

S. N. Bose National Centre for Basic Sciences

Block JD, Sector III, Salt Lake, Kolkata – 700098

(An autonomous national centre funded by the Department of Science & Technology, Government of India)

Tender No.SNB/PUR/OT/25/035

Date: 07/03/2014

OPEN TENDER

Sealed tender in two parts (separate technical bid and price bid) are invited in the name of Director, S. N. Bose National Centre for Basic Sciences from only reputed & original manufacturer or its sole authorized distributor/dealer with original manufacturing authorization certificate for design, engineering, manufacturing, testing at manufacturer's works and satisfactory delivery to S. N. Bose National Centre for **LT Distribution Panel**, Item no.03. The detailed technical specifications and terms & conditions can be obtained from the website: <http://newweb.bose.res.in/InfoAnnouncements/Tender.jsp> The sealed tenders must reach this office within **27th March, 2014**.

Registrar

S. N. Bose National Centre for Basic Sciences

Block JD, Sector III, Salt Lake, Kolkata – 700098

(An autonomous national centre funded by the Department of Science & Technology, Government of India)

NOTICE INVITING TENDER

Tender No.SNB/PUR/OT/25/035

Date: 07/03/2014

Sealed tenders are invited for the equipment as per the details enclosed from the reputed, established and competent manufacturers / suppliers in two bids – technical and financial. The details of tender documents are as follows:-

1.	<i>Name of office inviting tender</i>	S.N. Bose National Centre for Basic Sciences Block JD, Sector III, Salt Lake, Kolkata – 700098
2.	<i>Name of the equipment</i>	LT Distribution Panel
3.	<i>Specifications of the equipments</i>	Can be obtained / downloaded from our website address: http://newweb.bose.res.in/ InfoAnnouncements/Tender.jsp
4.	<i>Separate bid for Part-A: Technical and Part-B: Commercial</i>	One large envelope having two smaller envelopes containing separately – Part-A: Technical bid and Part-B: Commercial bid need to be submitted. Tender ref. no. and item name should be mentioned on top of the large envelope. Two smaller envelopes should be superscribed Technical bid / Commercial bid as the case may be.
5.	<i>Submission of Tender</i>	The tender documents duly filled in arranged and sealed in aforesaid manner should be sent to: The Director, at the address given under Sl.No.1 above so as to reach him within 27 th March, 2014 from the date of publication of advertisement. The envelope should be superscribed – “Item name: LT Distribution Panel , Item no.03 against Advt. No. SNB/PUR/OT/25/035 dtd:07/03/2014.” The commercial bid of only technical qualified tenders will be opened in presence of representative of the bidders. The technical bids will be opened and evaluated by the Centre internally.
6.	<i>Eligibility of bidder to participate in the tender</i>	Original Equipment Manufacturer (OEM) or its Sole Authorized Business Distributor/Dealer shall be able to bid with original authorization from OEM. No assemble or reseller shall be considered.
7.	<i>Opening of Commercial bid</i>	The Commercial bid will be opened in the presence of Tenderers/ their representatives. Technically qualified bidders will be intimated after technical selection internally.
8.	<i>Documents to be attached along with the tender</i>	All the documents mentioned in the tender document, Annexure I along with a detailed users list of the quoted item including their names, addresses, contact nos., email addresses etc. to be enclosed with the technical bid.

This Centre will not be responsible for postal or any other delay and the **Authority of the Centre reserves the right to accept or reject any or all tenders without assigning any reason thereof.** Tenders / offers sent by fax / email will not be considered and would be rejected.

