



## Electrical and Lighting Public Buildings Environmental Health Guide

### Electrical Installations

All electrical installations must comply with the supply authority or Office of Energy requirements, AS 3000, AS 3002 plus any special requirements of the Health (Public Buildings) Regulations 1992. An electrical contractor must certify that permanent and temporary electrical installations comply with the Health (Public Buildings) Regulations 1992, by submitting a Form 5 to the local government. A sample Form 5 has been included in the Forms section.

For events it is important that:-

1. There are no single phase generators 10kva or below;
2. Electrical equipment is supplied from reticulated supplies originating at supply authority mains or large generators;
3. Electrical leads do not create trip hazards;
4. Electrical outlets are protected by residual current devices RCD's;
5. Leads and residual current devices are tested and tagged every six months;
6. Joints and connections are not accessible to the public or exposed to damp conditions; and
7. Installations must comply with AS 3002 Electrical Installations for shows and carnivals.

### Electrical Leads and Portable Outlet Devices

All electrical outlets must be protected by a residual current device (safety switch). The Health (Public Buildings) Regulations 1992 require that a licensed electrical worker test these items every six months. A tag to identify the item, test date and the electrical workers should be fixed to the tested equipment. Details of the specific tests are at the section "Electrical Testing". Double adaptors or piggy back plugs are not permitted, although those on existing stage lighting effects are generally accepted by relevant authorities. New equipment requires a tag to define when it was brought into service.

### Temporary Electrical Installations

All Electrical outlets and electrically operated equipment in areas available to the public must be protected by RCD's. Installations and generators must comply with all relevant Australian Standards.

### Requirements to Achieve the Basic Principles

- For RCD's to be effective, the neutral and earth conductors must be bonded together at the point of supply. All town supplies are connected this way but generators may not be. AS 3010.1 (Electricity Generating Sets) requires neutral connections to be earthed at the generator frame. It is recommended that this connection be made via a removable link.
- Each generator must be connected to its own earth electrode driven into the ground.
- All electrical outlets and supplies must have circuit breakers to protect against overload.
- All final sub-circuits must have RCD protection.



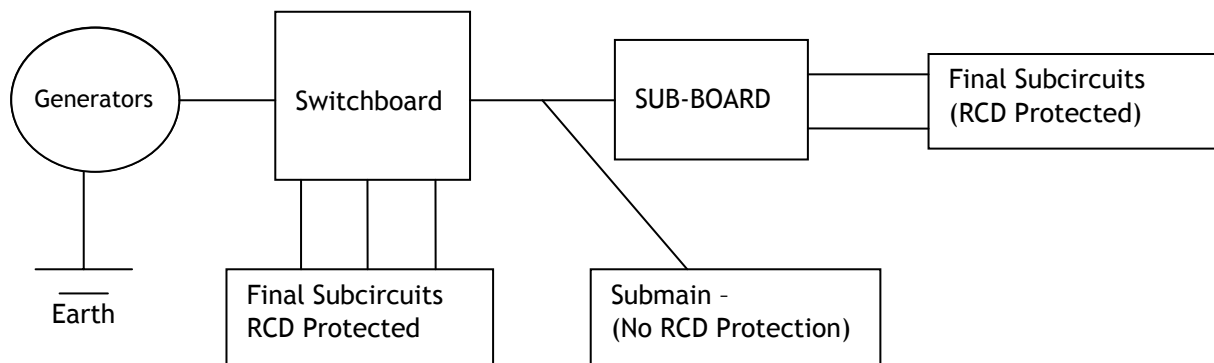
Typical temporary installations consist of sub-mains, sub boards and cord extension sets.

It is recommended that for typical installations -

- Outlets at generators that are specifically required for the use of tools etc, have RCD protection;
- Outlets that are solely for connection of submain cables supplying a distribution board should only have over-current protection; and
- RCD protection of final sub circuits should only be provided at the switchboard where those final sub circuits originate.

This type of protection will minimise the disruption to major sections of the lighting installations in the event of a current leakage to earth.

## Typical Electrical Installation for Circuses



## Switchboards

1. Must be in weatherproof enclosures.
2. Must have no access to live parts.
3. Must have doors that are able to be fully closed and locked with all cables connected or be located so that they are only accessible to authorised persons.
4. Must have a main switch.
5. Must have over-current circuit breakers to protect outlets for submains.
6. Must have RCD protection to protected final subcircuits.
7. Must have all components and their functions clearly identified.
8. Where electrical outlets are provided, there should be a tie bar to allow electrical cords to be secured to prevent tension on the electrical outlet.

## Residual Current Devices - RCD's

The preferred leakage tripping current is 30 milliamps. They must be tested every six months in accordance with the schedule at the section on Electrical Testing.



## Electrical Cables

Because cables are continually being rolled up and moved, they must be flexible. Standard multicore cables used in static installations are not appropriate.

Electrical cables should not be accessible to members of the public. Where this cannot be avoided, they must be either buried or suspended so that they are out of reach to members of the public.

