool; or
- (ii) installed (for an above-ground pool) at a height of not less than 0.45 m above ground level; or
- (iii) shielded by a fixed, continuous physical barrier of not less than 1 m high measured from the water container of the pool, provided that the socket-outlet is not less than 0.5 m from the outer edge of the barrier; and
- (b) Controlled by a manually operated switch and:
 - (i) supplied individually by an isolating transformer affording personal protection; or
 - (ii) supplied at safety extra-low voltage through an individual safety isolating transformer affording personal protection; or

- (iii) protected by the use of a RCD affording personal protection, having a residual operating current not exceeding 30mA.

3.6.3 Switches installed in Zone 0 and 1 shall be of a type having certification for use in such zones, and be supplied at a voltage not exceeding 12 volts from a safety isolating transformer affording personal protection. The switch shall have a minimum degree of protection of IPX7.

In Zone 1, air operated type switches, suitably located so as to prevent the ingress of moisture, are permitted.

In Zone 2, switches are permitted if they:

- (a) Comply with the requirements for Zones 0 and 1.
- (b) Are protected against the ingress of moisture with a minimum degree of protection IPX4; or
- (c) Are supplied at safety extra low voltage through an individual safety isolating transformer affording personal protection.

3.7 ELECTRICAL APPLIANCES

3.7.1 Electrical appliances in the pool Zone 0 shall be such that:

- (a) Each electrical appliance is supplied at safety extra-low or low voltage through an individual transformer affording personal protection; and either
- (b) The secondary conductor circuit of the transformer to each electrical appliance is not enclosed with other conductors and is not earthed; or
- (c) Electrical appliances are of the double insulated type and protected by a RCD affording personal protection, and having a residual operating current not exceeding 30mA.

3.7.1.1 This shall not preclude the use of a transformer having a number of secondary windings provided that:

- (a) Isolation of windings and terminations between each secondary winding comply to the requirements for personal protection; and
- (b) The secondary conductor circuit to each electrical appliance is not enclosed with other conductors and is not earthed.

3.7.1.2 Portable or fixed electrical appliances, such as pool chlorinators and sterilizers, which have parts that are intended to be immersed in or in direct contact with, the pool water during normal use shall be:

- (a) Constructed of suitable corrosion-resistant material; and
- (b) Protected against the ingress of moisture with minimum degree of protection IPX8.

- 3.7.2 Electrical appliances in pool Zone 1, such as filter pumps, that are:
- (a) Installed outside the pool; and
 - (b) Not immersed in, or in direct contact with, the pool water during normal use;
- shall be protected against the ingress of moisture with a minimum degree of protection IPX5.

3.8 LUMINARIES

- 3.8.1 Luminaries installed in pool Zone 0 shall:
- (a) Comply with the following constructional requirements.
 - (i) all parts of luminaries and wiring enclosures in contact with the water shall be of suitable corrosion-resistant material.
 - (ii) all wet-niche luminaries shall be provided with wiring enclosures protected against the ingress of moisture with minimum degree of protection IPX8.
 - (iii) dry-niche luminaries shall be installed in suitable recesses which are adequately drained.
 - (b) Be arranged so that:
 - (i) each luminaire is supplied at safety extra-low voltage through an individual safety isolating transformer affording personal protection; and
 - (ii) the secondary conductor circuit to each luminaire is not enclosed with other conductors and is not earthed; and
 - (iii) the voltage to each luminaire is not greater than 12 volts.
- This shall not preclude the use of a transformer having a number of secondary windings provided that:
- (i) isolation of windings and terminations between each secondary winding comply to the requirements for personal protection; and
 - (ii) the secondary conductor circuit to each underwater luminaire is not enclosed with other conductors and is not earthed.
- 3.8.2 Luminaries and lampholders installed within pool Zone 1 shall be fixed in position, have no exposed conductive parts, and be of one of the following types:
- (a) Lampholders having lamps of hardened glass construction and fitted with a protective guard or cover protected against the ingress of moisture with a minimum degree of protection IPX3, which can only be removed by the use of a tool; or
 - (b) Luminaries with lamps totally enclosed by a cover or diffuser protected against the ingress of moisture with a minimum degree of protection IPX5.

3.9 EARTHING AND BONDING

- 3.9.1 Means shall be provided to eliminate or limit any potential difference occurring:
- (a) Between different metallic parts of the pool in contact with the pool water, including water in the circulating or filtering system; and
 - (b) Between the pool water and metallic parts which may be accessible to persons fully or partially immersed in the pool water.
- This requirement shall be achieved by bonding the appropriate parts in accordance with Clause 3.9.2 or by other means which provides an equivalent degree of protection.

- 3.9.2 The following items shall be electrically bonded together:
- (a) The exposed conductive parts of any electrical fittings or electrical appliances in the pool area;
 - (b) Any metallic parts of electrical fittings or electrical appliances which are not separated from live parts by double insulation, and are in contact with the pool water including water in the circulation of filtering system; and
 - (c) The earthing contact of any socket-outlet provided for the connection of electrical fitting or electrical appliances installed in the pool zone.

If any of the items described in (a) or (b) above exist, the bonding shall be extended to the following additional items:

- (i) any fixed metallic parts of the pool structure, including the reinforcing metal of the pool shell and deck; and
 - (ii) any metallic fittings within or attached to the pool structure, such as pool ladders and diving boards; and
 - (iii) any fixed metal within 1 m of the pool Zone 0, such as metal fences, lamp standards and pipe work.
- 3.9.2.1 Normal tie-wires used during construction of reinforced concrete pools are considered to be an adequate electrical bond between the metallic reinforcing components. One point of connection to the reinforcement is satisfactory where bonding is required by subparagraph (i) of paragraph (c) of this clause.
- 3.9.2.2 Fixed metallic parts and fittings which are not part of electrical fittings and electrical appliances and which are not more than 100 mm in any dimension need not be bonded.
- 3.9.2.3 Underwater luminaire bezels shall be made of plastics and any associated fixing screws shall be insulated or of insulating material.

