PROPERTIES AND FACILITY DEPARTMNENT,
OLD AIRPORT, SANTACRUZ(EAST),
MUMBAI 400M 029

TEL. NO.: 26265609 / 5636 / 5670
FAX NO : 26157130
www.airindia.in

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

SUPPLYING,FIXING,FABRICATING AND COMMISSIONING THE ELECTRICAL PANELS AT OPERATION BUILDING AT OLD AIRPORT, SANTACRUZ (EAST) , MUMBAI-400 029

NAME & ADDRESS OF THE CONTRACTOR :

TELEPHONE NOS :

OFFICE: _____

RESIDENCE: _____

FAX: _____

MOBILE NO.: _____

E-MAIL ID : _____

PROPERTIES & FACILITIES DEPARTMENT

IMPORTANT NOTE

PROCEDURE FOR SUBMITTING OF TENDER

The tender for the subject work shall be submitted in two separate sealed covers. The Tenderers are required to convey in writing in the " Acceptance Letter" OR " Regret Letter" which shall be issued in duplicate along with the tender, their unconditionally acceptance to Air India's Tender Terms & Conditions in its entirety. The tenderers are also required to give an undertaking on "Service tax". It shall be the responsibility of the Contractor to collect the "Acceptance letter" in duplicate and proforma of "Undertaking on Service tax" from the issuing authority, prior to submission of the tender OR **" Regret Letter"**

" Cover No. 1" superscribed "Acceptance of Air India's Tender Conditions regarding Tender for …..(as per the subject of the tender)…… and bearing on the bottom left corner the name of tenderer, will contain the following

1. Receipt of Ernest Money Deposit/Demand Draft/ bank Guarantee.
2. "**Acceptance letter**"in duplicate fully completed.
3. Appropriate undertaking of Service Tax duly filled in with signature & stamp of the tenderer.

COVER NO. 1 SHALL NOT CONTAIN ANY OTHER DOCUMENTS

"Cover NO. 2" to be submitted under separate sealed cover will contain only the Tender document and superscribed …..(as per the subject of the tender…..) and bearing on the bottom left corner the name of the tenderer.

COVER NO. 2 SHALL NOT CONTAIN ANY OTHER DOCUMENTS

Both the seal Cover No. 1& 2 shall be properly pinned together and submitted. Tenders will be opened in the presence of any intending tenderers who may which to be present at the time on the date and at the place indicated. Only the sealed Cover No. 1 shall be opened first.

The offer from only those tenderers, who have submitted in Cover No. 1 their letter of Acceptance, conveying their unconditional acceptance of Air India's standard Conditions of Contract together, with the " Undertaking on Service tax" and receipt of Ernest Money Deposit shall be considered valid and Cover No. 2 containing the tender quotation for the subject work from such tenderers only shall be opened.

Those tenderers who do not fulfill the above requirements of Cover No. 1 or Cover no. 2 shall be rejected. The offers from those tenderers, who are unable to unconditionally accept Air India Standard Conditions of Contract will also be rejected.

REGRET LETTER

(To be sent under Contractor's Letter head)

To,
The Dy.General Manager,
Properties & Facilities Dept.,
Air India Ltd.
Santa Cruz (E),
Mumbai-400 029.

Sub: Supplying, fixing, fabricating & commissioning the Electrical Panels at Operation Building at OAP, Santa Cruz (E), Mumbai-400 029.

REF: Tender No. PF/ dtd.

Sir,

We regret to inform you that we are unable to quote for the subject tender due to the following reason :

1……

2. ……..

SIGNATURE OF THE TENDERDER WITH RUBBER STAMP

Date: ……..

PROPERTIES & FACILITIES DEPT.
SANTA CRUZ

ACCEPTANCE LETTER

To,
The Dy.GM - P&F Dept., Air India Ltd.
Mumbai 400 029.

Sir,

We hereby unconditionally accept the tender terms and conditions in its entirety for Tender No._____ dated _____.

We also confirm that payment of Earnest Money Deposit has been made in the form of DD and receipt of the same is enclosed where applicable.

We understand that if RATES against each item of Schedule of Quantities are not WRITTEN in both FIGURES as well as WORDS, the tender will STAND REJECTED.

Date : _____

_____.
SIGNATURE OF THE TENDERER WITH RUBBER STAMP

PROPERTIES & FACILITIES DEPT.
SANTA CRUZ

ACCEPTANCE LETTER

To,
The Dy.G.M - P&F Dept., Air India Ltd.
Mumbai 400 029.

Sir,

We hereby unconditionally accept the tender terms and conditions in its entirety for Tender No._____ dated _____.

We also confirm that payment of Earnest Money Deposit has been made in the form of DD and receipt of the same is enclosed where applicable.

We understand that if RATES against each item of Schedule of Quantities are not WRITTEN in both FIGURES as well as WORDS, the tender will STAND REJECTED.

Date : _____

SIGNATURE OF THE TENDERER WITH RUBBER STAMP

PROPERTIES & FACILITIES DEPARTMENT
OLD AIRPORT, KALINA, SANTA CRUZ(E) MUMBAI 400 029.

UNDERTAKING FOR GST
(FOR WORKS COSTING UP TO RS. 20 LAKHS ONLY)

Name of work:
Tender No. & Date :-

We, M/s _____,having our official address at _____, are not covered under the GST Rules, as our turnover is not likely to exceed Rs. _____ Lakhs.

We undertake all the responsibility of GST liability of this contract in case we exceed the turnover or gets covered under GST bracket during the execution and completion of this work or any liability of GST imposed on us for the concerned contract.

Place :
Date :

SIGNATURE & SEAL OF THE CONTRACTOR

UNDERTAKING FOR GST
(FOR WORKS COSTING RS. 20 LAKHS & ABOVE ONLY)

Name of work:
Tender No. & Date :-

We, M/s _____,having our official address at _____,hereby confirm that our GST Registration No. with Central Board of Excise and Customs is _____. We also confirm that our rates are exclusive of GST and we shall claim the applicable GST separately in our Running/Final bills. We also undertake the responsibility of payment of GST claimed from AIL to the appropriate authority of GST and keep AIL indemnified on this count.

OR

We, M/s _____having our official address at _____ hereby confirm that we will submit our GST Registration No. with Central Board of Excise and Custom to AIL before the submission of our 1st R.A. Bill. In case we fail to submit that same, AIL may withhold our payment. We also confirm that our rates are exclusive of GST and we shall claim the applicable GST separately in our Running/ Final Bills. We also undertake the responsibility of payment of GST claimed from AIL GST to the appropriate authority of GST and keep GST indemnified on this count.

Place :
Date :

SIGNATURE & SEAL OF THE CONTRACTOR

PROPERTIES & FACILITIES DEPARTMENT

CONTRACT ADMINISTRATION PROFORMA

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

NAME OF THE WORK: Supplying, fixing, fabricating & commissioning the Electrical Panels at Operation Building at OAP, Santa Cruz (E), Mumbai-400 029.

1. Estimated Cost of Work : **Rs.8.80 lakhs**

2. The Tender documents consists of the following:

   i) Contract Administration Proforma
   ii) Conditions of Contract (may be viewed on our website www.airindia.in)
   iii) Additional Conditions
   iv) Scope of work
   v) Schedule of Quantities
   vi) Declaration

3. The Tenderer is required to pay Earnest Money of **Rs.17,600/- (Rupees Seventeen Thousand Six Hundred Only).**
[**NOTE**: EMD is to be paid in Cash only for amount of upto Rs.10,000/- which payment is to be made to the Cashier, Cash Section, Finance Dept., OldAirport, Santacruz (E), Mumbai 29. For EMD amount more than Rs.10,000/-, payment has to be made by way of DD / PAY ORDER payable to “Air India Ltd.” at Mumbai.]

