DaRa Switchboards

FAQ’s

Designing metering switchboards as per Victorian service installation rules

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Q: Who develops the Victorian service installation rules?

- A committee represented by Victorian electricity distributors, namely CitiPower, Jemena Electricity Networks, Powercor Australia Ltd, SP AusNet and United Energy.

Q: Who should comply with these installation rules?

- Customer who purchase electricity from the network has an initial and ongoing responsibility to ensure their electrical installation is complied with SIR's. This is normally accomplished through their agents. Customer agents are parties representing the customers. Such parties may include registered electrical contractors, licensed electrical workers, licenced electrical inspectors, consulting engineers, architects, and equipment manufacturers (eg. Switchboard manufacturer)

Q: When do you have to take necessary measures at the switchboard to limit the supply capacity?

- All new and existing installations where the distributor has specified in writing that the supply capacity be controlled
- Installations subject to contract with an allocated maximum demand
- Installations where maximum demand exceeds 100A per phase

Q: How is supply capacity is controlled at the switchboard?

- A device or devices other than fuse cartridges to be fitted in the switchboard before the subcircuits.
- Where multiple circuit breakers are used (eg. General services main switches and safety services main switches), the aggregate rating of multiple circuit breakers should not exceed the supply capacity. The supply capacity control device or devices should be incorporated a sealing facility to secure the settings of an adjustable circuit breaker by the use of a distributor seal.

Q: Who is responsible to install a Supply Protection Device (SPD) for the installation?

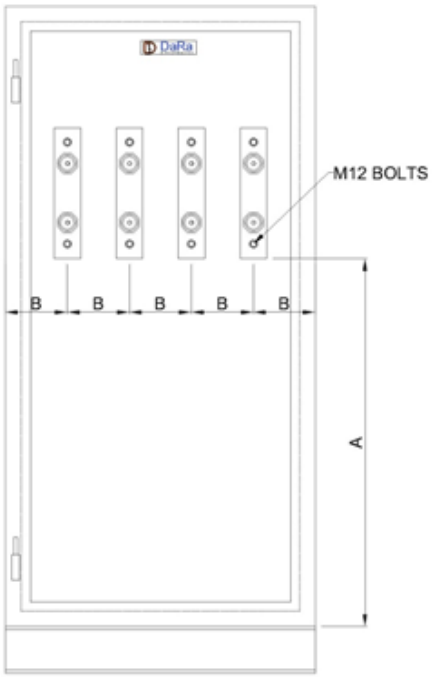
- Generally the customer shall install and maintain an assembly to accommodate a SPD. Depending on the distributor asset the supply originates, the distributor may also be responsible to house the SPD (eg. Supply directly fed from a substation)
- SPD to be generally on its own compartment without the need of disturbing SPD while working on the other parts of the installation.
- SPD shall be lockable and such locking should not disturb the other electrical equipment.
- SPD shall be labelled adjacent to the device/s as SUPPLY PROTECTION DEVICE
- SPD is to be located inside a lockable enclosure to ensure that non-Distributor personal will not interfere or operate this device
- SPD shall be rated to withstand the prospective short circuit current
- SPD shall be located with respect to minimum height restrictions from ground if service conductors are terminated directly.

