राष्ट्रीय कोशिका विज्ञान केंद्र
NATIONAL CENTRE FOR CELL SCIENCE
(जैवप्रौद्योगिकी विभाग, भारत सरकार की स्वायत्त संस्था/
An Autonomous Institution of the Department of Biotechnology, Govt. of India)
सावित्रीबाई फुले पुणे विश्वविद्यालय परिसर, गणेशखिंड, पुणे-411007
Savitribai Phule Pune University Campus, Ganeshkhind Pune 411007.

भाग- I /PART- I (तकनीकी बिड/TECHNICAL BID)

SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF 22/0.415KV, 400KVA SUBSTATION WITH ALLIED WORKS AT JIDNYASA BLDG., KOTHRUD, PUNE

प्रस्तुत करने की नियत तारीख/DUE DATE FOR SUBMISSION: 21/11/2023 @ 15 HRS

प्रेषित करने के लिए पता/ TO BE SUBMITTED TO:
निदेशक/The Director
राष्ट्रीय कोशिका विज्ञान केंद्र/National Centre For Cell Science
सावित्रीबाई फुले पुणे विश्वविद्यालय परिसर/ Savitribai Phule Pune University Campus,
गणेशखिंड/ Ganeshkhind, **पुणे/**Pune 411007 (**महाराष्ट्र, भारत/**Maharashtra, India)

बिडर का नाम एवं पता/NAME AND ADDRESS OF BIDDER:_____

Tender Cost: Nil

SEAL AND SIGN. OF THE BIDDER

अनुक्रमणिका / INDEX

SEAL & SIGN OF THE BIDDER

2. समाचार पत्रों में प्रकाशन हेतु जारी की जानेवाली मुद्रणालय सूचना/PRESS NOTICE TO BE ISSUED FOR PUBLICATION IN NEWSPAPERS

राष्ट्रीयकोशिकाविज्ञानकेंद्र
NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007

NOTICE INVITING TENDER

The Director NCCS, Pune invites sealed tenders in two bid system for following works

Sr. No.	NIT No.	Name of Work	Estimated Cost	EMD	Time of Completion
1	NCCS/MAINT/HT/454D/ 2023	SITC of 400 KVA Substation at Jidnyasa Bldg., Kothrud, Pune	Rs. 74 Lakh	Rs. 1.49 Lakh	Four Month
2	NCCS/MAINT/DG/454E/2023	SITC of 380 KVA DG Set at Jidnyasa Bldg., Kothrud, Pune	Rs.49 Lakh	Rs.0.98 Lakh	Four Month
3	NCCS/MAINT/GMP/454C/2023	SITC and Validation of c-GMP Compliant Mammalian Cell Line Repository on Turnkey Basis at NCCS Jidnyasa Building, Kothrud, Pune	Rs.910 Lakh	Rs.18.20 Lakh	Six Month

Detail tender document can be downloaded from our website **www.nccs.res.in and https://eprocure.gov.in**. All further information, instructions, corrigendum/addendum or notices will be published on website only.

SEAL & SIGN OF THE BIDDER

राष्ट्रीय कोशिका विज्ञान केंद्र
NATIONAL CENTRE FOR CELL SCIENCE
(जैवप्रौद्योगिकी विभाग, भारत सरकार की स्वायत्त संस्था/
An Autonomous Institution of the Department of Biotechnology, Govt. of India)
सावित्रीबाई फुले पुणे विश्वविद्यालय परिसर, गणेशखिंड, पुणे-411007
Savitribai Phule Pune University Campus, Ganeshkhind Pune 411007.

3. NOTICE INVITING TENDER

NCCS/MAINT/HT/454D/2023 01/11/2023

National Centre for Cell Science is a Premier Research, Autonomous Institute under Department of Biotechnology, Govt. of India having office at Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007.

The Director NCCS Pune invites sealed Item Rate tender in Two Bid System from registered Electrical contractors with CPWD, PWD, Railways, M.E.S., B.S.N.L., P.S.U's **or** interested, inline, experienced, reputed Individuals, firms, Contractors, OEM, Companies etc for "**Supply, Installation, Testing and Commissioning of 22/0.415KV, 400KVA Substation with allied works at Jidnyasa Bldg., Kothrud, Pune".**

Name of the Work	Estimated Cost (Rs.)	EMD (Rs.)	Time for Completion
Supply, Installation, Testing and Commissioning of 22/0.415KV, 400 KVA Substation with allied works at Jidnyasa Bldg., Kothrud, Pune	**Rs. 74 Lakh**	**Rs. 1.49 Lakh**	**Four Month**

3.1. SCHEDULE OF TENDERING PROCESS:

1	Tender available on website for download	:	01/11/2023 to 21/11/2023
2	Pre-bid Meeting	:	10/11/2023 @ 11:00 Hrs
3	Tender Submission due date	:	21/11/2023 @ 15:00 Hrs
4	Opening of Technical Bid	:	21/11/2023 @ 15:00 Hrs
5	Opening of Commercial Bid	:	Will be communicated in due course of time

3.2. PRE QUALIFICATION CRITERIA: (Please attached self- attested documents)

(i) The bidder should have registration for Shop Act, GST and PAN Number. Bidder should have legal status whether it will be a registered Proprietorship Firm/Partnership Firm/ Company under Companies Act having legal entity having all statutory licenses/registration for carrying out such activity.

(ii) The bidder should submit copy of valid Electrical Contractor License.

(iii) The bidder should be a manufacturer or submit valid authorization letter from manufacturer of Transformer and RMU.

(iv) The bidder should carried out similar type of work within last seven years upto previous day of last day of submission of tender. The value of each work order should be not less than

One similar completed works consisting not less than Rs. 60 Lakh
"OR"
Two similar completed works consisting not less than Rs. 45 Lakh
"OR"
Three similar completed works consisting not less than Rs. 30 Lakh

"Similar nature of works means SITC of Transformer, RMU etc."

(v) The bidder should have average annual turnover of not less than **Rs. 37 Lakh** (**Rupees Thirty Seven Lakh only**) for the last three years. The Bidder should not have loss for any consecutive two years during last three years ending 31st Mar 2023. The bidder should submit audited balance sheet and Profit & loss account duly attested by chartered accountant.

(vi) The Bidder should submit the Bank Solvency Certificate of **Rs. 30 Lakh** (**Rupees Thirty Lakh only**) from any Nationalized / Commercial/ Scheduled Bank as per attached format in the tender.