DIRECTOR

S.N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES

General Terms & Conditions:

- 1) The bid should be submitted in two bid system each of which is to be submitted in separate envelope. Main envelope should contain the “**Technical Bid**” mentioning the detailed technical specification and terms & condition, except price and the “**Price Bid**” should be enclosed in another envelope containing price of the quoted item in the prescribed format only. Both the envelopes should be separately sealed and sent in a large envelope which should be marked with tender reference number and name of the equipment. Separate bid with applicable EMD should be submitted for each of the items in the technical bid.
- 2) Quotation for each item should be submitted separately. Combined bids or combined EMD will not be entertained.
- 3) The tenderer should have high technical, financial reputation with sufficient experience and capable enough for satisfactory supply of similar type of equipment to actual users. Documentary evidence should be submitted in this respect with the technical bid.
- 4) Technical offer should be complete in all respect indicating detailed technical specifications of the offered items, make, model, duties, taxes, delivery period, gross and net weight of the consignment, together with the descriptive leaflet/catalogue/pamphlet/manufacturer’s brochure, etc.
- 5) **The offers shall remain valid at least for a period of 90 days. The period starts from the date of closing of tender submission.**
- 6) The Institute shall not be responsible for delay, loss or non-receipt of the tender through post/Air Mail
- 7) The aforesaid Open Tender is being issued with no financial commitment and purchaser reserves the right to change / vary any item or items thereof at any stage.
- 8) No tenderer shall be entitled for any compensation what so ever for rejection/non consideration of their tender.
- 9) Invitation of tender does not constitute any right or claim for issue of purchase order to the tenderer.
- 10) Only Price Bids will be opened in presence of the technically qualified bidders or their authorized representative who choose to attend on the date and time informed to them after opening of technical bids and its evaluation by the Centre internally.
- 11) The Centre will not be responsible for any misprinting by the newspapers concerned and inaccessibility of the downloading facility for any reason whatsoever and in that case the tenderer(s) should contact to the tendering authority to verify the fact in case of confusion.
- 12) If any information furnished by the tenderer is found incorrect or false at a later stage he shall be liable to be debarred from awarding the contract.
- 13) A copy of full tender document is to be submitted along with technical bid duly signed & stamped on all pages as an acceptance of all terms & conditions mentioned in tender documents.
- 14) a) Payment term: 90% of order value will be paid after delivery at site on satisfactory visual inspection.
b) Balance & final payment: 10% will be withheld as security deposit till expiry of warranty period which may be released against submission of bank guarantee from any nationalized bank

of India of equivalent amount by the supplier, which shall be valid for 18(eighteen) months from the date of its issue.

- 15) Vendors are requested to submit an Earnest Money Deposit (EMD) for the item as given below, in the form of Demand Draft in favour of “S. N. Bose National Centre for Basic Sciences”, payable at Kolkata. Bid without EMD will not be considered and shall be rejected. EMD should be enclosed with the technical bid only.
- 16) EMD of unsuccessful bidder will be refunded without interest after opening of the Commercial bids of the technically qualified vendors. In case of successful bidder EMD will be retained till successful delivery of the item at the Centre.

Sl. No.	Description of Items	Qty	Unit	EMD Amt.
3.	LT Distribution Panel MV LT—DB control panel for 2 Nos. 630 KVA transformer with proposed connection for 2 nos. 625 KVA D.G sets & 1 No. Bus Coupler with 42 Nos. outgoing feeders on either sides of the bus coupler as per attached sketch. as per detailed technical specification mentioned in the tender document.	Set	1	Rs.1,24,000.00

- 17) EMD will be liable to be forfeited if the vendor withdraws or found anything wrongful in the tender documents at any point of time after submission of bids.
- 18) Centre reserves the right to reject any or all bids without assigning any reason thereof.
- 19) Warranty: The items will be covered under onsite replacement warranty for a period of 18 months from the date of full & satisfactory delivery and its acceptance at the Centre.
- 20) Annexure – I of the tender document should be filled up, sealed & signed and submitted with the technical bid along with all relevant documents mentioned therein.
- 21) In case of any query please contact Mr.Supriyo Ganguly or Mr.Ganesh Gupta, JE(Electrical) over phone or in person on any working day during office hours of the Centre.

