

ANNEXURE-A

RATINGS AND REQUIREMENTS

1.0 General

Type : ACB Modules - Drawout type
MCCB Modules – Drawout type

Service : Indoor

Enclosure : IP52

2.0 System

AC DC

Voltage : 415V ± 10% 220V (187-242V)

Phase : 3-phase, 4-wire 2- wire

Frequency : 50 Hz +3% to - 5%

Combined voltage and
Frequency variation : 10% (absolute sum)

System grounding : Solidly grounded Ungrounded

3.0 Rating

Rated current : To be decided by the tenderers.

Design Ambient Temperature : 50°C

Short Circuit Current Symm. : 50 KA 25* KA

* Indicative only, the actual value will be decided by the tenderers.

S/C Withstand Time : ----- 1 second -----

High voltage test for 1 minute : 2.5 kV 1.5 kV

4.0 Duty

Circuit Breaker : 0-3'-CO-3'-0

Contactora (AC) : Class III - Category AC3 for
unidirectional drives and AC4 for bi-
directional / inching duty drives

Contactora (DC) : Class I – category DC2

MCCB / Switch Duty for AC DC

Motor Feeder : AC23 DC22

Other Feeder	:	AC22	DC22
5.0 A.C. / D.C. Power Supply			
Control Voltage for Circuit breaker	:	220V DC +10% to -15%	
Control voltage for MCCB modules	:	110V AC \pm 10%, 1Ph, 50Hz +3% to - 5%	
Service voltage	:	240V AC \pm 10%, 1Ph, 50Hz +3% to - 5%	

ANNEXURE-B

PROTECTIONS

- 1.0 All Protective relays shall be numerical type having communication facility with Plant DDCMIS system / PLC.
- 2.0 The minimum protections to be provided for different types of circuits are listed below:
 - a. Incoming Feeder & Bus-coupler with ACB:
 - 3 - inverse time O/C relays (51) for phase fault.
 - 1 - Inverse time O/C relay (51N) for Earth fault.
 - 3 - Under Voltage (27), Range : 40-80% with timer
 - b. Motor Feeder with ACB: (above 110 kW)
 - 1 - Composite Motor protection relay (99) for protection against
 - Thermal overload
 - Phase faults
 - Unbalance (negative sequence)
 - Locked rotor
 - Excessive Start-up time and Start-Stop.
 - Earth fault
 - c. Outgoing Feeder : with ACB
 - 3 - Inverse time O/C relays (51) for phase fault.
 - 1 - Inverse time O/C relay (51N) for Earth fault.
- 3.0 Apart from protection relays, each electrically operated breaker shall be provided with anti-pumping (94), trip annunciation (30), lockout (86) and trip circuit supervision (74) relays. Lockout relay shall be hand reset type.
- 4.0 Both primary side & secondary side fuse failure / voltage loss monitoring system of VT shall be provided..
- 5.0 For Auto-bus change-over as well as live bus change-over through synchronization refer enclosed Control Schematic drawings.
- 6.0 Each incomer shall be provided with three (3) nos. Bus Energised indicating lamps – Red/Yellow/Blue for each phase.

ANNEXURE-C

FITTINGS & ACCESSORIES

Each switchboard shall be furnished complete with fittings and accessories as listed below: -

1. Operating mechanism complete with all accessories, fittings and tripping coil and closing coil, pole discrepancy feature etc. as required.
2. Base frame and anchor bolts and nuts.
3. Auxiliary contacts and relays.
4. LOCAL/REMOTE Selector switch, TRIP/CLOSE Push Buttons.
5. Manual tripping devices with protective flap.
6. Mechanical ON-OFF indicator.
7. Operation counters.
8. Set of switch fuse units/MCCB for A.C. and D.C. supply.
9. Space heater with thermostat and ON-OFF switch.
10. Cubicle illumination lamp with ON-OFF switch.
11. 3 Pin 5A Socket with ON-OFF Switch.
12. Terminal blocks and internal wiring - lot as required.
13. Other standard accessories which are not specifically mentioned but supplied with breakers of similar type and rating for efficient and trouble-free operation.

14. Bimetallic terminal connectors.

ANNEXURE-D

BUS TRANSFER SCHEME FOR PMCC

1.0 The manual bus transfer shall be arranged in such a way that any of the following modes of operation is possible.

1.1 Manual Bus Transfer

a) Without voltage interruption

This means by allowing momentary parallel operation of two sources.

b) With voltage interruption

i) Slow Transfer

ii) Fast Transfer

NOTE : For CHP/AHP system 'Manual bus transfer without voltage interruption' and 'dead bus transfer with voltage interruption' shall be provided.

Synchronization of Incomer & Bus coupler for each of the 415V PMCC shall be implemented through PLC in CHP electrical cum control room building. Synchronization check relay, guard relay and auxiliary relay shall be provided in each PMCC. Synchroscope along with cut off switch, double voltmeter, double frequency meter shall be provided in the Main CHP electrical building cum control room. Separate synchronization switch and trip selector switch for each of the PMCC shall also be provided in the CHP electrical building cum control room.



