

# Electrical Switchboards

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29-10-12

## AS/NZS 3439.1 2002 Low-voltage switchgear and control gear assemblies

- Update on the IEC / Australian / New Zealand Standard

## NSW Service and Installation Rules

- Latest changes and the new edition

## Reviewing Switchboard Drawings and Factory Inspections

- Forms of Separation
- Segregation of Safety Services
- Service Protection Device
- Energy Authority Current Transformer Section
- Isolation of Energy Authority CT's

Modifications on site, when do I need to install an SPD?

AS/NZS3439 has remained unchanged for 10 years.

Based on IEC 60439 (1999 version), yet IEC has been updated 4 times in the last 10 years why has the Australian / New Zealand standard fallen so far behind?

Standards funding.

Proposal Form - Standards Development Projects - submitted September 2012.

If Standards Australia agree the proposal merits funding the committee will develop the new AU/NZ standard based on the latest version of IEC 61439.

Must be completed within 2 years.

The committee to decide on the extend of the changes from the IEC to AU/NZ version.

There will be opportunity for public comment prior to publication.

## *AS/NZS 3439.1 2002*

### *Low-voltage switchgear and controlgear assemblies*

#### *Part 1: Type-tested and partially type tested assemblies (IEC 60439-1:1999 MOD)*



Meeting held 30/8/12, changes have been finalized and the new revised to be published **by the end of this year.**

An example of upcoming changes:

1.2.4 Connection Point to be changed to Point of Common Coupling.

1.2.17 Point of Supply to be changed to Connection Point.

**These change made to reflect national electricity rules and law.**

1.5.3.4 'Where embedded generation is connected, the maximum permissible voltage rise on the underground or overhead service mains must not exceed 1%. See Table 8.3 for recommended maximum conductor lengths'.

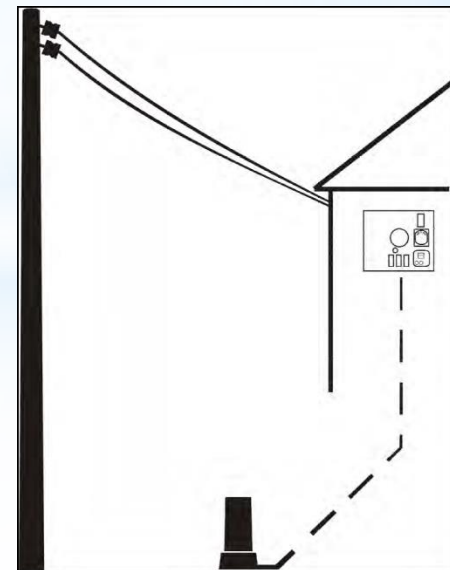
**This entire paragraph added due to solar panels increasing voltage levels.**

4.7.4(l) Grade (discriminate) with the electricity distributors protection ***starting at 100ms and above and up to the arcing fault level deemed to be at 30% of the prospective short circuit current.***

**Bold text added at request of NESMA**

## *NESMA Service and Installation Rules - July 2011*

*NESMA representation on the Service and Installation Rules of NSW management committee - Sean Peacock KEB*



