TITLE	:	**E TENDER FOR SITC OF ELECTRICAL PANEL AT SRI GURU GOBIND SINGH COLLEGE OF COMMERCE, PITAMPURA, NEW DELHI 110034**
OWNER	:	**PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE**
ADDRESS	:	**UNIVERSITY OF DELHI, OPPOSITE TV TOWER, PITAMPURA, DELHI 110034 (INDIA)**
WEBSITE	:	HTTPS://WWW.SGGSCC.AC.IN/
TYPE OF TENDER	:	**OPEN- E TENDER (TWO COVER SYSTEM)**
ESTIMATED COST OF WORK	:	**27.3 LAKHS**
TENDER FEE	:	**RUPEES ONE THOUSAND ONLY**
DATE OF START	:	**20-09-2023**
LAST DATE OF SUBMISSION OF TECHNICAL BID DOCUMENT	:	**05-10-2023**
EARNEST MONEY DEPOSIT	:	**55,000/-**
TENDER PREPARED BY	:	RANJIT SINGH & ASSOCIATES, 1206 SURYA KIRAN BUILDING, 19 K.G. MARG, NEW DELHI 110001. PH. 011-23312688. RSA1206@MSN.COM
ELECTRICAL CONSULTANT	:	**VAGISH & ASSOCIATES 9717496927**

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TENDER SCHEDULE		
Validity Of Offer	:	90 Days
Cost Of Tender Document	:	Rs. 1,000
Estimated Cost of The Work	:	27.3 LAKHS
Earnest Money Deposit.	:	55,000/- Payables by D.D. In Favour Of PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE. EMD of unsuccessful bidders will be returned.
Start Of Tender Download.	:	Wednesday, 20 September 2023
Last Date of Tender Download.	:	05-10-2023
Last Date of Submission of Tender.	:	05-10-2023 At 3:00 Pm
Date Of Opening of Technical Bid.	:	05-10-2023 At 3:30 Pm
Defects Liability Period.	:	24 Months
Contract Time Period.	:	2 Months
Penalty For Delay.	:	Rs. 5,000/- Per Day Up to Maximum Of 10% Of the Cost of The Works.
Minimum Running Account Bill Value.	:	5 LAKHS
Retention Percentage.	:	5%
Performance Guarantee.	:	Before Issue of Letter to Start the Work, Contractor Shall Furnish a Performance Guarantee In The Form Of A Bank Guarantee To The Tune Of Five Percent (5%) Of The Cost Of The Accepted Tender Amount. Bank Guarantee Will Be Kept Valid Up To 24 Months After Completion of The Works.
Contact Details for Clarification Related to Tender.	:	Email: Rsa1206@Msn.Com Phone. 011-23312688, 011-43560879

ELIGIBILITY CRITERIA

S. NO.		DESCRIPTION
1)	:	BIDDER SHOULD HAVE COMPLETED THREE SIMILAR WORKS EACH COSTING NOT LESS THAN RUPEES 11.00 LAKHS
		OR
		BIDDER SHOULD HAVE COMPLETED TWO SIMILAR WORKS EACH COSTING NOT LESS THAN RUPEES 16.40 LAKHS
		OR
		BIDDER SHOULD HAVE COMPLETED ONE SIMILAR WORKS EACH COSTING NOT LESS THAN RUPEES 22.00 LAKHS
2)	:	BIDDER SHOULD HAVE AVERAGE ANNUAL TURNOVER (GROSS) OF 13.65 LAKHS
3)	:	BIDDER SHOULD HAVE A SOLVENCY OF RUPEES 11 LAKHS
4)	:	BIDDER SHOULD SUBMIT AN EMD OF RUPEES 55,000/-.
5)	:	BIDDER SHOULD BE A REPUTED MANUFACTURER OF ELECTRICAL PANELS OR REPUTED ELECTRICAL CONTRACTOR WITH "A CLASS" ELECTRICAL CONTRACT LICENSE ISSUED BY ANY STATE/ CENTRAL LICENSING AUTHORITY. BIDDER SHALL SUBMIT COMPANY PROFILE WITH DETAILS OF MANUFACTURING FACILITY WHERE THE PANEL WILL BE MANUFACTURED AND LIST OF SIMILAR WORKS DONE IN THE PAST.

CHECKLIST OF DOCUMENTS TO BE PLACED IN THE TECHNICAL BID

S.NO.		DESCRIPTION	CHECK
1)	:	COMPANY REGISTRATION DETAILS	☐
2)	:	COMPANY PROFILE	☐
3)	:	GST REGISTRATION CERTIFICATE COPY	☐
4)	:	PAN CARD COPY	☐
5)	:	TURNOVER CERTIFICATE (ANNEXURE -1)	☐
6)	:	SOLVENCY CERTIFICATE	☐
7)	:	VALID COMPLETION CERTIFICATES OF SIMILAR WORKS	☐
8)	:	TENDER FEE OF RS. 1000 IN THE FORM OF A DEMAND DRAFT IN THE NAME OF PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE	☐
9)	:	EMD FEE OF RS. 55,000/- IN THE FORM OF A DEMAND DRAFT IN THE NAME OF PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE	☐
10)	:	DETAIL OF MANUFACTURING FACILITY WHERE THE PANEL WILL BE MANUFACTURED	☐
11)	:	COPY OF “A CLASS“ ELECTRICAL CONTRACTOR LICENSE ISSUED BY ANY STATE/ CENTRAL LICENSING AUTHORITY. (REQUIRED FOR BIDDERS WHO ARE NOT REGISTERED ORIGINAL PANEL MANUFACTURERS).	☐

SUBMISSION OF TECHNICAL BID & FINANCIAL BID

1) **HARDCOPY OF THE TECHNICAL BID DOCUMENTS AND FINANCIAL BID DOCUMENTS SHOULD BE SUBMITTED TO THE OFFICE OF PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE ON OR BEFORE 3:00 PM ON 05-10-2023.**

2) **THE TECHNICAL BID DOCUMENTS, FINANCIAL BID DOCUMENT AND EMD WITH TENDER FEE SHOULD BE PLACED IN THREE SEPARATE ENVELOPES.**

3) **ALL THE THREE ENVELOPES SHOULD BE PLACED IN ONE BIG ENVELOPE ADDRESSED TO THE PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE WITH THE HEADING "E TENDER FOR SITC OF ELECTRICAL PANEL AT SRI GURU GOBIND SINGH COLLEGE OF COMMERCE, PITAMPURA, NEW DELHI 110034".**

NOTICE INVITING TENDER

To,

All The Eligible Bidders,

Dear Sir/ Madam,

You are invited to submit your most competitive **OFFLINE** Quotation through E PUBLISHING system of the Government of India ePublishing System, Government of India (eprocure.gov.in)) in TWO COVER SYSTEM (TECHNICAL & FINANCIAL) on or before the prescribed due date and time for E TENDER FOR SITC OF ELECTRICAL PANEL AT SRI GURU GOBIND SINGH COLLEGE OF COMMERCE, PITAMPURA, NEW DELHI 110034.

Only Manual Bids shall be accepted, including the supportive documents / instruments if any asked in this tender.

The complete details of the tender items are available in the tender document, which can be downloaded from https://www.sggscc.ac.in/and ePublishing System, Government of India (eprocure.gov.in)

The bids are to be submitted OFF-LINE through ePublishing System, Government of India (eprocure.gov.in) up to the due date and time of submission of tender. Any queries related to the tender document should be addressed to the tender inviting authority PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE.

Any queries relating to the process of online bid submission or queries relating to ePublishing System, Government of India (eprocure.gov.in) by bidders should be addressed to 24x7 ePublishing System, Government of India (eprocure.gov.in) Portal Helpdesk.

Sd/-

PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE

TENDER ACCEPTANCE (OFFER) LETTER

TO,

PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE
UNIVERSITY OF DELHI, OPPOSITE TV TOWER, PITAMPURA, DELHI 110034 (INDIA)

Subject: Acceptance in respect of terms and conditions of tender document for E TENDER FOR SITC OF ELECTRICAL PANEL AT SRI GURU GOBIND SINGH COLLEGE OF COMMERCE, PITAMPURA, NEW DELHI 110034.

Dear Sir,

1. I / We have downloaded the tender document(s) for the above-mentioned tender from the website https://www.sggscc.ac.in/ ePublishing System, Government of India (eprocure.gov.in) .

2. I / We hereby certify that I / We have read every page of the tender document including all terms/conditions/drawings/annexures/forms/appendixes/paras etc. which are part of the contract agreement, and I / We agree to accept all the terms and conditions contained therein.

3. The corrigendum(s) issued from time to time by your organisation has also been taken into consideration, while submitting this acceptance letter.

4. I / We hereby unconditionally accept all the terms and conditions of above-mentioned tender document and corrigendum(s) as applicable.

5. In case any provisions of this letter are found violated, then PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE shall without prejudice to any other right or remedy be at liberty to reject my/our bid including the forfeiture of EMD.

6. 1 / We hereby certify that all statements made, and information supplied in the enclosed appendix, annexure, forms/paras etc. furnished herewith are true and correct.

7. I / We have furnished all information and details necessary for demonstrating our qualification and have no further critical information to supply.

8. I / We understand and accept that PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE is not bound to accept the lowest bid or any of the bids submitted by the bidders or to give any reasons for their decision.

9. I/We understand and accept that all taxes including GST shall be payable by the bidder/contractor and PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE will not entertain any claim whatsoever in respect of taxes.

10. I/We understand and accept that PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE reserves the right of accepting the whole or any part of the tender and the bidder/contractor shall be bound to perform the same at quoted rates.

11. I / We understand and accept that in case any information provided by me/us is found to be false/ incorrect, then PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE shall be at liberty to reject our bid and without prejudice to any other right or remedy, be at liberty to forfeit the EMD absolutely and I / We shall not have any claim against PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE .

12. I/We understand and accept that, if after the tender is accepted, I / We fail to commence the execution of the works within the stipulated time, then PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE shall without prejudice to any other right or remedy, be at liberty to forfeit the EMD absolutely and I / We shall not have any claim against PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE .

Yours Faithfully,

Signature of Bidder:

Name:

Designation:

Stamp of the Bidder:

BIDDER'S DETAILS

S.NO.	DESCRIPTION	DETAIL
1	Name of Company	
2	Address of Company	
3	PAN no.	
4	GSTN no.	
5	Telephone Number	
6	Email Address	
7	Name of Company Owner / Director / Partner	
8	Address of Company Owner / Director / Partner	
9	Telephone Number of Company Owner / Director/ Partner	

I/We hereby declare that the information furnished above is true and correct. In case the above information is found incorrect at any stage, the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE may take appropriate action as warranted.

Name:	
Designation:	
Stamp & Signatures:	
Place:	
Date:	

SPECIAL CONDITIONS OF CONTRACT

1. The tender is for replacement of existing LT Panel with a new LT panel. In this regard:

    a) Prior to removing the LT panels, the contractor shall provide adequate temporary arrangements for uninterrupted electrical supply to the college at their own cost. No additional payment will be made for this account.

    b) A power cut for the minimum time required to transfer the supply to the temporary arrangement and then to the newly installed electrical panel will be permitted on holidays and during non-working hours.

    c) The transfer of power supply to the temporary arrangement will only be allowed for the removal of the old panel, after the new panel has been prepared, inspected, and approved by the consultant, and brought to the site ready in all respects for installation. No additional payment will be made for shifting the power supply, labour, connection arrangements, temporary panels, etc. The contractor shall make all arrangements, including safety arrangements and labour, at their own cost.

2. CONTRACTORS are advised to inspect and examine the site and the surroundings and satisfy themselves before submitting their Tender as to the nature of the ground and sub-soil (so far as practicable), the form and the nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain necessary information as to the risks, contingencies and other circumstances which may influence or affect their Tender. CONTRACTORS shall be deemed to have full knowledge of the site, whether they inspect it or not and no extra charge consequent to any misunderstanding or otherwise shall be allowed.

3. Submissions of the Tender by the CONTRACTOR implies that he has read all contract documents and has made himself aware of the scope and specifications of the work to be done and local conditions and other factors bearing on the execution of the works.

4. On acceptance of the Tender, earnest money will be treated as a part of the security. In addition, contractor shall furnish performance guarantee in the form of an F.D.R or bank guarantee of 5% of the accepted Tender cost in favour of PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE before issue of letter to start the work.