4. The completed Tender Documents in Cover No.2, accompanied by the Earnest Money Receipt / DD / Pay Order and the Acceptance letter in Cover No.1, addressed to the Dy.Manager, Properties & Facilities Dept., Air India Ltd., Old Airport, Santa Cruz (E), should be deposited in the Tender Box kept in Admin. Office before 3.00 P.M. on **18-07-2017**.

5. Tenders will be opened on the same day at 3.30 p.m. in the office of the Dy. General Manager, Properties & Facilities Dept., Air India , Old Airport, Santa Cruz (E), Mumbai-400 029 in the presence of any intending tenderers who may wish to be present.

6. In case the Tenderer does not wish to quote for the work, he may please send a regret letter on the date of opening of the Tender

7. **EARNEST MONEY / SECURITY DEPOSIT**:

a) Earnest Money Deposit : Rs.17,600/-

b) Additional Security Deposit to be made Within 15 days of date of issue of WO: ----------

c) Retention Percentage from Running / Final Bill : 8 (Eight Percent) of Tender Amount.

d) Total Security Deposit : 10% (Ten)

8. Time allowed for the execution of the work: **THREE MONTHS**

9. **DEFECTS LIABILITY PERIOD**:

a) Building works / concrete pavements: -

b) Repair Works / Asphaltic pavements: -

c) Electrical & Mechanical Works : One Year

10. Minimum value of work to be done between Two consecutive Running Account Bills For claiming by the Contractor : --------

11. Likely period for Honouring Running Account Bill after proper submission : --------

12. Likely period for Honouring Final Bill After proper submission : --------

13. Percentage permitted in Rate Analysis For Extra / Deviated items to cover Overheads and Profits. : 20 PERCENT

SIGNATURE OF ENGINEER-IN-CHARGE
CONTRACTS SECTION

AIR INDIA LIMITED
PROPERTIES & FACILITIES DEPARTMENT
OLD AIRPORT, SANITACRUZ(EAST),MUMBAI - 400029

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

ADDITIONAL CONDITIONS

Sub: **SUPPLYING, FIXING,FABRICATING AND COMMISSIONING THE ELECTRICAL PANELS AT OPERATION BUILDING AT OLD AIRPORT, SANTACRUZ, MUMBAI-400 029**

The tenderer should quote their rates of individual terms and for rebate offered, in figures as well as in words. If the rates are not quoted in words in addition to figures, such tenders will be rejected. Incomplete tender in any form shall be rejected.

1. The tender shall be submitted in two sealed covers. The tenderers are required to convey in writing their unconditional acceptance of Air India Ltd. Tender Conditions regarding the Tender for …….(here mention the subject of the tender)……. and shall bear on the bottom left corner the name of the Tenderer.

Please mention the Tender number on the cover
This **Cover No.1** shall contain the following:

i) Earnest Money Deposit Receipt.

ii) Unconditional acceptance letter (in duplicate)

2. "Cover No.2**" to be submitted separately and shall contain the Tender Quotations of the contract, super scribed ….." (as per the subject in Tender Notice & Tender Number)….." and shall bear on the bottom left corner the name of the Tenderer.**

3. The offers from those Tenderers who unconditionally accept Air India Ltd. Tender conditions duly stamped and signed, will not be considered and will stand rejected and Cover No.2 containing the Tender quotations of such Tenderers shall not be opened.

4. The offers from those Tenderers who are able to unconditionally accept Air India Ltd. Tender Conditions shall be considered for the work and Cover No.2 from such Tenderers only shall be opened.

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

ADDITIONAL CONDITIONS

5. Those tenderers submitting Regret Letters are requested to kindly state on the envelope "Regret Letter for Tender No. …….(here mention Tender No. and Date)……..".

6. The offer shall be valid for acceptance for a period of 90 (Ninety) days from the date of opening of the tenders.

7. Escalation shall not be granted on any account over the rates quoted in the Tender.

8. All entries in the Tender documents must be made in English. They must be hand written in INK and must not be typed.

9. NO ALTERATIONS, ADDITIONS OR ERASURES in any of the Tender documents are permitted and if they are made, Air India Ltd. shall have the right to either disregard such alterations, additions or erasures or cancel the whole Tender as it may decide.

10. The Organization shall remove from the premises its employees(s) who is / are found to be failing in his / their duties or whose presence in the premises is otherwise objectionable in the opinion of Departmental Representative / Security Staff.

11. The successful bidder will have to enter into a service agreement with Air India in such form as may be required by them for the performance of the work, which will be subject to these conditions and Terms and Conditions which may be considered necessary or expedient by Air India.

12. It is suggested that the intending bidder / bidders or his representative should visit the various areas to study the details and nature of services to be rendered before sending their quotations. The organization will be deemed to have satisfied themselves as to the nature of the areas of work, local facilities of access and all matters and things in any way affecting their rendering services as per the agreement including, Security requirements. No claims for extra charges shall be entertained in this behalf for any reason whatsoever.

13. Each tenderer must enclose with the tender documents either the Receipt of EMD paid by Cash with the Chief Cashier , Finance & Accounts Department, Cash Section, 1st floor, Finance Dept., Old Airport, Santa Cruz (E), Mumbai-400 029 OR EMD in the form of Demand Draft / Bank Guarantee of Nationalized Bank only.

ADDITIONAL CONDITIONS

14. The organization shall at their sole cost and expense furnish and provide all the materials, tools, plants, equipments, mechanical and other gadgets required for tendering services covered by this agreement to the entire satisfaction of Air India. The work shall be carried out on all week days and if required on Sundays and Public Holidays also as specified on schedule at no extra cost to the Company.

15. The organization shall provide all his employees with identification badges with photographs and timings approved by Air India Security. The staff employed by the organization shall be required to wear these badges at all times, plainly visible to the Air India Security Watchmen and Staff. Any such staff failing to do so shall upon request of the Departmental Representative / Security Staff, be taken off the duties and shall not be re-assigned these duties by the organization in Air India Premises.

16. The organization shall be fully responsible for the acts of omissions of the workers engaged by him and shall indemnify and save harmless the Air India Ltd. from and against any and all losses and expenses thereby caused.

17. Any complaints received in connection with the services shall be attended to by the organization immediately.

18. **UNSATISFACTORY PERFORMANCE:**

If the services rendered by the organization are not upto the standard, the same shall be brought to the notice of the organization with a view to improve the same in a stipulated period. If no improvement in the services rendered during the period is observed, a penalty equivalent to upto 15% of the monthly payment value shall be levied upon the organization and shall be deducted from the bills. Notwithstanding anything contained, in the service agreement attached hereto, the contract can be terminated giving one month's notice to the organization without assigning any reason whatsoever.

19. The organization shall be responsible for compliance with provision of all applicable laws including minimum wages act particularly Labour Laws in connection with the services to be rendered under this service agreement and in relation to the employees of the organization. It is clearly understood that this service agreement and in relation to employees engaged for rendering these services, the organization shall hold Air India blameless in respect of any claim pertaining to or made by employees of the organization. It is clearly understood that this service agreement and arrangement thereunder, shall not constitute any relationship of employer / employee between Air India Ltd. on one hand and employees of the organization on the other hand. Organization shall include in their offer any statutory increase in wages by State / Central Govt. (applicable) during the currency of the contract.