(vii) The Bidder should accompany a DD / BG of **Rs.149000 /- (Rupee One Lakh Fourty Nine Thousand only)** drawn on any Nationalized / Scheduled Bank in the favour of the Director, National Centre for Cell Science, Pune payable at Pune towards Earnest Money Deposit (EMD). BG should be valid for minimum of six months. The MSME firms registered in NSIC are not exempted from payment of EMD for this work.

(viii) The Bidder should submit undertaking that their firm / organization have never been blacklisted by any Govt/ Semi Govt Organizations/ Institutes/ PSU's/ MSEDCL etc as per attached format in the tender.

SEAL & SIGN OF THE BIDDER

3.3 BID ISSUE AND SUBMISSION:

The interested bidders can download the tender document from website **www.nccs.res.in** and **https://eprocure.gov.in** which is available at free of cost. However in case of downloading of tender documents from website it will be the responsibility of bidders /applicants / firms to ensure that complete tender documents have been downloaded.

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The offer should be submitted in the downloaded bid document in two-envelope system i.e. Technical Bid and Commercial Bid in two separate sealed envelopes super-scribing "**SITC of 22/0.415KV, 400KVA Substation with allied works at Jidnyasa Bldg., Kothrud, Pune**" in the respective envelopes and both the envelopes shall be submitted together in another sealed envelope duly addressed to

The Director,
National Centre for Cell Science,
Savitribai Phule Pune University Campus,
Ganeshkhind, Pune 411007.

The '**Technical bid**' should consist of the following documents:

a) Application form along with documents relating to eligibility pre-qualification criterion (Forms & Annexure).
b) Bid Security (EMD)- DD/BG.
c) Power of attorney of person authorized to sign the Bid,
d) Complete Tender Document duly signed and stamped.
e) Detail drawings with specifications of all items offered by Bidder as per Bill of Quantity with product leaflet, brochure etc.

The '**Financial bid**' should contain the following documents:
a) As per the prescribed format (Part-II Commercial / Price bid)

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The tender document should be submitted intact in a sealed cover either in person or by post without tampering with any of the pages and drawings thereof and duly filled in, signed and seal at the bottom of each pages and drawings, by the Bidder or his / their authorized representative and it shall reach at NCCS, Pune within scheduled date and time. The tender received after the scheduled time on due date will not be considered. The bid should be valid and open for acceptance for a period of 90 from the date of opening the technical bid.

The Director, NCCS, Pune reserves the right to amend or withdraw any of the terms and conditions contained in the tender document before accepting the tender or to reject any or all the tenders without giving any notice or assigning any reason. The decision of the Director, NCCS, in this regard shall be final and binding on all.

DIRECTOR

SEAL & SIGN OF THE BIDDER

4. DEFINITIONS AND TERMS:

In this document the following words and expressions have the meaning hereby assigned to them

4.1 ***Employer*** shall mean National Centre for Cell Science, Pune and shall include his successors and assign, as well as his authorized officers or representatives. National Centre for Cell Science shall be known as "NCCS"

4.2 ***Bidder*** shall mean the Proprietor / Individual, Partnership firm, Company / Corporation, Society; they shall be, for the purpose of this contract.

4.3 ***Consultant*** shall mean MJA Pharmatech Pvt. Ltd, Banglore appointed by NCCS for the said works and shall include their legal representatives, assigns and successors.

4.4 ***Contractor*** shall mean the person or the persons, firm or company whose tender has been accepted by the NCCS and shall include his/their heirs, and legal representatives, the permitted assigns and successors.

4.5 ***Contract*** shall mean the Articles of Agreement, Terms & conditions, the Appendix, Schedule of Quantities and Specifications attached hereto and duly signed.

4.6 ***Site*** shall mean the site of the contracted works at ***National Centre for Cell Science, Survey No.85/2, Jidnyasa Building, Near Vanaz Company Ltd, Kothrud, Pune 411038***.

4.7 ***Work*** shall mean the works to be executed and recorded in accordance with the Contract and shall include all extra or additional altered or substituted works as required and recorded for the performance of the Contract.

4.8 This Contract shall include the notice inviting Tenders, the Articles of Agreements, the General Conditions of Contract, the Special conditions of contract, the Appendix, the Schedule of Quantities, Specifications for Materials, Work-Sheet and mode of measurements and drawings pertaining to the work. All sections of this Contract Document are to be read together. Further such correspondence between the NCCS and Contractors as admitted by the NCCS before award of work and thereafter shall also form part of contract documents.

5. INSTRUCTIONS TO THE BIDDERS:

5.1. METHOD OF APPLICATION:

5.1.1. If the Bidder is an individual, the application shall be signed by him above his full type- written name and current address.

5.1.2. If the Bidder is a proprietary firm, the application shall be signed by the proprietor above his full typewritten name and the full name of his firm with its current address.

5.1.3. If the Bidder is a firm in partnership, the application shall be signed by all the partners of the firm above their full typewritten names and current addresses or alternatively by a partner holding power of attorney for the firm. In the latter case a certified copy of the power of attorney should accompany the application. In both cases, a certified copy of the partnership deed and current addresses of all the partners of the firm should accompany the application.

5.1.4. If the Bidder is a limited company or a corporation, the application shall be signed by a duly authorized person holding power of attorney for signing the application accompanied by a copy of the power of attorney. The Bidder should also furnish a copy of the Memorandum of Articles of Association duly attested by a Public Notary.

5.1.5. Joint Ventures are not allowed for this work

5.1.6. The Bidder should submit Technical Bid & Commercial Bid in separate sealed Envelopes super scribing “Technical Bid” and “Commercial Bid” as the case may be as mentioned in the Tender Notice and both the envelopes shall be submitted together in another sealed envelope super scribing “Name of work and Tender Notice Ref. No”.

5.1.7. Bidders shall go through all documents before quoting the rates.

5.1.8. Bidder should ensure that the documents are attached with Technical Bid as per Check list and all pages of Tender and documents are signed and stamped. Failure to do so shall lead to the rejection of bids.

5.1.9. Bidder should submit their details as per attached format Letter of Transmittal and All Forms/ Annexures with self-attested documents.

5.1.10. Overwriting should be avoided. Correction, if any, should be made by neatly crossing out, initialing, dating and rewriting, Pages of the qualification document are numbered. Additional sheets, if any added by the Bidder, should also be numbered by him. They should be submitted as a package with signed letter of transmittal.

5.1.11. References, information and certificates from the respective clients certifying suitability, technical knowhow or capability of the Bidder should be signed by an authorized person or officer.

5.1.12. Any information furnished by the Bidder found to be incorrect either immediately or at a later date, would render him liable to be debarred from tendering /taking up of work in NCCS.