5. The CONTRACTOR, whose Tender is accepted, shall permit PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE at the time of making any payments to him for works done under the contract to deduct towards security deposit such sum

as will along with the amount of earnest money already deposited amount to the following % of the cost of the work: -

a) 5% of the bill amount.
b) 50% of the security money will be released along with the final bill and the balance after expiry of the successful performance of the Defects Liability Period of two year without any interest.
c) TDS on Income Tax/GST/Labour Cess etc. as applicable.

6. PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE will return the earnest money where applicable to every unsuccessful contractor on return of all the Tender documents without any interest.

7. TDS on Income tax/GST/Labour cess etc. as applicable shall be deducted from the payments made to the bidder/contractor and TDS certificates shall be issued by the owner.

8. The work shall be carried out in accordance with the phasing plan approved by the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE to avoid any disturbance. The site is expected to be handed over immediately. The contractor will prepare and submit a Phasing Plan with Bar Chart with targeted dates of completion for all the activities and get it approved from the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE within 7 days of award of contract.

9. The rates shall be inclusive of 2 years ON SITE comprehensive defect liability maintenance including all tools, plants, parts, labour, supervision and technical support.

10. The work shall be carried out as per specifications in the Tender schedule/latest C.P.W.D. Specifications, along with the correction slips; issued up to date of acceptance of Tender in case of doubt the decision of the Architect shall be final and binding on the Contractor.

11. The Contractor shall carryout the work in stages as to cause minimum disturbance to the Owner. Contractor shall be responsible for any damage to the equipment or structures, injury to the personnel during the progress of the work and he shall be liable to pay compensation as may be decided by the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE or his authorized representative in respect of such damages /injuries.

12. The serviceable materials out of the dismantled materials if any will be the property of the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE and all such materials shall be properly stacked by the Contractor as directed by the Engineer-in-charge. Decision of PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF

COMMERCE or his authorized representative on the serviceability of the dismantled materials shall be final and binding on the Contractor.

13. All labour Employed by the Contractor shall be covered by the workman's compensation act. Any death, injury or mishap to the workmen of the Contractor will entirely be the Contractor's responsibility and the College, shall not be liable to pay any damages for the same.

14. Contractor shall take adequate safety precautions to avoid any accident etc. at site. Shall erect proper barricades, sign boards, lights, etc. shall provide safety belts, safety shoes, head gears (helmet I.S.I standard) and shall be fully responsible for any criminal & civil liabilities. All safety arrangements are to be made by contractor at his own cost.

15. No labor or material rate escalation claims will be entertained from the contractor as this work has to be completed within 2 months from the date of commencement of work at site.

16. Rates quoted shall be applicable equally to all floors and shall include all lifts and leads. No extras on this account shall be payable.

17. The contractor shall provide training for operation and maintenance of Equipment's to the Owners representatives free of cost, where required.

18. Rates quoted by the contractor shall be inclusive of all items of work mentioned in the BOQ and Any work, supplies or services which might have not been specifically mentioned in the BOQ but are necessary for entire completion of the work shall be executed / provided/ rendered by the CONTRACTOR without any Extra cost and within the time schedule specified. Rates quoted shall be deemed to include such elements of labour and materials necessary to complete the items of work in all respects.

19. Contractor shall submit only computerized Bills supported with computerized measurement sheets in A4 size hard copy prints and soft copy in Microsoft Excel Format. Manual Handwritten bills or measurement sheets will not be accepted.

20. Labour Camp will be arranged by the contractor outside the Site of work at his own cost.

21. PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE College reserves the right to decrease the items of work, change the specifications of works or remove the entire section of work as may be deemed necessary to finish the works within the available budget.

GENERAL CONDITIONS OF CONTRACT

Definitions: the contract document consists of the agreement, the special and general conditions of the contract, specifications and bills of quantities including all modifications and the contract drawings prepared by the Architect from time to time

1. The site: shall mean the site of contract work.
2. Bidder / Contractor: Shall mean the person or business that agrees to conduct the contract work under the terms of the contract.
3. Sub-Contractor: includes those who have a direct contract with the Contractor.
4. Notice: written notice shall be deemed to have been served if delivered in person to a member of the Contractors firm.
5. Owner: PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE
6. Work: the term "work" includes both labour and material of the Contractor/Sub-Contractor.
7. Time limits: time limits stated in the contract are essence of the contract.
8. Law: law of the place of work shall govern the construction under this contract.
9. Virtual completion: date of virtual completion is the date when the construction is sufficiently completed in accordance with the contract documents, including modifications, if any.
10. Contract documents: shall consist of the following:
    a) The agreement.
    b) The General and Special conditions of contract.
    c) The Bill of Quantities.
    d) The drawings & specifications.
    e) The approved makes.

TYPE OF CONTRACT

It is an item rate contract. The Contractor shall be paid for the actual quantity and quality of work done, as measured at site on the rates quoted by him, on the basis of a payment certificate issued by the Architect/ Engineer- In charge.

SCHEDULE OF QUANTITIES

Schedules of quantities given in the contract bill are provisional and are meant to indicate the intent of the work and to provide a uniform basis for the contract. The Owner reserves the right to increase or decrease any of the quantities or to totally omit any of them. Contractor shall be bound to carry out the same without claiming any extras.

CONTRACT DRAWINGS

1. In general, drawings shall indicate dimension, position & type of construction.
2. Specifications shall indicate the qualities, methods, and bill of quantities shall indicate the quantum and rates. Any work indicated in drawings and not mentioned in the specifications or vice versa shall be furnished as fully set forth in both.
3. Contractor shall not deviate from the drawings and Architect's interpretation of the drawings shall be final and without appeal.
4. Errors/inconsistencies discovered in the drawings shall be instantly brought to the notice of the Architect for interpretation and correction, if any.
5. All drawings are the property of the Architect and shall not be used on any other project.

ARCHITECTS INSTRUCTIONS

If within seven days of receipt of written instructions from the Architect, requiring compliance with an instruction the Contractor does not comply hence-with, then the Owner may get the work executed through another agency at the risk and cost of the Contractor.

SCOPE OF WORK OF CONTRACTOR

The scope of work to be carried out by the CONTRACTOR shall also include the following:

1. Setting out of the works in respect of position, level dimensions, alignments, etc. including establishment of bench marks, survey reference points, etc.
2. Clearance of the site.
3. Site levelling /terracing within the limits as shown in the drawings or as directed by the Engineer In charge.
4. Disposal of debris, excavated materials, etc. as per the instructions of the Engineer In-Charge
5. All scaffolding, shorting, cantering, shuttering works, etc.
6. Running and maintenance of all plants and equipment, tools and tackles, etc.
7. Any other work required in connection with the execution of the contract work.

The cost of all the above-mentioned works shall be deemed to be included in the rates for various items of work although such inclusion may not be specifically spelt out.

SAMPLES AND SHOP DRAWINGS

The Contractor shall submit samples of materials and shops drawings required by the Architect / Engineer In Charge with promptness within a week.

PROGRESS CHART

In order to achieve the completion time as stated above, the CONTRACTOR shall submit to the OWNER within 2 (two) days from the effective date of Agreement a detailed Bar chart/PERT Network. The list of activities for which the Bar chart/ PERT network has been worked out and their commencement, duration and completion shall be subject to the approval of the OWNER

ACCESS FOR ARCHITECT/ ENGINEER IN CHARGE TO THE WORKS

The Architect and his representative shall have access, at all reasonable times, to the work and workshops of the Contractor.

ARCHITECTS STATUS AND DECISIONS

The Architect shall be Owner's representative during the construction period. He shall periodically visit the site to familiarize himself generally with the progress and the quality of work and to determine, in general if the work is proceeding in accordance with the contract documents. The Architect shall not be required to make exhaustive or continuous on-site inspections to check the quality and quantity of the work, and shall not be responsible for the Contractors failure to carry out the construction work in accordance with the contract documents. During his site inspections the Architect shall inform the Owner about progress of work, defects and deficiencies if any.

The Architect may in his absolute discretion from time to time, issue further drawings, details, written instructions, written decisions and written explanations in regard to: -

1. Variation or modification of the design
2. Quality or quantity of work, addition/alteration/omissions and substitutions of any work
3. Any discrepancy and divergence between drawings and specifications.
4. Removal and re-erection of any works executed by the Contractor
5. Dismissal of any persons employed on the site, who in the opinion of the Architect is not fit for the job.
6. Opening up for inspection any work-covered up
7. Amending and making good any defects under defects liability period
8. Removal from site, any materials brought by the Contractor, which in the opinion of the Architect is not up to the desired standard.
9. Delay and extension of time
10. Postponement of any work

ENGINEER IN CHARGE

Engineer In-Charge shall mean a competent engineer appointed and paid by the Owner and acting in congruence with the Architect.

CONTRACTORS FIELD ORGANIZATION AND EQUIPMENT

1. The Contractor shall employ qualified and competent licensed Electricians on the site.
2. Contractor shall provide and install all necessary hoists, ladders, scaffoldings, tools, tackles, plants, and machinery necessary for execution of the works.
3. Contractor shall provide and maintain simple watertight office accommodation at site.
4. Contractor shall make his own security arrangements at site and keep a 24-hour Watchman.
5. Contractor shall provide sanitary convenience for site staff and labour to keep the site clean.

6. A telephone line at site to be maintained and paid by the Contractor.
7. Guardrails shall be provided by the Contractor for safety of labour and general public at the site of works.

TAXES

All taxes including GST, Labour Cess etc. applicable in respect of this contract shall be payable by the Contractor and PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE will not entertain any claim whatsoever in respect of the same.

STATUTORY OBLIGATIONS

The Contractor shall comply with and give all notices required by any Govt. authority and instrument, rule or order made under an act of parliament or state assembly or any regulation or bye-law of the local body, relating to the work and indemnify the Owner against any such liability arising out of noncompliance of the law.

By way of illustration of various Acts/statutory compliances as stated above, the following Acts as amended from time to time shall be complied with by the CONTRACTOR:

1. Employee's Provident Fund Act 1952
2. Contract Labour Act (Regulations and Abolition 1970)
3. Minimum Wages Act 1948
4. Payment of Wages Act 1936
5. Workmen Compensation Act 1923
6. Factories Act 1948
7. Apprenticeship Act 1961

SUB CONTRACTOR

Before awarding any subcontract, the Contractor shall notify Architect/Engineer In-Charge in writing the names of the Sub-Contractors proposed. Contractor shall not employ the Sub-Contractor to whom Architect or Engineer In Charge may have a reasonable objection.

MEASUREMENT OF WORK

Unless otherwise specified, measurement of work shall be carried from the works actually executed. The measurements for the purpose of preparing Bills will be taken jointly by the Contractor’s representative and the Engineer In charge. In measurement of work as stated above, the CONTRACTOR shall certify that the work has been carried out strictly as per the drawings, specifications and item of work in terms of the agreement. Such certificate shall require Engineer In-Charge’s endorsement for the purpose of payment.

In the event of any dispute with regard to the measurement of the work executed, the decision of the OWNER shall be final and binding on the CONTRACTOR.

In the case of site measurements, should the CONTRACTOR not attend or neglect or fail to send his representative for taking joint measurements, the measurements taken by the Engineer

in Charge shall be deemed to be the correct measurement of work and shall be binding on the CONTRACTOR.

REJECTION

If the Contract work or any portion thereof, at any time, is found to be defective or fails to fulfil the requirements of the agreement, the Engineer In Charge shall give the CONTRACTOR notice in writing setting-forth particulars of such defects or failure and the CONTRACTOR shall forthwith make good the defects or replace or alter the same to make it comply with the requirements of the agreement.

Any materials, equipment, etc. brought to the site and found to be not in accordance with the agreement, shall be rejected by the Engineer In-Charge and the CONTRACTOR shall remove the materials from the site within the period specified by the Engineer In-Charge.

The CONTRACTOR shall not be entitled to any extension of time or extra cost for rejection as per above.

CERTIFICATES OF PAYMENTS

Architect/Engineer In-Charge shall issue an interim certificate of payment stating the amount due to the Contractor from the Owner and the Contractor shall be entitled to payment thereof within a period of two week after issue of the certificate. From the total amount, certified deduction shall be made towards payments already made, security deposit, TDS etc. As applicable to Delhi or any other tax applicable at the time of making payment.