20. The organization shall affect all such insurances, as may be required by the provisions of the applicable laws.

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

ADDITIONAL CONDITIONS

21. In addition to Earnest Money Deposit, the organization shall pay an amount equivalent to make 10% of the quoted amount, on acceptance of tender, as Security Deposit. This total amount can be furnished in the form of Bank Guarantee valid till 3 months after completion of works.

22. The organization shall not enter into any sub-contract.

23. **CONTRACT LABOUR ACT:**

The Contractor shall comply with all the labour rules and regulations for the time being and from time to time in force. He shall comply with the Contract Labour (Regulation & Abolition) Act, of 1970 and the rules framed thereunder and the Minimum Wages Act 1948 and the rules framed thereunder. The Contractor shall comply with all applicable laws, ordinance, rules and regulations in respect of this contract and the employment of the workers, provided by him and shall obtain all such Municipal and other Government Permits, Licences and inspections as may be necessary and shall pay at his own cost the charges in connection therewith. If Air India is required to make any such payments, initially Air India shall recover the same from the Contractor immediately from their monthly bills.

24. **CONTRACT LABOUR LICENCE:**

The Contractor shall be governed under the Contract Labour (Regulation & Abolition) Act, 1970 and he should obtain the Contract Labour Licence from the Asst. Labour Commissioner's office within 15 days from the date of issue of Works Order.

25. **RENEWAL CONTRACT**:

The Contractor shall renew the Contract Labour Licence from time to time and inform the Departmental Representative accordingly.

26. **EMPLOYEES STATE INSURANCE SCHEME:**

Contractor's Workmen are required to be insured under the Employees State Insurance Act, 1948. The Contractor shall be solely responsible for payment of employees contributions and also for all expenses and payments whatsoever in connection therewith, including the cost of expenses required to be incurred in connection with the preparation and submission of returns, etc. it will be the responsibility of the Contractor to obtain the necessary code Nos. as immediate employers payment of contributions at appropriate time to the ESIS authorities and also to ensure the availability of the facilities under ESIS to the employees.

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

ADDITIONAL CONDITIONS

The Contractor shall keep Air India completely indemnified having of all factors and aspects of Employees State Insurance Act and to the extent it may be applicable to this Contract.

27. All disputes and differences of any kind whatsoever arising out of or in connection with this contract, or in the interpretation of any of the clauses herein which cannot be resolved by agreement of the parties shall be referred for arbitration to Managing Director. Air India or any Officer nominated by him in accordance with the provisions of the Indian Arbitration Act 1970 of any statutory modification or re-enactment thereof for the time being in force. The venue of arbitration shall be Mumbai. The award of the Arbitrator shall be final, conclusive and binding on all parties to the Contract.

28. The Contractor shall also ensure that the Contract Labour is medically fit and of sound health. The Contractor shall ensure that the workmen and supervisor employed by him shall not be of minor age.

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AIR INDIA LIMITED
PROPERTIES & FACILITIES DEPARTMENT
OAP, SANTACRUZ(E), MUMBAI.
TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

GENERAL SPECFICATIONS

SUPPLYING,FIXING,FABRICATING AND COMMISSIONING THE ELECTRICAL PANELS AT OPERATION BUILDING AT OLD AIRPORT, SANTACRUZ, MUMBAI-29

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1. It is proposed to provide the LT panels at Operation Building at Old Airport, Santa Cruz (East), Mumbai.

2. **SCOPE OF WORK**

Scope of work includes following items :

a) Fabrication, installation, connecting, testing and commissioning of "LT panels".
b) Supplying, laying and terminating the cables as required.
c) Purchasing & Dismantling carefully existing Electrical panel completely and taking away from Air India premises **(Rebated / Discounted Item)**
d) Removing of existing panel and carting away the same from the premises of AIR-INDIA.
e) Re-fixing the termination of the outgoing Cables in the new Panel.

The tenderer is required to submit the single line diagram and fabrication of panel drawing immediately after release of work order but necessarily before the commencement of fabrication of panel.

3. **IMPORTANT NOTE:**

3.1 Tenderers are advised to visit the site before quoting for this job and get themselves conversant with the scope of work, site conditions, access to site, availability of place for work etc. and confirm the same by way of letter.

3.2 The building is already occupied fully by various offices and the contractor should, therefore, take special precautions and care, so as not to affect the regular functioning of the various offices in any way.

3.3 Tenderers are requested to go through these specifications carefully, while quoting for the job and strictly adhere to their contents at the time of execution of work.

GENERAL SPECFICATIONS

3.4 In order to complete the work in the stipulated time, contractor may be required to put in extra efforts and work after office hours and on Saturdays, Sundays and Holidays. Air India Ltd. will not make any extra payment on this account. However, required security permission will be arranged by Air India Ltd.

4. **GENERAL**:

4.1 After completion of work the contractor shall keep the area clean and clear of all scraps and debris etc.

4.2 Contractor has to take adequate safety precautions against injury to the existing building structure, wiring, staff or any outsiders moving in the premises. All safety precautions, including provision of necessary safety equipments for workmen as governed by safety codes shall be followed at site by the contractor.

5. **TENDER PRICES:**

5.1 Tender prices shall be FIRM & consolidated which shall include the cost of materials, labour, installation charges, all taxes, duties,(Except Service tax) octroi, packing, freight, forwarding, loading, unloading, handling, insurance etc. testing & commissioning all complete.

5.2 No extra payment will be made towards the cost of scaffolding, etc.

5.3 Tender price should be inclusive of all minor civil works.

5.4 Prices shall remain firm and free from variations due to rise or fall in the cost of materials, labour, taxes, duties, etc. throughout the period of contract and till the completion of work. Price variation clause is not acceptable to Air India Ltd.

5.5 In case the contractor wants to offer any rebate it shall be unconditional and indicated against the corresponding columns in the Schedule of Quantities.

5.6 All works should be carried out only as per latest I.S. Specifications Indian Electricity Rules / Safety Rules, Rules governed by Local Regulatory Bodies, if any.

GENERAL SPECFICATIONS

6. **TIME SCHEDULE:**

On award of contract a time schedule shall be prepared for the completion of various activities in relation to the work of other agencies i.e. Bar Chart CPM/PERT chart. Completion period will be **THREE MONTHS.**

7. **PERFORMANCE GUARANTEE**:

7.1 Contractor shall guarantee their work and maintain the design requirements as per the specifications and latest Indian Standard Specifications.

7.2 The material supplied and installed will carry one year performance guarantee and contractor shall replace or rectify any defective material and bad workmanship found during the defects liability period of one year at his own cost.

8. **POWER & WATER SUPPLY:**

8.1 Temporary power supply for erection work and water supply required during construction time will be provided by Air India Ltd.

8.2 Air India Ltd. shall provide power supply upto the main switch at one location. Thereafter necessary cabling / wiring to the point further are required to be carried out by the contractor. The necessary deduction for use of power supply will be done as per AI Rules & Regulations.

9. **ENTRY PERMIT:**

9.1 The Contractor who have been awarded the job through work order shall furnish necessary police clearance certificate in respect of character and antecedents of all labour engaged by them, before commencing the work at site.

9.2 This will be a part of contractual agreement, Air India Complex has been declared as 'Prohibited Area', all such contractors who would be awarded contracts are requested to comply with the above requirements.

9.3 Contractor shall obtain such police clearance certificate from police & obtain entry passes in the **'**Prohibited Area' from the concerned departments at the Airport, if required.

9.4 No extra charges towards the entry permit will be paid by Air India Ltd.

GENERAL SPECFICATIONS

10. **PAYMENT:**

10.1 Final payment shall be made only after fulfilling all conditions mentioned against Test Performance Guarantee as per the Specifications. – No Advance., 70% of the tender rate shall be paid on receipt of materials at site .