SUPPLY FROM	SUPPLY CURRENT RATING	DISTRIBUTION RETICULATION	SUPPLY PROTECTION ASSEMBLY	RESPONSIBILITY FOR PROVIDING SPD	SPD DEVICE	SPD LOCATION
SUPPLY FROM SERVICE PIT CONNECTED TO U/G OR O/H DISTRIBUTION	≤100A	URD AREAS U/G FROM O/H	PANEL MOUNTED FUSE/S 	CUSTOMER	TYPE 2a FUSE/S 	METER PANEL 
		O/H RETICULATION CONVERTED TO U/G RETICULATION	FOLCB 	CUSTOMER	TYPE 2a FUSE/S	A POINT WHERE AN O/H LINE WAS PREVIOUSLY CONNECTED
	>100 ≤170A	URD, O/H AREAS	FSD 	CUSTOMER	SIZES 00, 2 AND 3 DIN TYPE NH FUSES 	AS CLOSE AS PRACTICLE TO THE PROPERTY BOUNDARY OR WITHIN 3m OF THE CONSUMER TERMINALS OR NEXT TO METERING EQUIPMENT 
		O/H TO U/G OR U/G TO O/H CONVERSION		CUSTOMER		A POINT WHERE AN O/H LINE WAS PREVIOUSLY CONNECTED
		O/H AREA DEDICATED SUPPLY		DISTRIBUTOR		DISTRIBUTION COMPANY POLE
SUPPLY FROM AN UNDERGROUND SERVICE CABLE CONNECTED TO AN UNDERGROUND OR OVERHEAD DISTRIBUTION (NO PIT)	>100A	URD, O/H AREAS	FSD	CUSTOMER	Sizes 00, 2 and 3SIZES 00, 2 AND 3 DIN TYPE NH FUSES	AS CLOSE AS PRACTICLE TO THE PROPERTY BOUNDARY OR WITHIN 3m OF THE CONSUMER TERMINALS OR NEXT TO METERING EQUIPMENT
		DEDICATED SERVICE LINE SUPPLIED DIRECTLY FROM A SUBSTATION		DISTRIBUTOR		AT THE SUBSTATION
		O/H AREA DEDICATED SUPPLY		DISTRIBUTOR		DISTRIBUTION COMPANY POLE
SUPPLY FROM AN AERIAL SERVICE CABLE 	1PH≤80A	BUILDING OR STRUCTURE	FOLCB	CUSTOMER	TYPE 2a FUSE	IN ACCORDANCE WITH FIG. 7.4-B OF VIC SIR'S
	≤100A					
	>100A≤170A		FSD		SIZES 00, 2 AND 3 DIN TYPE NH FUSES	
	≤100A	PRIVATE POLE	FOLCB		TYPE 2a FUSE	IN ACCORDANCE WITH FIG. 7.4-C OF VIC SIR'S
	>100A≤170A		FSD		SIZES 00, 2 AND 3 DIN TYPE NH FUSES	
SUPPLY FROM AN INDOOR, KIOSK, GROUND OR POLE TYPE SUBSTATION LOCATED WITHIN THE PROPERTY IT SUPPLIES 	>100A	KIOSK INDOOR GROUND TYPE	FSD	DISTRIBUTOR	SIZES 00, 2 AND 3 DIN TYPE NH FUSES	INSTALLED WITHIN SUBSTATION
			MCCB		MCCB	
			ACB		ACB	
			HV PROTECTION		HV PROTECTION	
	≤100A	POLE TYPE	FOLCB	CUSTOMER	TYPE 2a FUSE/S	DISTRIBUTION COMPANY POLE
	>100A		FSD		SIZES 00, 2 AND 3 DIN TYPE NH FUSES	

Above table illustrates the types of SPD's that can be installed depending on where the supply originates etc and who is responsible for installing and maintaining the SPD.

Q: What is the distance from ground to the consumer terminals if the cable size is 1 x 240mm2?

- 500mm. This is as per table 7.3-1 and figure 7.3-B



CONNECTION FACILITY INSIDE A SWITCHBOARD
DOOR & ESCUTCHEON REMOVED
(ENCLOSURE MINIMUM 500mm WIDE X 300mm DEEP)

SERVICE CABLE		SERVICE CONNECTION FACILITY		
CABLE SIZE	MINIMUM CONDUIT SIZE	MINIMUM CLEAR SPACE FROM GLAND PLATE TO CONSUMER TERMINALS		MINIMUM DISTANCE BETWEEN CONSUMERS TERMINALS
		ONE OR TWO FACES OF ACCESS (EG.CT ENCLOSURE WITH ONE DOOR ACCESS)	THREE OR FOUR FACES OF ACCESS (EG. SUPPLY PILLAR WITH LIFT OFF COVERS)	
		DIMENSION A (mm)		DIMENSION B (mm)
1 X 35mm2 Cu XLPE	63	260	260	75
1 X 50mm2 Cu XLPE	80	260	260	75
1 X 185 mm2 Alum	100	500	360	100
1 X 240mm2 Cu Alum	100	500	360	100
2 X 50mm2 Cu XLPE	100	450	260	75
2 X 185mm2 Cu Alum	2 x 100	700	600	100
2 X 240mm2 Cu Alum	3 x 100	700	600	100

TABLE 7.3.1 of VIC SIRs

Q: Do we have to do any other labelling other than as per AS/NZS3000:2007 in metering switchboards?