5.2. BIDDER TO VISIT SITE:

The bidder must visit/examine the site and it's surrounding on pre bid meeting for the proper assessment of prospective assignment (scope of works). No claims later on shall be entertained.

Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A bidder shall be deemed to have full knowledge of the site whether he inspects it or not and no extra cost consequent on any misunderstanding or otherwise shall be allowed. The bidders shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidder implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

The site shall be handed over in its present existing condition, to the successful bidder for execution of the works. The existing fittings/fixtures and items to be dismantled shall be handed over to NCCS.

5.3. PRICE:

5.3.1. Bidder must ensure to quote percentage rate against Total Project Cost put to tender.

5.3.2. The rate(s) and amounts are in Indian Rupees only. The total amount should be written both in figures and in words.

5.3.3. In addition to this, while selecting the cells a warning appears that if the cell is left blank the same shall be treated as "0". Therefore, if the cell is left blank and no rate is quoted by the bidder, rate shall be treated as "0" (ZERO).

5.3.4. However, if tenderer doesn't quote any percentage above or below on the total amount of the tender in percentage rate tender, the tender shall be treated as invalid and will not be consider as lowest tenderer.

5.3.5. The rates for all tendered items shall be inclusive of GST, all taxes, duties, levies, transportation, transit insurance, cost of the materials, equipment/item, stores, freight, transit insurance, loading unloading including mathadi charges, packing & forwarding, clearance charges for imported goods, inspection/inspective certificate charges any contingency charges etc. and including all other incidental charges whichever is applicable for the equipment/item supply, erection, installation, testing and commissioning with all men, material, tools & tackles complete in all respect..

5.4. CORRECTION OF ERRORS

Tenders determined to be substantially responsive will be checked by NCCS for any arithmetic errors. Errors will be corrected by the NCCS as follows:-

(a) Where there is a discrepancy between the rates in figures and in words, the lower of the two will govern; and
(b) Where there is a discrepancy between the unit rate and the line-item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.
(c) The amount stated in the Tender will be adjusted by the NCCS in accordance with the above procedure for the correction of errors and, with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount the bid is liable to be rejected, and the earnest money deposit may be forfeited.

5.5. CLARIFICATION OF BID:

5.5.1. To assist in the examination and comparison of Bids, the NCCS, Pune may, at its discretion, ask any Bidder for clarification of his Bids. The request for clarification and the response shall be in writing or by email / fax, but no change in the price or substance of the Bid shall be sought, offered, or permitted.

5.5.2. Any effort by the Bidder to influence the NCCS's Bid evaluation, bid comparison or contract award decisions, may result in the rejection of his bid.

5.5.3. Corrigendum/amendments etc., if any, will be notified only on the NCCS web site and no separate advertisement will be made for the same. All prospective bidders are therefore advised to regularly visit the NCCS web site (**www.nccs.res.in**) for any future information or update.

5.6. BID OPENING:

On the due date as specified in tender, NCCS Pune will first open technical bid of all bids received in the presence of the bidders/ their representatives who wish to attend.

5.7. TECHNICAL EVALUATION OF BID:

Initially bidders will be shortlisted as per eligibility criteria led down in the tender. NCCS may at any time after opening of the technical bid, depute a team

of its' officials to the site / work place / office of the Bidder to get the credentials of the information furnished by the Bidder and to verify the status, workmanship & quality of the work / services rendered by them. The tender of the bidder shall be liable for rejection in case of

- Any information furnished by the Bidder is found incorrect.
- The quality of the work and workmanship is found unsatisfactory

The technically qualified responsive bidder only will be short listed for opening of the commercial bids.

5.8. AWARD OF CONTRACT:

The NCCS, Pune shall award the Contract to the Bidder whose evaluated offer/Bid has been found to be the technically suitable, financially lowest and is substantially responsive to the bidding document, provided further that the Bidder is found to be qualified to execute the contract satisfactorily.

The Director, NCCS reserves the right to accept or reject any bid or all the bids at any time, without thereby incurring any liability to the affected bidder or specifying the grounds for the same.

The work to be carried out under the Contract shall, except as otherwise provided in these conditions, include all labour, materials, tools, plants, equipment and transport which may be required in preparation of and for and in the full and entire execution and completion of the works. The descriptions given in the Schedule of Quantities shall, unless otherwise stated, be held to include wastage on materials, carriage and cartage, carrying and return of empties, hoisting, setting, fitting and fixing in position and all other labour necessary in and for the full and entire execution and completion of the work as aforesaid in accordance with good practice and recognized principles.

On acceptance of the tender, the name of the accredited representative(s) of the contractor who would be responsible for taking instructions from the E-I-C shall be communicated in writing to the E-I-C.

The Contractor shall prepare an BAR Chart for the execution of the work showing clearly all activities with sequence from the start of the work to the completion, with detailed of manpower, materials, equipments and machinery required for the fulfillment of the programme within the stipulated period or earlier and submit the same for approval of the E-I-C.

6. GENERAL CONDITIONS OF CONTRACT:

6.1 PRE BID CONFERENCE-

The objective of PBC is to provide a platform for clarifying issues and clearing doubts, if any, about the specification and other allied technical/commercial details of the bid document. Bids should be submitted only after the PBC so as to take care of the change made in the bidding document. Bidders are requested to send their written queries, doubts, clarifications if any well in advance on following email, minimum two days before meeting.
Email: pmtamhane@nccs.res.in

The Minutes of the pre-bid meeting will be uploaded on the NCCS website. All Bidders are requested to formulate their bids accordingly.

6.2 RIGHT TO ACCEPT OR REJECT TENDER:

The Director, NCCS reserves the right to amend or withdraw any of the terms and conditions contained in the tender document before accepting the tender or to reject any or all the tenders without giving any notice or assigning any reason. The decision of the Director, NCCS in this regard shall be final and binding on all.

The Director NCCS reserves the right to delete items, reduce or increase the scope of work without the contractor claiming any compensation for the reduction in the scope of work. Contractor has bound to carry out the reduced or increased quantity of work at the quoted rates.

6.3 ABNORMALLY HIGH RATE (AHR) & ABNORMALLY LOW RATE (ALR) ITEM:

If the bid of the successful bidder is seriously unbalanced in relation to the estimate of the cost of work to be performed under the contract, the NCCS may require the bidder to produce detailed price analysis for any or all items of the Bill of quantities of demonstrate the internal consistency of these prices with the working method and the schedule proposed.

6.4 ESCALATION:

Escalation is not applicable for this work.

