



## Electrical Newsletter Autumn 2008

### Grid Connected Inverters photovoltaic installations (PV)

As public interest increases concerning investment in private generation of power for exported energy into the distribution network, attention is drawn to the ACTEWAGL Service and Installation Rules (S & I Rules) and AS/NZS 3000: 2007 (the Wiring Rules) requirements for additional low voltage installation connections to existing or new installations.

ACTPLA requires that all PV installations meet the requirements of the S & I Rules; and the following relevant standards: Clauses 2.3.3.1, 7.3.8.3 of the Wiring Rules; AS 4509-1999 series; AS/NZS 5033 and AS/NZS 4777.1. The main switch for the PV installation shall be located at the main switchboard. All installation boxes containing metering and consumers equipment shall contain a panel size not less than 575 mm high x 565 mm wide to allow for the extra PV equipment and labelling to be installed.

Photovoltaic installations are a second supply and its protection equipment must be logically identifiable on the main switchboard from the existing consumers equipment. The PV installation shall be indicated on the switchboard equivalent to the sample labelling shown in Appendix A11 of the S & I Rules.

Labelling of PV equipment is required to be legibly and permanently identified. Switchboards in outdoor locations require self adhesive labels to be permanently attached to the switchboard independent of the adhesive.

In the event of a fire the Fire Brigade may not be aware of the PV installation. Labelling is required as to the standards to assist in safe isolation in an emergency. A double pole direct current (d.c.) rated circuit breaker, with IP rated enclosure shall be installed adjacent to or on the solar panel to allow for disconnection by emergency services personnel.

Lettering and label sizing shall be in accordance with AS/NZS 4777.1 Clause 5.5.

For other alternative supplies, typically petrol or gas driven generators, refer to AS/NZS 3000:2007 Clause 7.3 for examples and AS/NZS 3010 Electrical Installations - Generating sets.

Electricians and electrical contractors must contact ActewAGL prior to installation of any system for approval. Refer to ActewAGL's Service and Installation Rules at [www.actewagl.com.au](http://www.actewagl.com.au)

### New edition of AS/NZS 3000: 2007 Wiring Rules

The new Wiring Rules edition was published 12 November 2007. Mandatory application commences on 1 June 2008 in NSW and ACT.

Installation wiring systems commenced before 12 November 2007 and completed by 1 June 2008 need only comply with the former Wiring Rules edition, AS/NZS 3000: 2000.

Work commenced after 12 November 2007 and completed before 1 June 2008 may comply with either AS/NZS 3000: 2000 or AS/NZS 3000: 2007.



Work commenced before 12 November 2007 and completed after 1 June 2008 must meet the requirements of AS/NZS 3000:2007 unless varied by permission.

Work commenced after 12 November 2007 and completed after 1 June 2008 must fully comply with AS/NZS 3000: 2007.

## Summary of frequently asked new wiring rules questions:

### Residual current devices

#### AS/NZS 3000:2007 Clause 2.6.3.4 Alterations, additions and repairs

Socket outlets that are added to an existing final sub circuit(s) shall be protected by an RCD.

Note: installing a combination switched socket outlet with an integral RCD is acceptable at the socket outlet where the new cable originates or as a replacement for the circuit's first socket outlet out from the switchboard, so that all socket outlets downstream are RCD protected.

#### Clause 2.9.2.2 Accessibility and emergency exit facilities

The 2007 edition in Clause 2.9.2.2 sets out the new egress requirements for large switchboard room environments. The electrical inspectorate welcomes viewing of switchboard plans and wiring schematics before construction gets underway to minimise serious non-compliance issues occurring at the final inspection stage.

Doors of the switchroom or of an enclosure that may contain a person and is dedicated to a switchboard shall open in the direction of egress without the use of a key or tool on the switchboard side of the door.

Where more than one switchroom door is provided for access to the same switchboard, the doors should be spaced well apart.