All running payments shall be regarded as payment by way of advance against final payment only and not as payment for the work completed till the date of final payment. The running payment made shall not preclude the liability of the CONTRACTOR to finally complete the work strictly in accordance with the specifications and drawings, if required by re-constructing faulty work

CLAIM FOR EXTRA

In the case of extra item(s) (items that are completely new, and are in addition to the items contained in the contract), the contractor will submit rates, supported by rate analysis, for the work and the engineer-in-charge shall within one month of the receipt of the rates supported by rate analysis, after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

DEDUCTION FOR UNCORRECTED WORK

If the Architect/ Engineer In-charge deems it in-expedient to correct work damaged or not done in accordance with the contract, an equitable deduction from the contract price shall be made thereof.

FLUCTUATIONS

The Contractor shall not claim any extras for fluctuation of price and the contract price shall not be subjected to any rise or fall in prices.

POSSESSION BEFORE VIRTUAL COMPLETION

If the Owner, with the consent of the Contractor takes possession of part of the works for handing over to the finishing Contractor, such part of the building shall not be deemed to be virtually completed. Virtual completion of such part would occur only on completion of every part of the contract work.

TIME EXTENSION

Upon it becoming reasonably apparent that the progress of the work is delayed, the Contractor shall forthwith give written notice of the cause of delay to the Architect/ Engineer In charge, to enable the Architect and Owner to take a proper decision in the matter.

INSPECTION AND TEST

1. The CONTRACTOR shall ensure inspection and test of all materials and work at his cost through his ENGINEER IN CHARGE and other technical staff either at site or through any approved laboratory.
2. The CONTRACTOR shall ensure proper supervision and inspection during the progress of work at site.
3. All materials and work, whether at the site or in the Contractor’s /Sub-Contractor's premises shall be subject to inspection and test by the ENGINEER IN CHARGE. The CONTRACTOR/ his Sub-Contractor shall provide all facilities free of cost to the ENGINEER IN CHARGE including all labour, materials, tools, tackles, instruments, appliances, etc. to enable the ENGINEER IN CHARGE to carry out inspection and/or test.
4. All test certificates shall be subject to certification by the ENGINEER IN CHARGE.
5. The CONTRACTOR shall submit to the ENGINEER IN CHARGE three copies of all inspection/ test certificates.
6. The CONTRACTOR shall not be entitled to any claim for extra time or cost due to any delay in carrying out inspection and testing or re-inspection and re-testing if so, decided by the ENGINEER IN CHARGE.
7. The CONTRACTOR shall take adequate steps to rectify the defects or to replace such materials and work which have failed during inspection /testing.

RESPONSIBILITY OF COMPLETION

Any work, supplies or services which might have not been specifically mentioned in the specifications, schedule of items or drawings but are necessary for entire completion of the contract work shall be executed / provided/ rendered by the CONTRACTOR without any Extra

cost and within the time schedule specified. Rates quoted shall be deemed to include such elements of labour and materials necessary to complete the items of work in all respects.

DAMAGES FOR NON-COMPLETION

If the Contractor fails to complete the works by the date specified or within any extended time granted to him, the Contractor shall allow the Owner to deduct a sum calculated at the agreed liquidated damages, from the money due to him for the period the work remained incomplete, subject to a maximum amount of 10% of the Contract Value.

LIQUIDATED DAMAGES FOR DELAY

If the CONTRACTOR fails to complete the work/item (s) of work in all respects and hand over the same to the OWNER within the time stipulated the CONTRACTOR, without prejudice to any other right or remedy of the OWNER on account of such breach, be liable to pay the OWNER liquidated damages at the rate of Rs. 5,000/- (Five Thousand) per day of delay. The total amount of liquidated damages shall be limited to 10% (Ten percent) of the total contract price.

The above provisions shall not apply in cases of delay for which the CONTRACTOR is entitled to extension of completion time

VIRTUAL COMPLETION CERTIFICATE AND DEFECTS LIABILITY PERIOD

When in opinion of the Architect/Engineer In charge the works are practically completed, he shall forthwith issue a certificate to that effect, that date will be taken as the date of virtual completion.

The Architect/Engineer In charge shall prepare a schedule of defects, not later than 14 days after the expiry of the defect's liability period. The Contractor shall within a reasonable period of time after receipt of schedule of defects shall rectify the same, failing which the Architect/Engineer In charge will make suitable deductions from the contract sum.

MAINTENANCE GUARANTEE / DEFECTS LIABILITY PERIOD

Maintenance Guarantee period will be 24 months from the actual date of completion and handling over to the OWNER.

1. The CONTRACTOR guarantees that within the maintenance guarantee period, the contract work shall not show any signs of defects, cracks, settlements, disfigurations, shrinkage, leakage, dampness or any other defects.
2. The CONTRACTOR shall maintain and satisfactorily execute, at his own cost, all such works of repair, amendment, re-construction, rectification, replacement and any other work to make good the faulty work as stated in Article (a) during the maintenance guarantee period.
3. The CONTRACTOR shall, if required by the ENGINEER IN CHARGE, search for the causes of any defects, imperfection or fault under the direction of the ENGINEER IN CHARGE. The cost of such search shall be borne by the CONTRACTOR.

4. At intervals specified by the ENGINEER IN CHARGE the CONTRACTOR, along with the ENGINEER IN CHARGE, shall inspect the contract work to satisfy himself that no defects have cropped up in the contract work. Should there be any signs of defects, the CONTRACTOR shall take immediate steps to rectify the same, failing which; the ENGINEER IN CHARGE may get the defects rectified at the risk and cost of the CONTRACTOR.
5. At the end of the maintenance guarantee period, the CONTRACTOR, along with the ENGINEER IN CHARGE, shall carry out final inspection of the contract work to prove that no defects had appeared in the contract work or that all defects which appeared in the contract work have been rectified to the entire satisfaction of the ENGINEER IN CHARGE. If during the final inspection it is found that the defects still remain in the contract work, the period ·of maintenance guarantee shall be extended at the discretion of the ENGINEER IN CHARGE and the CONTRACTOR shall be liable to make good the defects and be responsible for the maintenance of the work till the defects have been fully rectified.
6. Upon successful completion of the maintenance guarantee period the OWNER shall issue final acceptance certificate to the CONTRACTOR

PAYMENT WITH HELD

The Architect/ Engineer In Charge may withhold or on account of subsequently discovered evidence nullify the whole or part of any certificate to such an extent as may be necessary in his reasonable opinion to protect the Owner from loss, for defective work, non- payment to Subcontractors, or other claims connected to this work.

INJURY TO PERSONS

The Contractor shall indemnify the Owner against any liability, loss, claim or proceedings whatsoever arising under any statutory or common law in respect of personal injury to or the death of any person, whomsoever arising out of or in the course of or caused by carrying out the work.

INSURANCE

Without prejudice to his ability to indemnify the Owner, the Contractor and his Subcontractors shall maintain such insurance as are necessary to cover the liability of the Contractor and the sub-Contractors.

INSURANCE AGAINST FIRE

The Contractor shall in the joint name of the Owner and the Contractor, insure the works against loss or damage due to fire, earthquakes and riots.

COORDINATION OF WORK

Contractor shall extend complete coordination to other agencies i.e. electrical, firefighting and interiors working on the same site.

LABOUR

Contractor shall not employ child labour under 14 years of age and if female workers are employed, he should make provision for safeguarding the small children to keep them clear of the site. All labour shall wear safety helmets and shoes to protect them from injury.

SAFETY

In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this contract, the contractor shall at his own expense arrange for the safety provisions as per C.P.W.D. Safety Code framed from time to time and shall at his own expense provide for all facilities in connection therewith. In case the contractor fails to make arrangement and provide necessary facilities as aforesaid, he shall be liable to pay a penalty of Rs.200/- for each default and in addition, the Engineer-in- Charge shall be at liberty to make arrangement and provide facilities as aforesaid and recover the costs incurred in that behalf from the contractor.

GUARANTEE

Besides guarantees required elsewhere, the Contractor shall guarantee the works in general for one year after completion of defects liability period.

PERFORMANCE GUARANTEE

In addition to the Security Deposit the Contractor shall furnish a performance guarantee in the form of a Bank Guarantee to the tune of Five percent (5%) of the cost of the tender amount, which will be kept valid up to 24 months after completion of the work.

WARRANTY

The Contractor shall give warranty that works to be done supplied shall be new and free from all defects and faults in material, workmanship, and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for materials of the type ordered and shall perform in full conformity with the specifications and drawings. The Contractor shall be responsible for any defects that may develop under the conditions provided by the contractor and under proper use, arising from faulty materials, design or workmanship such as corrosion of the equipment, inadequate contact protection, deficiencies in design and or otherwise and shall remedy such defects at his own cost when called upon to do so by the Institute who shall state in writing in what respect goods are faulty. This shall survive inspection or payment for, and acceptance of goods, after the goods have been taken over.

If it becomes necessary for the contractor to replace or renew any defective Portion / portions of the equipment under this clause, the provisions of the clause shall apply to the portion / portions of equipment's replaced or renewed or until the end of the warranty period of 24 months, whichever may be later. If any defect is not remedied within a reasonable time, the College may proceed to get the work done at the Contractor's risk and expenses, but without prejudice to any other rights which the College may have against the Contractor in respect of

such defects. Replacement under warranty clause shall be made by the Contractor free of all charges at site including freight, insurance and other incidental charges

REPLACEMENT OF DEFECTIVE EQUIPMENT

If any equipment or any part thereof, is found defective or fails to meet the requirements of the contract before it is accepted College shall give the Contractor a notice setting forth details of such defects or failures and the Contractor shall forthwith arrange to set right the defective equipment or replace the same by the good one to make it comply with the requirements of the contract. This in any case shall be completed within a period not exceeding one month from the date of the initial report pointing out the defects. The replacement or rectification shall be made at site by the Contractor free of cost. Should the Contractor fail to do the needful within this stipulated time frame, the College reserves the right to reject the equipment in full or in part and get it replaced at the cost of the Contractor. The cost of any such replacement made by the College shall be deducted from the amount payable to the Contractor against this purchase order.

If any equipment or part thereof is lost or rendered defective during transit, pending settlement of the insurance claim, fresh order shall be placed on the Contractor for such loss or defective equipment and the Contractor shall arrange to supply the same within three months of such order at the same prices and on the same general terms and conditions as mentioned in this purchase order.

ADD ON ORDER

PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE reserves the right to place Add on order for additional quantity up to 100% of the original quantity at the same rate and terms & conditions of the purchase order within six months from the date of issue of purchase order.

ARBITRATION

In case of dispute, the difference of opinion on any matter pertaining to the works, the decision of the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE be final and binding on the contractors. If either party is not satisfied with the decision of the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE, within 28 days a notice to this effect will be sent to the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE in writing. The matter can then be referred to a sole arbitrator or a panel of two arbitrators appointed under the arbitration act 1996.

LIQUIDATION

If the CONTRACTOR commences to be wound up, not being a member's voluntary winding up for the purpose of amalgamation or reconstruction, or carries on his business under a receiver for the benefits of his creditor the OWNER shalt be at liberty to:

i) Give such receiver the liquidator or other person the option of carrying out the performance under the Agreement, subject to the receiver, liquidator or other person providing a guarantee up to an amount to be agreed upon by the OWNER and such receiver liquidator or other person for the due and faithful performance of the Contractor's obligations under this Agreement, or

ii) If the receiver, liquidator or other person fails within 30 (thirty) days to exercise the option to carry out performance of the Agreement then the OWNER may terminate the Agreement and give notice in writing to the CONTRACTOR or to the receiver, liquidator or to any person in whom the Agreement may have become vested.

TERMINATION OF CONTRACT

If the CONTRACTOR violates the Agreement or shall neglect to execute the work with due diligence or expedition or shall refuse or neglect to comply with any reasonable directions, instructions or orders given to him in writing by the Architect/Engineer In-Charge in connection with the work or shall contrivance or breach any provisions of the Agreement, the OWNER may give notice in writing to the CONTRACTOR to make good the failure, neglect or contravention complained of or cure that breach within a period of 30 (thirty) days of receiving such notice and in default of the compliance with the said notice, the OWNER without prejudice to his rights as below may rescind or terminate the Agreement stating therein the effective date of termination, holding the CONTRACTOR liable for the damages that the OWNER may sustain in this behalf.