# Reviewing Switchboard Drawings and Factory Inspections

## Forms of Separation

Form 1

Form 2a

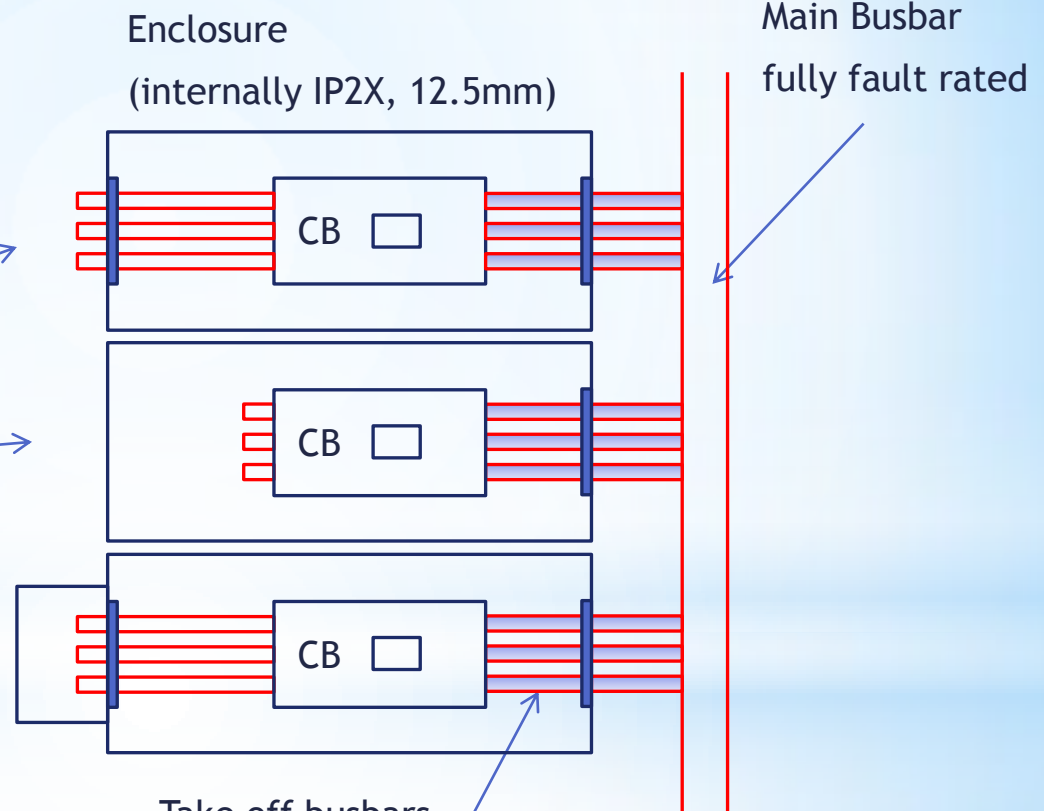
Form 2b

Form 3a

Form 3b

Form 4a

Form 4b



Take off busbars

Insulated

Less than 1m in length

NOT subject to full fault  
level for 1 second

Do I need terminal covers?

**Not a requirement of the standard**

When do I need rotary handles?

**Subject to the IP rating**

## Form 3bih

i - separation achieved by insulation of the busbar

h - the integral housing of the functional unit provides separation when complying with IP2X.

AS/NZS 3000 The Wiring Rules

Clause 2.5.5.1 - Protection against arcing fault currents while the equipment is in service, or is undergoing maintenance, shall be provided for **heavy current switchboards (800amps and above)**.

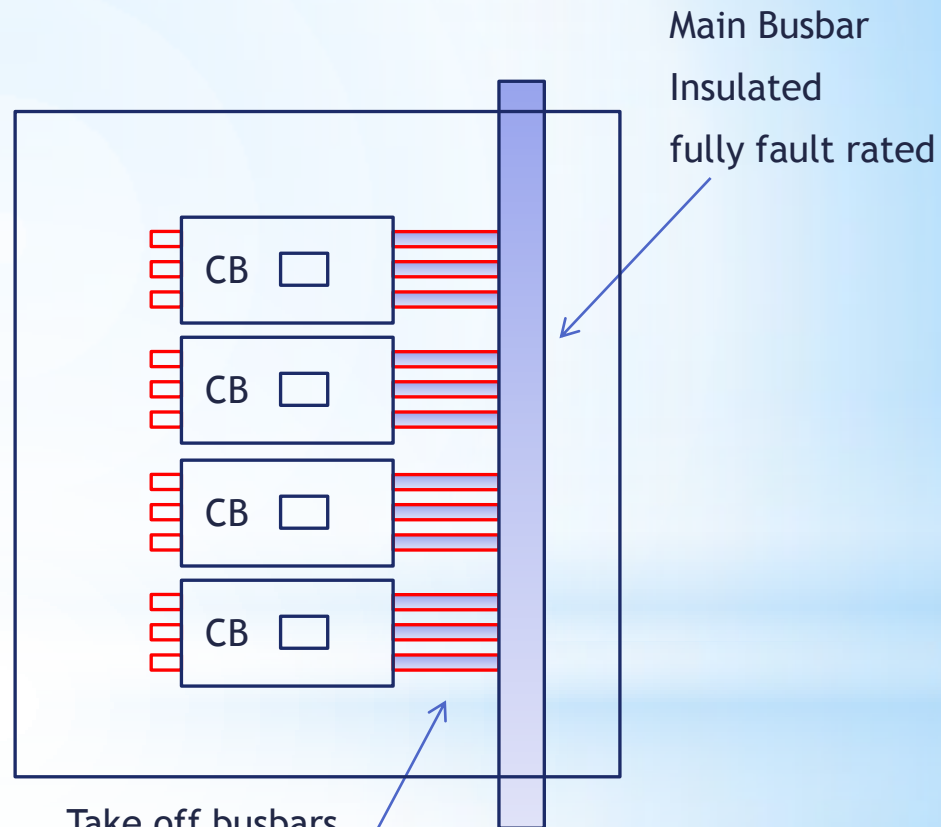
The notes go on to clarify Form 3bih as an acceptable method of protection.