Doors of enclosures dedicated to switchboards that open into a passage or narrow access way shall be capable of being secured in the open position to prevent workers being inadvertently forced towards a switchboard under abnormal conditions.

Exception: The requirements for doors of switchrooms and for emergency exit facilities need not apply to single domestic electrical installations.

The four important factors that must be considered for adequate egress and switchboard compliance are: 600 mm clearance around switchboard fixed hinge doors and racked-out circuit breakers; when the board has a prospective short circuit current greater than 15 kA; the board is designed with at least one circuit rated at 800 amps; and the switchboard assembly is longer than 3 metres.

#### Clause 3.7.4 Installation couplers

An installation coupler, enclosed or unenclosed, complying with the requirements of AS/NZS 61535, is a suitable method for the electrical connection of cables, including flexible cords, flexible cables and rigid (solid or stranded) cables.



## Notes:

- 1 Installation couplers are intended for permanent connection between sections of wiring, particularly in 'soft' wiring systems, and are considered equivalent to a junction box.
- 2 Installation couplers require a deliberate act to disengage the latching mechanism and are not intended to be engaged or disconnected under load or to be used as socket outlets.

Note: An example is a 32 Amp coupler on a 32 Amp circuit may be used for the connection for ovens and hot plates.

### Clause 4.2.2.6 Prevention of spread of fire

Electrical equipment, including switches, socket-outlets and other accessories shall be arranged to provide a separation not less than 300 mm horizontally and 600 mm vertically from any opening or recess in the opposite side of wall, ceiling or floor that is required to be fire-rated (a 'fire-rated barrier').

The openings made for electrical equipment installed in fire-rated barriers shall not penetrate beyond 50% of the thickness of the barrier.

Any gap between electrical equipment and a fire-rated barrier shall be sealed to the degree of fire-resistance prescribed for the barrier, in accordance with the relevant provisions of the National Building Codes.

Note: This is a new clause specifically to minimize the effects of fire. Other relevant clauses are: *Fire protective measures Clause 2.9.7* and *Selection and installation to minimize the spread of fire Clause 3.9.9*.

### Clause 5.5.1.3 Labelling of the main earthing connection

The main earth connection shall have a permanent label attached at the connection to the electrode with legible warning against disconnection in the following form:

**WARNING: 'MAIN ELECTRICAL EARTHING CONDUCTOR-DO NOT DISCONNECT'**

Note: the label is required to last the life of the building. The label must be made of a material that resists mechanical damage and environmental conditions.

### Clause 5.5.3.5 Unprotected consumers mains

Exposed conductive parts associated with consumers mains not provided with short-circuit protection on the supply side shall be earthed by a conductor with a current carrying capacity not less than that of the main neutral conductor.

This conductor shall be connected to-

- (a) the main neutral conductor or bar; or
- (b) The main earthing terminal/connection or bar, in which case, in accordance with Clause 5.3.5.2, the cross-sectional area of the MEN connection shall be not less than that of the main neutral conductor.



## Notes:

- 1 Where double insulation of the consumers mains conductors is maintained up to the supply terminal/s of the service protective device/s, and short circuit protection is provided by that device, this requirement need not apply.
- 2 A system that is deemed to provide double insulation for aerial conductors would include use of XLPE type X-90UV cable to AS/NZS 3560 with insulated strain clamps and double insulated connectors to AS/NZS 4396.
- 3 Exposed conductive parts associated with consumers mains include-
  - (a) switchboard cases, surrounds and enclosures;
  - (b) wiring enclosures;
  - (c) boxes and accessories; and
  - (d) supports for aerial conductors
- 4 A distributor's upstream service protective device may provide short-circuit protection of consumer's mains.

Note: In the ACT an earth the same size as the neutral conductor is required to be connected to the frame of the riser or bracket and metal fascia of a building if it is in close proximity of the service provider's connection.

### Clause 4.5.2.3 Recessed luminaires

Recessed luminaires and their auxiliary equipment shall be installed in a manner designed to minimize temperature rise and prevent the risk of a fire.