10.2 Balance Payment shall be made to the Contractor after completion of the work and to the entire satisfaction of Engineer-in-Charge and General conditions of Contract, if applicable.

11. **TESTING OF MATERIAL:**

11.1 The Contractor shall produce all materials in advance so that there is sufficient time for testing of the materials and clearance of the same before use in the work.

11.2 Samples of various materials required for testing shall be provided free of charge by the contractor. Testing charges, if any, shall also be borne by the contractor irrespective of any other. Stipulation to the effect in any of the contract document including Properties & Facilities Dept., Specifications, etc. All other expenditure required to be incurred for taking the samples, conveyance packing etc. shall be borne by the Contractor himself.

11.3 Routine type of Testing at works shall be carried out such as Meggar, HV Tests and functional tests for all meters.

11.4 The Contractor shall be responsible to arrange at his own cost all the necessary tools and plants required to execution of the subject work.

11.5 The installation shall be tested at site for its performance test and results shall be furnished to the Engineer-in-Charge.

12. **GENERAL:**

12.1 Vouchers and / or challans for various materials for the work shall be produced to the EIC on demand.

12.2 On completion of works, drawings for completed installation shall be prepared by the Contractor and copies of the same (As directed by AIR INDIA) shall be submitted to the department.

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AIR INDIA LIMITED
PROPERTIES & FACILITIES DEPARTMENT
OAP, SAHAR.

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

TECHNICAL SPECFICATIONS (LT PANELS)

SUPPLYING,FIXING,FABRICATING AND COMMISSIONING THE ELECTRICAL PANELS AT OPERATION BUILDING AT OLD AIRPORT, SANTACRUZ, MUMBAI-29

1.0 The following Technical Specifications are made applicable for the Stated Job and shall be rigidly adhered to while supplying and installing the materials at site.

1.1 **CODES AND STANDARDS :-**

1.1.1 The following Codes and Standards shall be applicable for continuous performance of all electrical equipment to be supplied, delivered at site, erected, tested and commissioned. The Electrical equipment offered shall comply to the relevant Indian Standard Specifications, Fire Insurance Regulations, Tariff Advisory Committee's Regulations, and in particular to Indian Electricity Rules in all respects with all its latest amendments up-to-date.

1.1.2 For guidelines to the tenderer, few of the Indian Standards are indicated below :-

IS 116 Circuit Breakers for AC System.
IS 159 Bus bars and Bus bar connections.
IS 3072 Code of Practice for Installation of Switchgear.
IS 3106 Code of Practice for Selection, Installation and Maintenance of Fuse (upto 650 Volts)
IS 3427 Metal enclosed Switchgear and Control Gear.
IS 4047 Heavy Duty Air Break Switches and composite Switch Fuse Units for voltage not exceeding 1000 Volts.
IS 4064 Switch Fuse Units for Industries etc.
IS 4237 General requirements for Switchgears not exceeding 1000 Volts.
IS 5133 (Part-I) Sheet Steel Boxes.

TECHNICAL SPECFICATIONS (LT PANELS)

IS 2208 HRC Cartridge Fuse Units upto 650 Volts.
IS 2251 Code of Practice for Danger Notice Plates.
IS 2274 Code of Practice for wiring installations (exceeding 650 Volts)
IS 2705 Current Transformers.
BS 162 Electric Power Switchgear for Indoor and Outdoor Installations.
IEC Pub 26 Circuit Breakers.
IS 375 Marking and arrangement for Switchgear Boards Main connections and Auxiliary Wiring.
IS 722 Three Phase Watt Hour meters with MDI.
IS 732 Electrical wiring installation (upto 650 Volts)
IS 1248 Direct acting Electrical Indicating Instruments.

The entire electrical installation work shall be strictly complied with the Codes Standards, Rules and Regulations framed under the Indian Electricity Act.

Any other IS Codes As applicable at the time of execution over and above whatever stated above.

TECHNICAL SPECFICATIONS (LT PANELS)

2.0 **Construction :-**

2.1 The Panel shall be totally enclosed, metal clad, sheet steel fabricated, compartmentalized, Single / double front type (As per Data sheet), dust and vermin-proof, freestanding, floor mounting type. It shall be of unit construction suitable for splitting into sections for shipping to site and to be correctly re-erected on prepared foundations without skilled supervision. Provisions shall be made for addition of future units on either ends of a switchgear line-up after its installation on site. End busbar fishplates shall be provided.

2.2 The switchgear shall be easily extensible on either side by the addition of vertical sections. It shall be possible to extend the switchgear, irrespective of the type of end panel and the design shall be such as to permit addition of extension panels of a type other than the type of end panel. Any adapter panels required shall be included in the basic price and indicated clearly in the technical particulars furnished

2.3 The switchboard shall be fabricated from Cold Rolled Close Annealed sheet steel. It should be frame – cover design type. The load carrying part is of 2 mm Frame can be bolted or welded design however frame should be bolted to other frame using standard hardware.

2.4 Door should be made from CRCA sheet having 2mm sheet thinness.

2.5 Cover should be made from CRCA sheet having 1.6 mm sheet thinness. Partition Plates should be made of 1.6 mm CRCA sheet thinness.

2.6 All doors, Cover should have proper Gasket for insuring no dust ingress. Liquid PU form is preferred.

2.7 The height of the switchboard shall be constant throughout its length, but not exceeding 2400mm

2.8 The base frame shall be so designed to withstand the complete weight and operation of the Panel.

TECHNICAL SPECFICATIONS (LT PANELS)

2.9 IP of Switchgear Compartment should be minimum IP54 while Bus alley, cable alley should be IP32/ IP 42

2.10 Adequate lifting facilities such as hooks for ease of handling on site shall be provided. These hooks when removed shall not leave any openings in the switchgear compartment.

2.11 Front access shall be available to all components in each cubicle, which require adjustment, maintenance or replacement. Checking and removal of components shall be possible without disturbing adjacent equipment. All auxiliary equipment shall be easily accessible. Setting of relays shall be possible without de-energizing other equipments

2.12 Rear access shall be available to all cable glands and multi core terminal blocks by means of sheet steel hinged doors, designed to give the maximum possible access to the cable terminations. The cable alley door shall be provided with bolts, which can be opened with special keys by authorized persons.

2.13 Each unit of switchgear shall have necessary interior barriers to form separate compartments for buses, switching devices entering cable connection etc. All barriers shall be manufactured from non-inflammable material, preferably of sheet steel.

2.14 Each compartment shall be constructed and segregated to confine any damage caused by an internal fault to that compartment.

2.15 Adequate barriers shall permit personnel to work safely within an empty switching device compartment or one from which the switching device assembly has been temporarily removed with bus energized.

2.16 The arrangement of feeders in the switchboard shall take into consideration the number and size of cables required for the feeders.

2.17 The arrangement of the feeders shall ensure that operating handle of the switch / breaker shall be above 300 mm but below 1800 mm from ground level.

2.18 Removable type undrilled Gland Trays shall be provided on bottom of the panel. Gland Tray shall be 2 mm thick sheet steel for 3ph., 4W cable or 3mm Aluminium for single core cable.

2.19 Suitable provision shall be made for clamping cables inside the switchboard.

2.20 The cable terminations inside the cable alley shall be completely shrouded so that it shall be possible to work on any one of the terminations by switching OFF the corresponding feeder switch only.

2.21 All bezels, handles, screws, bolts, washers, hinges and other embellishments shall be of the best quality electro galvanized or passivated to withstand attack from corrosive atmosphere.