Do I need terminal covers?

**Yes if the housing does not maintain IP2X.**

Can I use a circuit breaker chassis?

**Yes**



Take off busbars

Insulated

Less than 1m in length

NOT subject to full fault level for 1 second

## BCA and AS/NZS 3000 Safety Services

Safety Services as defined in AS/NZS3000 are warning and extinguishing systems, fire detection, smoke control systems, evacuation systems and the safety of persons using a lift.

Safety Service circuit breakers must be separated by a metal partition to minimize the spread of a fault from other switchgear.

What additional separation do you need to provide for a Form 3b switchboard?

**None, the circuit breakers are already separated from each other.**

What about Form 3bih?

**If you are using chassis you would need a separate chassis in a metal partitioned section.**

Do the cables for Safety Services need to run in separate cable zones within the switchboard?

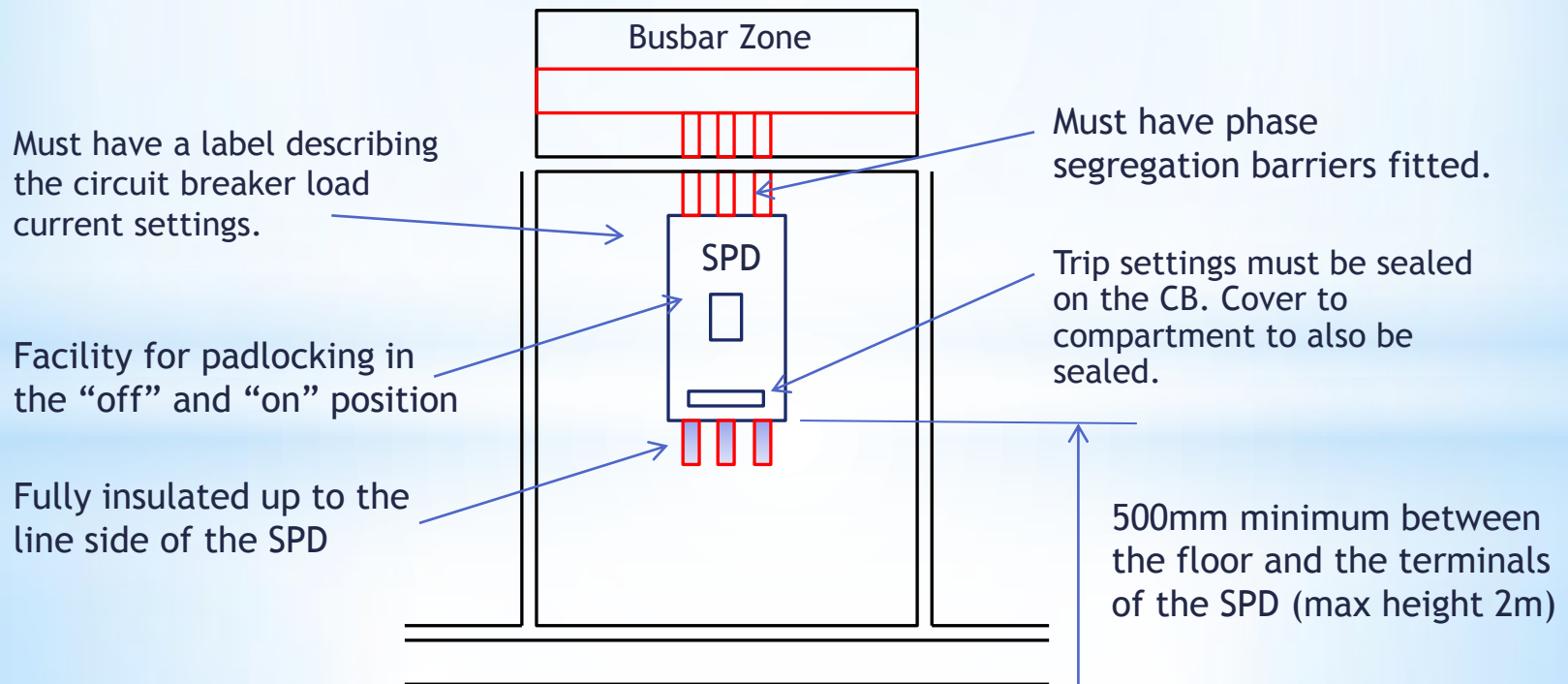
**No, they just need to be kept separate from the general supply cables by 50mm.**



## NSW Service and Installation Rules

Service Protective Device - must be located adjacent to or within the Main Switchboard. It must grade with the Energy Authority protection.