Submains cables must have integral earth and neutral conductors.

## Electrical Supplies

Electrical outlets should only be supplied from a reticulated power supply. Supplies may originate from a supply authority or on site generators. Small individual generators should not be utilised.

AS 3010.1 requires neutral connections to be earthed at the generator frame and recommends that this connection be made via a removable link. Each generator must be connected to its own earth electrode driven into the ground.

The Health (Public Buildings) Regulations 1992 requires electrical contractors to certify electrical installations by completing a Form 5. It is recommended that reticulated supplies be certified.

## Leads

- All electrical leads must be tested and tagged within past 6 months in accordance with AS3012 - Clause 13.
- Temporary electrical leads must be flexible cables. TPS cables are not permitted.
- Leads must **not** be placed on the ground in trafficable areas.
- Cord junctions shall not be exposed to the weather or in damp situations.

## Luminaires

Luminaires must not be placed in areas where heat may ignite adjacent materials and must be out of reach of people.

## Extra Low Voltage Equipment

Extra low voltage devices must be clearly identified and have plug tops and bases that cannot be inadvertently connected to higher voltage supplies.

## Testing Cords & RCD's

The testing of electrical extension cords and residual current devices, RCD's used in circuses, travelling shows and other temporary installations is a requirement of the Health (Public Buildings) Regulations 1992; it is also a requirement for building and construction sites.

NOTE: RCD's are also known as safety switches or ELCB's.

The specific tests were initially set out in clause 13 of AS 3012 - Electrical Installations - Construction and Demolition Sites. This has been amended and is no longer relevant.

The intent of the Regulation is to have portable electrical equipment tested and tagged at six months intervals. The construction site requirements are too onerous.

Once a test has been carried out a tag should be fixed to the device. The tag should identify who carried out the tests and when they were done.



Details of the required tests are:

## Extension Cords (Single and Three Phase)

1. check that the insulation is in good order;
2. check that the plug sockets and plug tops attached to the cord are the correct rating;
3. check the continuity of each conductor; and
4. check that the conductors are correctly connected (correct polarity).

## Residual Current Devices

### Test 1: Residual non Operating Current

A current between 40% and 50% of the rated tripping current should be passed between active and earth for 5 seconds. The RCD should not trip.

### Test 2: Tripping Current and Time Test

A current equal to the rated tripping current of the RCD should be passed between active and earth. The RCD should trip within its specified time - usually 30 milli-seconds.

### Note:

The recommended tripping current for RCD's is 30 milli-amps. Test instruments are readily available from electrical wholesales. In addition to the above tests the inbuilt test facility should be operated each time that the unit is in use.

Portable outlet devices require a combination of all these tests.

## Lighting

All venues and egress paths must be able to be illuminated to 40 lux by lighting that is:

- independent of the event production lights;
- controlled from a central positions;
- able to reach the required illumination within three seconds of being energised; and
- supplied from the supply authority mains or generator approved by the local government.

Bare lamps must not be able to be touched by the public.

## Area Lighting

Areas available to the public at night, including concert areas, should always be illuminated. For general areas, illumination to an average as low as 10 lux at ground level with no area less than 5 lux, is acceptable. Lighting should be energised approximately 1 hour prior to sunset to allow time for any unserviceable lights to be repaired before sunset.

For crowded areas, especially for concerts and areas licensed to consume alcohol, there must be a system in place that will allow areas to flood light instantaneously in the event of an emergency. The supplies and controls for these lights should be independent of theatrical or production lights and controlled from a location attended at all times by a designated person. They should not be controlled at the mixer desk.

## Emergency Lighting

Enclosed venues must have emergency lighting that will operate if the main electrical source fails. For buildings, it must comply with Australian Standard As 2293 or for outdoor venues there must be at least two alternative power supplies. Two generators or a supply authority supply plus another generator are acceptable alternatives provided that the venue lighting supplies are distributed between both.



## Safety Lighting

For events where lighting will be dimmed or extinguished stairs, ramps and egress paths must be illuminated by safety lighting. Safety lighting must be a separate supply to normal or emergency lighting and must not be dimmed or modulated whilst the normal lighting is dimmed or extinguished. For permanent facilities the safety and emergency lighting must be interconnected so that in the event of a failure of the safety lighting circuit, the emergency lighting will be automatically energised.

## Exit Signs

These must be installed in compliance with AS 2293 and be illuminated and clearly visible whenever the venue is occupied by the public. For outdoor events, standard signs are rarely adequate. Signs illuminated by two light sources and large enough to make the exit location obvious to patrons wishing to exit the area must be used.

## Spectator Stands, Stages and Lighting Rigs

There are no specific regulatory requirements for these structures however, specific guidelines are included under the heading, "Spectator Stands".

## For further information contact:

Environmental Health Directorate  
Department of Health  
PO Box 8172  
Perth Business Centre  
Perth WA 6849.

Phone: (08) 9388 4999  
Fax: (08) 9388 4955

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