Yes. Clearly visible label (6mm) in addition to the normal labelling should be as follows:

- All switches installed on the line side of distributor grouped metering equipment shall be labelled:

UNMETERED SWITCH

- Occupancy Disconnection Device (ODD) controlling CT metering shall be:

OCCUPANCY DISCONNECTION DEVICE
TO BE OPERATED BY
AUTHORISED PERSONS ONLY

- Each set of consumer's terminals, un-metered switchboards, meter panels, occupancy meter/s, ODDs and occupancy switchboards to indicate the occupancies they control or are related to;

CONSUMER TERMINALS
TENANCY 1 AND TENANCY 2

MAIN SWITCHBOARD
TENANCY 1

METER PANEL
TENANCY 1

OCCUPANCY DISCONNECTION DEVICE
TENANCY 1
TO BE OPERATED BY
AUTHORISED PERSONS ONLY

- Any ODD supplying safety services must indicate the portion/s of the electrical installation it controls and be labelled:

OCCUPANCY DISCONNECTION DEVICE
SAFETY SERVICES
DO NOT SWITCH OFF INCASE OF FIRE
TO BE OPERATED BY
AUTHORISED PERSONS ONLY

- Where the occupancy consists of a number of separate areas or street addresses, each of the occupancies shall be labelled or identified in a manner acceptable to the relevant Distributor.

OCCUPANCY DISCONNECTION DEVICE
PL & P, LIFT AND FIRE PUMP
DO NOT SWITCH OFF INCASE OF FIRE
TO BE OPERATED BY
AUTHORISED PERSONS ONLY

Q: Can you use any size of meter panel to install electricity distributor meters?

- No. Meter panels should be selected as per below table:

MAXIMUM NUMBER OF METERS PER PANEL			
TYPICAL PANEL SIZE W X H (mm)	**SINGLE PHASE 2 WIRE**	**MULTI PHASE**	**COMBINATION SINGLE PHASE AND THREE PHASE**
200 X 370	1	-	-
400 X 380	2	1	-
400 X 590	4	2	2
600 X 600	6	3	3
600 X 900	9	4	REFER TO METER PROVIDER

Q: Can the meter panels be fixed?

- No. Meter panels need to be hinged vertically in the meter panel capable of opening 80 degrees from the closed position when all equipment is fitted.
- Meter panel to be secured with fasteners that requires a tool to release and fitted with provision for sealing.

Q: What are the requirements to consider in selecting a meter enclosure?

- Meter panel and wiring to be separated from other parts of the switchboard
- Should have minimum clearance from the back of the meter panel to the enclosure of 50mm for CT meter panels. This distance is 75mm for 16mm2 conductors and 150mm for 35mm2 conductors in direct metering panels.
- Provided with a clearance between the front of the meter panel and the back of the enclosure door of not be less than 175mm for direct connected metering and Current Transformer metering.
- If not exposed to weather or adverse environment, the meter panel does not require having doors.
- Meter enclosures exposed to the weather or adverse environment shall take the form of a box type enclosure equipped with a hinged door secured by an effective door restrainer and fitted with provision for VPI lock.

- Need to have ventilation and draining that will minimise condensation and provide for draining of moisture that might collect in the enclosures.
- Enclosure should be ventilated, shaded or other measures to be taken to ensure the operating temperatures of the meters are maintained within its limits inside the metering enclosure:
  - Direct Connected Metering (class 1 or 1.5): -10 deg C to +60 deg C
  - LV CT and HV Connected Metering (class 0.2 or 0.5): -10 deg C to +45 deg C
- Where metering is enclosed within the customer's switchboard, a temperature rise limit (above ambient) of 10K is to be used for LV CT and HV Connected meters, and 25K is to be used for Direct Connected meters.
- The switchboards and metering surrounds should be designed not to exceed above limits and certified evidence to this effect must be provided by a NATA testing laboratory or temperature rise assessment by extrapolation certified by a suitably qualified engineer.
- Meter enclosure need to be minimum IP23 rated.

Q: What is the minimum distance from ground to the bottom of direct metering panel?

- Bottom of the meter panel can be dropped to 500mm from ground as long as the meter panel is enclosed
- If the meter panel is unenclosed the minimum height from the ground is 1000mm.

Q: Can building wires used for meter wiring.