It must be installed in accordance with the requirements of AS/NZS 3439.1 Annex ZC arc fault minimization.





Where is the main neutral connection located?

Next to the mains connection

Where is the main earth connection located?

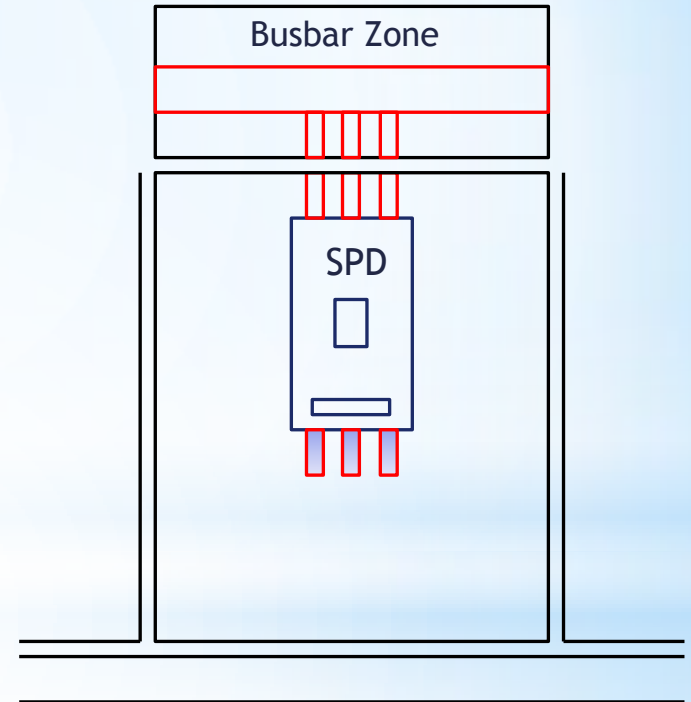
In another section of the switchboard which is metered.

Where is the M.E.N Link located?

In another section of the switchboard which is metered.

What other parts of a MSB need to be separated irrespective of the Form of Separation?

Energy Authority CT section.



# Energy Authority Current Transformer Metering

## NSW Service and Installation Rules - Section 4

Cover must be no greater than 1sqm and must not exceed 1500mm in height.

Cover must have sealing facility. If outdoors or the CT's are remote from the meters then it must have a padlocking facility.

Potential Fuses

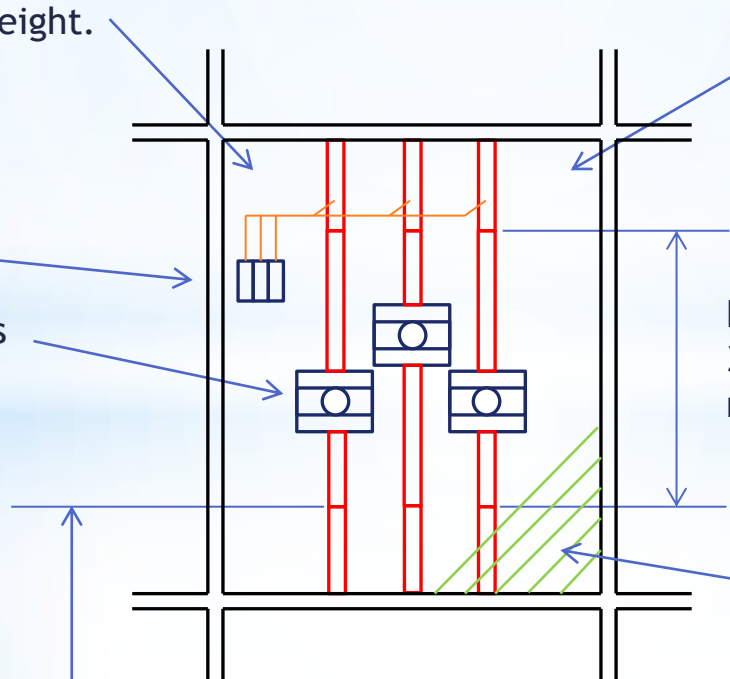
Current Transformers

Link must be a minimum of 300mm in length to a maximum of 450mm.