Without prejudice to any of the rights or remedies under this contract, if the contractor dies, the Owner shall have the option of terminating the contract without compensation to the CONTRACTOR.

OFFICIALS NOT TO BENEFIT

The Contractor warrants that it has not and shall not offer any direct or indirect benefit arising from or related to the performance of the Contract or the award thereof to any representative, official, employee, or other person in the office of PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE , UNIVERSITY OF DELHI, OPPOSITE TV TOWER, PITAMPURA, DELHI 110034 (INDIA). The Contractor acknowledges and agrees that any breach of this provision is a breach of an essential term of the Contract.

PENALTY FOR USE OF UNDUE INFLUENCE

The contractor undertakes that he has not given, offered or promised to give, directly or indirectly, any gift, consideration, reward, commission, fees, brokerage or inducement to any person in service of the Buyer or otherwise in procuring the Contracts or for bearing to do or for having done or forborne to do any act in relation to the obtaining or execution of the present Contract.

Any breach of the aforesaid undertaking by the Contractor (Seller) or any one employed by him or acting on his behalf (whether with or without the knowledge of the Seller) or the commission of any offers by the, Seller or anyone employed by him or acting on his behalf, as

defined in Chapter IX of the Indian Penal Code, 1860 or the Prevention of Corruption Act, 1986 or any other Act enacted for the prevention of corruption shall entitle the Buyer to cancel the Contract and all or any other Contracts with the Seller.

FORM OF PERFORMANCE SECURITY BANK GUARANTEE BOND

In consideration of the PRINCIPAL, SRI GURU GOBIND SINGH COLLEGE OF COMMERCE (hereinafter called "The Owner") having agreed under the terms and conditions of agreement no.

Dated:

Made between the Owner and

(hereinafter called "the Said Contractor(s)) for the work of **E TENDER FOR SITC OF ELECTRICAL PANEL AT SRI GURU GOBIND SINGH COLLEGE OF COMMERCE, PITAMPURA, NEW DELHI 110034** herein after called "the said agreement".

We (please mention name of the bank below)

Undertake to pay to The Owner an amount not exceeding Rupees

(In words)

On demand by The Owner.

2. We (please mention name of the bank below)

Do hereby undertake to pay the amounts due and payable under this Guarantee without any demure, merely on a demand from The Owner stating that the amount claimed is required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rupees

(In words)

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3. We, the Said Bank further undertake to pay to The Owner any money so demanded notwithstanding any dispute or disputes raised by the Said Contractor(s) in any suit or proceeding pending before any court or tribunal relating thereto, our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Said Contractors(s) shall have no claim against us for making such payment.

4. We (please mention name of the bank below)

Further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and it shall continue to be enforceable till all the dues of The Owner under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-Charge on behalf of The Owner certified that the terms and conditions of the said agreement have been fully and properly carried out by the Said Contractor(s) and accordingly discharges this guarantee.

5. We (please mention name of the bank below)

Further agree with The Owner that The Owner shall have the fullest liberty without our consent and without effecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for anytime of from time to time any of the powers exercisable by The Owner against the said contractor(s) and to for-bear or enforce any of the terms and conditions relating to the sad agreement and we shall not be relived from our liability by reason of any such variation, or extension being granted to the Said Contractor(s) or for any forbearance, act of commission on part of The Owner or any indulgence by The Owner to the Said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of The Bank or the Said Contractor(s)

7. We (please mention name of the bank below)

Lastly undertake not to revoke this guarantee except with the previous consent of The Owner in writing.

8. This Guarantee shall be valid upto _____. Unless extend on demand by The Owner. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rupees

(In words)

And unless a claim in writing is lodged with us within six months of the sate of expiry of the extended date of expiry of this guarantee all our liablities under this guarantee shall stand discharged.

Dated: the _____ day of _____ for _____ (Bank).

TURNOVER CERTIFICATE (ANNEXURE 1)

ON THE LETTER PAD OF CHARTERED ACCOUNTANT

This is to certify that the total turnover of

M/s _____

Having PAN _____

is as under:

FINANCIAL YEAR	AMOUNT (FIGURES)	AMOUNT (WORDS)
2019-2020		
2020-2021		
2021-2022		

Average = Total/3 = _____

It is further certified that the above-mentioned amounts have been derived from the books of accounts presented before us for the above-mentioned periods.

Stamp and Signature of Chartered Accountant.

TECHNICAL SPECIFICATIONS OF LT PANELS

A. MEDIUM VOLTAGE SWITCHBOARD PANELS

1. SCOPE

The vendor scope shall be design, manufacturing, supply, supervision for testing and commissioning of LT Panels as per latest IEC / IS standard as mentioned below for Power & Motor Control Center for Voltages up to 1000 V.

2. STANDARDS & CODES

Updated and current Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract.

Low Voltage Switchgears Assemblies	:	IEC61439-1& 2
Low Voltage switchgear & control gear	:	IEC60947 / IS13947:1993 Part I: General rules
Part II	:	Circuit Breakers
Part III	:	Switches, disconnectors, switch disconnectors and fuse combination Units
Part IV	:	Contactors and Motor starters
Part V	:	Control circuit devices and switching Elements
Internal Arc	:	IEC 61641

Degree of Protection of Enclosures : IEC60529/ IS2147:1962

for low voltage Switchgear

3. General

Medium voltage power control centres (generally termed as switchboard panels) shall be in sheet steel clad cubicle pattern, free floor standing type, totally enclosed, compartmentalized design. The panels shall be of extensible type with provision of bus bar extensions.

The LV switchboards shall be as per the standards IEC 61439-1 & 2. The switchboards and the associated equipment including switchgear, control gear, Busbar supports, Busbar orientation, Busbar links etc. shall be identical in construction to the assembly which has undergone the type test. The drawings of the type-tested assemblies shall be made available for inspection.

The designs of the switchboards should be with switchgear manufacturer, and all the mechanical drawings must sbe available in the factory beforehand.

Switch boards shall have a short circuit level withstand as per Schedule of Quantities and drawings.

Panel shall be tested of design as per Seismic Zone 5 of IS 1893 Part -1 2002 and ICC - ES AC 156 :2010. The enclosures shall be designed to take care of normal stress as well as abnormal electro- mechanical stress due to short circuit conditions. All covers and doors provided shall offer adequate safety to operating persons and provide ingress protection of IP 42 / IP 54 unless otherwise stated. Ventilating openings and vent outlets, if provided, shall be arranged such that same ingress protection of IP 42 / IP54 is retained as stipulated in schedule of quantities. The unused openings within the switchboards shall be closed using suitable grommets.

Degree of Protection shall be IP54 Up to 2000A and IP42 above 2000 Suitable pressure relief devices shall be provided to minimize danger to operator during internal fault conditions.

The Panel Should be communication ready, all ACB, MCCB in main LT Panels shall have RS845 port for communication and Ethernet Gateway Module for Energy Meter shall be connected over IP network using Din Rail Mounted Managed Ethernet Switch in such a way that all electrical panel data shall be able to be communicated to SCADA.

The switch board along with ACBs and connections should have been be type tested design at CPRI / Independent international latest house for short circuit, temperature rise, and dielectric tests of the ratings required. All components like door locks, bus bar supports, panel body structure, Hinges should be supplied by the type tested design’s OEM.

Panel shall be rated for Impulse withstand capability 8KV for main circuit as per IEC61439 Clause 5.2.4 Rated impulse withstand voltage (Uimp) (of the ASSEMBLY).

For operator safety IP2 X (touch proof) protection to be available even after opening the feeder compartment door. The compartmentalization to be achieved by using metal separators, use of PVC sheet / Hylem sheets shall not be allowed.

Main switch board shall be form 4b, for form of separation only metallic covers shall be used, Hylem/ PVC sheets shall not be allowed, rest of the panels shall be minimum conform to form 4b design.

All ACB, MCCB of Main LTpanel MCCBs shall have inbuilt earth fault protection.

4. Construction

The Switchboards shall be metal clad totally enclosed, floor mounted free-standing type of modular extensible design suitable for indoor mounting.

Switch boards construction shall employ the principle of compartmentalized and segregation for each circuit.

Incomer and bus section panels or sections shall be separate and independent and shall not be wired with sections required for feeder. The incomer panel shall be suitable for receiving bus trucking or MV cable of size specified.

Switch boards shall be made up of requisite vertical sections, which when coupled together, shall form continuous dead front switchboards.

The switch board shall be readily extensible on both sides by addition of vertical sections after removal of the end covers.

The switchboards shall be designed for use in high ambient temperature and humid tropical conditions as specified. Ease of inspections, cleaning and repairs while maintaining continuity of operation shall be provided in the design.

Neoprene gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust and vermin proof to provide a degree of protection of IP 42/IP 54 as stipulated in schedule of quantities. The unused openings within the switchboards shall be closed using suitable grommets.

Special care to be taken to ensure effective earthing of the frame and doors of the switchboards.

Each vertical section shall be provided with a rear or side cable chamber housing the cable end connections and power/control cable terminations. There should be a generous availability of space for ease of installation and maintenance with adequate safety for working in one vertical section without coming into contract with any live parts. The design of the switchboard shall allow standard extension chambers if required to accommodate cables.

Some switchboards may be required to be installed against the wall, for such application-documented designs shall be available.

Switch board panels and cubicles hall be fabricated with CRCA Sheet Steel of thickness not less than 2.0mm and shall be folded and braced as necessary to provide a rigid support for all components. The doors and covers shall be fabricated from CRCA sheet steel of thickness not less than 2mm. Joints of any kind in sheet metal shall be seam welded and all welding slag ground off and welding pits wiped smooth with plumber metal. The external covers provided should have been subjected to minimum mechanical impact of IK10 as per IEC to ensure a specified degree of protection.

All panels and covers shall be properly fitted and square with the frame. The holes in the panel shall be correctly positioned.

Switchboard shall be provided with "Danger Notice Plate" conforming to relevant Indian Standards.

The Panel design shall be type tested for Internal arc tests as per IEC 61641 for 70 KA for 0.5 sec as applicable as per system design fault level at HBB, VBB and cable chamber. Copies of the test certificate of anyone rating shall be submitted along with the tender.

5. Dimensions

All power control centers shall have dimensions not more than that given on the layout drawings. Panels arranged side by side shall have the same height and depth. The height of the panel should be limited to 2400mm. All the operating levers, handles etc. of the heights unit shall not be at a height more than 1.7 mtr. For all incoming cables a removable gland plate will be provided in the panel and a minimum distance of 300mm will be provided between the gland plate and the nearest terminal for proper dressing and termination of the cable. All the components of a module will be mounted on a component plate using the machine screws and taped holes (excepting the components mounted on the door). These component plates should be fixed with bolts for easy replacement. Standardization will be adopted while making these plates so that the component plates of the same size modules can be changed from one module to another. In case of panel of lengths more than 4 meters the fabrication of any single section will be limited to a maximum length of 3 mtr. for the purpose of shipping and shifting at the site. These sections will be assembled at the location of installation with the help of nuts and bolts. While making these sections consideration will be given to the place of sectionalization and select the location where the minimum electrical connections are transferred from one section to another. All the hardware used in the assembly will be electroplated for protection and a neat appearance.

6. Bus Bars

The bus bars shall be suitable for 4 wires, 415 volts, 50 Hz, system. The bus bar shall be made of high conductivity grade electrolytic copper and at the time of joining of two copper buses tinning will be done on the copper strips ends to a length equal to the lap length of the joint plus one each. The bus bars shall have uniform cross sections throughout. The bus bars shall be capable of carrying the rated current at 415 volts continuously. The bus bar will run in a separate busbar chamber using bus insulators made of non-deteriorating, vermin proof, non-hygroscopic materials such as epoxy fiber, reinforced polyester or molding compound. The interval between the two insulators will be designed after considering:

(a) Strength and safe load rating of the insulator,

(b) The vibrating force generated during a fault,

(c) A Factor of safety of 1.8

(d) A set of insulators at both ends of the bus.

The bus size calculations must be approved by the consultants. The bus bars shall be designed to withstand a temperature rise of 45° above the ambient. To limit the temperature, rise in the bus bar chamber a set of louvers can be provided at strategic places considering the air circulation. The louvers provided will have a brass wire mesh covering from inside with more than 100 openings per sq. inch. The overall temperature of bus bar shall not exceed 85°C. A current density of 0.8 Amp / Sq.mm for aluminum and 1.3 Amp/ Sq. mm for copper shall not be exceeded for bus bars.