Annexure I

- The following form should be submitted with the technical bid duly filled and signed.
- **Relevant documents must be enclosed with the technical bid as per Sl. no. 01 to 13.**

S/ N	PARTICULARS	Yes/No	REMARKS
01	Technical bid & Price bid duly sealed & signed enclosed in separate envelopes as instructed.		
02	<u>Contents of Technical bid</u> (a) Technical details as per specification enclosed with technical bid ⇨ (b) Technical Compliance Statement to be prepared in a separate sheet ⇨ (and any deviation should be mentioned specifically) (c) Literature/Manual of the offered item ⇨ (d) Current Authorization Certificate from the Principal Manufacturer ⇨ (e) Name, address, email & ph. no. of users in India. ⇨		
03	Copy of Trade License, VAT, PAN, Service Tax Registration no. enclosed with the technical bid.		
04	Credentials of past experience		
05	Income Tax Clearance Certificate / copy of income tax return filed / PAN Card		
06	Copy of Proprietary Certificate of the firm in case applicable.		
07	Open Tender no. should be mentioned on top of all quotation envelopes		
08	Validity of Quotation should not be less than 90 days from the date of submission		
09	After sales maintenance procedure of the offered item to be mentioned		
10	Contact details of after sales service centres in Kolkata to be mentioned		
11	Bank details of the beneficiary to be mentioned		
12	In case of any defect found after receipt of material or in case of any deviation from the specifications or in case of any operational defect found during the warranty period, any part or the entire material is to be replaced by the supplier at no extra cost to the Centre.		
13	Whether your company has been blacklisted by any Central/State Govt. organization.		

Note: Offer received without any of the relevant information / certificate / document asked in the above sl. nos. 01 to 13 may not be considered. The Centre reserves the right to accept or reject offer of the tenderer. The Centre's decision shall be final and binding on the tenderer. Attached documents should be duly marked.

Seal & Signature with date



SATYENDRA NATH BOSE NATIONAL CENTRE FOR BASIC SCIENCES
 [Funded by the Department of Science & Technology, Government of India]
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 EMAIL: santosh@bose.res.in

Price Bid for 11 KV HT Panel

“Design, Engineering, Manufacture, Testing at Manufacturer’s Works and Supply & Delivery to SNBNCBS.”

SI No.	Description of Items	Qty	Unit	Unit Rate (in Rs.)	Tot. Amt. (in Rs.)
3.	LT Distribution Panel MV LT—DB control panel for 2 Nos. 630 KVA transformer with proposed connection for 2 nos. 625 KVA D.G sets & 1 No. Bus Coupler with 42 Nos. outgoing feeders on either sides of the bus coupler as per attached sketch. as per detailed technical specification mentioned in the tender document.	Set	1		
Item Total					
Packing, Forwarding, Freight, Insurance, etc.,					
CST/VAT @%					
Others (if any) should be indicated					
Net F.O.R price up to S. N. Bose National Centre – Total (in words):					

 Seal & signature with date

- ❖ Note: Centre is exempted from payment of Central Excise Duty against DSIR certificate. CEDEC will be provided with the Purchase Order if required.

DETAILED TECHNICAL SPECIFICATION

3. MV COMPOSITE CONTROL PANEL (Make: EAP/AC Control/Neptune/Any other reputed MV Panel Manufacturer certified by CPRI):

Supply of MV LTDB-1 control panel for 2 nos.630 KVA OIL Type Transformr alongwith interconnection for proposed 2 Nos. 625 KVA DG set as per and 1 no. Bus - Coupler with 42 Nos. outgoing Feeders on either side of the Bus coupler.

A control panel according to manufacturer's standard shall be equipped with:

3.1. The Incomer from 625 KVA DG Set Control Panel – 2 Feeders

Each Feeder consists of:

Qty	Description	Make
1 Set	1000 A, 4 Pole, Electrically operated Draw Out Type Air Circuit Breaker with Display and Microprocessor Based O/L, S/C,E/F, U/V (SR18G),50kA, Closing Coil & Spring Charge Motor : 230V AC, Shunt Trip : 24V DC, with U/V 415 V AC,LTPB, Micro switch for O/L & S/ C (Breaker trip Contact)	L&T(C-Power)/ SCHNEIDER/ Siemens
7 Set	Phase Indication, ON/OFF/TRIP, DC ON,	Schneider/ Esbee/L&T/GE
1 Set	Breaker Control Switch	Schneider//L&T/GE
1 Set	2 O/C + 1 E/F Relay,CDG-31, DMT- 3 sec 2 NO+2 NC, H/R setting 50-200%, E/F setting 10-40%, CTR-/ 5A , Flag Required	ALOSTOM/L&T/GE
1 Set	Trip Circuit Supervision relay, VAX31, Flush Type, 2NO + 2NC , S/ R , Aux Supply 24V DC	ALOSTOM/L&T/GE
1 Set	Master trip Relay. Flag Required, Aux Supply 24 V DC	ALOSTOM/L&T/GE
1 Set	96 sq. mm. Digital Ammeter	Schneider/AE/L&T/GE
1 Set	96 sq. mm. Digital Volt meter	Schneider/AE/L&T/GE
1 Set	Ammeter Selector Switch	Kaycee/Salzer//L&T/GE
1 Set	Volt meter Selector Switch	Kaycee/Salzer//L&T/GE
1 Set	Auto-Manual Selector Switch	Kaycee/Salzer
1 Set	Push Button	Schneider/ Esbee
1 Set	Auxiliary Contactor, 24V DC	Schneider/ L&T
1 Set	Auxiliary Contactor, 240V AC	Schneider/ L&T
3 Set	Resin cast Current Transformer, ratio : 800/5A, Class-1, VA-15	Kappa/AEE
3 Set	Resin cast Current Transformer, ratio : 800/5A, Class-5P10, VA-15	Kappa/AEE
1 Set	6A/10 A DP Miniature Circuit Breaker, 10Ka	Legrand/ABB/Siemens

1 Set	10 / 6 A TP /4Pole Miniature Circuit breaker,10 KA	Legrand/ ABB/Siemens
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3.2. The Incomer from 630 KVA OIL Type Transformers : 2 Feeders

Each Feeder Consist of:

Qty	Description	Make
1 Set	1000A 4 Pole Electrically operated Draw Out Type Air Circuit Breaker with Display and Microprocessor Based O/L, S/C, E/F, U/V (SR18G), 50kA, Closing Coil & Spring Charge Motor : 230V AC, Shunt Trip : 24V DC with U/V 415 V AC,LTPB , Micro Switch for O/L & S/C (Breaker Trip contact)	L&T(C-Power) / Schneider /Siemens or equivalent
7 Set	Phase Indication, ON / OFF , Trip, DC ON	Schneider/ Esbee/L&T/GE
1 Set	Breaker Control Switch	Schneider/L&T/GE
1 Set	2 O/C + 1 E/F Relay DMT-3sec 2NO+2NC H/R , O/C setting 50-200%, E/F setting-10-40%, HIEGHEST O/C 250-200%, HIEGHEST E/F 1000-800%, CTR-/5A, Flag Required, Type CDG 61	ALOSTOM/L&T/GE
1 Set	Trip Circuit Supervision relay, VAX31, Flush Type, 2NO + 2NC , S/ R , Aux Supply 24V DC	ALOSTOM /L&T/GE
1 Set	Master trip Relay. Flag Required, Aux Supply 24 V DC Type VAJH	ALOSTOM /L&T/GE
1 Set	Auto-Manual Selector Switch	Kaycee/Salzer
1 Set	Push Button	Schneider/Esbee
1 Set	Auxiliary Contactor, 240V AC	Schneider/L&T
1 Set	Auxiliary Contactor, 24V DC	Schneider/L&T
3 Sets	Resin cast Current Transformer, ratio :1200/5A, Class-1, VA-15	Kappa/AEE
3 Sets	Resin cast Current Transformer, ratio : 1200/5A, Class-5P10, VA-15	Kappa/AEE
1 Set	6A DP Miniature Circuit Breaker, 10kA	Legrand/ ABB/Siemens
1 Set	10 / 6 A TP /4Pole Miniature Circuit breaker,10 KA	Legrand/ ABB/Siemens
1 No	Annunciator, 12 Window Without T/A/R PB, 1 No Hooter Contact , 24 V DC	MINILEC
1 No	Buzzer, Flush Type , 24 V DC	Paramount

3.3. BUS-COUPLER- 1 No.

Each Feeder consists of:

Qty	Description	Make
1 Set	1000A 4 Pole Electrically Operated Draw Out Type Air Circuit Breaker with Display type and Microprocessor Based O/L, S/C,E/F (SR18G),50kA, Closing Coil & Spring Charge Motor : 230V AC, Shunt Trip : 24V DC, with U/V415 V AC,LTPB, Micro Switch For O/L & S/ C (Breaker Trip Contact)	L&T(C-Power)/ Schneider /Siemens
3 Set	ON/OFF /Trip Ckt Healthy	Schneider / Esbee
1 Set	Breaker Control Switch	Schneider/L&T
1 Set	Auto-Manual Selector Switch	Kaycee/Salzer
1 Set	Push Button Trip Circuit Healthy ckt.	Schneider/Esbee
1 Set	Auxiliary Contactor, 240V AC	Schneider/L&T
1 Set	TWIDO PLC , INPUT-24, OUTPUT-16, 24 V DC In Auto Mode all ACBs operation i.e MAINS INCOMER / DG INCOMER / BUS-COUPLER ACB will be controlled from PLC.	Schneider or Equivalent
1 Set	Aux Relay 2 C/O , 24 V DC	Schneider/L&T
1 Set	UPS, 1 KVA, BACK-UP 30 MINTS, ON-LINE	MICROTEK or equivalent
1 Set	Power Supply Unit, Input-230V AC, Output-24 V DC , 10 A	Schneider or Equivalent
1 Set	6A DP Miniature Circuit Breaker, 10kA	Legrand or equivalent
1 Set	6A, TPN Miniature Circuit Breaker, 10kA	Legrand or equivalent

4. OUTGOING FEEDER: 42 Nos

dsine Moulded Case Circuit Breakers (MCCB's) with Microprocessor Releases RC10

i) 63-160 A	FEEDER	:	02 Nos	4 Pole MCCB, Type DN2-250N
ii) 100-250 A	FEEDER	:	09 Units	4 Pole MCCB, Type DN2-250N
iii) 160-400 A	FEEDER	:	12 Units	4 Pole MCCB, Type DN3-400N
iv) 250-630 A	FEEDER	:	17 Units	4 Pole MCCB, Type DN3-630N
v) 250-630 A	FEEDER	:	2 Units	4 Pole MCCB, Type DN3-630N

Qty	Description	Make
02 Units	Moulded Case Circuit Breaker With Electronic Trip Unit (MICROLOGIC2) 63-160A, 4P, 36kA with following Accessories: a) Rotary Operating Mechanism Extended b) Accessories Aux. Contact Block / Trip Contact c) Spreader Set d) Accessories, Plug In Base (Complete Kit with extended rotary type handle with short ckt. Rating 36 ka)	Schneider/L&T/Esbee
09 Units	e) ON / OFF / Trip Indication f) MCB & Digital Ammeter with selector switch Moulded Case Circuit Breaker With Electronic Trip Unit (MICROLOGIC2) 100-250A, 4P, 36kA with following Accessories : a) Rotary Operating Mechanism Extended b) Accessories Aux. Contact Block / Trip Contact c) Spreader Set d) Accessories, Plug In Base, (Complete Kit with extended rotary type handle with short ckt. Rating 36 ka)	ABB/Legrand/Siemens/ AE Schneider/L&T/Esbee
	e) ON / OFF / Trip Indication f) MCB & Digital Ammeter with selector switch	ABB/Legrand/Siemens/ AE
12 Units	Moulded Case Circuit Breaker With Electronic Trip Unit (MICROLOGIC2) 160-400A, 4P, 50 KA with following Accessories : a) Rotary Operating Mechanism Extended b) Accessories Aux. Contact Block / Trip Contact c) Spreader Set d) Accessories, Plug In Base, (Complete Kit with extended rotary type handle with short ckt. Rating 36 ka) e) ON / OFF / Trip Indication f) MCB & Digital Ammeter with selector switch	Schneider/L&T/Esbee ABB/Legrand/Siemens/ AE
17 Units	Moulded Case Circuit Breaker With Electronic Trip Unit (MICROLOGIC2) 250-630A, 4P, 50 KA with following Accessories : a) Rotary Operating Mechanism Extended b) Accessories Aux. Contact Block / Trip Contact c) Spreader Set d) Accessories, Plug In Base, (Complete Kit with extended rotary type handle with short ckt. Rating 36 ka)	Schneider/L&T/Esbee
	e) ABB/Legrand/Siemens/AE f) MCB & Digital Ammeter with selector switch	ABB/Legrand/Siemens/ AE
2 Units	Moulded Case Circuit Breaker With Electronic Trip Unit (MICROLOGIC2) 630 A,4 P,50 KA with following Accessories: a) Rotary Operating Mechanism Extended b) Accessories Aux. Contact Block / Trip Contact c) Spreader Set d) Accessories, Plug In Base, (Complete Kit with extended rotary type handle with short ckt. Rating 36 ka) e) ON / OFF / Trip Indication	Schneider/L&T/Esbee