PVC Shield with CT terminals, Potential fuses and Neutral link exposed.

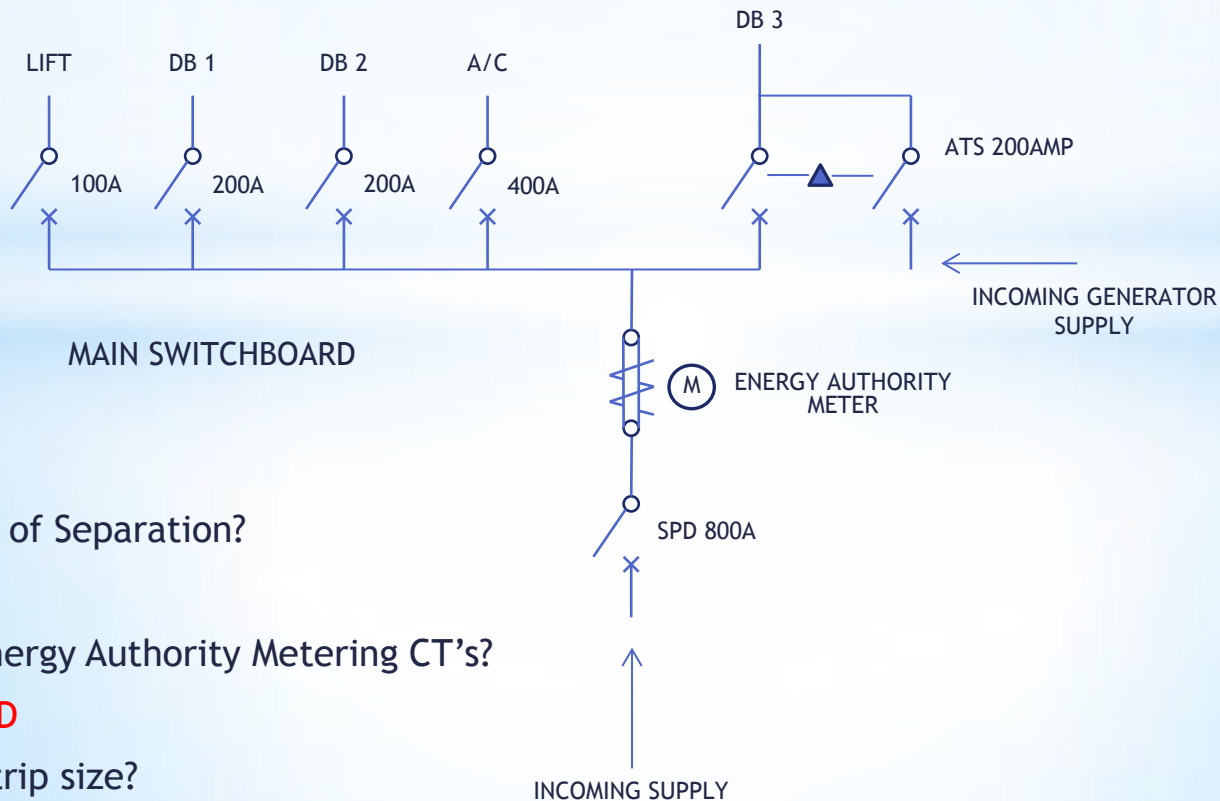
500mm minimum to the floor.

(maximum 2500mm to the top of the link)



## Isolation of Energy Authority Metering Transformers

NSW Service and Installation Rules Clause 4.13.2 - A sealable isolation device must be provided for CT metered installations. This isolation device is located on the line side of the CTs, which allows each individual tariff or customer to be isolated and sealed. A circuit breaker is a suitable device for this purpose.



Minimum Form of Separation?