6.5 VALIDITY OF OFFER:

Bidder/s shall keep his / their offer valid for a period of at least 3 months (90 days) from the date of opening of the Technical Bid. If any Bidder withdraws or amends impairs or derogates from the tender in any respect within the period of validity of his offer, the EMD is liable to be forfeited.

6.6 **PERFORMANCE BANK GUARANTEE (PBG)-**

6.6.1. The Successful Bidder shall submit an irrevocable Performance Bank Guarantee of **5% (Five percent)** of the contract amount for his proper performance of the contract agreement, (not withstanding and/or without prejudice to any other provisions in the contract) within period of seven days from the date of issue of letter of Intent as per attached format of any Nationalized /Scheduled bank.

After receipt of Performance Bank Guarantee from the successful Bidder, formal work order will be issued and physical site will be handed over and EMD will be refunded to all bidders within one week without any interest.

If he / she / they decline/s or fail/s to submit the PBG within the stipulated time, the EMD shall stand forfeited, without prejudice to NCCS's right to rescind the contract and other rights and remedies warranted by the law.

In the event of refusal to carry out work within fifteen days by the successful Bidder on any grounds, its Earnest Money Deposit / Performance Bank Guarantee shall be forfeited.

6.2.1. The Performance Bank Guarantee shall be initially valid up to the stipulated date of completion plus sixty days beyond that. In case the time for completion of work gets enlarged, the contractor shall get the validity of PBG extended to cover such enlarged time for completion of work. After recording of the completion certificate for the work by the NCCS, the PBG will be returned to the contractor on written request by contractor, without any interest.

6.2.2. The Engineer-in-Charge shall not make a claim under the PBG except for amounts to which NCCS is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:

i) Failure by the contractor to extend the validity of the PBG as described herein above, in which event the Engineer-in-Charge may claim the full amount of the PBG.

ii) In the event of the contract being determined or rescinded under provision of any of the Condition of the agreement, the PBG shall stand forfeited in full and shall be absolutely at the disposal of the NCCS.

6.7. **SIGNING OF THE CONTRACT:**

The successful Bidder shall be required to execute an agreement with NCCS as per the General Conditions / Special conditions enumerated in the tender documents and as per attached format, on a Non-Judicial Stamp Paper of **Rs.500/- (Rupees Five Hundred only)** within 15 days from the date of LOI. In the event of failure on the part of the successful Bidder to sign the agreement

within the above stipulated period. The NCCS reserves the right to forfeit the EMD / PBG and cancel the contract.

Until the Agreement is formally signed, the Letter of Intent/ Work Order of Tender issued to the successful Bidder and accepted by him shall be operative and binding on the NCCS and the Contractor. No payment for the work done will be made unless contract is signed by the Contractor.

6.8. **INDEMNITY BOND:**

The Contractor shall at all times hold NCCS harmless and effectively indemnified (as per attached format) on a Non-Judicial Stamp Paper of **Rs.500/- (Rupees Five Hundred only)** within 15 days from the date of receipt of the notice of acceptance of tender. This clause shall survive the termination of this contract.

The Contractor shall indemnify, protect and save NCCS against all claims, losses, costs, damages, expenses, action suits and other proceedings, resulting from infringement of any patent, trademarks, copyrights etc. or such other statutory Infringements in respect of the equipments etc. supplied by him

6.9. **PAYMENT TO CONTRACTOR:**

6.5.1. No advance payment will be paid against this work order.

6.5.2. 70%.Payment will be made within 15 to 20 working days against delivery of material at NCCS in good condition against Invoice, report with delivery challans.

30% Payment will be made within 15 to 20 working days against satisfactory completion of installation, testing and commissioning of the transformer and allied equipments at site, getting approval / permissions from MSEDCL & Electrical inspector to start the electrical supply and as per actual measurements of work carried out at site.

Security deposit of 10% deducted from respective bills shall be paid after completion of Defect Liability Period of one year from the date of completion of work.

6.5.3. Payments will be made by online through RTGS / NEFT.

6.5.4. TDS will be deducted as per Prevailing Rules.

6.10. **SECURITY DEPOSIT:**

Security Deposit will be refunded after twelve months of defect liability period from the date of completion of work. In case of unsatisfactory performance by the Contractor Security Deposit will be forfeited.

6.11. It shall be the responsibility of the Contractor to meet transportation, food, medical and any other requirements in respect of the workers engaged by him at NCCS Pune and NCCS shall have no liabilities in this regard.

6.12. The NCCS will not be responsible for any damages, losses, theft, claims, financial or other injury to any workers deployed by service providing Bidder in the course of their performing the functions / duties, or for payment towards any compensation.

6.13. **DISCIPLINE:**

Contractor shall carry out the works hereunder with due diligence and in a safe and workman like manner according to good Contractor's employees and shall abide by and conform to all rules and regulations promulgated by the NCCS governing the operations.

6.14. **SAFETY CODE:**

The Contractor shall take adequate precautions to ensure that the tendered works not at all affects the working of the NCCS. He shall take adequate measures to barricade the work sites so that unauthorized persons do not enter the work site. All the safety codes and the preventive measures for this type of work shall be strictly followed. All the personnel and staff shall be under the Contractor's authority and it shall be the responsibility of the Contractor for all insurance, accident claims etc. at the site. The Contractor shall strictly abide by the labour laws in force from time to time and comply with the same and will co-ordinate directly with the concerned authorities. Contractor should follow CPWD safety code norms and IE norms applicable for this work at his own risk and cost.

6.15. **QUALITY OF WORK:**

The quality of work at all stages should be as per the standards laid down, as per NIT and explained to the Contractor by NCCS, Pune. It is made clear that there cannot be any compromise in the material quality and workmanship of work. It shall be the responsibility of the Contractor to ensure that the standards laid down from time to time are strictly maintained. Contractor should use approved brands of materials only and get approved sample of each material from Engineer in charge before use.

6.16. **DATE OF COMPLETION:**

6.16.1. Time is the essence of the Contract. The entire work shall be completed in 120 days (four month) in all respects within the period.

6.16.2. The Bidder should submit detailed tentative BAR Chart showing delivery of materials, installation, testing, commissioning, training, documentation and handing over the project with this tender document. The work shall not be considered as complete until the Engineer in charge of NCCS have certified

completion in writing. The defects liability period shall commence from the date of such certificate.