- Yes but only upto 16mm2. Meter wiring should be as per table 8.9.1 of VIC SIR's

Conductors Sizes			
Load Carrying Conductors	≥ 4mm^2 to ≤ 35mm^2		
Metering Neutral Conductors	4mm^2 or 6mm^2 and coloured black		
Meter Register Changeover Switch Wire/s	Not required		
Soft Drawn Copper Conductors	**Minimum Number of Strands**		
≥ 2.5mm^2 to ≤ 16mm^2	7 strands		
≥ 25mm^2 to ≤ 35mm^2	18 strands		
[3] **Flexible Cables**	**Required Ferrule Size**		
25mm^2	≥ 22mm long and ≤ 8mm diameter		
≤ 16mm^2 cables	≥ 18mm long and ≤ 8mm diameter		
[2] **Maximum Size of Soft Drawn Copper Conductors and Depth behind panel**			
Maximum Conductor Size	[4] 16mm^2	16mm^2	35mm^2
Minimum Depth behind panel	**50mm**	[1] **75mm**	**150mm**

Footnotes;

[1] This depth can also accomodate no more than four 25mm^2 conductors attached to the meter panel.

[2] The maximum sizes specified in this table may not be applicable where the use of flexible conductors are incorporated to ensure adequate flexibility.

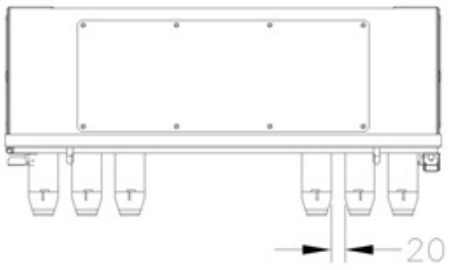
[3] Flexible cables used for meter panel wiring shall be provided with end-terminals (boot lace ferrules).

[4] Only to be used where;

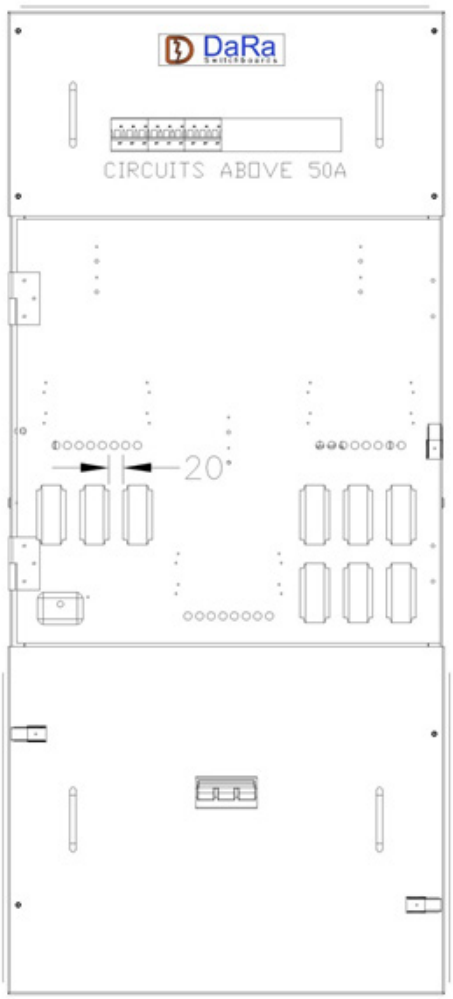
- Consumer's mains comprise of 16mm^2 soft drawn copper conductors forming a 2 Wire 230 volt Single Phase, single occupancy installation.
- 4 mm^2 permitted for any controlled loads.
- Cables located at the rear of the meter panel shall be arranged in accordance with the relevant clause contained in the Wiring Rules to prevent undue stress on the conductors or their terminations.

Q: Is there a distance between adjacent fuses that need to be considered in meter panel design?

- Yes. The distance between fuses to be minimum 20mm when the maximum demand exceeds 50A.



TOP VIEW



FRONT VIEW

Q: Do you need to install a separate supply disconnection device if single meter panel is installed within a switchboard?

- No. if this single panel can be isolated by a SPD or a main switch, you do not have to have a separate supply disconnection device. However, if you have multiple meter panels, you need to have separate supply disconnection devices for each meter panel.

Q: Where can I find meter panel wiring arrangements for direct metering?