f) MCB & Digital Ammeter with selector switch

ABB/Legrand/Siemens/
AE

5. Electrical interlocking arrangement for LTDB between DG receiving breakers, Mains breakers and Bus- couplers

Mains Incomer-1	Mains Incomer-2	Bus coupler	DG Receiving Breaker – 1	DG Receiving Breaker-2	Remarks
ON	OFF	ON	OFF	OFF	Mains Incomer-1 and Bus coupler is ON
OFF	ON	ON	OFF	OFF	Mains Incomer-2 and Bus Coupler is ON
ON	ON	OFF	OFF	OFF	Mains Incomer-1 and Mains Incomer-2 are ON
OFF	OFF	ON	ON	OFF	DG receiving Breaker-1 and Bus coupler is ON
OFF	OFF	ON	OFF	ON	DG receiving Breaker-2 and bus coupler is ON
OFF	OFF	OFF	ON	ON	DG receiving Breaker-1 and DG receiving Breaker- 2 are ON. Both the DG sets are in solo operation.

1. 433 v M.V. PANELS

1.1 Scope

This Section covers the detailed requirements of medium voltage switch Panel for 433V, 3 phase 50Hz 4 wire system. These shall be branded and/or assembled/fabricated from a factory of repute. All switchgears shall be fully rated at an ambient of 40 deg C.

1.2 Type of Panel

The medium voltage switch board panel shall comprise of any one of the following types of switchgears or combination thereof as specified.

- (a) Air Circuit breakers electrically draw out type.
- (b) MCCB's of suitable Ics ratings. MCCBs shall invariably be Current Limiting type. Features like Double Break, Positive Isolation functions shall be preferred.

The Panel shall be indoor type having incoming sectionalization and outgoing switchgears as specified. The design shall be cubical type. The degree of enclosure protection shall be IP 42 as per IS: 13947 (Part-I).

(c) Size of the MV LT panel should be of 10.5MX1.2MX2.4M, and Size of the MV LT Panel base should be 10.5MX1.2MX0.3M.

1.3 M.V. Panel

1.3.1 General Construction

The switchboard shall be floor mounted free standing totally enclosed and extensible type. The switch board shall be dust & vermin proof and shall be suitable for the climate conditions as specified. The design shall include all provisions for safety of operation and maintenance personnel. The general construction shall conform to IS: 8623/1993 for factory assembled switch board.

1.3.2 Cubicle Type Panels

1.3.2.1 Cubicle type panels shall be fabricated out of sheet steel not less than 3.0 mm thick. Wherever necessary, such sheet steel members shall be stiffened by angle iron frame work. General construction shall employ the principle of compartmentalization and segregation for each circuit. Unless otherwise approved, incomer and bus section panels or sections shall be separate and independent and shall not be mixed with sections required for feeders. Each section of the rear accessible type panel shall have hinged access doors at the rear. Overall height of the panel shall not exceed 2.4 meters. Operating levers, handle etc. of highest unit shall not be higher than 1.7 meters. Multi-tier mounting of feeder is permissible. The general arrangement for multi-tier construction shall be such that the horizontal tiers formed present a pleasing and aesthetic look. The general arrangement shall be approved before fabrication. Cable entries for various feeders shall be either from top or bottom. Through cable alleys located in between two circuit sections, either in the rear or in the front of the panel. All cable terminations shall be through gland plates.