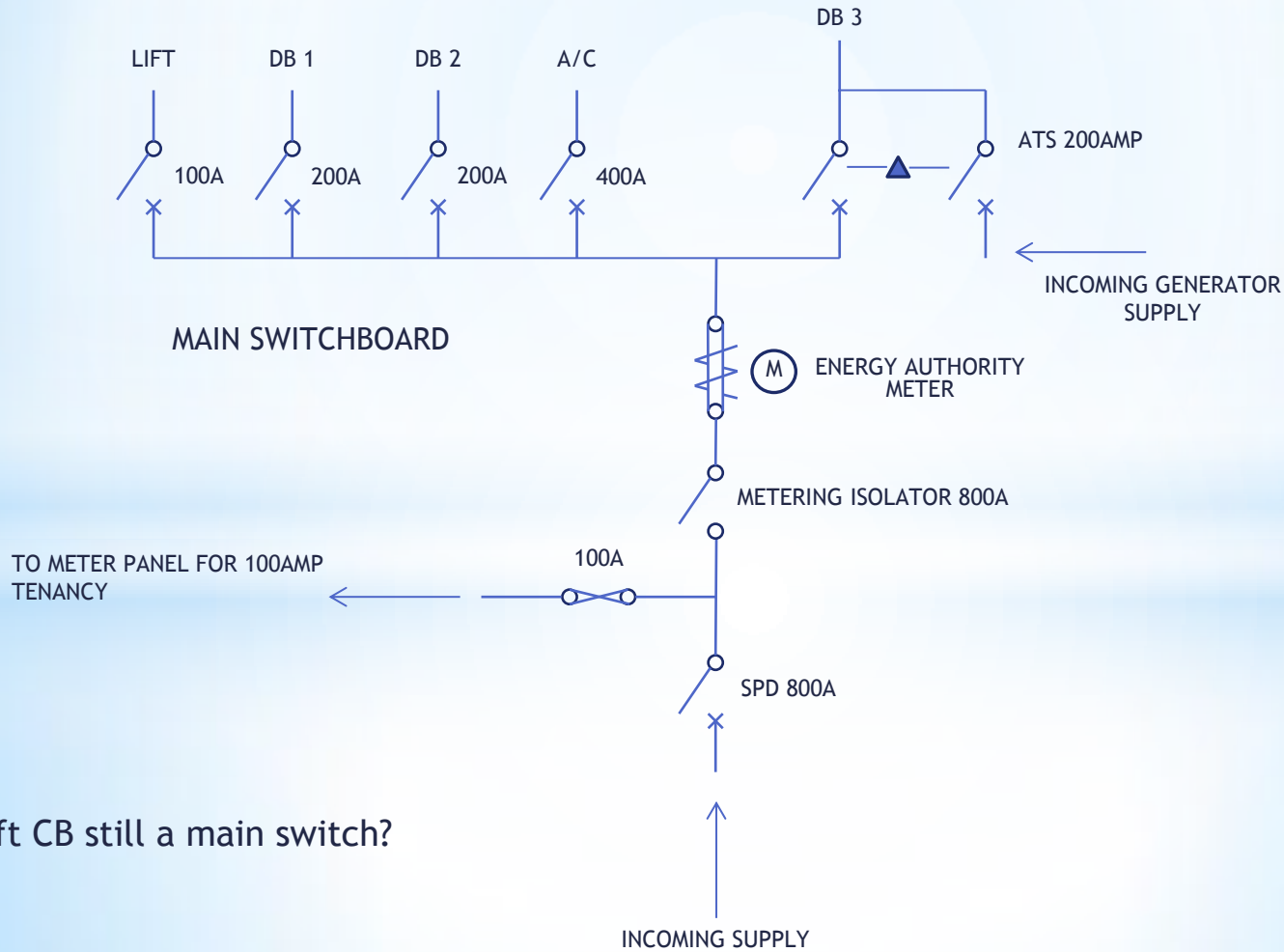
Form 3bih

Isolation for Energy Authority Metering CT's?

Provided by SPD

Frame size or trip size?

# Isolation of Energy Authority Metering Transformers



Is the Lift CB still a main switch?

Yes

## Service Protective Device - Ausgrid

When modifying a switchboard on site, when do you need to add an SPD?

The following is a list of typical situations, where Ausgrid may require a Service Protective Device to be installed at the main switchboard in conjunction with alterations or additions to existing installations connected directly to the low voltage within kiosk or chamber stations:

- (1) Consumers mains are being replaced (e.g. due to increased load) or relocated or extended;
- (2) The main switchboard or CT Metering enclosure is being relocated, reconstructed or significantly altered to accommodate a change in capacity such as an increase or transfer of electrical load;
- (3) Switchgear panels are being added to the main switchboard to accommodate additional circuits which increase the maximum demand of the installation or to accommodate load profiling equipment such as Power Factor Correction or voltage optimization/regulation equipment;
- (4) **Additional circuits are added to the main switchboard resulting in an increase in the maximum demand** and/or require a change to the upstream installation protection equipment;
- (5) Ausgrid is required to increase the capacity of its substation as a result of changes to the customer's installation;
- (6) Ausgrid's protection equipment within the substation is no longer considered adequate for the customer's installation.

# Questions