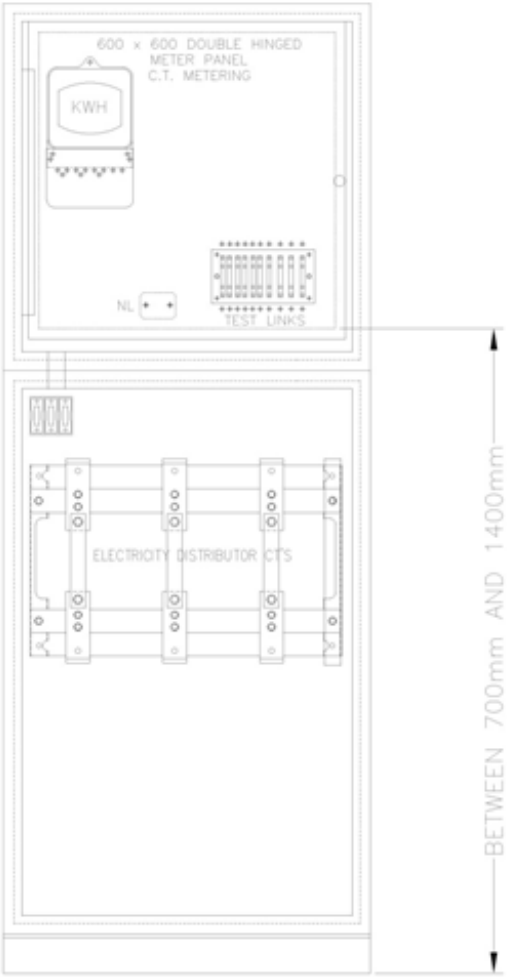
- Figure 8.10-G to 8.10-V of VIC SIR's shows typical arrangements of group metering complied with VIC SIR's.

Q: Can CT meters installed with direct metering?

- No. You are not allowed to mix CT meters and direct meters in the same meter panel and the minimum size of CT meter panel is 600H x 600W mm

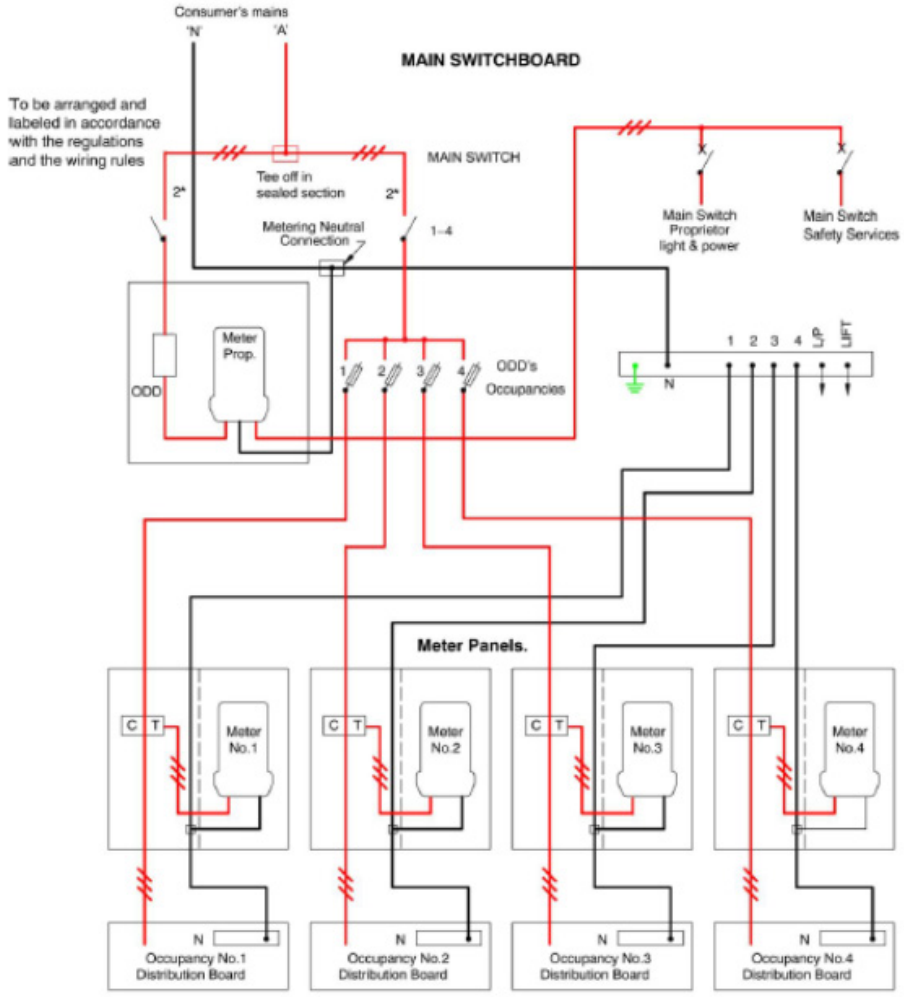
Q: Can the CT meter panel be 500mm from ground as per the direct metering?