There shall be separate gland plate for each cable entry so that there will not be dislocation of already wired circuits when new feeders are added. Cable entry plates shall therefore be sectionalized. The construction shall include necessary cable supports for clamping the cable in the cable alley or rear cable chamber.

Cubicle panels with more than 1000 Amps BUS shall be made of tested structural modular sections.

Apparatus forming part of the main L.T. Panel shall have the following minimum clearances.

- a) Between phases-32 mm
- b) Between phases and neutral-26 mm
- c) Between phases and earth-26 mm
- d) Between neutral and earth-26 mm

1.3.2.2 **Bus Bar and Connections.**

The bus bars shall be of Copper of high conductivity electrolytic quality and of adequate section. Current density shall not exceed 160 amps for Copper /sq. cm. The bus bar system may comprise of a system of main horizontal bus bars and ancillary vertical bus bars run in bus bar alleys on either side of which the circuit could be arranged with front access cable entries. In the case of rear access, horizontal bus system shall run suitably either at the top or bottom. All connections to individual circuits from the bus bar shall preferably be solid connections; however flexible connections shall also be permitted as per recommendations of the Panel Manufacturer. All bus bars and connections shall be suitably sleeved / insulated in approved manner.

1.3.2.3 **Incoming & Outgoing Termination**

Incoming & Outgoing termination shall be suitable for receiving bus trunking /underground cables. Cable terminations for both Incoming & Outgoing shall invariably be through copper busbars terminals.

1.3.2.4 **Instruments**

All voltmeters and ammeters shall be digital & flush mounted of size minimum 96 mm conforming to class 1.5 of IS:1248 for accuracy. All voltmeters shall be protected with MCB.

1.3.2.5 **Indicating Lamps**

On all the incomers of M.V panels, ON/OFF indicating LED lamps shall be provided and shall be suitable for operation on AC supply. Phase indicating LED lamps shall be associated with necessary ON/OFF toggle switch.

1.3.2.6 **Small Wiring**

All small wiring for Controls, Indication etc. shall be of with suitable FRLS/HFFR (halogen free fire retardant) copper conductor cables.

Wiring shall be suitably protected within switch board. Runs of wires shall be neatly bunched, suitably supported and clamped. Means shall be provided for easy identifications of the wires. Where wires are drawn through steel conduits, the works shall conform to CPWD General Specifications for Electrical works (Part I- Internal) - 2013 and IS: 732 as the case may be. Identification ferrules shall be used at both ends of the wires. All control wiring meant for external connections are to be brought out of terminal board.

1.4 **Operational Requirements**

The indoor type MV panel shall conform to the following: -

- (a) The panel shall comprise of incomers, outgoing feeders and bus coupler as specified. The incomer shall be an Air Circuit Breaker. The bus coupler shall be an Air circuit breaker. The outgoing feeders shall be MCCBs.

- (a) Bus bars for phase and neutral shall have a rating as specified.
- (b) The entire switch panel shall be cubical type generally conforming to IS:8623/1993 for factory assembled switch board.
- (c) The incomer panel shall be suitable for receiving bus trunking or MV cable of size specified either from top or from bottom.
- (d) All incoming AIRCIRCUIT BREAKER shall have suitable adjustable tripping current and the time delay settings.
- (e) The entire panel shall have a common earth bar of size as specified with two terminals for earth connections.