2.22 Adequate packaging against damage and deterioration shall be provided for transportation to site and subsequent storage prior to re-assembly

2.23 In case of copper to aluminum connections, proper treatment shall be given to minimize the bimetallic effect. That is, all joint surfaces at aluminum to copper joints shall be silver / tin plated, alternatively Cu-Al. washers (bimetallic washers) may be used

2.24 Any unused circuit breaker compartment shall be fully equipped and provided with compartment door, vertical bus bars and control terminals / wiring, etc., such that the same could be used for housing outgoing breakers in future without any modifications to the panel. All quotations must indicate the number of circuit breakers, which could be provided in unused space for each switchboard line up. Unit price for providing such outgoing circuit breakers shall be quoted which could be considered during placement of order

2.28 Nameplate (engraved metallic nameplates with screw fixing) with shall be provided for each door equipment (lamps, push buttons, switches, relays, etc.) mounted on the switchboard. Special warning plates one each on each front of a shipping section shall be provided on removable covers of doors giving access to cable terminals and busbars. Special warning labels shall be provided inside the switchboard also, wherever considered necessary. Identification tags shall be provided inside the panels matching with those shown on the circuit diagram

2.29 Engraved nameplates shall be anodized aluminum. Nameplates shall be fastened by screws and not by adhesives

2.30 Manufacturer shall furnish the general arrangement drawing of switchboard along with the quotation. The General Arrangement drawing of switchboard shall be subject to Client's approval

2.33 Each vertical section shall comprise :-

A front framed structure of rolled/folded sheet steel channel section, of minimum 2 mm thickness, rigidly bolted together. This structure shall house the components contributing to the major weight of the equipment, such as Moulded case circuit breakers, Miniature Circuit Breakers, main horizontal bus bars, vertical risers and other front mounted accessories.

2.34 The structure shall be mounted on a rigid base frame fabricated using ISMC channel of minimum 100 mm height. The design shall ensure that weight of the components is adequately supported without deformation or loss of alignment during transit or during operation.

a) A rear/or front cable chamber housing the cable and connections, and power/control cable terminations. The design shall ensure generous availability of space for case of installation and maintenance of cabling, and adequately safety for working in one vertical section without coming into accidental contact with live parts in an adjacent section.

b) M.S. perforated sheets of 1.6 mm shall be provided inside the Main Bus bar chamber and vertical Bus bar section. After the opening of the Bus bar chamber cover these perforated sheets should be visible this is to be provided for ventilation purpose and to avoid direct access to main bus after the opening the cover of Bus-bar alley. The size of the holes shall be less than 12.5 mm in diameter. This sheets should also go under seven tank painting process and should be painted with Epoxy Painted and white in colour.

c) Front and rear doors should be fitted with dust excluding synthetic rubber gaskets with fasteners designed to ensure proper compression of gaskets. When covers are provided in place of doors, generous overlap shall be assured between sheet steel surfaces with closely spaced fasteners to preclude the entry of dust.

d) No Black sheets shall be allowed. All sheets shall be white CRCA. If it is found at any stage that Black sheets have been used, The panel shall be summarily rejected.

TECHNICAL SPECFICATIONS (LT PANELS)

2.35 The height of the panel should not be more than 2400 mm. The total depth of the panel should be adequate to cater for proper cabling space 450 mm for MCB and MCCB sections. The Minimum size of the Compartments for the various sizes of MCCB shall be as follows.

a) For MCCBs of 32 Amps and 63 Amps 350 x 225 mm.
b) For MCCBs of 100 Amps and 125 Amps 450 x 350 mm
c) For MCCBs of 200, 250, 315 Amps and 400 Amps 450 x 450 mm
d) For MCBs of 100 A and 63 Amps – 250 x 250 mm

2.36 Doors and compartment partitions shall be fabricated using 2 mm thick sheet steel. Sheet steel shrouds and partitions shall be of minimum 14 Gauge thickness. All sheet steel work forming the exterior of switch boards shall be smoothly finished, leveled and free from flaws. The corners should be rounded. All the Sheet steel forming the exterior of the switch board should be fabricated using 2 mm White CRCA Sheets. The entire Panel shall be fabricated using 2 mm white CRCA Sheets only.

2.37 The apparatus and circuits in the power control centres shall be so arranged as to facilitate their operation and maintenance and at the same time to ensure the necessary degree of safety.

2.38 Apparatus forming part of the power control centres shall have the following recommended minimum clearances for un insulated bus-bars or should be as per relevant IS Codes.

a) Between Phases - 25 mm.

b) Between Phases and Neutral - 25 mm.

c) Between Phases and Earth - 25 mm.

d) Between Neutral and Earth - 25 mm.

When, for any reason, the above clearances are not available, suitable insulation shall be provided. Clearances shall be maintained during normal service conditions. Creepage distances shall comply to those specified in relevant standards.

2.39 All insulating material used in the construction of the equipment shall be of non-hygroscopic material, duly treated to withstand the effects of high humidity, high temperature tropical ambient service conditions.

2.40 Functional units such as circuit breakers and fuse switches shall be arranged in multi-tier formation. All the Air Circuit Breakers shall housed in a single tier formations only. Nothing shall be housed above and below the Bus- Coupler. The above and below compartments of the Bus-Coupler/Or shall be kept empty.

2.41 Metallic/insulated barriers shall be provided within vertical sections and between adjacent sections to ensure prevention of accidental contact with :

2.41.1 Main bus bars and vertical risers during operation, inspection or maintenance of functional units and front mounted accessories.

2.42 All doors/covers providing access to live power equipments circuits shall be provided with tool operated fasteners to prevent unauthorized access.

2.43 Provision shall be made for permanently earthing the frames and other metal parts of the switchgear by two independent connections.

3.1.6 Two coats of granule finished Powder Coating of Siemens gray having shade No. RAL 7032 is to be done from inside and outside of the panel on the phosphate panels on all exterior and interior side, by wet on wet process, with an interval of 2-3 minutes between coats. One coat involves 2 phases horizontally/ vertically over the entire surface on all exterior and interior side. All the panels shall be Granule finished powder coated painted with **Siemens Gray** /as per instruction of EIC

The external finish of the board shall be of the highest standard

The external and internal surface of the board shall have same finish.

4.0 **BUS BARS :-**

4.1 The bus bars shall be air insulated and made of high conductivity, high strength 99.9% Purity tinned Copper as called for in the Bill of Materials. The bus-bars shall have 99.9% Purity. These bus-bars shall confirm to I.S Specification No 5082 of 1969 or the latest amendments. The size of the bus-bars should be indicated by the Bidder in his Bid and shall be subject to the Purchaser's approval. For all the Molded Case Circuit Breakers (MCCBs) more than 63 Amps the connections should be done using Tinned Copper bus bars.

The connections to MCCBs having rating 63 Amps and below can be done using FRLS Copper flexible of Lapp or approved makes of wires given in the approved makes. To arrive at the bus bar size, the calculations will be based on 1.4 Amps. per sq. mm for Copper Conductor and 1.0 Amps / sq.mm for Aluminum Conductor Busbars. The size of the bus bar thus arrived at shall be chosen to the nearest mm. The sizes of the Bus-bars shall be chosen in such a manner that the sizes of the terminals and the sizes of the Bus-bars are matches with each other.

4.2 The bus bars shall be suitably braced with non-hygroscopic SMC supports. The Neutral as well as the earth bar should also be cable of withstanding the stresses of electrical fault. Ridges shall be provided on the SMC supports to prevent tracking between adjacent bus bars.