6.17. **DEFECT LIABILITY PERIOD:**

The Defect Liability Period (Period of Maintenance) for the work is twelve month from the date of the completion of work. During the period of maintenance, the contractor will be responsible for rectifying any defects in working caused due to bad workmanship and poor quality of materials etc. This will be rectified by the contractor at his own expenses otherwise SD (10%) will be forfeited.

6.18. **COMPENSATION FOR DELAY:**

If the contractor fails to maintain the required progress or to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the NCCS on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the Engineer in Charge of NCCS (whose decision in writing shall be final and binding) may decide on the amount of tendered value of the work for every completed day/month (as applicable) that the progress remains below that specified in Clause- Time and Extension for Delay or that the work remains incomplete.

Compensation for delay of work with rate 2% per month of delay to be computed on per day basis based on quantum of damage suffered due to stated delay on the part of Contractor, provided always that the total amount of compensation for delay to be paid under this Condition shall not exceed 10% of the contract value of work.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this contract with the NCCS or the security deposit will be forfeited.

6.19. **WHEN CONTRACT CAN BE DETERMINED:**

Subject to other provisions contained in this clause, the Engineer-in-Charge may, without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and/or any other provisions of this contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the cases as mentioned or elaborated General condition of Contract, reference shall be made to CPWD Manual or Amended upto date.

6.20. **TIME AND EXTENSION FOR DELAY:**

The time allowed for execution of the Works as specified in the NIT shall be the essence of the Contract. The execution of the works shall commence from such time period as mentioned in NIT or from the date of handing over of the

site whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid, Director NCCS shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the earnest money & performance guarantee absolutely.

As soon as possible after the Contract is concluded, the Contractor shall submit a Time and Progress Chart for each mile stone and get it approved by the Engineer-in Charge. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds the time period to complete the work as per mile stones given in NIT.

6.20.1. **IF THE WORK(S) BE DELAYED BY:-**

- force majeure, or
- abnormally bad weather, or
- serious loss or damage by fire, or
- civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or
- delay on the part of other contractors or tradesmen engaged by Engineer-in-Charge in executing work not forming part of the Contract, or
- Any other cause which, in the absolute discretion of the Engineer-in-Charge is beyond the Contractor's control.

Then upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Engineer-in Charge but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the works.

6.20.2. Request for rescheduling of Mile stones and extension of time, to be eligible for consideration, shall be made by the Contractor in writing of the happening of the event causing delay on the prescribed form to the Engineer-in Charge. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.

6.20.3. Request for rescheduling of Mile stones and extension of time, to be eligible for consideration, shall be made by the Contractor in writing of the happening of the event causing delay on the prescribed form to the Engineer-in Charge. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.

6.20.4. In any such case the Engineer-in Charge may give a fair and reasonable extension of time and reschedule the mile stones for completion of work. Such

extension shall be communicated to the Contractor by the Engineer-in Charge in writing after receipt of such written request. Non application by the contractor for extension of time shall not be a bar for giving a fair and reasonable extension by the Engineer-in Charge and this shall be binding on the contractor.

6.21. **MEASUREMENTS OF WORK DONE:**

All measurements shall be taken jointly by the Engineer-in-Charge or his authorized representative and by the contractor or his authorized representative after completion of the work and such measurements shall be signed and dated by the Engineer-in-Charge and the contractor or their representatives in token of their acceptance.

6.22. **CONTRACTOR TO KEEP SITE CLEAN:**

On completion of the work, all rubbish materials related to contract works shall be removed by the contractor(s) at his/their own expenses and the site cleaned and handed over to the NCCS and shall intimate officially of having completed work as per contract.

If it is noticed that the Contractor does not clean the place of work, then NCCS Pune reserves the right to get the area cleaned and unilaterally debit the cost of cleaning to the Contractor or deduct the cost incurred, from the Contract amount as deemed fit.

6.23. **DISMANTLED MATERIAL NCCS PROPERTY:**

The contractor shall treat all materials obtained during dismantling of a structure, excavation of the site for a work, etc. as NCCS property and such materials shall be handed over to NCCS after completion of work.

6.24. **INCONVENIENCE TO NCCS ACTIVITIES:**

The Contractor shall not deposit materials on any site which will seriously inconvenience to any of the NCCS activities. The Engineer in charge may instruct the Contractor to remove such materials which are considered by him to him by the dangerous or inconvenient to the activities of the NCCS.

6.25. **WORK TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS, DRAWINGS AND ORDERS ETC:**

The contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner both as regards materials and otherwise in every respect in strict accordance with the specifications. The contractor shall also conform exactly, fully and faithfully to the design, drawings and instructions in writing in respect of the work signed by the Engineer-in-Charge and the contractor shall be furnished free of charge copy of the contract

documents together with specifications, designs, drawings and instructions as are NIT.

The contractor shall comply with the provisions of the contract and with the care and diligence execute and maintain the works and provide all labour and materials, tools and plants including for measurements and supervision of all works and other things of temporary or permanent nature required for such execution and maintenance in so far as the necessity for providing these, is specified or is reasonably inferred from the contract. The Contractor shall take full responsibility for adequacy, suitability and safety of all the works and methods for execution of the works.

6.26. **DEVIATION / VARIATION – EXTENT & PRICING:**

The Engineer-in-Charge shall have power to make any alterations in, omissions from, additions to or substitutions for, the original specifications, drawings, designs and instructions that may appear to him to be necessary during the progress of the work and the contractor shall carry out the work in accordance with any instructions which may be given to him in writing signed by the Engineer-in-Charge, and such alterations, omissions, additions or substitutions shall not invalidate the contract and any altered, additional or, substituted work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work. The time for the completion of the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract work, and the certificate of the Engineer-in-Charge shall be conclusive as to such proportion. Over and above this, a further period to the extension shall be allowed to the contractor. The rates for such additional, altered or substituted work under this clause shall be worked out in accordance to the prevailing market rate analysis.

6.27. **For elaboration of any items of the General condition of Contract, reference shall be made to CPWD Manual or Amended upto date. The Contractor shall in advance seek clarification on any elaboration**.

7. SPECIAL CONDITIONS OF CONTRACT:

7.1. For Technical data and specifications if in doubt / unclear / mismatch, the same are to be clarified with the Engineer in Charge.

7.2. The bills of quantities indicated in this tender are approximate and are liable to change at the discretion of the NCCS. Any variation in quantities will not be applicable for change/modification in quoted rates.

