

Maintenance Manual Method

PCC/MCC as maintenance manual

Pre-Energising Checks for PCC

Inspect busbar chamber, unit compartments and cable alleys. Remove tools, conductor strands and any other material lying loose.

Use vacuum cleaner to remove dust, small particles etc. Do not use air hoses which may contain oil, moisture.

Wipe the interior, particularly the insulation, using a clean cloth. Do not use cotton waste.

Check tightness of all electrical joints.

Plug all unused opening on outer surfaces.

Check alignment of operating handles for all switches and MCCBs. While despatching the switchboard, SECONDARIES OF CURRENT TRANSFORMERS ARE SHORTED. Remove these shortings while connecting relays/meters.

Close all doors before energising the board. Do not operate any equipment with its compartment door open when the PCC is energised.

Ensure that settings on protective devices are set for proper overload and short circuit co-ordination.

Check operation of ACB and associated control circuit in accordance with the relevant scheme drawing.

Measure insulation resistance of the system for any short or ground connection, using a 500V DC meggar.

During the monsoon, the switchboard may show lower meggar values. If insulation level is lower than 1 Mohm, switch on the space heaters and check meggar value after some heating.

If meggar value is satisfactory, the HV test need not be carried out. (Repeated insulation properties. All individual components as well as switchboard assemblies undergo HV test in the Factory). However, if HV test is deemed necessary, it should be conducted as per relevant Indian Standard

Ensure proper earthing connection. Ensure that all other ACBs/switches are off before switching on the Incomer.

Take following steps for cable termination :

1. Remove insulation from cable end without damaging conductor strands. Cut the ends clean and square.
2. Clean the conductor and coat immediately with inhibiting compound.
3. In case sector shape conductors are used, form the conductor using a circular forming die. Forming should be done prior to cleaning and applying inhibiting compound.
4. Use lugs with serrated barrels for crimping aluminium conductors. Serration increases the pull strength after crimping. It also cuts through the oxide film, if any, formed on the conductor.
5. Coat the lug barrel with inhibiting compound from inside.
6. Use proper crimping dies, as recommended by the lug manufacturer. For aluminium conductors, use ring or hexagonal dies. Ensure that the die surfaces meet during crimping. Incomplete crimping will result in higher temperature rise at the joint.
7. In case of long barrel lugs, increase number of crimps i.e. crimp the lug at 2 to 2 places

For MCC -

In addition to precautions in PCC we have to take special care for MCC starter feeders

- a) Check SLD & Control Circuit
- b) Check Interlocking connections
- c) Check Field Interlocks. Shorting links provided on these interlocks need to be removed & field wiring to be done. Before making field wiring please check all circuit operations in cold start method. Give supply through starters only after check megger values of motor winding.

General Recommendations :

- i) Tools like screw drivers, fuse pulling handle, door opening key for cable alley
- ii) All reference drawings like General Arrangement Drawing, Scheme Drawing
- iii) Consumable spares like bulbs, fuses

Do not use rewired HRC fuses. It may cause an explosion or are, leading to a fire.

Precautions before starting maintenance :

1. Switch off incoming power supply before removing top plates and side covers. Lock out incoming power supply. For safe operations, rack out the incomer ACB to isolated position and lock it.
2. Measure voltage on busbars to ensure that busbars are de-energised.
3. Switch off the control supply. Isolate remote control voltage sources. Short all CT secondaries. In case of shutdown on only one feeder, lock the upstream breaker in position.
4. For safety of personnel, while working on busbars, provide temporary earthing using a metallic chain/strip near the work place. Remove this earthing only after the job is completed.

SPECIFICATION :

IP - Code Of Protection

Degree of Protection for the Electrical Enclosures As per IEC 529 & BS 5490

First Numeral- Protection Against Solid Particles

IP	Test	Result
0	No protection	Object not protected
1	Protection against objects of size 50 mm in Dia or greater e.g Hand	Any Object having 50mm size should not enter
2	Protection against objects of size 12.5mm in Dia or greater e.g Fingers	Any Object having 12.50mm size should not enter
3	Protection against objects of size 2.5mm in Dia or greater e.g Tools	Any Object having 2.50mm size should not enter
4	Protection against objects of size 1mm in Dia or greater e.g Small Wire	Any Object having 1 mm size should not enter
5	Dust Protected	Harmful Dust Particles Protected
6	Dust Proof	Completely Protected Against Dust particles

IP - Code Of Protection

Degree of Protection for the Electrical Enclosures As per IEC 529 & BS 5490

Second Numeral- Protection Against Water

IP	Test	Result
0	No protection	Object not protected
1	Protection against water Droplets falling vertically(0)Deg	No Harmful Effect of Water
2	Protection against water Dropping at 15 Deg from both sides of vertical	No Harmful Effect of Water

3	Protection against Sprayed water upto 60 Deg from both sides of vertical	No Harmful Effect of Water
4	Protection against Splashing water From all sides of vertical	No Harmful Effect of Water
5	Protection against normal (1 Kg)water Jet From all sides of vertical	No Harmful Effect of Water
6	Protection against Power ful water Jet (4-5 Kg)From all sides of vertical	No Harmful Effect of Water
7	Protection against Temporary immersion in water upto 1 meter	No Harmful Effect of Water

Wire Selection Chart			
PVC Copper Flexible			
Upto 6 Amp		2.5 sqmm	
Upto16 Amp		2.5 sqmm	
Upto 20 Amp		4 sqmm	
Upto32 Amp		6 sqmm	
Upto 40 Amp		10 sqmm	
Upto 63 Amp		16 sqmm	
Upto 80 Amp		35 sqmm	
Busbar Selection			
	Al	Cu	Nywin wire
Upto 100 A	20x5	20x5	size 4
Upto 125 A	25x6	20x5	size 4

upto 160 A	25x6	25x6	Size 2
Upto 200 A	25x8	25x6	size 0
Upto 250 A	25x10	25x8	Size 000
Upto 315 A	30x10	25x8	Size 0000
Upto 400 A	40x10	30x10	
Upto 500 A	50x10	40x10	
Upto 630 A	50x12/60x10	40x10	
Nywin wire only for local application			

Torque Wrench For various Types of Bolts

Sr. No.	Bolt Size	Torque (N —m) for	
		Up to 4.8 Grade	8.8 Grade and above
1	M3	0.5	—
2	M4	1.12	—
3	M5	2.2	—
4	M6	3.8	—
5	M8	—	19
6	M10	—	37.5
7	M12	—	62
8	M16	—	155
9	M20	—	290