The temperature rise at the rear of a recessed luminaire shall be limited to prevent damage to adjacent combustible materials.

This requirement shall be satisfied by one of the following methods:

- (a) The use of a luminaire specifically designed and certified by the manufacturer to permit —
  - (i) contact with combustible materials; or
  - (ii) enclosure or covering by thermal insulation material, as appropriate to the location of the luminaire.
- (b) Installation of the luminaire within a suitable fire-resistant enclosure.
- (c) Provision of required clearances from combustible and thermal insulating material as specified by the manufacturer of the luminaire.
- (d) Provision of the default clearances from combustible and thermal insulating material as specified in fig 4.7.

Where manufacturer's installation instructions that specify required clearances are not available, the luminaire shall be installed in accordance with (b) or (d).

Note: In the case of a suitably designed luminaire, the installation instructions may specify that no clearance is required.

Recessed luminaires and their auxiliary equipment shall be installed in such a manner that air movement through or around the luminaire is not impaired by thermal insulation or other material.

Where thermal insulation is of a type that is not fixed in position, e.g. loose fill, a barrier or guard constructed of fire-resistant material shall be provided and secured in position to maintain the necessary clearance (see Figure 4.7)

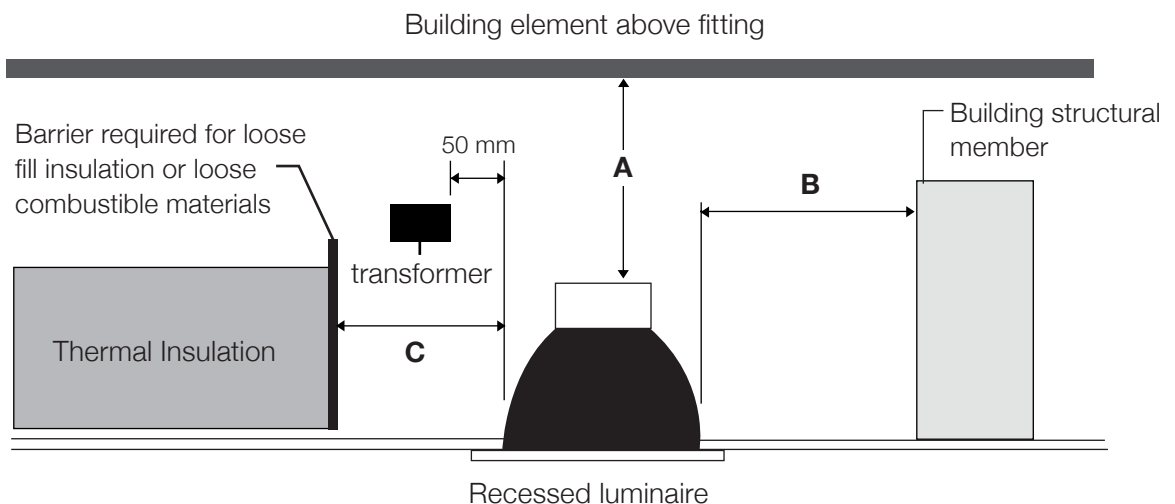
Where thermal insulation may reasonably be expected to be installed in the space containing a recessed luminaire, the luminaire shall be installed in such a manner as to provide for subsequent installation of thermal insulation.

Recessed luminaires shall be installed in accordance with (a) or (b), or provided with equivalent protective measures, where there is likelihood of extraneous combustible material, e.g. leaves or vermin debris, etc., collecting on or around the luminaire.