7.3. The nomenclature of the item given in the schedule of quantities gives in general the work content but is not exhaustive i.e. does not mention all the incidental works required to be carried out for complete execution of the item of work. The work shall be carried out , all in accordance with true intent and meaning of the specifications and the drawings taken together, regardless of whether the same may or may not be particularly shown on the drawings and / or described in the specifications, provided that the same can be reasonably inferred there from. There may be several incidental works, which are not mentioned in the nomenclature of each item but will be necessary to complete the item in all respect. All these incidental works / costs which are not mentioned in item nomenclature but are necessary to complete the item shall be deemed to have been included in the rates quoted by the contractor for various items in the schedule of quantities. No adjustment of rates shall be made for any variation in quantum of incidental works due to variation / change in actual working drawings. Also, no adjustment of rates shall be made due to any change in incidental works or any other deviation in such element of work (which is incidental to the items of work and are necessary to complete such items in all respects) on account of the directions of Engineer-in-Charge. Nothing extra shall be payable on this account.

7.4. Unless otherwise provided in the Schedule of Quantities, the rates quoted by the Contractor shall be inclusive of carrying out the works at and / or upto all heights, lifts, leads and depths. The contractor shall make all arrangements for the same. Nothing extra shall be payable on this account.

7.5. All ancillary and incidental facilities required for execution of work like labour camp, stores, fabrication yard, offices for Contractor, watch and ward, temporary ramp, temporary structure for plants and machineries, installation and temporary electricity supply, telephone, water etc. if required for execution of the work, etc., protection works, barricading, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts.

7.6. PROCEDURE FOR APPROVAL OF MATERIALS, SHOP FLOOR DRAWINGS AND COMMENCEMENT OF WORK

Within prescribed time period as per the mile stone the contractor shall visit the site and submit following documents for approval

1. List of makes & Model numbers of all items of equipment and accessories.
2. Catalogues of the equipment to be supplied along with design details, technical specification, safety certifications etc. as required for each product.
3. Shop floor drawings of each package shall be submitted separately for approval. It is the responsibility of the tenderer to get the makes, models and shop floor drawings approved by the department. The makes and models offered should be as per the specification and BOQ of the NIT. The decision of Engineer-in –charge is final in this regard. The materials can be brought to site only after the due approval of drawings, makes, models from the department.

7.7. The Contractor shall be responsible for the due and proper execution of all the works as per the terms and conditions. The contracting agency should study the design details and understand clearly, prior to quoting. The responsibility of performance shall be with the Contractor.

7.8. The debris arisen during the period of work of execution will have to be cleared then and there to keep the site / surroundings clean and tidy. Such debris shall be cleared at Contractors risk and cost.

7.9. The contractor should to use additional supports, scaffoldings, materials, accessories, equipments, crane for lifting & shifting loading & unloading, hardware, labour, insurance etc. for proper execution and performance of the work. No additional cost will be paid for this.

7.10. The NCCS reserve the right to call explanations and rate analysis from any bidder, regarding the calculations / clarifications on any details. They may also visit the office of the bidder / various works carried out by him. The necessary co-operation in this regard is envisaged form the bidder.

7.11. The NCCS or their representatives shall have access to the workshop /Manufacturing facilities of the bidder and or successful contractor so as to assure themselves of the quality of the material and workmanship.

7.12. Min. one experienced, competent engineer of the contractor, capable of understanding all the technical points etc., related to this work and act accordingly, should be available on site all the times.

7.13. In case of conflict in specifications or terms, between tender, general engineering practice, National and International Codes, more stringent among all will be applicable.

7.14. The NCCS shall have a right to delete any item of work from the scope of contract and contractor shall not make any extra claim on this account.

7.15. The time for supply of items is very important factor to the NCCS. Only those Tenderers, who are confident and willing to supply the requested items to NCCS within the prescribed time period after the receiving of confirm work order from NCCS are requested to participate in this Tender.

7.16. The submission of tender shall be deemed to be an admission on the part of the bidder that it has fully acquainted with the contract terms and no claim other than what stated in the tender shall be paid in the event of award of Contract.

7.17. The successful tenderer is responsible to provide the required manpower with qualified persons to meet the requirements of the maintenance of the installation during the guarantee period. The contractor shall provide any materials required. Tools required for the maintenance shall be arranged by the contractor.

7.18. The staff to be engaged on this work shall have full knowledge and experience of the work in which they are engaged. The electrician shall have valid licenses for corresponding trades.

7.19. No subletting or subcontracting of the work will be permitted.

7.20. Necessary protective and safety equipment shall be provided to the Site Engineer, workers & Supervisory staff by the Contractor at his own cost for use at site.

7.21. The contractor shall execute the whole and every part of the work in the most sound and substantial and workmanlike manner, and in strict accordance with the specifications both as regards materials and workmanship. The contractor shall also conform exactly, fully and faithfully to the designs, drawings and instructions in writing relating to the work signed by the NCCS / Consultant.

7.22. In case of conflict in specifications or terms, between tender, general engineering practice, National and International Codes, more stringent among all will be applicable.

The order of preference in case of any discrepancy as indicated to be read as following:

a) Nomenclature of item as per Bill of Quantities.
b) Additional specifications, particular specifications & special conditions.
c) General Conditions.
d) Tender drawings and specifications mentioned in drawings.
e) Tender specifications.
f) Indian Standard specifications of BIS.
g) Sound engineering practice as per directions of NCCS / Consultant.
h) Manufactures specifications.

A reference made to any Indian Standard specifications in these documents reference to the latest version of that standard, including such revisions /amendments as issued by Bureau of Indian standards up to last date of receipt of tender. The contractor shall keep at his own cost all such publications of relevant Indian Standards applicable to the work at site.

7.23. The NCCS shall have a right to increase or delete any item of work from the scope of contract and contractor shall not make any extra claim on this account.

7.24. In case this tender document does not contain a provision or terms for dealing with a situation that may arise during the execution of the works, the relevant provisions contained in the CPWD manual amended upto date or any other laws/rules shall be followed in such cases and the same will be binding on the Contractor.

7.25. Contractor should arrange power supply at his own cost if required. Contractor shall be given water free of cost at one point. The contractor has to make his own arrangement for taking it up to using place at his own expense. The contractor shall make further arrangements at his own cost ensuring safety of instruments and persons at all time.

7.26. It shall be the responsibility of the Contractor to meet transportation, food, medical and any other requirements in respect of the workers engaged by him at NCCS Pune and NCCS shall have no liabilities in this regard.

7.27. The NCCS will not be responsible for any damages, losses, theft, claims, financial or other injury to any workers deployed by service providing Bidder in the course of their performing the functions / duties, or for payment towards any compensation.

