



Low & Medium Voltage Switchgear Systems

NTPC Faridabad - MV & LV Power Distribution Scheme

INTRODUCTION TO SWITCHGEARS

Switchgear: Assembly of switching devices (breakers, fuses, isolators) used to protect and control electrical systems.

Types:

1. Low Voltage (LV/LT) : Upto 1 kV.
2. Medium Voltage (MV) : 1 kV to 33 kV

Aim :

- Protection from faults (short circuits, overloads)
- Load control & isolation
- Safe switching under normal and fault conditions

LT Switchgear – 415V System

- Voltage: 415 V, 3-phase, 50 Hz
- Components:
 - Air Circuit Breakers (ACB)
 - MCB, MCCB, Contactors, Meters
- Major Brands : L&T, Siemens.
- Applications:
 - Auxiliary power to lighting, control panels, small motors.
 - LT panels fed from 4 transformers.
- Panel Mapping:
 - 5A, 5B, 5C → CISF Security Block
 - 8A, 8B → Township Distribution
 - 9A, 9B → Switchyard Loads

MV Switchgear – 6.6 kV System

- Voltage Level: 6.6 kV Medium Voltage (MV)
- Breaker Type: Vacuum Circuit Breaker (VCB)
- Make : BHEL.

- Rated Current: 2500 Amps
- Location : 6.6 kV SWGR OCA Sec-A

- Panel Layout:
 - PCC-1 → Feeder-1
 - PCC-2 → Feeder-2
 - Coupled via Bus Coupler

MV Motor Loads (6.6 kV Motors)

Seven Major Motors Powered by 6.6 kV Switchgear :

1. CEP-1 – Condensate Extraction Pump
2. CEP-2 (Standby)
3. CW Pump-1 – Circulating Water Pump
4. CW Pump-2 (Standby)
5. BFP-1 – Boiler Feed Pump
6. BFP-2 (Standby)
7. LP Booster Pump – Boosts suction for BFP

Motor Ratings:

- Voltage: 6.6 kV
- Current: ~630 Amps
- Make/Model: GE Make, M40 Model (3F Motors)

Transformers (MV to LV)

- 6.6 kV to 415 V **step-down transformers** supply LT switchgear.
- 4 **transformers** connected to HT panels.
- Transformers feed :
 - Township
 - CISF blocks
 - Switchyard auxiliaries
- Ensures reliable operation of LT systems during normal & emergency conditions.

Black Start Procedure & Backup Power

- During blackout:
 1. Black Start DG activates automatically.
 2. Incomer breaker gets charged.
 3. Transformers energized, restoring 415V LT bus.
 4. Critical loads powered:
 - Control room
 - Emergency lights
 - SCADA/DCS
- Ensures rapid restart of essential services.



THANK YOU

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