4.3 Large clearances and creepage distances shall be provided on the bus bars system to minimized the possibility of a fault.

4.4 High tensile bolts and spring washers shall be provided at all bus bars joints.

4.5 The cross section of the bus bars and risers for various ratings shall have been decided on the basis of temperature rise tests results carried out on some other Panels for the stated sections.

4.6 Connections from the main bus bars to functional circuits shall be arranged and supported so as to withstand without any damage or deformation the thermal and dynamic stresses due to short circuit currents.

4.7 Bus bars shall be colour coded for easy identification of individual phases and neutral.

4.8 All the bus-bars shall be provided with colour coded heat sink sleeves through the full length. Intermittent color bands are not acceptable . The Earth Bus bar shall be provided with green colour heat shrink sleeve. The size of the Earth Bus-bars shall be same as the size of the neutral bus bar but in any case it should not be less than 50 x 6 mm Tinned Cooper strip with Heat Shrinkable PVC Sleeve.

Horizontal busbar chambers shall be at the top only irrespective of cable / Busduct entry. Copper Busbars shall be tinned coated to avoid oxidization

The busbars shall be of Tined Copper with continuous rating as given in the SLD. All busbars and their main current carrying connections shall have preferably the same sectional area throughout their length. The busbars shall be colour coded.

The busbar sizes shall be determined taking into consideration the continuous rating without exceeding the final temperature of 45 C over maximum ambient temperature during the steady state condition and should not exceed 200oC during fault condition. The busbars shall be supported by insulators on non-carbonizing material resistant to acid and alkali and having non-hygroscopic characteristics and braced to withstand the fault level specified.

Earthing - Two earth terminals shall be provided on each switch cubicle, at the back, near the cable entry. An earth bar of at least 50 x 6 mm Aluminium shall be fixed to these terminals. The earth bar shall be electrically continuous and shall run the full extent of each board. Each unit shall be constructed to ensure satisfactory electrical continuity between all metal parts not intended to be alive and earth terminals of the unit. Suitable holes with bolts and lugs shall be provided at each end of earth bar of switchgear for connection to a main earthing grid of 50 x 6 mm AL bus. The earth bar shall be accessible in each cable entering compartment either directly or through a branch extension to ground the cable armour and shields. Earthing strip projected out 2inch both sides.

Busbars and connections shall be secured in such a manner that the insulators are not subjected to bending forces under short circuit conditions. The vertical dropper shall be sized to carry continuously at least the rated current of the connected switching devices. When multiple switching devices are combined in tiers for a vertical unit, the droppers shall be able to carry the total current resulting from the combination of all switching devices

5.0 **Auxiliary Bus Bars**

5.1 Auxiliary bus bars both AC & DC supply shall be of minimum size 18 sq.mm which shall also be sleeved using heat shrinkable PVC sleeves copper shall be provided through out the length of the board for following applications.

5.2 Panel space heaters and motor space heaters, Cubicle illumination lamp, Plug socket for all panel control supply

5.3 Control supply for breaker motor spring charging mechanism, closing tripping and indication, interlocking circuits

5.4 Auxiliary power supply for transducers, KWH meter and motor starter circuit control and indication

5.5 Tee-of connections shall be used for distributing auxiliary supply to each vertical panel. Rubber grommets shall be used for all wire entries to make the entries dust and vermin proof. Isolating links / blanking plates shall be provided between two auxiliary bus sections.

6.0 **MOULDED CASE CIRCUIT BREAKER :-**

6.1 The MCCB should be current limiting type and with a trip time of less than 10 millisecond under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS13947 – Part 2/IEC 60947-2 and should have test certificates for Breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

7.0 MCCB shall comprise of Quick Make -break switching mechanism, arc extinguishing device and the tripping unit shall be contained in a compact, high strength, heat resistant, flame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses

7.1 The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (Icu). MCCBs for motor application should be selected in line with Type-2 Co-ordination as per IEC-60947-2, 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

7.2 All the MCCBS Shall be suitable for fault braking Capacity as mentioned in the Single line Diagrams but in any case should not be less than 16 KA.

7.3 All the MCCBs shall be provided with Over Current, Short Circuit variable releases. The same shall be provided if called for in the schedule of quantity.

7.4 All four pole MCCBS above 250 Amps shall have capability of setting Neutral to N or N/2. All accessories of MCCBS shall be snap fitted type.

All MCCBS should have flexibility of Line Load reversibility. Manufacture should submit let through energy curves and discrimination charts and cascading table if applicable.

All the MCCBS should be designed in such a way that no live parts is accessible. All the MCCBS should comply to IEC 60947-2 and IS 13947-2.

All the MCCBS should have three clear positions ON/OFF and TRIP. The Manufacturer to Provide direct or extended Rotary handle with door interlock facility for all the rating of the MCCBS.

Current Limiting & Co-ordination

The MCCB shall employ maintenance free minimum let-through energies and capable of achieving discrimination up to the full short circuit capacity of the downstream MCCB. The manufacturer shall provide both the discrimination tables and let-through energy curves for all.

Protection Functions

MCCBs with ratings up to 200 A shall be equipped with Thermal-magnetic (thermal for overload and magnetic for short-circuit protection) trip units

The MCCBS having rating 250 Amps shall have releases of Thermo magnetic type. All the MCCBS shall have Ics=100% of Icu. All the MCCBS shall conform to disconnection function as per IEC947-2 Section 7.1.2.

Microprocessor and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorized access to the settings

Microprocessor trip units shall comply with appendix F of IEC 60947-2 standard (measurement of RMS current values, electromagnetic compatibility, etc.)

Protection settings shall apply to all poles of circuit breaker.

All Microprocessor components shall withstand temperatures up to 125 °C

Testing

a) Original test certificate of the MCCB as per IEC 60947-1 &2 or IS13947 shall be furnished.

b) Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.

Interlocking

Moulded case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.

a) Handle interlock to prevent unnecessary manipulations of the breaker.

b) Door interlock to prevent the door being opened when the breaker is in ON position.

c) Defeat-interlocking device to open the door even if the breaker is in ON position.

8.0 MINIATURE CIRCUIT BREAKERS (MCB)

All the Miniature Case Circuit Breakers shall comply fully with IEC 8828-1996 IEC898-1995. and should have uniform breaking capacity of 10 KA.

All the MCB shall comply with Isolation function.

"C" Curve MCBS shall be used for Lighting and other small motor loads and "D" Curve MCBS should be used for Capacitors and UPS Loads.

All the accessories of the MCB should be Snap fit type in design.

The Power loss per pole of the MCB shall be less than as specified in relevant codes of IEC standards and Manufactures shall submit the test certificate for the same.

Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection.

The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted.

The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B,C,D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values.MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

Mechanical Operation

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing /opening of all the three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.

Neutral Advance Feature

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact First before the phases; and at the time of opening, the neutral shall breaks last after allowing the phases to open first. This is an important safety feature which is also required by regulations.

Testing Provision
A test device shall be incorporated to check the integrity of the earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB / RCCB and the operating handle shall move to the "OFF" position.

9.0 **CURRENT TRANSFORMERS :-**

9.1 The Current Transformers (CT) to be provided where ever indicated shall be FR Grade ABS Casing Box type Bar Primary Metering and protection Class CTs.

9.2 The Current transformers shall be strictly manufactured as per IS 2705. The Insulation Class shall be E complying to 120^0C and service Voltage of 660 Volts grade. The insulation level should confirm to 3 KV for 1 Minute. The short time Current Rating shall be 50 KA for 1 second.