7.28. The Contractor should have the requisite license for running their own establishment from authorities such as Local Authority, State / Central Departments etc., at its' own cost. The NCCS shall not be responsible in any way for any breach of these rules and regulations by the Contractor.

7.29. The Contractor shall comply with all the statutory requirement in respect of engaging the personnel, their service condition, rules and regulation and all liabilities under the various labour law and other statutory obligations like PF, ESIC, Bonus, workmen's compensation, gratuity and also comply with the provisions of Minimum Wages Act, Payment of Wages Act etc. shall be that of the Contractor, and NCCS, Pune shall in no way be responsible or liable in case of any dispute, prosecution or awards made by court of law or other authorities.

7.30. **SAFETY, HEALTH AND ENVIRONMENT**

i. The Contractor(s) shall take all precautions to avoid accidents by exhibiting necessary caution boards. He shall be responsible for all damage and accidents caused to existing/new work due to negligence on his part. In case of any accident of labour / contractual staff the entire responsibility will rest on the contractor and any compensation under such circumstances if becomes payable shall be entirely borne by the contractor.

ii. Appropriate personnel protective equipments such as helmets, gloves, googles, aprons, safety belts etc. shall be provided to the workers employed at the work site.

iii. All hazardous materials shall be labeled with the name of the materials, the hazards associated with its use and necessary precaution to be taken.

iv. Contractor shall ensure that during the performance of the work, all hazard to the health of personnel, have been identified, assessed and eliminated.

v. The contractor has to keep a record of all the workers employed at site, mark daily attendance along with the location of the work. All the labour record shall be made available for inspection and verification as and when required.

7.31. **QUALITY ASSURANCE:**

i. The contractor shall establish, document and maintain an effective quality assurance system as outlined in the specifications and various codes and standards.
ii. The bidder shall understand scope of the work, drawing, specifications and standards etc. attached with the tender or to be followed and shall seek clarification, if any before submission of the tender
iii. The quality assurance system plans / procedures / method statement to be followed shall be furnished in the form of quality assurance manual. It should cover quality assurance, plan procedure, specifications, frequency of the inspection, testing, acceptance criteria, method of sampling, testing etc. to be followed for quality.
iv. The approval of quality assurance does not absolve the contractor of the contractual obligations towards executing the work as laid down in the specification of the work.
v. The contractor shall produce quality control records in the formats approved by Engineer-in-charge / Consultant in the quality assurance plan.
vi. The contractor shall ensure the enforcement of quality assurance plan by all his specialized agencies as approved. The NCCS reserves the right to inspect, witness, review any stage of the work at shop / site as deemed necessary for quality assurance and / or timely completion of work.
vii. The contractor shall procure required materials in advance so that there is sufficient time for testing of the materials and clearance of the same before use in the work. The contractor shall provide at his own cost suitable measuring arrangements at site for checking the dimensions as may be necessary for execution of work.

7.32. **RESOLUTION OF DISPUTES** :

Any dispute arising out of this contract including any clarification as to the intent or interpretation of any of the provisions of these terms and conditions, the same shall be first referred to /sought from the Director, NCCS, whose decision in the matters shall be final and binding on the Contractor. Any other matter relevant to but not covered in the contract shall also be decided by making reference to the Director, NCCS whose decision will be final and binding on the Contractor.

If the dispute is not resolved through the reference made to the Director, NCCS, a reference of the same shall be made to an Arbitrator to be appointed by the Director NCCS Pune for adjudication of the same in accordance with the provisions of Arbitration & Conciliation Act-1996 and any statutory modification

there under from time to time. There shall be no objection if the Arbitrator to be appointed is a Competent Officer of NCCS in the discretion of the Director NCCS Pune.

LEGAL JURISDICTION: If any dispute is not resolved by Arbitration will be referred to the Court of Pune Jurisdiction only.

SEAL & SIGN OF THE BIDDER

8. SCOPE OF THE WORK:

The scope of contract covers design, engineering, assembly, Inspection / testing at manufacturing works, packing into properly sized units, forwarding, delivery to FOR site, erection & commissioning of equipments including all required items / equipment and accessories as mentioned in the document for establishing substation. The details of the items/equipment and works to be supplied and carried out are given in Technical Specification

The scope includes provision of any minor additional items though not specifically mentioned, but as may be required for satisfactory completion of work, within the contract price. The contractor within contract price shall arrange special tools, tackles & instruments as may be required for satisfactory erection, installation, testing & commissioning at site of equipment supplied by them.

The scope of work also includes casting civil foundations for erection / installation of items / equipment provided for completion of the work.

The contract will be awarded on single point responsibility basis for complete scope of work including supply, erection, testing & satisfactory commissioning of the equipments and obtained permissions/ approvals from MSEDCL & Electrical Inspectorate for energizing substation installation as specified in this tender document. **Please note that MSEDCL has sanctioned load of 284KW/355KVA HT Power supply to NCCS Letter dated 10/08/2023. Based on sanction, NCCS has deposited security deposit and, supervision charges to MSEDCL.**

The Contractor shall obtain approval for the installation from the Electrical Inspectorate, Electricity Board (MSEDCL), PMC and any other statutory authority as may be/ become necessary. For this purpose he shall prepare all drawings submit the drawings for approval, follow-up to get the drawings approved, arrange for inspection, carryout all modifications and rectification as demanded by the authority if required. All costs for approvals has to be included by the Tenderer in his offer and the NCCS shall not entertain any extra claim on this account except statutory fees payable which shall be reimbursable on production of documentary evidence. All modifications, rectification if any also shall have to be carried out without extra cost to NCCS.

Contractor shall therefore bear full responsibility for all activities such as executing contract agreement, undertaking the proposed works for efficient, trouble free & successful commissioning of the system as well as performance thereafter etc.

It is not the intent to specify herein complete details of design and construction. The equipment offered shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements. All supplies and services necessary for this purpose shall be provided by the contractor within the contract price.

The equipment and installation shall conform to high standard of engineering, design, and workmanship in all respects and shall be capable of performing continuous operation in satisfactory manner. The Contractor within the contract price shall provide all supplies and services including any equipment or accessories not specified herein but necessary for this work.