- No. The lower edge of the meter panel shall be not less than 700mm or greater than 1400mm above the floor or ground level for meter panels located within a meter enclosure, a switchboard enclosure, switchrooms, cupboards or rooms set aside specifically for metering.



Q: Do you need CT isolation device for all installations?

- No. for single occupancy installations, the SPD located in front of the CT can be used for CT isolation. This means the CT's can be on the line side of the main switch. However, for multi occupancy installations, each set of conductors passing through each set of CT's to be isolated by CT isolation device/s. This device to have padlocking provision.



Notes

1. A plan of the installation showing the location of the metered and un-metered Mains and sub-mains in relation to the main structural features, together with a schematic diagram indicating the control, isolation and metering arrangements of the installation, shall be submitted to the Responsible Officer for approval prior to the intended commencment of the installation.
2. Attention to Wiring Rules regarding switches controlling Safety services is recommended.
3. SPD must be located in accordance with Tables 7.2-1, 7.3-2, 7.4-3 or 7.5-1 which ever is applicable.

Figure 8.11-C Typical Wiring Diagram for 4 CT Metered Occupancies and Proprietor with Direct Connected Metering

Q: Can CT enclosure fitted with a lift off door?

No. The CT enclosure shall be fitted with a hinged door which must have provision for sealing. The door shall be:

- Hinged on a vertical side and capable of being secured in the open position at a minimum of 90 degrees to the closed position; or
- Hinged at the top if the door is capable of being secured in the open position at a minimum of 170 degrees to the closed position; and

equipped with:

- A handle to open and close the door;
- A latch or securing device to retain the door in the closed position, the device shall be arranged to prevent contact with exposed live parts when the door is closed;
- Sealing facilities to enable the door to be sealed in the closed position by the meter provider or locking facilities for a padlock with a 5.5mm diameter hasp if the enclosure is in an outdoor location unless otherwise approved by the Responsible Officer; and
- Labelled:

ELECTRICITY METERING TRANSFORMERS

Q: Can the CT's be located 2meters from the ground?

- Yes. Bottom of CT's can be located within 500mm to 3 meters from ground.

Q: can the CT secondary terminals be at any distance from the back of the enclosure door?

- No. The CT secondary terminals should not be more than 300mm from the back of the door providing reasonable access for testing purposes.

CT METERING CHECKLIST	
CT CHAMBER	**YES/NO**
Are potential fuses mounted correctly in top left/right or busbar mounted?	
Are potential fuses wired using 4mm2 single double insulated cables?	
Are fuses connected to the line side of the supply?	
Are fuses positioned not to obstruct secondary terminals of CT's and fuse wedge can be operated towards operator?	
Are busbars inside the CT chamber installed in same direction and has not changed direction inside the CT chamber?  Unacceptble arrangement	
Have 32A HRC fuses been fitted?	
Provision for metering neutral within CT chamber?	
Is CT chamber lockable if outdoors?	
Is CT chamber Sealable?	
Is CT chamber door hinged?	
Is CT chamber door fitted with door stay if outdoor?	
Is the lowest mounted CT is higher than 500mm?	
Is the highest mounted CT is lower than 3m?	
Is there sufficient air clearance between CT's and busbar? Reference fig. 8.11-E of VIC SIRs	
Is the CT terminals maximum of 300mm from the chamber door when closed?	
Is the enclosure dedicated for CT equipment and associated wiring?	
Is the CT chamber correctly labelled?	
Are CT's mounted after SPD but before consumers main switch?	
Are CT's installed in a multiple occupancy installation able to be independently isolated?	
CT METER PANEL	**YES/NO**
Is metering enclosure earthed?	
Distance between CT chamber and the meter panel no more than 10m?	
Is meter panel sized 600H x 600W?	
Is the bottom edge of the meter panel mounted between 700mm-1.4m?	
Has the panel labelled with correct address?	
Ensure no mains cables behind meter panel?	
Is the panel correctly hinged?	
Is the doore supplied with provision for VPI lock?	

Above checklist can be used to check the compliance of CT chamber and CT meter panel compliance to VIC SIR's.

Q: Do you need to install separate main switches before an automatic transfer switch (ATS)?

- Yes. As per figure 6.9-D of VIC SIR's separate main switches to be installed.

Reference: : Victorian Service Installation Rules 2014 http://www.victoriansir.org.au/

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