3.9.3 Earthing and bonding conductors.

All earthing and bonding conductors located within the pool zone and used for the earthing or bonding of electrical fittings or electrical appliances within the pool zone shall be insulated copper conductors, not smaller than 2.5 mm² for earthing conductors or 4 mm² for bonding conductors.

This requirement need not apply to earthing conductors incorporated -

- (a) With live conductors in sheathed cables used for fixed wiring; or
- (b) In a flexible cord associated with the fixed wiring of an electrical appliance.

Figure 1a

ZONE DIMENSIONS OF SWIMMING AND SPA POOLS

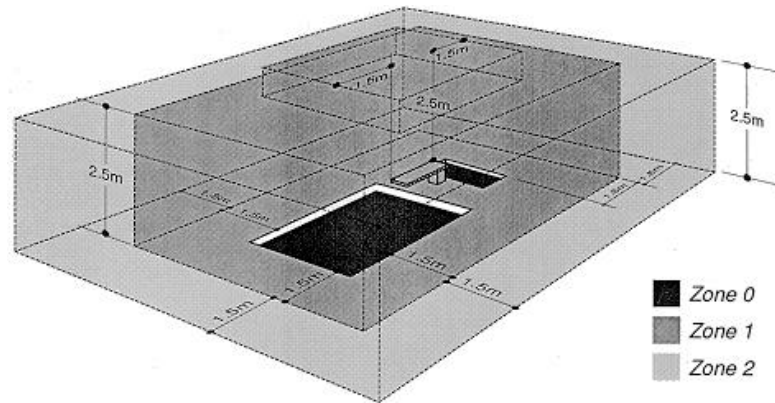
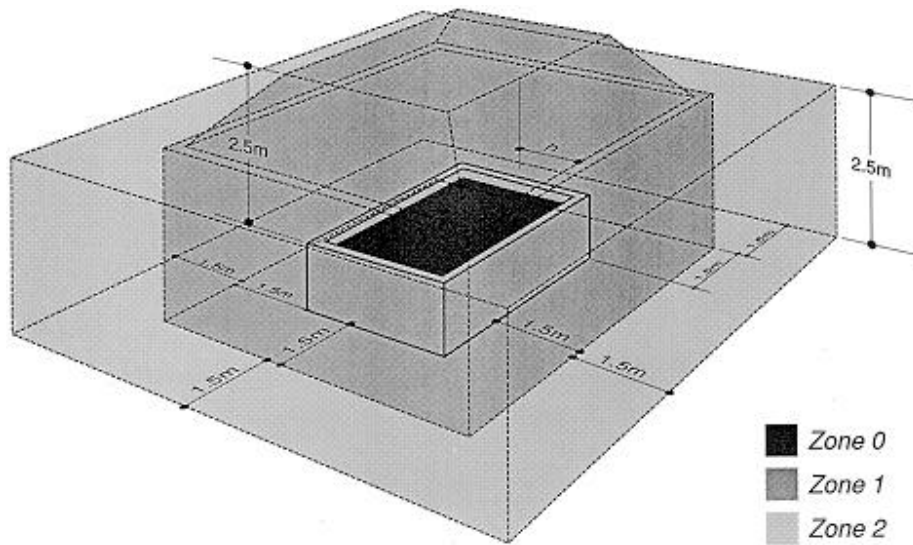


Figure 1b

ZONE DIMENSIONS OF SWIMMING AND SPA POOLS ABOVE GROUND

SECTION 4

DAMP SITUATIONS NEAR BATHS SHOWERS AND OTHER FIXED WATER CONTAINERS

4.1 CLASSIFICATION OF RESTRICTED AREAS FOR BATHS AND SHOWERS

4.1.1 The following Zones apply to baths and showers (for examples, see Figures 2A on pages 19, 20 and 2B on page ?):

Zone 0 is the interior of the bath tub or shower basin;

Zone 1 is limited by:

- (a) The vertical plane circumscribing 0.15 m outside the bath tub or shower basin, or for a shower without basin, by the vertical plane 0.75 m from the shower head; and
- (b) The floor and the horizontal plane 2.5 m above the floor;

For unenclosed showers where a shower rose or head is attached to the end of a flexible hose or extension arm, the zone shall be determined with such hose or arm in a fully extended position in all possible directions of operation of that room.

Zone 2 is limited by:

- (a) The vertical plane external to zone 1 and the parallel vertical plane 0.45 m external to zone 1; and
- (b) The floor and the horizontal plane 2.25 m above the floor;

Zone 3 is limited by:

- (a) The vertical plane external to zone 2 and the parallel vertical plane 2.4 m external to zone 2;
- (b) The floor and the horizontal plane 2.25 m above the floor.

The dimensions are measured taking account of walls and fixed partitions (see Figure 2A on pages 19, 20).

4.1.2 The presence of a raised hob or curtain rail, with or without a curtain rail, may be used to define the Zone 1 area.

4.2 CLASSIFICATION OF RESTRICTED AREAS FOR OTHER FIXED WATER CONTAINERS

4.2.1 The following zones apply to sinks, hand-basins or similar fixed water containers with a capacity not exceeding 45l (for examples, see Figure 3A at page 23):

Zone 0 is the interior of the sinks, hand-basins or similar fixed water containers;

Zone 1 is limited by:

- (a) The vertical plans 0.15 m outside the boundaries of the water container; and
- (b) The floor to a horizontal plane 0.4 m above the water container.