All the bus bars shall be insulated with PVC heat shrinking sleeves suitably throughout (except at joints) the length. The Electro galvanized high tensile steel nuts, bolts, plain or spring washers of suitable size will be used in connecting the various section of the bus bar. A minimum of 1.6 times the width of bus bar will be the lapping length of each joint.

7. Earthing

The panels shall be provided with an aluminum earth strip running throughout the length of the switchboard. Suitable earthling eyes/bolts shall be provided on the main earthing bus to connect the same to the earth grid at the site. Sufficient number of star washers shall be provided at the joints to achieve earth continuity between the panels and the sheet metal parts.

8. Mountings

Panels incorporating switch-fuse units shall have suitable compartments of standard width. Each compartment shall incorporate a heavy-duty load break switch-fuse and HRC

fuses. Suitable cable termination arrangement shall be provided for switch-fuse unit feeders. Equipment shall be provided with proper fastening arrangements to ensure vibration-free operation. The proper designation as given on the respective drawings shall be provided for every equipment.

Circuit breakers shall be mounted such that they are accessible from the front of the panel. More than two circuit breakers shall not be incorporated in a vertical section. The breaker compartment shall be divided into two parts, one for the breaker and the other for incorporating associated control gear. The necessary instrumentation shall be provided on the door of the compartment. Protection relays and KWH meters shall be fixed on the rear side of the panels.

9. Interlocking

The panels shall be provided with the following interlocking arrangement.

a) The door of the switch-fuse compartments is so interlocked with the switch drive or handle that the door can be opened only if the switch is in `OFF' position. De-interlocking arrangement shall also be provided for occasional inspection.

b) It shall not be possible for the breaker to be withdrawn when in `ON' position.

c) It shall not be possible for the breakers to be switched on unless it is either in fully inserted positions or for testing purposes in fully isolated position.

d) The breaker shall be capable of being raked in to `testing' `isolated' and `maintenance' positions and kept locked in any of these positions.

e) A safety latch to ensure that the movement of the breaker as it is withdrawn, is checked before it is completely out of the cubicle shall be provided.

10. Protection & Instrumentation

Protection and instrumentation shall be as per standard specifications.

11. Wiring

All the interconnecting between the incoming, bus and the outgoing of 100 A and above rating shall be done by insulated Aluminium/copper strips of suitable sizes. Switch-fuse and equipment below 100 A rating shall be wired with insulated copper conductors. The wiring for instrumentation protection and control equipment shall be carried out with insulated flexible copper conductors. The power interconnecting shall be carried out by means of pressure clamps, special washers, etc. The wiring shall be terminated by using crimping sockets. Wiring shall be laid out neatly in bunches which are firmly fastened to the steel members of the panel. When the wiring is crossing from fixed parts to moving parts such as door etc. the

wires will be run in PVC sleeve of suitable size. Under no circumstances the wiring should be under any kind of stress. All the potential circuits shall be protected by fuses mounted near the tap-off point from the main connections.

12. Terminals

All the control, instrumentation and protection wiring shall be provided with printed PVC ferrules at both ends. For terminating control cables on to the equipment in the panels suitable terminal blocks shall be provided. The terminal shall also be numbered for easy identification and maintenance.

13. Surface treatment

All sheet metal accessories and components of power control centers and switchboard panels shall be thoroughly cleaned, degreased, de-rusted, rinsed and hot-dip phosphatized before drying and doing red oxide primer. After this, it shall be spray finished with a primer, oven dried and spray painted with finish paint, 2 coats wet on wet. Then it shall be baked in oven to achieve a uniform, smooth and tough film. The painting shall be with synthetic enamel stoving grade to a final overall dry film thickness of 50/60 microns

14. Enclosure

The panel enclosure shall be totally dust and vermin proof and shall be suitable for indoor installation. All the cubicles will have front located, outward opening lockable doors having hidden hinges and a bolted back cover both using no deteriorating neoprene/rubber gasket. Enclosure design shall be in accordance with degree of protection IP 54 as per IS 13947-1993.

15. Name plate

The panel as well as the feeder compartment doors shall be provided with name plate giving the switchboard/feeder descriptions as indicated on the drawings.

16. Testing

The power control centers shall be tested at factory after assembling of all components and completion of all inter- connections and wiring. Tests shall be conducted in accordance with the requirements of BS:3659 and 3185/IS: 8623-1993.

a) Insulation Test

i) Insulation of the main circuit, that is, the insulation resistance of each pole to the earth and that between the poles shall be measured.

ii) Insulation resistance to earth of all secondary wiring should be tested with 1000 volt meggar.

Insulation test shall be carried out both before and after high voltage test.

b) High Voltage Test

A high voltage test with 2.5 KV for one minute shall be applied between the poles and earth. Test shall be carried out on each pole in turn with the remaining poles earthed, all units raked in position and the breakers closed. Original test certificate shall be submitted along with panel.

17. Storing, Erection and Commissioning

a) The panels shall be stored in a well ventilated, dry place, suitable Polyethylene covers shall be provided for necessary protection against moisture.

b) Erection

Switch boards shall be installed on suitable foundation. Foundation shall be as per the dimensions supplied by the panel manufacturer. The foundation shall be flat and level. Suitable grouting holes shall be provided in the foundation. Suitable MS base channel shall be embedded in foundation on which the panel can be directly installed. The switch boards shall be properly aligned and bolted to the foundation by atleast four bolts. Cables shall be terminated on the bottom plate or top plate as the case may be, by using brass compression glands. The individual cables shall then be led through the panel to the required feeder compartments for necessary terminations. The cables shall be clamped to the supporting arrangement. The switchboard earth bus shall be connected to the local earth grid.

c) Pre-commission Tests

Panels shall be commissioned only after the successful completion of the following tests. The tests shall be carried in the presence of Architect's / Consultants representative.

i) All main and auxiliary bus bar connections shall be checked and tightened.

ii) All wiring termination and bus bar joints shall be checked and tightened.

iii) Wiring shall be checked to ensure that it is according to the drawing.

iv) All wiring shall be tested for insulation resistance by a 1000 volts meggar.

v) Phase rotation tests shall be conducted

vi) Suitable injection tests shall be applied to all the measuring instruments to establish the correctness and accuracy of calibration and working order.

vii) All relays and protective devices shall be tested for correctness of settings and operation by introducing a current generator and an ammeter in the circuit.

B. MEDIUM VOLTAGE AIR CIRCUIT BREAKER

1. General

Air circuit breakers shall be incorporated in power control center and motor control centers wherever specified. ACB shall conform to IEC 60947 PART I &II AND IS 13947 PART I & II in all respects. ACBs shall be suitable for operation on 415 volts, 3 phase, 50 Hz, AC supply.

The breaker shall comply with the Isolation function requirement of IEC 60947 section 7.12 and marked as Suitable for Isolation / disconnection function to ensure safety of operating personnel.

The breaker shall provide CLASS – II front facia. All circuit breakers can be reverse fed without reduction in performance.

2. Type and construction

Air circuit breakers shall be of molded case design with trip free operating mechanism. Air Circuit breakers shall be with drawable type with horizontal draw out carriage. The ACBs shall be strong and robust in construction with suitable arrangement for anchoring when in fully engaged or fully drawn out positions. The carriage or cradle on which the breaker is mounted shall be of robust design made of fabricated steel, supported on rollers. Cradle shall also comprise of main and secondary separable contacts and all draw out mechanisms in a completely fig welded assembly. There shall be no dependence upon the panel board frame for any critical alignment. The withdrawal arrangement shall be such as to allow smooth and easy movement.

All ACBs accessories shall be front fitted type. All the releases like U/v, Shunt and Closing coils shall be rated for Continuous operation.

All 4 pole ACBs shall be capable of setting neutral protection to N or N/2 to ensure precise neutral protection.

In case 3Pole ACB are offered based on application, it shall still be possible to protect the neutral by providing an external CT.

All the current carrying parts of the circuit breakers shall be silver plated. Suitable arcing contacts shall be provided to protect the main contacts. The contacts shall be of spring loaded design. The sequence of operation of the contacts shall be such that arcing contacts `make' before and `break' after the main contacts. Arcing contacts shall be provided with efficient arc chutes on each pole. The contact tips and arc chutes shall be suitable for ready replacement. Self aligning isolating contacts with automatic shutters to screen the live parts shall be provided. The design of the breaker shall be such that all the components are easily accessible to inspection, maintenance and replacement.

3. Operating Mechanism

Air circuit breaker shall be provided with a quick-make, trip-free operating mechanism. The operating mechanism shall be strain-free spring operated. The operating shall be "handle front of the panel" type. The design shall be such that the circuit breaker compartment door need not be opened while moving the breaker from completely connected, through test, in to the disconnected position. A flush mounted manual trip shall be provided on the front of the panel. The breaker shall also be provided with a hand reset automatic trip indicator. All breakers will have switching ON and OFF time of less than 4 cycles.

There shall be mechanical indication on the front panel for “Ready to Close” situation for the ACB by checking all interlockings. ACB shall be convertible from manual to electrical at site.

4.Interlocking and safety arrangement

Air circuit breakers shall be provided with the following safety and interlocking arrangements:

i) It shall not be possible for breaker to be withdrawn when in `ON" position.

ii) 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.

iii) The breaker shall be capable of being raked in to `testing' isolated and maintenance positions and kept locked in any of these positions.

iv) A safety latch to ensure that the movement of the breaker, as it is withdrawn is checked before it is completely out of the cubicle.

v) The operating mechanism shall provide for raking the breaker in to connected, test and disconnected positions without opening the compartment door.

vi) Mechanical interlocks will be provided between the operation of different breakers with the help of individually unique and matched castle key-locks (if specifically asked for).

5.Protections

ACB should be provided with Thermal Magnetic, or micro processor based releases as mentioned in the specifications or Bill of Material.

(i) Micro Processor based Release.

The microprocessor releases unit shall be provided on circuit breaker for Long time (Over Load), Short time (Short Circuit) and earth fault protection all with adjustable setting and

adjustable time delay by dial. Releases shall also have instantaneous protection, true RMS sensing with EMC/EMI Compatibility.

The micro-processor release should be self-powered type without any auxiliary power supply during normal operation of the breaker.

The circuit breaker control unit shall measure the true r.m.s value of the current.

Thermal Memory: When the breaker shall re close after tripping on overload, then the thermal stress caused by the overload if not dissipated completely, shall get stored in the memory of releases and this thermal memory shall ensure reduced tripping time in case of subsequent overloads and earth fault. Realistic hot/cold curves shall take into account the integrated heating effects to offer closer protection to the system. Breaker shall have facility of zone selective interlocking as a standard without need of an external power supply.

ii) Thermal Magnetic Trip Unit

Breaking capacity should be minimum 65KA upto 3200A. Breaker shall be of category B & Ultimate braking capacity Icu should be equal to service breaking capacity Ics.

The over current relay shall be of thermal type.

- It shall be bimetal based and be integrated as part of the circuit breaker.
- The over current relay shall be connected with epoxy coated CT.
- The over current relay shall have a wide adjustment range (50 –100%) to allow flexibility of the setting on site.

The short circuit release should have the following characteristics:

- It should be direct acting type. Instead of sensing through a CT it should sense the current directly.
- It should be possible to have phase wise indication of fault operation for short circuit release.
- There should be a provision of resetting the release after every short circuit fault to have antipumping feature.

Earth fault release should have the following characteristics.

- Current setting should be available from 02.In to 0.6In
- Time delay from instantaneous to 1 second should be possible with various steps in between.

C. MOULDED CASE CIRCUIT BREAKERS

1. General

Moulded case circuit breakers shall be incorporated in the switch board wherever specified. MCCB shall conform to the latest IEC 60947-Part 1&2 & IS 13947:1993 in all respects.

