Specification of APFC Panel

Design, manufacturing, supply, installation, Testing and commissioning of APFC Panel of 200kVar 12 stages as per following specification:-

**General**
The 440V APFC Panel shall be metal clad, indoor type floor mounted in Non drawout execution. Fabricated from Sheet steel shall be CRCA of minimum 2.0 mm thickness. Incomer Circuit breaker (MCCB) shall be mounted in a separate compartment and Metering compartment along with APFC Relay etc shall be separate. The position of various control switches, push buttons, louvers etc. requiring manual operation. The operational Height of Panel shall be at a height not less than 300mm and shall not exceed 1850mm from the finished floor level. Name plate for each incoming and outgoing feeder at front. All equipments of similar rating shall be interchangeable.

**Insulation Level**
Rated insulation voltage 1100 V  
One minute power frequency withstand voltage :
- 2.5 kV for power circuits  
- 2 kV for control circuits  
Clearance in air (minimum) :
- Phase to phase - 25 mm  
- Phase to earth - 19.0 mm

**Short Circuit Strength**
Rated short time withstand current not less than 36kA for 1sec. Rated peak withstand current not less than 52.5kA.

**Busbars**
Busbars made of EC grade aluminium alloy equivalent to E91E WP as per IS 5082, 1981, size adequate for specified rated continuous and SC current.

Three phase, neutral (with at least 50% rating of main buses) and continuous earth bus. Bus bar shall be provided with proper grade & colour of heat shrinkable sleeve.

Rating of horizontal buses shall be same as that of incomer circuit breakers and vertical run shall be same as that of outgoing breaker rating Temperature rise of bus bars shall not be more than 40 deg. C above an ambient of 50 deg. C.

**Construction Features (Mechanical Design)**
Sheet steel clad, floor mounted, free standing design, non-dust proof construction  
Extension bus links properly spaced for terminating single cables of required size and above as well as for terminating multiple cables of all sizes.

The interior of the switchboard shall be finished with OFF WHITE (RAL 7032) paint shade.
All panels shall be supplied with base channels.

The IP Protection for enclosure shall be IP52 or better.

Necessary Louvers along with cooling fans shall be provided in the panel to ensure the cooling of Panels at the time of exercitation of Capacitor Banks and Contactors.

**Incomer Circuit Breaker (MCCB)**

**01. Electrical Features**
Air break triple pole MCCB of required size and in conforming to IS 13947.
Rated continuous current as specified.
Symmetrical service breaking capacity of breaker shall not be less than 20kA.
Making capacity 2.5 times breaking capacity.
Adjustable Over Load and Short Circuit protection

**02. Operating Mechanism**
Manual operated quick make and break trip free mechanism as to ensure high speed closing and tripping independent of the operating forces.
Mechanical indication to show: Breaker ON/OFF/TRIP

**Outgoing Feeders**

Each Out going feeder shall be provided with required rating of MCB, Contactor along with the necessary fuses etc, Capacitor Banks along with on/off Push Button and on/off LED Indicating Lights as per following specification :

**01. MCB/MCCB**
Air break triple pole MCB/MCCB conforming to IS 13947 of adequate continuous current rating as specified.

Symmetrical breaking capacity not less than 10kA in case of MCB and 18 kA in case of MCCB.

**02. Capacitor Switching Contactors**
All Capacitor Banks shall be controlled by power contactors, which shall on/off the Capacitor Bank, accordingly these contactors should be suitable to handle the inrush current of capacitor Banks.

**03. Capacitor Bank**
Capacitor Banks shall be suitable for operation at 440V Three phases. The type of capacitor banks shall be self healing MPP type Heavy duty as per IS: 13340-1993 and shall be housed in sheet steel container to ensure the explosion free design. The external discharge resistors shall also be provided. Capacitor Banks shall be suitable for
Overloading as 115% for Over Current and 110% for Over Voltage. The Watt Loss shall not be less than 0.5w/kVAr.

**Protections:**
Combined lightning and surge protection device for three phase should be connected parallel to the output for providing safety from all types of possible surges. The device should safely handle 10/350 surges of 7KA per pole and 8/20 surges of 35KA per pole.

**Control Terminations**
650V grade multiway terminal blocks of non-tracking moulded plastic complete with insulated barriers, stud type terminals, washers, nuts and lock nuts and identification strips. Power and control terminals segregated. Control terminals of minimum rating 10 amps suitable to receive 2.5 sq. mm copper conductor. 20% spare terminals in each control terminal block.

**Measurements and Control**
A Digital Multi function meter shall be provided in Incomer feeders to measure and display the following parameters along with APFC Relay of required stages as specified as per following specification :-

**APFC Relay**
The APFC Relay shall be suitable for operation at 415V Power and Auxiliary both and 5A as current measurement.
The Relay shall be of 12 stages to improve the P.F at least 0.98. The relay shall be microprocessor based with self diagnostic and setting including C/K ration.