- 4.2.2 The following zones shall apply to sinks, basins or similar fixed water containers with a capacity in excess of 45l (for example see Figure 3B at page ?):
Zone 0 is the interior of the sinks, basins or similar fixed water containers;
Zone 1 is limited by:
- (a) The vertical planes 0.5 m outside the boundaries of the water container;
 - (b) The floor to a horizontal plane 1 m above the water container.

4.3 SOCKET-OUTLETS

- 4.3.1 Socket-outlets shall not be installed in Zones 0, 1, or 2 or within 0.3 m of the floor of a bathroom, laundry or other place where the floor is likely to become wet.
In Zone 3, socket-outlets shall be:
- (a) Supplied individually by an isolating transformer affording personal protection; or
 - (b) Protected by an RCD affording personal protection, and having a residual operation current not exceeding 30mA; or
 - (c) Supplied at safety extra low voltage through an individual safety isolating transformer affording personal protection.
- 4.3.2 Electric shaver supply units may be installed in Zones 2 and 3.

4.4 SWITCHES

- 4.4.1 Switches installed in Zones 0 and 1 shall be of a type having certification for use in such zones, and be supplied at a voltage not exceeding 12 volts from a safety isolating transformer affording personal protection. The enclosure shall be protected against the ingress of moisture with a minimum degree of protection IPX7.
- 4.4.2 In Zone 1 switches are permitted if they are of the air-operated type and suitably located so as to prevent the ingress of moisture.
- 4.4.3 In Zone 2 switches are permitted if they:
- (a) Comply with the requirements for Zones 0 and 1;
 - (b) Are protected against the ingress of moisture with a minimum degree of protection IPX4; or
 - (c) Are supplied at safety extra low voltage through an individual safety isolating transformer affording personal protection.
- 4.4.4 In Zone 3 ordinary switches may be used, provided they are located above 0.3 m from the floor.

4.5 LUMINARIES AND LAMPHOLDERS

- 4.5.1 Luminaries and lampholders installed in Zone 1 shall be:
- (a) Of a type having no exposed conductive parts; and
 - (b) Of a type protected against the ingress of moisture with a minimum degree of protection IPX5; and
 - (c) So arranged that the removal of the cover of the enclosure providing access to lamps for replacement purposes requires the use of a tool.

These requirements need not apply to the following arrangements:

- (i) luminaries having enclosed lamps and lampholders mounted on the ceiling which is not less than 2.2 m above the floor or 1.6 m above the coping of the bath.
 - (ii) luminaries having enclosed lamps and lampholders in an enclosure mounted on the ceiling which is not less than 2.2 m above the shower basin. However such luminaries or lampholders shall be installed in a manner or be of a type which:
 - prevents inadvertent personal contact with live parts;
 - requires the removal of an enclosure or cover, not necessarily by the use of a tool, for access to the lamp for replacement purposes; and
 - prevents the accumulation of water and steam which may affect satisfactory and safe operation.
- 4.5.2 Luminaries and lampholders shall not be installed on a flexible pendant within 2.5 m of the floor in any damp situation.

4.6 HEATING ELECTRICAL APPLIANCES

- 4.6.1 Heating electrical appliances shall not be installed in Zones 0 and 1.
- 4.6.2 Heating electrical appliances installed in Zone 2 shall be of a type with the element totally enclosed in metal (eg heated towel rail).
- 4.6.3 Heating electrical appliances installed in Zone 3 the heater shall either be of a type where the element or its connections cannot be contacted by the standard test finger, mounted not less than 0.3 m from the floor, or be of the type specified in subclause 4.6.2.

4.7 FIXED ELECTRICAL APPLIANCES

Fixed electrical appliances installed in damp situations shall comply with Subsection 2.4.