- They shall be of Category A with a rated service breaking capacity (Ics) equal to the ultimate breaking capacity (Icu).
- Rated insulation voltage shall be 750V AC (50/60 Hz).
- MCCB shall be suitable either for single phase AC 230 Volts or three phase 415 volts. Suitable discrimination shall be provided between upstream and down stream breakers in the range of 10-20 milli seconds.
- The circuit breaker shall comply with the isolation function requirement of IEC 60947-2 section 7.1.2 to marked as suitable for isolation/disconnection to facilitate safety of operating personnel while the breaker is in use.
- MCCBs shall be available in fixed or plug in / with drawable version as well as in 3P & 4P version. A safety trip shall provide advanced opening to prevent connection and disconnection of a closed circuit breaker.
- The MCCB shall provide class II insulation between the front and internal power circuit. It should be suitable for reverse fed.
- All MCCBs required as per BOQ shall have Ics=100% Icu, with following minimum service breaking capacity requirements.

2. Construction

The MCCB cover and case shall be made of high strength heat-resistant and flame retardant thermosetting insulating material, operating handle shall be quick make/quick break. The operating handle shall have suitable `ON' `OFF' and `TRIPPED' mechanical indicators notable from outside. Three phase MCCBS shall have a common operating handle for simultaneous operation and tripping of all the three phases.

MCCB shall be equipped with a “push to trip” button in front to test operation and the opening of poles. MCCB should provide instantaneous protection feature in event of high value short circuit current independent of thermal magnetic or electronic trip unit.

3. Contact

Contact tips shall be made of suitable arc resistant, sintered alloy for long electrical life. Terminals shall be of liberal design with adequate clearances.

4. Accessories

MCCB shall be provided with the following accessories, if specified in schedule of quantities.

i. Under voltage trip

ii. Shunt trip

iii. Alarm switch

iv. Auxiliary switches

All the accessories shall be rated for continuous operation. These Auxiliaries shall be common for the similar type and range of MCCBs

It should be possible to equip MCCBs with a motor mechanism for electrically controlled operation.

5. Interlocking

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

i. Handle interlock to prevent unnecessary manipulations of the breaker.

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

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

6. The MCCB shall be current limiting type and comprise of quick make – Break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. All MCCBs rated 200 Amps and above shall have adjustable short circuit pick-up. Where earth fault protection is indicated they shall be integral and have adjustability from 20% to 100% of rated current with adjustable time delays.

7. The trip command shall override all other commands. The MCCB shall employ maintenance free double break contract system to minimize the 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 (with test certificates) and let-through energy curves. Line and Load connections shall be interchangeable.

8. 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.

D. SWITCH FUSE UNITS AND MEASURING INSTRUMENTS

1. General

Switch-fuse units shall be incorporated in the switchboard panels wherever specified. The switches will conform to the requirements of IEC 947.1 and IEC 947-3 & IS 13947 part 1 and part 3. Switch-fuse unit shall be suitable for 415 Volts, 3 phase, 4 wire, 50 HZ, AC supply.

2. Construction & Operation

The unit housing shall be of robust/Modular construction designed to withstand arduous conditions encountered in the electrical system. Sheet materials used for switch-fuse enclosure shall be given a rigorous rust proofing treatment before it is fabricated and painted. Unit shall preferably have double break per phase in order to isolate fuse links when the switch is in OFF position.

The switch operating mechanism will ensure rapid opening and closing (operator independant) and will conform to §2-12 of IEC 947-3. The closing of all poles, including the neutral, will be simultaneously as required by IEC 947-3.

To ensure positive contact indication as described in IEC 947-3 § 7-2-7

- The operating handle will only indicate the O (OFF) position if the main contacts are actually separated. They will be achieved by design of the operating mechanism.
- The switches will be designed to be locked on the OFF position by padlock (with locking in the ON position possible)
- Fuses should be isolated from both sides. Construction should prevent the possibility of live outgoing when incoming is live but there is no fuse mounted on the switch.
- These auxiliary contacts will be common with all of the range.
- The auxiliary contacts can easily be mounted on site without taking out any part like side plate etc. and disturbing the mechanism.

The electrical endurance will be that of category A. It will correspond to an AC23 operational category without a current derating at 415V ac for ratings up to 630A.

Fuse should be stationery during the switch operation.

Phase barriers for all switches should be available as standard. Terminal shield up to 63A should be available as standard. For higher ratings provision for fitment should be available.

Length of operating shaft should be adjustable continuously. This feature should come as a standard.

The switches should be able to take Aluminium termination.

3. Fuses

The units shall contain fuse base and carriers for accommodating HRC units. HRC fuse units of specified rating.

In case it is required it should be possible to convert a switch from BS type fuse holder to DIN type fuse holder and vice versa at site.

4. Operating mechanism

The operating mechanism of the unit shall be crisp and positive in action with quick-make, quick-break silver plated contacts. The operating handle shall be suitable for rotary operation unless otherwise specified. Position of the handle such as 'ON `OFF' shall be clearly indicated. Operating handle shall be of retractable type.

Contact system should have self wiping feature. Separate arcing and current carrying zone to be provided for better thermal performance throughout the life of the switch

Contact system should be designed in such a way that during high short circuit fault current the contact pressure increases and switch can withstand the fault. In no circumstances there shall be any repulsion between the contacts during short circuit.

5. Shrouding

All the live parts inside the switch-fuse units shall be shrouded to prevent any accidental contact.

6. Terminals

All the terminals shall be liberally designed. All the units above 100 A shall be provided with integral cable socket.

7. Interlocking

All switch-fuse units shall be provided with suitable interlock such that the door of the switch board panels shall not open unless the switch is in 'OFF' position. Provision for padlocking the switch in 'OFF' position shall be also provided.

8. Testing

a) Routine and type test shall be conducted as per IS: 13947. The original test certificate shall be furnished.

b) Pre-commissioning tests at the site as per standard specification shall be conducted before commissioning

E. METERING, INSTRUMENTATION AND PROTECTION

1. General

The specifications hereinafter laid down shall cover all the meters, instrumentation and protective devices required for the electrical work. The ratings, type and quantity of meters, instruments and protective devices shall be as per the schedule of quantities and drawings.

2. Instrument Transformers

i) Current Transformers

Current transformers shall be in conformity with IS:2705 (Part-I, II, & III) in all respects. All current transformers used for medium voltage applications shall be rated for 1 KV. Current transformers shall have rated primary current, rated burden and class of accuracy as specified in the schedule. However, the rated secondary current shall be 5 A. unless otherwise specified. The acceptable minimum class of various applications shall be as given below :

For energy Measuring	:	Class 0.5
Protection	:	Class 10 p.

Current transformers shall be capable of withstanding without damage, magnetic and thermal stresses due to short circuit fault of 35 MVA on medium voltage system. Terminals of the current transformers shall be marked permanently for easy identification of poles. Current transformers shall be provided with earthing terminals for earthing chassis frame work and fixed part of the metal casing (if any). Each CT shall be provided with rating plate indicating the following :

i) Name and make

ii) Serial Number

iii) Transformation ratio

iv) Rated burden

v) Rated voltage

vi) Accuracy class

Current transformers shall be mounted such that they are easily accessible for inspection, maintenance and replacement. The wiring for CTs shall be copper conductor, PVC insulated

wires with proper termination lugs and wiring shall be bunched with cable straps and fixed to the panel structure in a neat manner.

ii) Potential transformers

Potential transformers shall be provided if specifically called for. Potential transformers shall comply with the requirements of IS: 3156 (Part-I, II & III) in all respects.

3. Measuring Instruments

i) General

Direct reading electrical instruments shall be in conformity with IS: 1248. The accuracy of direct reading shall be 1.0 for voltmeters and 1.5 for ammeters. Other types of instruments shall have accuracy of 1.5. The errors due to variations in temperature shall be limited to a minimum. The meters shall be suitable for continuous operation between -100C & + 50°C. All meters shall be of flush mounting type with square or circular pattern. The meter shall be enclosed in a dust tight housing. The housing shall be of steel or phenolic mould. The design and manufacture of the meters shall ensure the prevention of fogging of instrument glass. Instrument meters shall be sealed in such a way that access to the measuring element and to the accessories within the case shall not be possible without removal of the seal. The meters shall be provided with white dials and black scale markings. The pointer shall be black in colour and shall have zero position adjustment device which could be operated from outside. The direction of deflection shall be from left to right. Suitable selector switches shall be provided for all ammeters and voltmeters intended to be used on three phase supply.

ii) Ammeters

Ammeters shall be of moving-iron type. The moving part assembly shall be with jewel bearings. The jewel bearing shall be mounted on a spring to prevent damage to pivot due to vibrations and shocks. The ammeters shall be manufactured and calibrated as per the latest edition of IS: 1248. Ammeters shall be instrument transformer operated, and shall be suitable for 5 A secondary of instrument transformation.

iii) Voltmeters

The voltmeter shall be of moving iron type. The range for 400 volts, 3 phase voltmeters shall be 0 to 500 volts. A suitable selector switch shall be provided for each voltmeter to read voltage between any two lines of the system. The voltmeter shall be provided with a protection fuse of suitable capacity.

iv) Wattmeter, Frequency meters, power factor meters

• Wattmeter: Wattmeter shall be of three phase, Electro-dynamic type, suitable for use with current and potential transformers associated with the particular panel. The wattmeter shall be provided with a maximum demand indicator.

- Power factor meters: Polyphase power factor meters shall be of Electro-dynamic type with current and potential coils suitable for operation with current transformers and potential transformers associated with the particular panel. The scale shall be calibrated for 50% lag - 100% - 50% lead readings. Phase angle accuracy shall be + 40.

- Energy meters and reactive power meters :Trivector meters shall be two element, integrating type kilowatt-hour, KVA, Kilovolt - ampere - hour reactive meters. The meters shall conform to IEC - 170 in all respects. Energy meters, KVA and KVARH meters shall be provided with integrating registers. The registers shall be able to record energy consumption of 500 Hours corresponding to maximum current at the rated voltage and unity power factor. These meters shall be suitable for operation with current and potential transformers associated with the particular panel. Trivector meter shall be digital type,

4. Relays

i) General

Protection relays shall be provided wherever required to trip and isolate the particular section under fault. All the relays shall be adjusted and coordinated for proper range of the particular circuit or equipment. Relays shall be provided with flag type indicators to indicate the cause of tripping. The flag indicators shall remain in position until they are reset by hand reset.

Relays shall be designed to make or break the normal circuit current with which they are associated. The relay contacts shall be of silver or platinum alloy. The contacts shall be designed to withstand repeated operation without damage. The relays shall be of draw-out type to facilitate testing and maintenance. The draw-out case shall be dust tight with a finish suitable for tropical country. The relays shall be capable of disconnecting faulty section of network or faulty equipment without causing interruption or disturbance to the remaining sections. The analysis of setting shall be made considering relay errors, pick-up and overshoot errors and shall be submitted to the Engineer/Architect for approval.

ii) Over current relays

Over current relays shall be induction type with inverse definite minimum time lag characteristics. The over current relays shall be provided with adjustable current and time settings. The setting for current shall be 50-200% in step of 25%. The IDMT over current relays shall have time lag (delay) of 0 to 3 seconds. The time setting multiplier shall be adjustable from 0.1 to unity. Over current relays shall be fitted with suitable tripping device with trip coil being suitable for operation on 5 amperes.

iii) Earth fault relay

Earth fault relay shall have current setting of 10% to 40% in steps of 10%, otherwise, the earth fault relays shall conform to specification laid down for over current relays.

iv) Under Voltage Relays

Under voltage relays shall be induction type and shall have inverse limit operation characteristic, with pick up voltage range of 50 - 90% of the rated voltage.

5. Testing

5.1 Instrument transformers shall be tested at factory as per IS:2705& IS:3156. The test shall incorporate the following:

a) type tests

b) Routine tests

Original test certificates in triplicate shall be provided.

5.2 Meters shall be tested as per IS: 1248. The tests shall include both type tests and routine tests. Original test certificate in triplicate shall be furnished.

5.3 a) Suitable injection tests shall be applied to the secondary circuit of every instrument to establish the correctness of calibration and working order.

b) All relays and protective devices shall be tested to establish correctness of setting and operation by introducing a current generator and an ammeter in the circuit.