9.3 **Material** :

The CTs should be suitable for DIN Rail Mounting, Panel Mounting Clamps arrangement, Bus bar Holding Clamps and any other application so desired by the design. The P1, P2, S1 and S2 markings on the CTs should be embossed and not with a sticker.

9.4 **The Accuracy Class**:

All CTs for Metering Class shall have an accuracy class as 1 for measurement of energy consumption and class 1 for Current and other parameter measurements

TECHNICAL SPECFICATIONS (LT PANELS)

10.0 INDICATING/INTEGRATING METERS :-

10.1 All indicating instruments shall be of flush mounting industrial pattern, conforming to the requirements of I. S.

10.2 The instruments shall have non-reflecting bezels, clearly divided and indelibly marked scales, and shall be provided with zero adjusting devices in the front.

10.3 Integrating instruments shall be of flush mounting switchboard pattern, complying with the requirements of I. S.

11.0 RELAYS :-

11.1 Circuit breakers shall be provided with integrally mounted solid state relays. The relay shall have a set of 3 phase characteristics which shall be adjustable over wide range to provided discrimination between a multiplicity of devices. The relay shall be able to provide over-current and earth-fault protection.

12.0 CONTROL SWITCHES :-

12.1 Control switches shall be of the heavy duty rotary type with escutcheon plates clearly marked to show the operating position. They shall be semi-flush mounting with only the front plate and operating handle projecting.

12.2 All the Indicating lamps shall be of the LED type. All the Lamps shall be color LED lamps. Lamps and lenses shall be easily replaceable from the front. All the Lamps should be Tested and certified as per IS 13947 (Part II) 1993. All the lamps shall be provided with leakage voltage glow protection. All the lamps shall be Immune to vibrations. All Indicators shall be provided with 5 years guarantee.

The Power Consumption of the lamps should not be more than 0.5 Watts at 230 Volts A.C. The Lamps should be suitable for –30% to + 20% of operating Voltage. The Lamps Housing material shall be Flame Retardant ABSTRYNOL with ribbed Poly Carbonate Lens. The Enclosure shall be IP 65 as per IS 13947- (1) of 1993. The Rated Insulation Voltage shall be 500 Volts and Insulation shall be above 500 Mega Ohms. The Termination shall be Totally enclosed/finger Touched proof glass filled nylon and suitable for 2.5 sq. mm FRLS wires with M 3 brass screws. All the Lamps shall be provided with color LEDs.

13.0 PUSH BUTTONS :-

13.1 Push buttons shall be of the momentary contact, push to actuate type, fitted with self reset contacts and provided with integral escutcheon plates marked with its functions.

14.0 CABLE TERMINATIONS :-

14.1 Cable entries and terminals shall be provided in the switchboard to suit the number, type and size of aluminium conductor power cables and copper conductor control cable specified in the detailed specifications.

14.2 Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chambers shall be provided, with the position of cable gland and terminals such that cables can be easily and safely terminated. The minimum depth of the panel shall be restricted to suit for this purpose.

14.3 Barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.

14.4 Cable risers shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.

14.5 Cable sockets shall be of copper and of the crimping type as specified.

TECHNICAL SPECFICATIONS (LT PANELS)

15.0 **Control Wiring :-**

15.1 All control wiring shall be carried out with color coded 1100 Volts grade single core FRLS wires of Lapp make conforming to IS 694/IS 813- having stranded copper conductors of minimum 2.5 Sq. mm. section for potential circuits and 2.5 sq. mm. section for current transformer circuits.

15.2 Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance.

15.3 Wires shall be identified by numbered ferrules at each end. The ferrules shall be of the ring type and of non-deteriorating material. They shall be firmly located on each wire so as to prevent free movement.

15.4 All control circuits fuses shall be mounted in front of the panel and shall be easily accessible.

16.0 **Earthing**

16.1 An earthing bus shall be provided and earthed throughout the length of the switchboard. It shall be bolted / brazed to the framework of each unit and each breaker earthing contact bar.

TECHNICAL SPECFICATIONS (LT PANELS)

16.2 The earth bus shall have sufficient cross section to carry the momentary short circuit and short time fault current for used as specified in design criteria without exceeding maximum allowable temperature rise.

16.3 All vertical panels shall be connected to earth bus bar throughout the length of the switchboard. Provision shall be made to connect the earthing bus bar to the plant earthing grid at two ends.

16.4All non-current carrying metallic parts of the mounted equipment shall be earthed.

16.5All Hinged doors and movable parts shall be earthed through flexible copper connections to the fixed frame to the switchboard.

16.610mm dia bolts with nuts shall be provided on the earth bus for termination of fourth line of cable per vertical panel. Bolted joints, splices, taps, etc. to be the earth bus shall be made with least two bolts.

16.7 The colour code of earthing wires shall be as per applicable standard. Earthing wire shall be connected on terminals with suitable clamp connection. Soldering shall not be permitted. Looping of earth connection to other devices shall not be permitted. However, looping of earth connection between equipment to promote alternative paths to earth bus shall be provided.

16.8 VT and CT secondary neutral (or) common lead shall be earthed at one place only at the terminal blocks, when they enter the panels. Such earthing shall be made through links so that earthing may be removed from one group without disturbing continuity of earthing for other groups.

17.0 **Terminal Blocks :-**

17.1 Terminal blocks shall be of 500 volts grade of the suitable type. Insulating barriers shall be provided between adjacent terminals.

17.2 Terminal blocks shall have a minimum current rating of 10 Amps. Provisions shall be made for label inscriptions.

18.0 **Labels :-**

18.1 Labels shall be of anodized aluminium, with white engraving on black background. They shall be properly secured with fasteners.

18.2 A nameplate with the switchboard description shall be fixed at the top of the central panel. A separate nameplate giving details for each component of bus section shall be provided.

18.3 Name plate (or) polyester adhesive stickers shall be provided for each equipment (lamps, pushbutton, switches, relays, auxiliary contactors etc.) mounted on the switchboard. Special warning plates shall be provided on removable cover (or) doors giving access to cable terminals and bus bars. Special warning labels shall be provided inside the switchboards also, wherever considered necessary identification tags shall be provided inside the panels matching with those shown as the circuit diagram.

18.4 Engraved nameplates shall preferably be of 3-ply (Black-White-Black) laminated sheets (or) anodised aluminium. Hard paper nameplates shall not be acceptable. Nameplates shall be fastened by screws and not by adhesive.

19.0 **Tests :-**

19.1 Routine tests shall be conducted on L.T Panelin accordance with relevant IS codes and shall comprise:-

19.2 Inspection of the Main L.T Panel, Power Control Center and Distribution boards shall include inspection of wiring and electrical operational tests where necessary.

19.3 Checking of Protective Measures and electrical continuity of the protective circuits.

19.4 High Voltage Test with 2.5 KV, 1 minute for checking insulation and insulation tests before and after the installation.

19.5 Any other tests as desired by Owner / Consultant.

19.6 Physical verification of all components.

19.7 Calculation pertaining to sizing of the bus bars for Air insulated bus bars. Also calculation of r sizing of the bus bar of the main Panel.

19.8 CT burden verification both by calculation and tests.

19.9 Switchboard shall be subjected to following routine tests

Physical & Dimension Check
Bill of Materials
Functional test
HV and Megger Test

20.0 INFORMATION TO BE PROVIDED ALONG WITH BID

20.1 The bidder shall provide information about past supply references, type test certificates and general arrangement drawing.

20.2 List of sub-suppliers of items proposed to be bought from outside.

20.3 A clear exclusion list, which, when procured and provided by purchaser, will make the system complete and operational to meet the performance guarantees.