Figure 2a

ZONE DIMENSIONS (PLAN) FOR DAMP SITUATIONS NEAR BATHS AND SHOWERS. PART I - BATHS

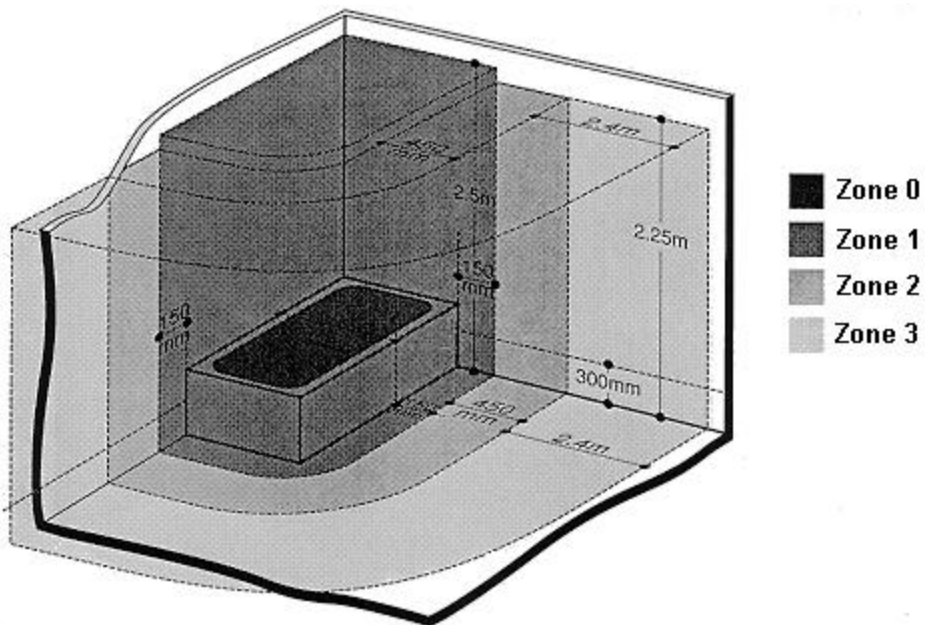
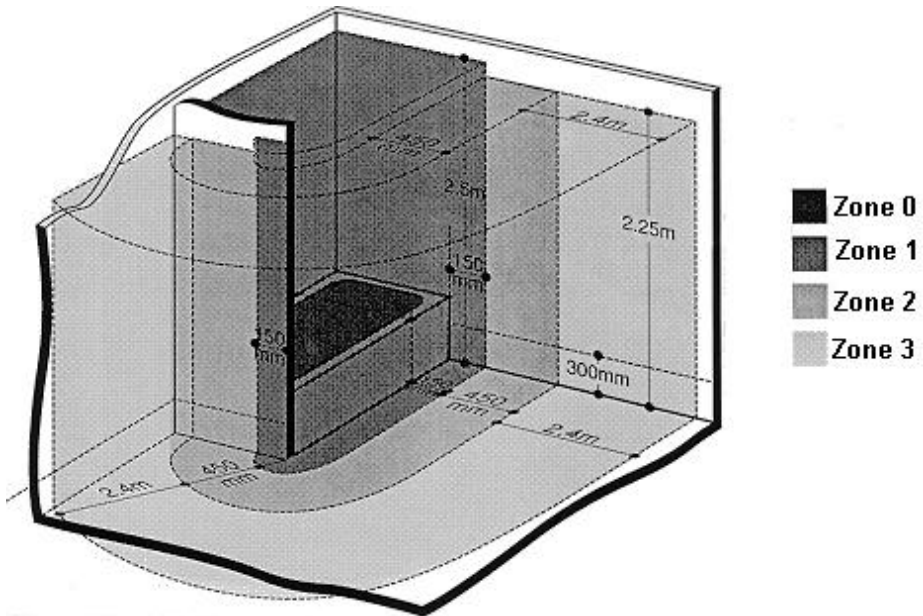