FINANCIAL BID DOCUMENT

SUMMARY

S.NO.	DESCRIPTION	AMOUNT (INR.)
1)	MAIN LT PANEL	
2)	CAPACITOR PANEL	
3)	DISMANTLING & RECONNECTING WORKS	
4)	GLAND & LUGS	
5)	MAINTENANCE FREE CHEMICAL GEL EARTHING SYSTEM & STRIP	
	TOTAL OF SITC WORKS	
	GST ON SITC WORKS @ _____	
	TOTAL SITC AMOUNT INCLUDING GST (A)	
6)	BUY BACK ITEM	
	BUY BACK AMOUNT	
	GST ON BUY BACK AMOUNT @ 18%	
	TOTAL BUYBACK AMOUNT INCLUDING GST (B)	
	GRAND TOTAL (A) - (B)	
	IN WORDS	

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
	NOTE- The following points to be considered in quoted price.				
	1. The bidder shall visit the site, ascertain the site conditions and scope of works before bidding.				
	2. Maximum two days shut down period shall be allowed to vendor to complete all activity of below given BOQ				
	3. The bidder shall buy-back the old Main panel and one capacitor panel as mentioned and take delivery of these items in as is where is condition.				
	4. Temporary connection of external lighting, guard room lighting, College lighting, Gurudwara lighting feeder from exiting installed Transformer/DG set will be in contractor scope. Material required for temporary connection to be arranged by contractor only, no extra claim shall be entertained for the same.				
1	**LT PANELS**				
	Supplying, testing, and commissioning of cubicle type free floor mounted front operated panels made out of 2.0 mm powder coated sheet steel for load bearing structure and 1.6 mm for non-load bearing structure, PVC colour coded aluminium bus bar of current density 0.8A/mm², 50 x 10 Sq.mm aluminium earth tape from end to end of the panel, consisting of the following, all as per single line diagram. Panel colour Siemens Grey (**Note-G.A.** Drawing of panel to be approved before fabrication).				
Note-	ACBs shall have Icu= Ics =Icw 50 KA minimum				
	MCCBs shall have Icu= Ics =36 KA minimum				
	Incomer ACBs of Main LT panel shall have microprocessor-based release trip with O/C, S/C, E/F in built protection.				
	Outgoing MCCB's of Main LT panel shall have thermal magnetic based release trip with O/C, & S/C protection.				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
	MCCBs shall be variable current setting, current limiting type with front extended rotary operating handle, phase shall have phase separators, spreader links, terminals, transparent polycarbonate sheet shrouding.				
	The DG, Transformer incomer and Bus coupler shall be PLC based interlocked.				
	The cost of PLC, for interlocking of Incomer & Bus coupler, Powerpack, UPS, battery, charger shall be included in the cost of panel.				
	All meters shall be digital type with class 1 accuracy.				
	All indication lamps shall be LED type.				
	SPD shall be pluggable type having the indication for in operation/ end of life,				
	Three phase four wire Surge Protection Device of spark gap technology for peak value of current of 8/350 µs wave form with protection Fuse/MCCB in incomer feeders' bus				
	Incomer & Outgoing feeders shall be provided with 'ON', 'OFF' and 'TRIP' indication lamp				
	Incomer feeders of MLTP & DG SYN Panel shall be provided with digital type MFM-1 (Multi-function meter-1) for A,V, kW & kWh, PF, Hz,				
	All outgoing feeders of MLTP shall be provided with digital type MFM-2 (Multifunction meter) A, V & kWh energy meter				
	All live accessible parts shall be shrouded with 1mm thick polycarbonate/3 mm thick FRP sheet and all equipment shall be finger touch proof. The busbar insulation shall be with heat shrinkable sleeves according to the colour code. SMC shrouds and busbar supports shall be used.				
	Galvanised hardware with zinc passivation shall be used in fabrication of Switchboards.				
	Space heater shall be provided with thermostat with 6A MCB as backup protection in each section of Main LT Panel & controlled with 20 A DP MCB, 10 KA.				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
	Provision of one 6/16-amp socket & compartment lighting for each vertical section of main LT Panel				
	10% extra of each R,Y,B,G,A colour indicating lamp and illuminated push buttons and normal push button shall be provided with main LT panel				
	All control, power and communication wiring shall be brought out up to the cable alley in the terminal blocks. 10% extra terminals shall be supplied along with Panel.				
	All bus bar size after derating shall be equal to the ampere given in the BOQ.				
1.0	**Main L.T. Cum Panel**				
	-				
1.1	**Incomer (2Nos. 1000 kVA Transformer)**				
	2 Nos. 1600 Amps Electrically Operated Drawout type 415, 50Hz, Volts, 4 Pole, air circuit breaker with CTs, charging motor, built in overload + short circuit + earth fault and under voltage release, auxiliary contacts etc. complete in all respects.				
1.1a	**The following Instruments shall be provided for each Transformer**				
	1 No. 0-1600 Amps, Digital ammeter with built in selector switch and matching CTs for each transformer				
	1 No. 0-500 Volts, Digital voltmeter with built in selector switch and protection MCB for each transformer				
	1 Nos. Multi data meter (kW, kWH, kVA, PF, A, V) with matching CTs for each incomer				
	1 Set of suitable rating CT's for APFC Relay for each transformer				
	1 Set R Y B phase indicating lamps for each transformer				
	1 Set of ON/OFF/TRIP indicating lamps for each incomer				
1.1b	**The following protection relay shall be provided for each Transformer**				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
	Each Transformer breaker shall be provided with the following protection:				
	1 No. of Phase sequence relay for each transformer				
	1 No. of Master Trip relay for each transformer				
	1 Set of FP (Three phase + 4wire) Surge Protection Device for Lightning current & voltage surge protection shall be provided with protection MPCB/Fuses for each transformer				
1.2	**DG AMF & LOAD MANAGEMENT PANEL SUITABLE FOR 2Nos. 500kVA DG SETs**				-
	-				
1.2.1	**Incomer 2Nos. 500 kVA DG Set**				
	2 No. 800 Amps Electrically operated draw out type 415, 50Hz, Volts, 4 Pole, air circuit breaker with CTs, charging motor, built in overload + short circuit + earth fault and under voltage release, auxiliary contacts etc. complete in all respects.				
1.2.1a	**The following Instruments shall be provided for each DG Set feeder**				
	1 No. 0-800Amps, Digital ammeter with built in selector switch and matching CTs for each DG set				
	1 No. 0-500 Volts, Digital voltmeter with built in selector switch and protection MCB for each DG set				
	1 Nos. Multi data meter (kW, kWH, kVA, PF, A, V) with matching CTs for each DG set				
	1 Set R Y B phase indicating lamps for each DG set				
	1 Set of ON/OFF/TRIP indicating lamps for each incomer				
	1 No. 8 Window Annunciation for alarm and trip for each DG set				
	1 No. Auto / Manual selector switch for each DG set				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
	1Set of push buttons for DG start, DG Stop Reset & Emergency Stop for each DG set				
	1 Set of automatic Battery charger with inbuilt facility of trickle / boost & consisting of following for each DG set				
	DC Ammeter (0-30) V.				
	DC Voltmeter. (0-30) Amp				
	Charger ON, OFF indications.				
1.2.2	**DG AMF, Load Management, Protection & Interlocking System.**				
	Micro logic PLC shall be suitable for DG Sets Auto start / stop, Load Management, interlocking and operation of DG sets, EB incomer ACB's and bus coupler, with auxiliary relays, indication lights, Push button, Emergency stop, UPS, A/M switch, PLC - CPU, 24V DC power supply as required. (PLC- Allen Bradley / Wood Ward / Siemens).				
	Auto load sharing, DG sets protection and AMF operation of DG Sets shall be carried out by Woodward OR power command centre 3.3 installed on each DG Set by DG Manufacturer however required coordination and provisions to achieve the same in coordination with PLC based interlocking of Transformers and DG sets breakers and Auto Load Management shall be in the scope of work of Panel Manufacturer.				
1.3	**Bus Coupler**				
	1 No. 1000 Amps Electrically operated draw out type 415, 50Hz, Volts, 4 Pole, air circuit breaker with CTs, charging motor, built-in overload + short circuit + earth fault and undervoltage release, auxiliary contacts etc. complete in all respects.				
	All Incomers and Bus coupler shall be Electrically interlocked with each other.				
1.4	**Bus bar**				
	2000 Amps, 415 volts, 3 phase, 4 wire colour coded Al. bus bar.				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
1.5 a	**Outgoings**				
	-				
	2 Nos. 800 Amps, 415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
	4 Nos. 630 Amps, 415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
	2 NoS. 400 Amps,415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
	1 No. 320 Amps, 415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
	5 Nos. 200 Amps,415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
	2 NoS. 160 Amps, 415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
	4 Nos. 125 Amps,415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
	2 Nos. 100 Amps, 415 Volts, TP MCCB with isolable neutral, extended Rotary operating mechanism etc.				
1.5 b	**Metering & Indication Lamp**				
i	1 Nos. Multi data meter (kW, kWH, kVA, A, V) with matching CT's for each outgoing feeder				
ii	ON & OFF Indication lamp shall be provided in each outgoing feeder				
	Panel shall be complete with above mentioned switchgear, interlocking PLC, Energy meter with internal wiring.	**1**	**Set**		
	TOTAL OF MAIN LT PANEL				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
2	**Capacitor Panel indoor type**				
	Design, supply, unloading, shifting up to the location, installation, testing and commissioning of the following extensible, indoor floor mounted, fully compartmentalised with hinged lockable detachable front & back openable, dust and vermin proof, fabricated out of 2 mm thick CRCA powder coated sheet steel suitable for use at 415 volts 3 phase 4 wire 50 cycle system and to withstand a symmetrical fault level of 25 KA minimum at 415 volts. Panels shall be fabricated in easily transportable sections, length, height, depth etc. to match with site condition.				
	Note – **a).** All MCCB shall thermal magnetic based O/C, & S/C release.				
	b). 1 No. Capacitor panel is available at site and same shall be used with proposed main LT panel, CTs required for existing APFC panel relay shall be considered by panel manufacturer in their scope.				
2.1	**INCOMER**				
2.1.1	1No. 800A, FP MCCB 25kA complete with Thermal Magnetic based release trip.				
2.2	**BUS BAR**				
2.2.1	1000 Amps, 415 volts, 3 phase, 4 wire colour coded Al. bus bar.				
2.3	**OTGOING CAP. FEEDERS**				
2.3.1	4 Nos. 50 KVAR MPPH Capacitor bank units				
2.3.2	3 Nos. 25 KVAR MPPH Capacitor bank units				
2.3.3	2 Nos. 12.5 KVAR MPPH Capacitor bank units				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
2.3.4	4 Nos. 100A TP MCCB with heavy duty solid detachable neutral link & 4 Nos 63 A capacitor duty Contactor. (Suitable for 50kVAR Capacitor)				
2.3.5	3 Nos. 63 A TP MCB with heavy duty solid detachable neutral link & 4 Nos 63 A capacitor duty Contactor. (Suitable for 25 kVAR Capacitor)				
2.3.6	2 Nos. 25 A TP MCB with heavy duty solid detachable neutral link & 2 Nos 25 A capacitor duty Contactor. (Suitable for 12.5kVAR Capacitor)				
2.3.7	10 Sets of 'RED' and 'GREEN' push buttons for manual operation of capacitors.				
2.3.8	Indicating lamp in each 50kVAR/25kVAR/12.5kVAR capacitor chamber unit to indicate "ON/OFF" status of capacitor unit				
2.3.9	Push button to switch off each capacitor bank in manual and auto mode.				
2.40	10 step APFCR relay having facility to change the sequence of switching 'ON' the capacitor banks as required. The program of APFCR shall be re settable to enable sequence of ON/OFF individual bank, so that the end unit of capacitor bank is not kept idle for long.				
2.5	All interconnections from the Vertical bus bars to individual MCCB and MCCB to contactor and contactor to terminal blocks for Automatic Switching "ON" and "OFF".				
	Capacitor Panel as described as above and as per specification complete in all respects with internal wiring bus bar etc.	**1**	**Set**		
	TOTAL OF CAPACITOR PANEL				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
3	**DISMANTLING & RCONNECTING WORKS**				
	Dismantling of existing installed items like panel, bus duct, cables as mentioned below. This is the contractor responsibility to dismantle existing gland / lugs carefully. The scope of work shall be included of properly cleaning of removed items and shift at safe place as per site in charge instruction. Tools, tackles, and other equipment's as required for dismantling works shall be in Contractor scope. **Note-** It is advised to Contractor to visit the site to check and understand the scope of works to quote for this item.				
3.1	Dismantling of Bus ducts end termination, power and control cables from the existing installed Main LT panel end only, complete with glands, clamp and lug/thimble etc as required.	1	lot		
3.2	Dismantling, shifting of existing installed main LT panel to store/scrap yard within the site as per site in charge instruction. Approx dimension 7.0Mtr (W) x 1.5 Mtr (D) X 2.4mtr (H)	1	lot		
3.3	Re-termination of above dismantled Bus ducts end termination, power, and control cables in new Main LT panel end only, complete with glands, clamp and lug/thimble etc as required.	1	lot		
	TOTAL OF DISMANTLING & RCONNECTING WORKS				
4	**GLAND & LUGS**				
4.1	Supply and erection of suitable compression type brass cable glands for underground Cable :-				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
4.1a	Up to 6 Sq mm Cable 2 to 4 Core	1	Set		
4.1b	10 Sq mm to 16 sqmm Cable 2 to 4 Core	2	Set		
4.1c	25 Sq mm to 50 sqmm Cable 2 to 4 Core	1	Set		
4.1d	120 Sq mm to 185 sqmm Cable 3 to 3'1/2 Core	2	Set		
4.1e	240 sqmm Cable 3 to 3'1/2 Core	2	Set		
4.1f	300 sqmm to 400 sqmm Cable 3 to 3'1/2 Core	2	Set		
4.2	Supply and erection of aluminium lugs heavy duty including crimping etc. up to the entire satisfaction of the Engineer-in-charge of the work.				
4.2a	4 sqmm to 6 sqmm	4	each		
4.2b	16 sqmm	10	each		
4.2c	25 sqmm	1	each		
4.2d	35 sqmm	6	each		
4.2e	50 sqmm	3	each		
4.2f	70 sqmm	4	each		
4.2g	95 sqmm	5	each		
4.2h	120 sqmm	16	each		
4.2i	150 sqmm	6	each		
4.2j	185 sqmm	15	each		
4.2k	240 sqmm	6	each		
4.2l	300 sqmm	12	each		
4.3	Supply and laying of 1.1 KV, Three & half core Aluminium/Copper conductor, XLPE insulated, armoured Cables as per IS 7098 Part-1 . cable shall be laid on tray/trench/directly buried in ground with sand and brick protection as per Engineer-in-charge of the work.				
4.3a	4 C x 16 sqmm	R.O.	Mtr		
4.3b	3.5 C x 35 sqmm	25	Mtr		
4.3c	3.5 C x 70 sqmm	R.O.	Mtr		
4.3d	3.5 C x 120 sqmm	25	Mtr		
4.3e	3.5 C x 185 sqmm	40	Mtr		