21.0 TECHNICAL INFORMATION TO BE PROVIDED UNDER THE CONTRACT

Successful bidder shall be required to provide the following Drawings and Documents, as specified below

- Final dimensions / weights.
- All Drawings for approval
- Typical component arrangement drawing
- Busbar sizing calculations
- All Drawings As built : As per directives of AIR INDIA.
- Operation and Maintenance Instruction Manuals – 2 sets.

TECHNICAL SPECFICATIONS (LT PANELS)

Successful bidder shall furnish all necessary drawings, documents and manuals and all information, as detailed below

- Necessary engineering drawings like single line diagram, general arrangement, door GA layout, control schematic diagrams, terminal connection drawings, panel cross-section drawings, etc. to be submitted by the contractor for approval from Air India
- Detailed drawings showing foundation requirement with load details
- Busbar sizing calculation
- Inspection and Test Certificates for Equipment
- Type test certificates
- All the above are required to be approved from Air India Ltd.

Catalogue numbers of all components liable to be replaced during the life of the switchgear.

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

LIST OF APPROVED MATERIALS BRANDS/MAKES

The following are the list of approved brands/makes of equipments required under this tender. Please note that wherever there is a multiple choice of brands/makes approved, any one make as nominated by the Owners/Consultants will have to be supplied by the Contractor without any extra cost to the owners. No deviation in this will be accepted by the owners.

Sr. No.	Description	Approved Makes	Makes/Brands being offered by the Contractor
1.	Low Tension, Molded Case Circuit Breaker, 415 Volts AC, 3 Phase 50 Hz., 16/25/35 KA-STR. Ics=Icu	SCHNEIDER SIEMENS/ ABB-T-MAX-SACE L & T – D SINE	
2.	Low Tension, Miniature Circuit Breaker, 415 Volts AC, 3 Phase 50 Hz., 50 KA/35 KA-STR. Ics=Icu & Microprocessor	SCHNEIDER SIEMENS/ ABB-T-MAX-SACE L & T – LEGRAND/ HAGER	
3.	LED Type Indicating Lamps with Color LED.	SCHNEIDER/L & T/ SIEMENS/TELEMECHANIQUE-HARMONY	
4.	Selector Switches for Ammeter/Voltmeter	SCHNEIDER/L & T SIEMENS/KAYCEE	
5.	Meters, Analog type. for Ammeters, Voltmeters, PF meters, Frequency Meters.	IMP/AE RISHABH	
6.	Energy Meters.	CONZERV/L & T/ELMEASURE	
7	Relays.	SCHNEIDER/ABB/SIEMENS/ SCHNEIDER-CONZERV	

LIST OF APPROVED MATERIALS BRANDS/MAKES

Sr. No.	Description	Approved Makes	Makes/Brands being offered by the Contractor
8.	FRLS Panel wires, in color in 660/1100 Volts grade. (Unilay Construction)	LAPP/ R.R. KABEL POLYCAB	
9.	Cable Glands - Siemens DOUBLE Compression type.	COMMET/JENSON	
10.	Lugs, Crimping type, tinned copper heavy duty only.	JENSON/ LAPP/DOWELL'S	
11.	Push Button Stations type, in different colour codes.	SCHNEIDER/ L & T /SIEMENS/ TELEMECHAIQUE	
12.	Terminal Blocks, Clip on type.	WAGO/ LAPP	
13.	MS fabricated Panels	AS APPROVED BY CONSULTANTS	
14.	Starters/ Contactor/ Timer	TELEMECANIQUE/L & T SIEMENS/ABB/MERLIN GERIN	
15.	CTs - 660/1100 Volts grade ABS CASINGS	RECO/KAPPA AE	
16.	HRC Fuses	L & T – HAGER/BUSSMAN/ SCHNEIDER	
17.	Any other Item.	SAMPLE FOR APPROVAL OF THE CONSULTANTS/OWNER	

LIST OF APPROVED MATERIALS BRANDS/MAKES

I/We hereby declare that I/We have read and understood the above instructions which have been issued as conditions of the contract.

In case any of the makes for any of the materials is missed out in the above list, then the contractor shall inform the Consultants about the same and obtain the approval. Thereafter, he can proceed with the supply of the equipments. All the Control Panel Manufacturer shall get their sub vendors approved by the Consultants/Owner prior to fabrication of the Panels. Penalty shall be charged or Panel can get rejected, if the fabricator is not approved by the Consultants.

TENDER NO. : PFD/ E & M/ 06 /06 DATED: 27/ 06 /2017

SCHEDULE OF QUANTITES

Sr	Description	Qty	Rate	Unit	Amount
1	Supply, Installation, Testing, Commissioning Main Power Panel as per the technical specification and suitable size for the fixing the following switch gears at Operation Building Basement, as follows:Job includes removing the old panel and re-fixing the new one with minor civil works and supplying the materials with all taxes **except Service Tax** which will be paid extra subject to submission of documentary evidence. a. 630A MCCB, 4P Thermal O/L 35kA, 4pole, as follows: (with 1 NO+1 NC). Instantaneous magnetic S/C Trip ,Rotary Operating Handle, Shunt release, 630A tinned CU Bus Bars 4Pole for panel.- 1no b. Outgoing 100A MCCB's with Thermal O/L & SCe., 35 Ka with Rotary Operating Handle- 15 nos c. Outgoing 63 A MCCB's with Thermal O/L & SCe., 35 Ka with Rotary Operating Handle- 7 nos The panel to be provided with RYB Indicator, Ammeter, Volt meter and suitable Copper Bus bar, all components, Wiring & accessories. Job also includes all existing cable terminations **Rate In words**	1		No	

2	Removing the existing cables of different sizes like 300/95/70/50/16 sq mm etc from the old panel and re-terminating to the new panels with proper lugs and glands etc all complete. **Rate in words**	Job		Ls	
3	Rebate for carting away the existing old panels from Air India Premises. **Rate in words**	1		No	(-)
	Total (1+2-3)				
	Rebate if any				
	Grand Total				

Amount in words:

Date:

Place:

Signature of the tenderer with rubber Stamp

संपत्ति और सुविधा विभाग / **PROPERTIES & FACILITIES DEPT.**
सांताकुज /**SANTA CRUZ**

DECLARATION

1. I/We hereby declare that I/We have read and understood the Conditions of Contract, Specifications, drawings, Schedule of Quantities etc. and hereby agree to abide by them. In token thereof I/We have signed below and at the end of Schedule of Quantities. I/We also understand that otherwise this tender is liable to be rejected.

2. I/We understand that our Tender will not be considered, if the rates for items are not written both in FIGURES AND WORDS.

3. I/We hereby confirm that only the relevant entries asked for have been made within the Tender documents issued to us. I/We also confirm that in the even of any entry in this Tender document, other than the relevant entry, shall make this Tender invalid.

4. I/We hereby agree to obtain the Registration Number under the Contract Labour Act by Registering with the Labour Commissioner and furnish the Registration details to Air India Ltd.

5. I/We hereby agree to obtain Employer's Number under the Employees State Insurance Corporation and the Provident Fund `Commissioner. in the event of our not being able to provide the above said numbers, we agree to Air India Ltd. retaining appropriate amounts at the stipulated percentage rates towards ESIS and PF, Air India Ltd. may remit such amounts to the appropriate authorities.

6. I/We agree to submit to Air India Ltd. necessary reports and returns as required for compliance of ESIS & PF regulations.

Place :

Date :

SIGNATURE OF TENDERER WITH RUBBER STAMP