Figure 2a

ZONE DIMENSIONS (PLAN) FOR DAMP SITUATIONS NEAR BATHS AND SHOWERS. PART II - SHOWERS

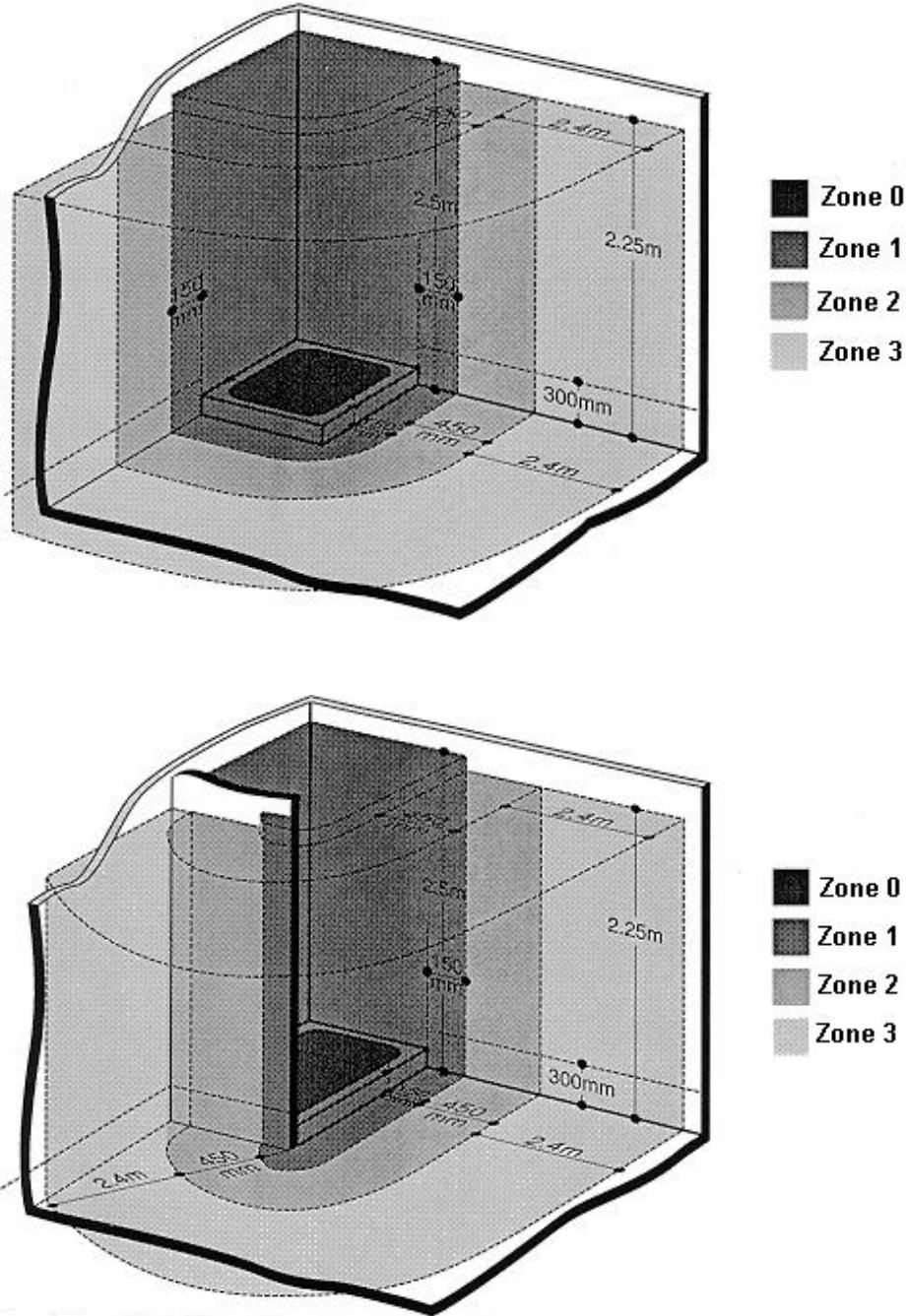


Figure 2a

ZONE DIMENSIONS (PLAN) FOR DAMP SITUATIONS NEAR BATHS AND SHOWERS. PART III - SHOWERS WITHOUT BASINS

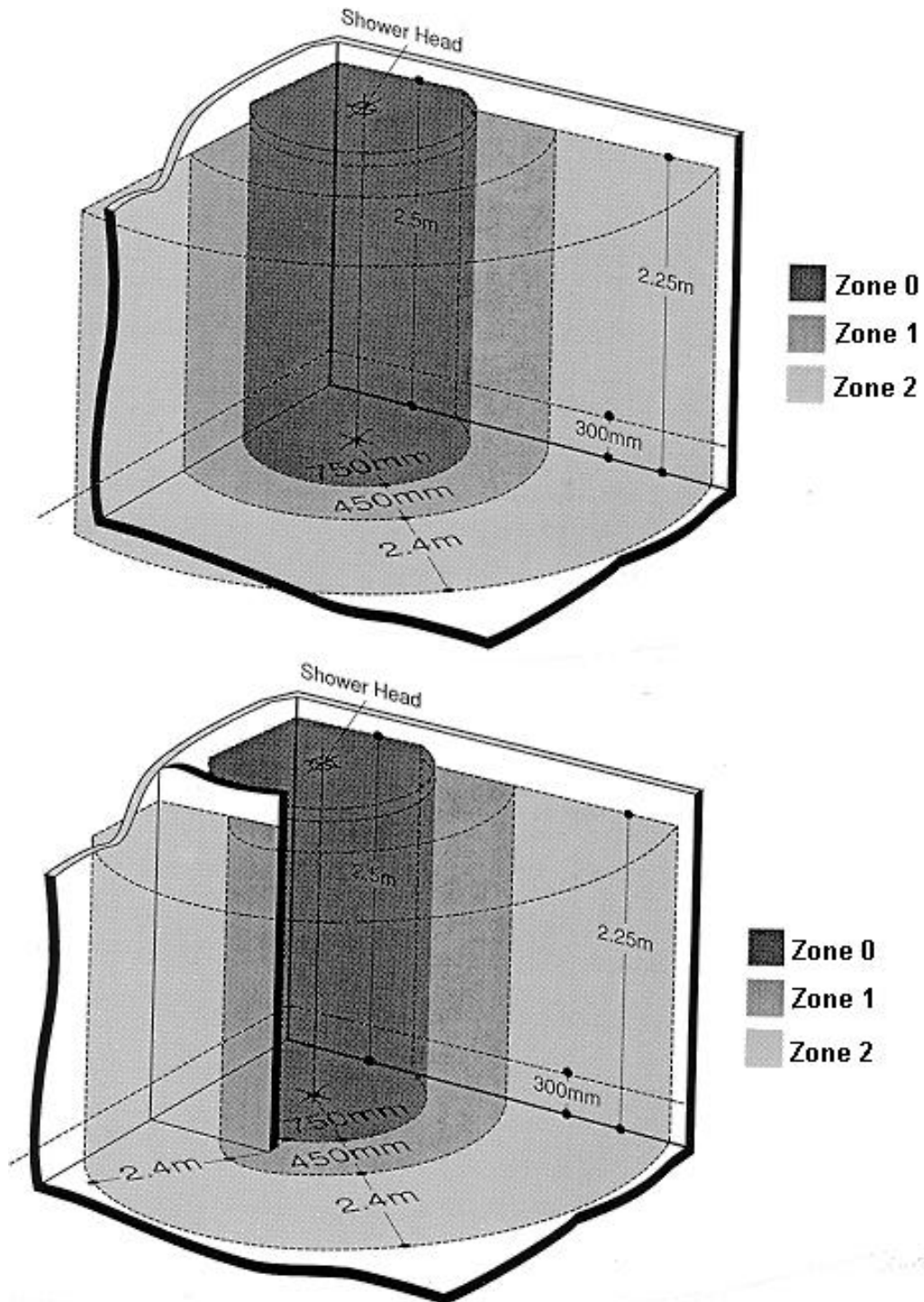


Figure 2b