**5 X 800 MW YADADRI TPS
AIR CONDITIONING SYSTEM
INSPECTION AND TESTING**

SPECIFICATION No: PE-TS-417-553-A001

SECTION : III

SUB-SECTION : 1

REV 00

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**SECTION-III
SUB-SECTION-1
INSPECTION AND TESTING**



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- 1.01.00 Inspection and Tests during Manufacture.
- 1.01.01 The method and techniques to be used by the Bidder for the control of quality during manufacture of all plant and equipment shall be agreed with the Owner.
- 1.01.02 The Owner's general requirements with respect to quality control and the required shop tests are set out elsewhere in this specification.
- 1.01.03 Before any item of plant or equipment leaves its place of manufacture the Owner shall be given the option of witnessing inspections and tests for compliance with the specification and related standards.
- 1.01.04 Advance notice shall be given to the Owner as agreed in the Contract, prior to the stage of manufacture being reached, and the piece of plant must be held at this stage until the Owner has inspected the piece, or has advised in writing that inspection is waived. If having consulted the Owner and given reasonable notice in writing of the date on which the piece of plant will be available for inspection, the Owner does not attend the Bidder may proceed with manufacture having forwarded to the Owner duly certified copies of his own inspection and test results.
- The owner's representative shall have at all reasonable times access to bidder's or his sub-vendor's premises and shall have power to inspect/ examine materials and workmanship or equipment under manufacture.
- The Bidder shall forthwith forward to the engineer duly certified copies of the Test Certificates in six copies (one to the Purchaser and five to the Consulting Engineer) for approval. Further nine (9) copies of Shop Test Certificates shall be bound with Instruction Manuals referred to elsewhere.
- For electrical equipment, routine tests as per relevant IS spec are to be carried out on all equipment. Type tests are also to be carried out on selected equipment as detailed in the specs of concerned electrical equipment.
- 1.01.05 Under no circumstances any repair or welding of castings be carried out without the consent of the Engineer. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Engineer.
- 1.01.06 All the individual and assembled rotating parts shall be statically and dynamically balanced in the works.
Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Bidder shall allow for trial assembly prior to dispatch from place of manufacture.
- 1.01.07 All materials used for the manufacture of equipment covered under this specification shall be of tested quality. Relevant test certificates shall be made available to the



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Purchaser. The certificates shall include tests for mechanical properties and chemical analysis of representative material. Equipment or parts coming under any statutory Regulations shall be certified by a Competent Authority under the regulations in the specified format.

1.01.08 All pressure parts connected to pumping main shall be subjected to hydraulic testing at a pressure of 150% of shut-off head for a period not less than one hour. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than one hour.

1.01.09 All necessary non-destructive examinations shall be performed to meet the applicable code requirements.

1.01.10 All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination magnuflux and ultrasonic testing shall be employed wherever necessary/ recommended by the applicable code. At least 10% of all major but welding joints shall be radiographed unless otherwise stipulated.

Statutory payments in respect of IBR approvals including inspection shall be made by the bidder. Bidder's scope shall include to preparation of all necessary documents, co-ordination and follow-up for above approval. Owner shall only forward assistance/endorsement of documents /design /drawings /reports/records to be submitted for approval as stipulated/ required by Statutory Authorities till registration of the unit and clearance for commercial operation.

1.02.00 Performance Tests at Site

1.02.01 The full requirements for testing the system shall be agreed between the Owner and the Bidder prior to Award of Contract. The completely erected System shall be tested by the Bidder on site under normal operating conditions. The Bidder shall also ensure the correct performance of the System under abnormal conditions, i.e. the correct working of the various emergency and safety devices, interlocks, etc.

1.02.02 The Bidder shall provide complete details of his normal procedures for testing, for the quality of erection and for the performance of the erected plant. These tests shall include site pressure test on all erected pipe work to demonstrate the quality of the piping and the adequacy of joints made at site.

1.02.03 The Bidder shall furnish the quality procedures to be adopted for assuring quality from the receipt of material at site, during storage, erection, pre-commissioning to tests on completion and commissioning of the complete system/equipment.

1.03.00 For details of specific tests required on individual equipment refer to respective section of this specification.



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All Statutory testing / clearance is in Bidder's scope including payment of all fees, etc.
as required

QAP FORMAT

BHARAT HEAVY ELECTRICALS LIMITED

CORPORATE QUALITY ASSURANCE

PROJECT:

SYSTEM :

VENDOR :

ITEM :

SL NO	COMPONENT /OPERATION OPERATIONS	CHARACTERISTICS CHECKED	CATEGORY	TYPE /METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS
1	2	3	4	5	6	7	8	9	10	11

Legend: 1. BHEL 2. Vendor 3. Sub-Vendor

QP No	CQS/SQP/31	Signature	Date							
	Rev		Name							
Page No	1 of 1	Party	Customer/Consultant	Bhel						Vendor