Notes:

- 1 National Building Codes require the installation of thermal insulation in many situations.
- 2 **AS/NZS 60598.1 and AS/NZS60598.2 detail the test method and the maximum surface temperatures permitted for recessed luminaires (light fitting). These maximum temperature limits must be satisfied to permit any reduction in the default values of Figure 4.7**

### Default minimum clearances for recessed luminaries



Dimension	Incandescent lamp	Halogen lamp
A - clearance above luminaire	50 mm	200 mm
B - side clearance to structural member	100 mm	200 mm
C - clearance to thermal insulation	50 mm	200 mm
D - clearance to supply transformer	50 mm	

Note: Due to Building Code of Australia requirements, you can no longer guarantee that thermal insulation, in particular, the loose fill type, will not be installed. A manufactured certified fire resistant barrier or guard must be installed. The barrier must be suitable for the situation. Always check that the barrier, guard or luminaire used imposes no fire risk to the structure involved.

If there is no Certificate of Suitability (C of S) or the certification does not cover the environment the luminaire is installed in, do not install it. Select a luminaire and or barrier that does.

Advise the owner and builder of the installation conditions. Attach a copy of the C of S to the Certificate of Electrical Safety (CES) and submit to ACTPLA. Attach another to the owners CE S copy.

Always check that electrical cables nearby remain fixed outside the default distances of figure 4.7.

### AS/NZS Clause 2.5.1 Insulating ceiling F mark, symbol

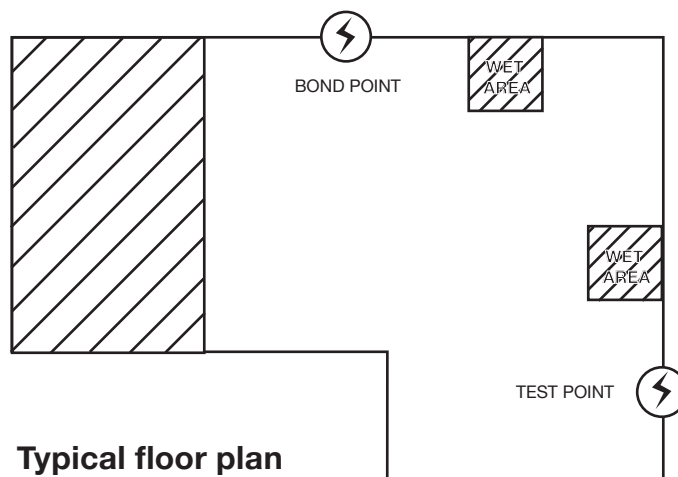
Recess luminaire with this F mark are suitable for mounting on normally flammable surfaces where thermal insulating may cover the luminaire.



All recessed lights not marked with the symbol should have a warning notice on an attached label or given in the manufacture's instruction leaflet supplied with the luminaire, that the luminaire shall, under no circumstances, be covered with insulation matting or similar material.

### Clauses 5.6 and 5.6.2.5 regarding equipotential bonding of reinforced concrete under or in walls associated with showers and bathrooms

If plumbing runs under garage slab, garage reinforcing is to be included with entire earth bonding



**Typical floor plan**

Any conductive reinforcing within a concrete floor or wall forming part of a shower or bathroom shall be bonded to the earthing system of the electrical installation to avoid any potential differences that may occur between conductive piping (including taps, drains, etc.) connected to, or in contact with, the electrical installation earthing system and the concrete wall or floor.

An equipotential bonding conductor, in accordance with Clause 5.6.3, shall be connected between the reinforcing material and any part of the electrical earthing system within the room.



ACTPLA **recommends** two equipotential bonding points, fabricated as exposed steel rods at the slab's edge or central to an internal wall floor plate, be installed during fabrication of the steel reinforcing by the builder's steel fixers so that the electrician can complete earth bonding during latter stages of the project's installation wiring fit-off. One point is for the connection of the bonding conductor, the other is a test point for verification of the bonding system.

Large installations sharing a single concrete slab require the bonding conductor to originate at the main switch board if more than one tenancy is to be equipotentially protected by the same bonding system.