ZONE DIMENSIONS (ELEVATION) FOR DAMP SITUATIONS NEAR BATHS AND SHOWERS

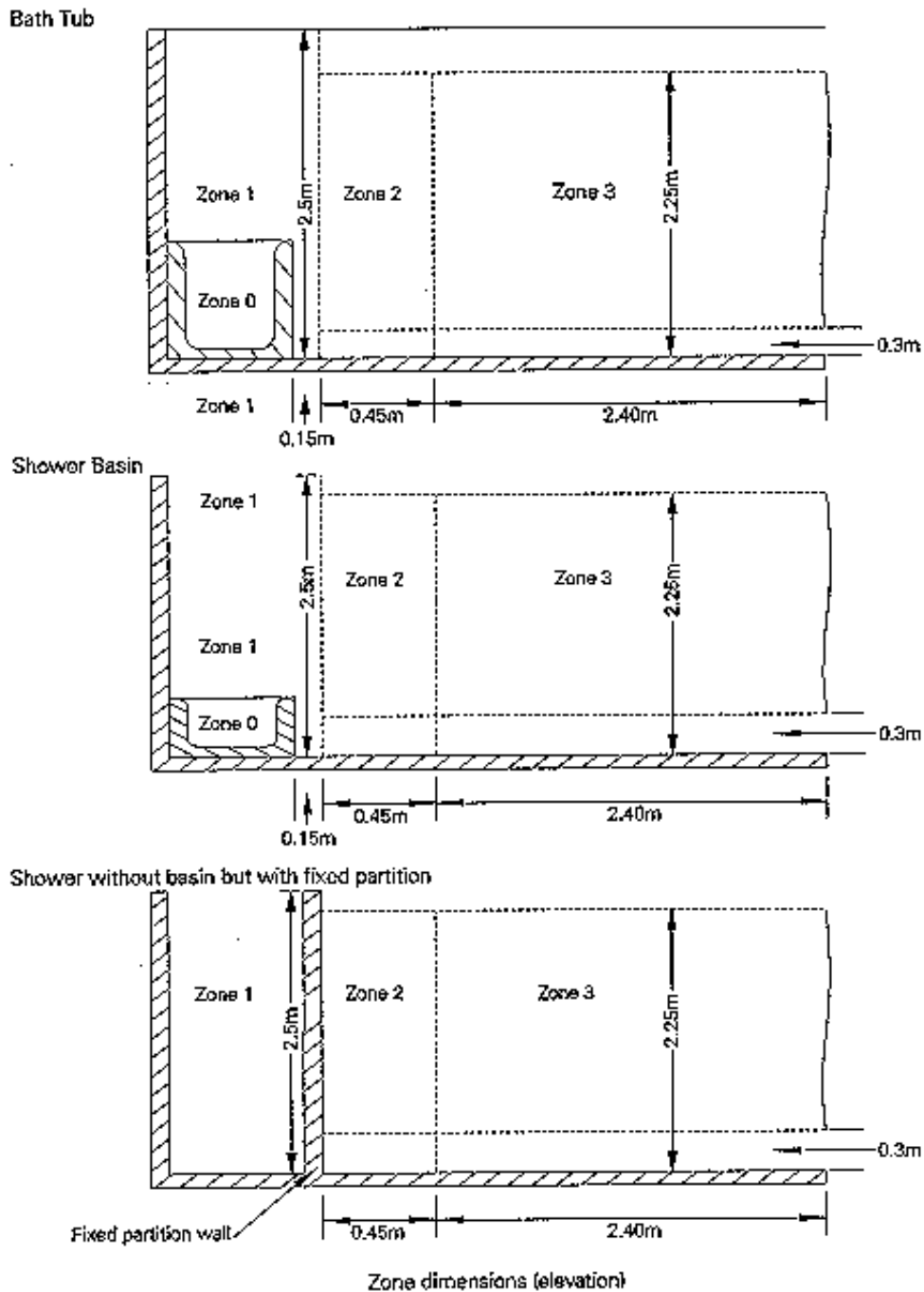


Figure 3a

ZONE DIMENSIONS IN DAMP SITUATIONS FOR OTHER FIXED WATER CONTAINERS WITH A CAPACITY NOT EXCEEDING 45 LITRES

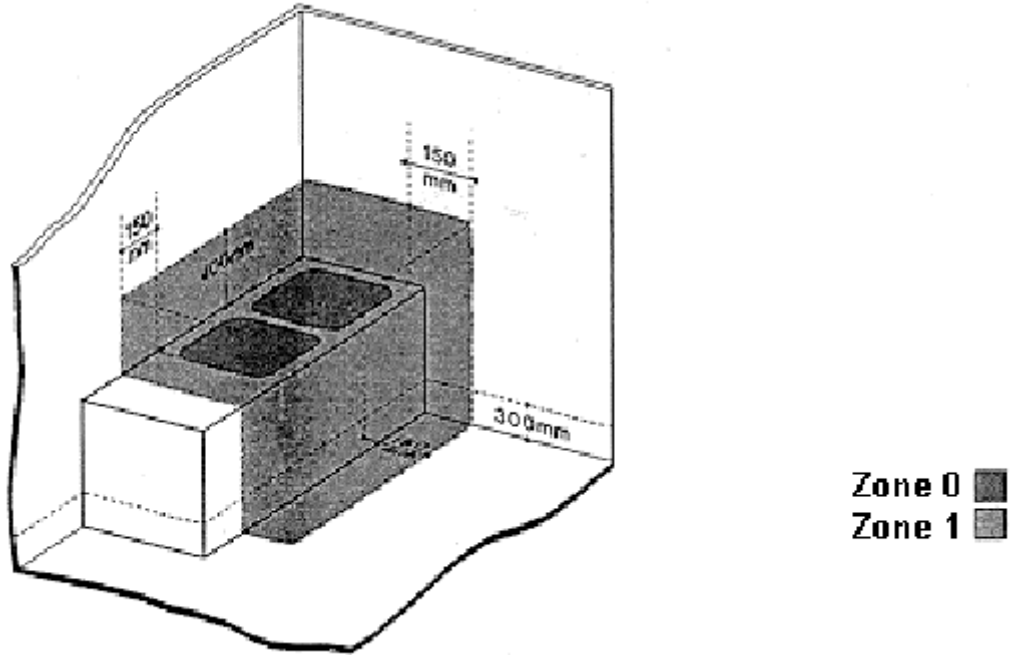
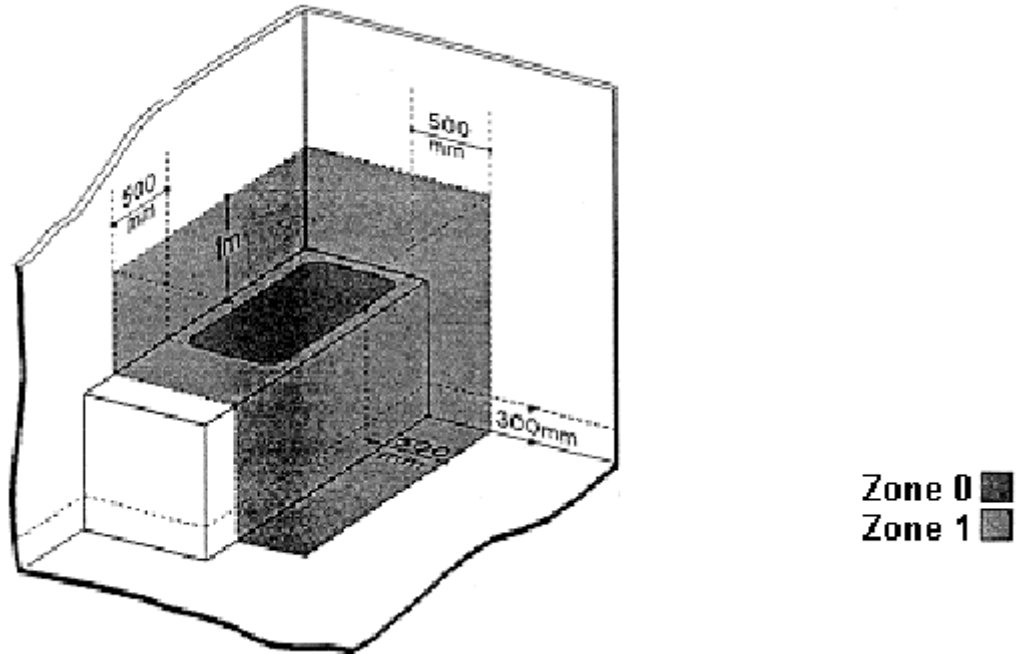