1.5 Rating and Requirements

1.5.1 Air Circuit Breaker

1.5.2

All Air Circuit Breakers shall be 4 pole with minimum 50 KA breaking capacity (35 MVA at 433V) conforming to IS: 13947 (Part-II). Rated current shall be as per capacities specified. The equipment shall be complete with the following:

- (a) Necessary circuit breaker carriage with 3 positions (isolate, test, service), electrically operated draw-out mechanism.
- (b) Necessary isolating plugs and sockets.
- (c) Necessary mechanism interlock and automatic safe shutters gear with arrangement for pad locking.
- (d) Necessary independent manual spring mechanism with mechanical On/Off indication as well as electrical On/Off indication.
- (e) Necessary bus bars with bolted type neutral links.
- (f) ACB shall be provided with display type microprocessor based releases having built in over load, short circuit, under voltage & earth fault protection. Microprocessor release shall be EMI (electro magnetic induction)/EMC (electro magnetic compatible) certified.
- (g) Necessary set of auxiliary switches.
- (h) Necessary set of CTs with ratios as specified.
- (i) Necessary identification, metering requirements as specified i/c. ON/OFF indication lamps, selector switches, fuses, ammeter, voltmeter etc.
- (j) 4 pole Air Circuit breaker's neutral shall be fully rated with adjustable settings from 50% to 100% of In.
- (k) ACB terminals shall be suitable/suitably brought out for direct copper termination as per IS 13947 Part-II.

INTERLOCKING AND SAFETY ARRANGEMENT

Air circuit breaker shall be provided the following safety and interlocking arrangements

1. It shall not be possible for breaker to be withdrawn when in 'ON' position
2. It shall not be possible for the breaker to be switched on until it is either in fully inserted position or for testing purposes it is in fully isolated position.
3. The breaker shall be capable of being racked into testing, isolator and maintenance positions and kept locked in any of these positions.
4. A safety catch to ensure that the movement of the breaker as it is withdrawn is checked before it is completely out of the cubicle.
5. The operating mechanism shall provide for racking the breaker into connected, test and disconnected position without operating compartment door. When cubicle door shall be in open

position, the breaker can be pulled out to a 4th position, maintenance, where free access shall be possible to all parts of the breaker.

1.5.3 MCCB

All MCCB's shall be current limiting type with features of 4 pole type, load line reversibility and suitable for Horizontal/Vertical mounting without any derating. Beyond 300Amps capacity MCCBs shall have positive isolation and preferably double break / contact repulsion & double insulation features. The MCCBs shall invariably be used with terminal spreaders and outgoing copper bars for termination of cables.

Moulded case circuit breaker shall be incorporated in the Main L.T. Panel wherever specified. MCCBs shall conform to IS: 13947(part II) IEC-947(2) in all respects. MCCBs shall be suitable either for single phase AC 230 Volts or three phase 415 Volts.

The MCCBs shall be of the standard frame of the manufacturer's sizes subject to meeting the fault level as specified elsewhere.

There should be a digital ammeter with selector switch in all the outgoing MCCB's.

1.6 Test at Manufacturers Work

All routine tests shall be carried out and test certificates shall be produced to the Centre.

1.7 Testing at manufacturer's works before delivery

Checks and tests shall include all wiring checks and checking up of connections. Relay adjustment/setting shall be done before commissioning in addition to routine Megger tests. Checks and tests shall include the following: -

- (a) Operation checks and lubrication of all moving parts.
- (b) Interlock function checks.
- (c) Continuity checks of wiring, fuses etc. as required.
- (d) Insulation test: When measured with 500V Megger the insulation resistance shall not be less than 100 mega ohms.
- (e) Trip tests and protection gear test.
- (f) Routine test as per relevant IS.

3.9 EARTHING

Vendor should provide galvanized steel earth bus at the bottom of each panel which should run throughout the length of the board. The same should be bolted to the framework of each panel and breaker earthing contact point from horizontal bus bar, a vertical earth bus should be provided in each vertical section. The cross section area of the earth bus should be suitable to bear short circuit current. The horizontal earth bus should be extended at both sides of the panel.

All the non current carrying metallic parts should be effectively bonded to earth bus and conductivity of the whole switch gear enclosure, framework, doors and trolley should be maintained even after painting. All metallic cases of relays, instruments, and other panel mounted equipments should be connected to earth bus by green colour flexible copper wire of size not less than 2.5 sq. mm. The earthing of CTs should be through shorting link type terminal blocks.

3.10 LABELS

All HV & LV panel should be marked.

☞ **Single line drawing of 11KV HV panel is uploaded in the website in Autocad LT2011 version.**

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