Remember on completion of the installation after you have tested and verified to AS/NZS 3017. You have 14 days to submit your Certificate of Electrical Safety to ACTPLA and do not forget to give a copy to the owner of the installation. It is an offence against the ACT Electricity Safety Act 1971 if you fail to comply.

Submitting CES forms on the internet is still available:

<https://forms.act.gov.au/smartform/public/FormServer?formId=1013>

### Cook Top Heat Barriers

Electrical contractors and kitchen installers are not always ensuring that a heat barrier is installed as per manufacturer's instructions. The barrier is required under most built-in cook tops to prevent the ignition of the cupboard and contents.

A caution notice may be found fixed to cook tops including within the installation instructions. Instructions supplied with cook tops should provide dimensions for the barriers. If not found, then check the installation instructions for installation compliance. If an oven is installed directly under the cook top, a barrier may not be required.

### Range Hoods

This year inspectors are finding that electrical contractors, builders and kitchen installers are not always following the manufacturer's instructions regarding double insulated range hoods.

If the range hood is smaller than the cupboard it is attached to, a plastic filler piece and suitable blind-tip fitting screws are supplied by the manufacturer or supplier. If alternative screws are used to install either the range hood or the filler or substitute filler are too long, they may come in contact with sheathed internal equipment wiring conductors and present a shock risk to occupants.

Metal parts of a damaged double insulated range hood could remain live until contact is made between the range hood and earth. The RCD will not trip until the shock recipient causes a sustained earth fault. If there is no RCD on the circuit a double insulated range hood with live contactable metal could cause serious shock injury.

### Recall Notices

April 10, 2008 Schneider Electric (Australia) is undertaking a voluntary recall on a particular RCD. Details: Product Name: PDL branded 691RCD and 955RW Residual Current Devices. Product Information: Model Numbers 955RW Orange, 953/15, 954, 955, 955/10, NT955 BULK, 956,691 RCD White.

Please advise your customers with any PDL RCD to test for defective operation by pushing the RCD's test button to ensure effective mechanical operation. In the event that the RCD fails the push button test, tell your customer not to use the protected socket outlets until the RCD is tested and if necessary, replaced.



## Important notice

### Main Switchboards

All ACT licensed electricians please note that before main switchboards are given authorisation to be energised by ACTPLA Electrical Inspectors compliance with the following summary of the Wiring Rules requirements must be:

- be fixed permanently in position and installed to meet the requirements of AS/NZS 3000:2007 Clause 2.9;
- installed in a suitable well ventilated place;
- protected against the effects of moisture and dust;
- access is not obstructed by contents of the building or by fittings and fixtures within the building;
- all smoke doors and fire doors to be fitted;
- be provided with the prescribed clearance (in all situations 600 mm) around the switchboard on all sides where persons are to pass to allow for servicing and maintenance;
- all doors of the switchboard to be installed;
- the switchboard must be labelled and main earth and bond locations are marked on the main switchboard;
- all sub-mains shall be terminated, danger tagged and locked off. The switchboard shall be 100% complete;
- no cables are to be drawn into cabinets after the switchboard is energised;
- All penetrations to be filled for fire sealing and vermin;
- bollards are to in place for mechanical protection of the switchboard; and
- bollards are required in front of switch room doors to stop doors being blocked.

### Switch room environment

- In case a switchboard is installed in a car park or installed lower than parking bays, all bunds or barriers shall be in place to prevent spillages reaching the main switch room.
- Signage must be in place for the location of the main switch board at the fire indicator panel or at each entry for the building.
- Signage is affixed to the doors of more than one switch room indicating the location of other switch rooms on the same site.
- The main switch room and switchboard internals are clean of dust and metallic debris.
- All foreign objects removed from against the switchboard and switch room floor area.
- Main switch room is not to be used as an office or storage room during final construction stages of the project.
- Permanent lighting in the main switch room shall be completed and maintained from the temporary supply before connection of the network supply.
- Advise construction safety officers that tagged installation cables emanating from the main switch room are live as from ACTPLA's authorisation date.