Figure 3b

ZONE DIMENSIONS IN DAMP SITUATIONS FOR OTHER FIXED WATER CONTAINERS WITH A CAPACITY IN EXCESS OF 45 LITRES



SECTION 5

FOUNTAINS AND WATER FEATURE INSTALLATIONS

5.1 GENERAL

5.1.1 This section applies to the installation of the electrical fittings and electrical appliances in or near fountains and water features.

The provisions of Sections 1, 2 and 3 shall apply with the exception of Subsections 3.2, 3.7, and 3.8, and clause 3.1.1.

For the purposes of this section, reference in Section 3 to a "pool" is deemed to apply to "fountains and water features".

5.1.2 Plug-in fountains or water features connected by a plug/socket shall be protected by a RCD affording personal protection, having a residual operating current not exceeding 30mA.

5.2 CLASSIFICATION OF FOUNTAIN AND WATER FEATURE AREAS

The following Zones apply to fountains and water features:

Zone 0 is the interior of basins and other vessels.

Zone 1 is limited by a vertical plane 2 metres from the rim of the basin and by the floor or base on which persons may stand, and a horizontal plane 2.5 metres above.

Zone 2 is limited by the external vertical plane of zone 1 and the parallel plane 1.5 metres apart, and by the floor or base on which persons may stand and the horizontal plane 2.5 metres above the floor or the possible surface.

5.3 ELECTRICAL APPLIANCES AND LUMINAIRES

5.3.1 Electrical appliances and luminaires of fountains or water features shall be provided with or used in conjunction with the following safeguards:

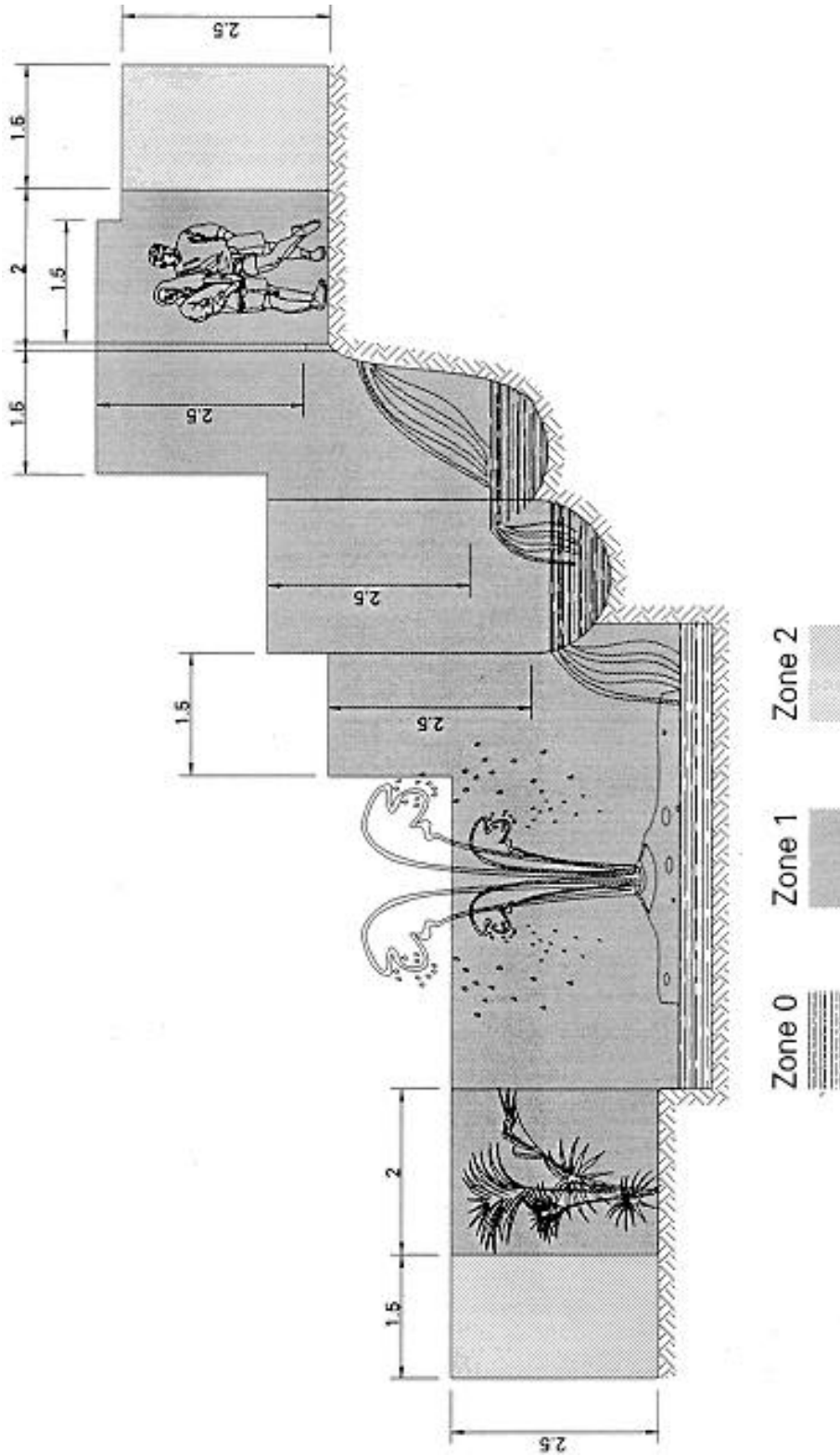
5.3.1.1 For Zones 0 and 1:

- (a) Each luminaire or electrical appliance shall be supplied by an individual isolating transformer affording personal protection; or
- (b) Electrical appliances and luminaires shall be supplied by an extra-low voltage source affording personal protection; or
- (c) Class I electrical appliances or luminaires shall be supplied at low voltage and protected by a RCD affording personal protection, having a residual operating current not exceeding 30mA.

5.3.2 Electrical appliances and luminaires installed below the surface of the water shall be protected against mechanical damage.

Figure 4

ZONE DIMENSIONS FOR FOUNTAINS



SECTION 6

CONTROLLED ATMOSPHERE ROOMS

6.1 GENERAL

A room or other enclosed space such as a refrigeration room or sauna bath which has its atmosphere controlled so that under normal operating conditions water vapour in the air can condense shall be regarded as a damp situation, and the electrical installation therein shall comply with the appropriate requirements of Sections 1, and 2, and in addition, with subsections 6.2 to 6.6.

However, a room or other enclosed space which has its atmosphere controlled in such a manner as will prevent the condensation of water vapour within the area, except at times of maintenance or breakdown, shall be regarded as a damp situation only at points where conduits or conductors leave or enter the room or enclosed space.

6.2 WIRING SYSTEMS

6.2.1 The system of wiring used in a controlled atmosphere room shall be of a type which:

- (a) Will not be affected by the operating temperature of the room; and
- (b) Does not provide pockets or channels in which moisture may accumulate or through which it may pass into fittings or electrical appliances.

No conductors other than those required for the supply, control and protection of fittings or electrical appliances within controlled atmosphere rooms shall be taken through or be installed in such rooms.

6.2.2 Types permitted.

The following systems of wiring are permitted.

- (a) Unenclosed sheathed cables including served MIMS cables.
- (b) Insulated cables enclosed in a conduit or other form of protective covering which has adequate draining facilities.
- (c) Other wiring systems permitted by this Code which are not inferior to a) or b) above.

6.2.3 PVC insulated and/or sheathed cables may not be satisfactory for installations in refrigerated rooms where the cables may be subjected to bending, flexing or vibration at temperatures below approximately -5°C . Other insulants should be considered where these conditions are known to exist.

6.2.4 Rigid PVC conduit and fittings shall not be installed in an ambient temperature below -15°C .

6.3 SEALING

The following shall be sealed with a compound that does not set hard:

- (a) Each conduit or other form of wiring enclosure at any point where it passes from a controlled to a non-controlled space;
- (b) The point of entry of cables into motors, luminaries, switches or other fittings or electrical appliances.

6.4 FITTINGS

Fittings shall be installed in a controlled atmosphere room only if the use of such fittings is unavoidable; in such a case the enclosure shall be of a design such that provision is made to prevent the retention of moisture within the enclosure.

This requirement may be satisfied by the use of fittings that are permanently sealed.

6.5 LUMINARIES

Luminaries shall be permanently sealed to prevent the entry of liquid or vapour, or be designed and constructed so that:

- (a) Moisture cannot enter the lampholder and other components containing the parts; and
- (b) Provision is made to prevent the retention of moisture in or on the fitting.

6.6 MOTORS

Motor enclosures shall have a minimum degree of protection in accordance with AS 1939, and be suitable for the conditions in which the motors are installed.

This requirement is deemed to be satisfied by the provision of internal heaters in the motor enclosure which would prevent the retention of moisture.

SECTION 7

HOSING DOWN AREAS

7.1 GENERAL

Installations in process rooms of abattoirs, milk rooms of dairies and other locations where general hosing down operations are carried out shall comply with the appropriate requirements of Sections 1, and 2, and in addition, with Subsections 7.2 and 7.3.

7.2 ENCLOSURE OF FITTINGS

Electrical fittings located or mounted:

- (a) Within 2 m above the floor;
- (b) On a wall;
- (c) On a ceiling within 1 m of the walls; or
- (d) In any other position likely to be affected by hosing;

shall be protected against the ingress of moisture with a minimum degree of protection IPX5.

7.3 CONDUITS AND CONDUIT FITTINGS

Conduits and conduit fittings installed in positions likely to be affected by hosing shall be either a:

- (a) Corrosion-resistant screwed metal type; or
- (b) Thermoplastic type with glued or other appropriate fittings which will prevent the entry of moisture.