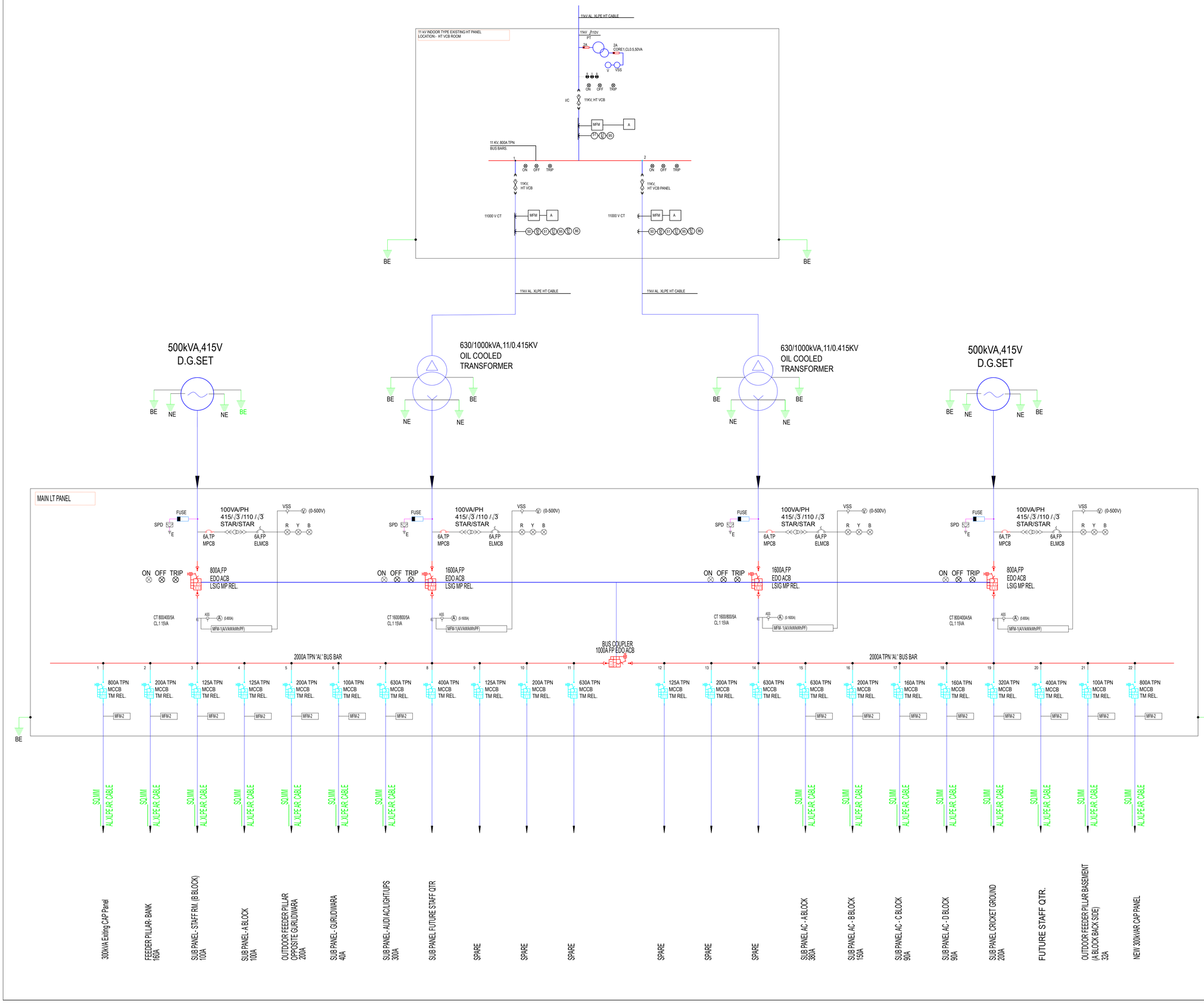
S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
4.3f	3.5 C x 240 sqmm	R.O.	Mtr		
4.3g	3.5 C x 300 sqmm	30	Mtr		
	Total of Gland & Lugs				
5	**MAINTENANCE FREE CHEMICAL GEL EARTHING SYSTEM & STRIP**				
	Supply of advance chemical gel earthing system for the proper dissipation of fault / leakage current to the ground and ensure the continuous electrical connectivity and proper functioning to the electrical system. The earth rod shall be of UL listed & CPRI tested of following sizes as mentioned below. The chemical compound should be tested and certified by any International accredited and BIS (Bureau of Indian Standards) accredited laboratory. The testing laboratory should be ISO 9001 & ISO 14001 certified. The UL listed copper bonded rod also should be tested & certified from CPRI for a short circuit current of 31.5 KA or more. The UL listing shall be punched / engraved on the rod for the physical verification at site.				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
	The engravings shall contain the following details - UL Control number, Dimension details of the rod, Product model number & UL certificate reference number as per detailed technical specification attached. To ensure the electrical conductivity, 2X25 Kgs (per pit) or more resistance grounding minerals per earth pit / earth rod shall be used along with the copper bonded rod. The chemical compound shall be tested for the contents from BIS (Bureau of Indian Standards, Govt of India) & NABL accredited laboratory in India. The testing laboratory shall be an ISO 9001 & ISO 14001 certified. As per IEEE 80-2013 (Clause 14.5 d), the grounding minerals shall be tested & certified for the resistivity of less than 0.12 ohm-mtr. The grounding minerals should be ROHS certified to ensure it does not pollute the ground water as per technical specification attached. The cost of chamber to be included in earth pit station.				
5.1	3 metre long 25 mm dia 250 microns copper bonded steel rod along with 2X25 Kgs of JK RESLOW Resistance Lowering Grounding Minerals & heavy duty poly plastic chamber	2	Nos		
5.2	SITC of 50 X 6mm GI strip to laid underground/surface/tray	50	Mtr		
	TOTAL OF MAINTENANCE FREE CHEMICAL GEL EARTHING SYSTEM & STRIP				
6	**BUY BACK ITEM** (The repurchase of the old LT panel will **exclude** two 600-amp and one 400-amp L&T make switches recently installed in the existing LT panel.)				

S.No.	DESCRIPTION	QTY	UNIT	RATE (INR.)	AMOUNT (INR.)
6.1	The bidder shall buy-back existing Main LT Panel and take delivery of these items in as is where is condition.	1	Set		
6.2	The bidder shall buy-back existing Cap Panel and take delivery of these items in as is where is condition.	1	Set		
	TOTAL OF BUY BACK ITEM				

APPROVED MAKES		
Sl.No.	**ITEM DESCRIPTION**	**MAKES OF MATERIAL**
1	Medium Voltage Incomer ACB	Advance panel / Innovic Energy / Zeniya
2	Medium Voltage ACB	Schneider (Master pact NW) / Siemens (3WL ETU 76) / ABB / LT U- Power / Mitsubishi Electric
3	Moulded case circuit breaker	Schneider / Siemens / ABB / L&T
4	Switch fuse Units	Schneider / Siemens /ABB /L&T
5	ATS/C.O.S	HPL Socomec/ HH Elcon / Schneider / ABB
6	MCB/ELCB/MCB DBs	Hager / Legrand / ABB (ITUS) / Schneider
7	Potential Transformer	AE / Kappa / Precise / Advent
8	L.T. CTs	AE / Kappa / Precise / Advent
9	Contactors	Schneider /Siemens /ABB /L&T
10	Conventional Meters	AE /Rishline/ L&T/ L&T
11	Digital Meters	Schneider / Elmeasure / HPL / L&T
12	Indicating Lamps (LED)	Schneider / Siemens / ABB / L&T
13	Selector Switches	Schneider/L&T/Kaycee /Slazer
14	Capacitors & APFC relay	EPCOS/Schneider/ABB/L&T
15	Starters	Schneider/Siemens/ABB/L&T
16	Connectors & Terminal blocks	Elmex/Wago/Connectwell
17	Gland	Comet/APS/HEX
18	Protection Relays	Schneider/Siemens/ABB/L&T
19	Breaker Control Switch	Schneider/L&T/Switron/Kaycee
20	Toggle Switch	Schneider/L&T/Switron/Kaycee
21	LED Lighting Fixture	Philips /Bajaj /Wipro
22	Compact Sandwich Bus Duct	Schneider/ABB/C&S/L&T
23	FRLS Copper wires for panel internal wiring	Polycab/KEI/ Skytone/Bonton/Finolex
24	Power Pack	Mahamai / IRA / Equivalent
25	Busbar	Hindalco / RR Global / Equivalent
26	Space Heater	Girishego / Vileco,Mumbai / Equivalent
27	Electronic Hooters	Alan / Paramount / Equivalent
28	Maintenance Earthing	JK / Cape
29	Annunciator	Alan / GIC / Equivalent

SINGLE LINE DRAWING



LEGEND

	VACUUM CIRCUIT BREAKER (VCB)
	AIR CIRCUIT BREAKER (ACB)
	MOLDED CASE CIRCUIT BREAKER
MFM	MULTI FUNCTION METER
A	AMMETER
VSS	VOLTMETER SELECTOR SWIT.
R Y B	PHASE IND. LTS.
ON OFF TRIP	ON /OFF/TRIP INDICATION LAMP
	FUSE
BE	BODY EARTHING
NE	NEUTRAL EARTHING

ARCHITECT

RANJIT SINGH & ASSOCIATES
1206 Surya Kiran Building,19 K.G.Marg, New Delhi 110001
Ph.23312688 Fax: 51510129 Email: rsa1206@msn.com
Architects, Engineers & Interior Designers
Govt. approved Valuers and House Tax Consultants

CONSULTANT

VAGISH & ASSOCIATES
F-124 UG-1 Dilshad Colony
Delhi-110095
Mob.: 9717496927
email: vagishrana@gmail.com

TITLE

MAIN POWER DISTRIBUTION SCHEMATIC DIAGRAM

SCALE	DATE	DRG. NO.	REVISION
1:100	12-04-2023	EL-01	R1