The scope of work covers supply, installation, testing and commissioning of the Substation comprise to the following but not limited:-

1. **SITC of 400KVA BIS approved Transformer, RMU, Metering Kiosk with TOD meter as per MSEDCL Guidelines and approval.**
2. **SITC of LT Kiosk/panel, Earthing, HT & LT cabling, terminations etc.**
3. **Fabrication of shed for Kiosk, fencing for transformer, civil foundations, earthing chambers etc. as per MSEDCL Guidelines and approval.**
4. **SITC of Power factor improvement capacitor panel.**
5. **Safety equipments as per MSEDCL Guidelines.**
6. **Liasioning work with MSEDCL and Electrical Inspectorate for obtaining approval and permissions for energizing the installation.**
7. **Liasioning work with PMC/METRO for obtaining approval and permissions for cable laying from MSEDCL RMU/Panel to NCCS campus.**
8. **Other any related works required as per MSEDCL/ Electrical Inspectorate/ PMC/ METRO guidelines but not mentioned anywhere, will be in the scope of work without any cost to NCCS.**

The contractor is required to ascertain the entire scope of work that may be necessary for completion of the work envisaged on their past experience of similar projects. The tenderer is advised to inspect and examine the site and satisfy himself about the nature of work and site before submitting the tender. It shall be deemed that the tenderer has full knowledge of the site whether the site is inspected or not and no extra charges consequent on misunderstanding or otherwise shall be allowed.

All materials, tools and tackles, equipments, labour, including all labour facilities as per labour laws are to be arranged by the contractor. Cost of transportation of labour and materials shall have to be borne by the contractor. In the event of any dispute of any kind related to the works, decisions of the In-charge, Maint for this work shall be final and binding.

The successful tender in his own interest shall insure all the materials for transit up to destination. Also insure all the men employed in the work till handing over. The rate quoted by the firm shall be inclusive of insurance charges.

The electrical installation work shall be carried out in accordance with Indian Standard Code of Practice. It shall also be in conformity with the current Indian Electricity Rules, and Regulations and requirements of the Local Electricity Supply Authority/ Fire Regulations so far as these become applicable to the installation. All

works in general shall be carried out as per NCCS and CPWD /PWD Maharashtra specifications with up to date amendment.

Wherever, this specification calls for a higher standard of materials and or workmanship than those required by any of the above mentioned regulations and specification then the specification here under shall take precedence over the said regulations and standards.

The design and constructional aspects of materials shall not withstanding any anomalies, discrepancies, omissions, in-completeness, etc. in these specifications and will be subject to good engineering practice in conformity with the required quality of the product, and to such tolerances, allowances and requirements for clearances etc. as are necessary by virtue of various stipulations in that respect in the relevant Indian Standards (IS), IEC standards, I.E. Rules, I.E. Act and other statutory provisions.

2. DRAWINGS

On award of work, the successful tenderer shall prepare and furnish the required shop drawings for approval by the Engineer-in-charge. Such drawings shall be based upon specifications, local laws and regulations for the following systems. The shop drawings for complete systems shall be submitted within ten days of placement of work order. The contractor shall not proceed with the installation works until the drawings are approved by NCCS/ Consultant. Approval of drawings shall not absolve the contractor of any of his obligations to meet the requirements of specifications under this contract.

3. METHOD OF EXECUTION

The contractor shall submit detailed program in the form of BAR chart clearly depicting the schedule for completion with defined milestones.

4. FOUNDATION AND CIVIL WORKS

a. Equipment foundations, concrete trenches and other civil works are in the scope of contractor. The foundation drawing /details of the equipments may be furnished by the contractor and get it approved from NCCS and Consultant.
b. The contractor shall check the existing foundations before casting and commencement of erection to ensure their suitability/correctness.
c. All final adjustment of foundation levels, chipping and dressing of foundation surfaces drilling holes on foundation channels to suit the equipment/structure setting and grouting of anchor bolts, sills, inserts and fastening devices shall be carried out by the contractor including minor modification of civil work as may be required for erection.
d. Any cutting of masonry work, which is necessary, shall be done by the contractor at his own cost and shall be made good to match the original work. The contractor shall obtain approval before proceeding with the cutting of masonry /concrete work.

e. The Contractor shall perform all small excavation and backfilling if required for his system.
f. All excavation shall be back filled to the original level with good consolidation.

5. MATERIALS

a. Materials shall be supplied as per the BOQ items under schedule of quantities of tender documents.
b. All the materials required for this work should conform to relevant IS specifications.
c. The type test certificates, routine test certificates and acceptance test certificates for Transformer, RMU etc as applicable shall also to be submitted.

6. MAKES

In general, make of various items shall be as per the approved list. However, NCCS reserves the right to accept /opt any make in the interest of work. Where makes have not been indicated in the list, they shall be of ISI marked / reputed brands or as per MSEDCL approved brands. Reputed brand implies a brand which is supported by nationwide sales & service distributors/ dealers/ network/ centers. All makes of items to be got approved by the In-charge Maint before manufacture/ supply/ use in the work irrespective of appearing in the approved list.

7. STORAGE OF MATERIALS

The contractor shall provide proper and adequate storage facilities to protect all the materials and equipment against damage from any cause whatsoever. The watch & ward of the stores, equipment & materials shall be the responsibility of the contractor till the completion, commissioning & handing over to NCCS.

The contractor shall take away the balance of any materials left at the site after commissioning of the system. The cost, if already paid, for such items shall be deducted from the subsequent running bills. NCCS shall not be liable to pay for any of the incidental charges connected with the above.

8. STACKING OF MATERIAL AND SITE HANDING OVER

Prior permission has to be obtained before stacking of materials in the premises. The work shall be done in phases, in close co-ordination with civil /electrical and other works as directed by NCCS.

The contractor shall note that the site for installation will be made available in parts or in phases. It is the responsibility of the contractor to programme his work accordingly. No extra amount will be paid on account of site being made available in phases/parts.

Surplus/dismantled material with no scrap value shall be removed from the site to maintain the site free of any surplus material at all times. Dismantled item with scrap value shall be stacked up neatly inside NCCS at no additional cost.

9. CO-ORDINATION

The Contractor shall co-operate and co-ordinate with all other agencies working in the project and so arrange his work so that there will be no interference during execution of the work.

The Contractor shall forward to NCCS all correspondence and drawings exchanged. Failure to do so will render the Contractor responsible for subsequent change found necessary and its cost. However, the Contractor shall arrange necessary facilities to execute the work simultaneously with other agencies. No claim on this account shall be entertained by NCCS.

Contractor shall plan all activities to ensure that there is minimal interference with existing installation and operation is not affected.

10. TESTING AND MEASURING EQUIPMENTS

Equipment for measurement of work and testing the installation shall be procured by the Contractor for their use at their own cost. The same shall also be made available to NCCS without any charges to NCCS.

11. SITE MAINTENANCE DURING CONSTRUCTION

The Contractor shall from time to time clear and remove all rubbish and obstructions from the site and the work area shall be kept clear and unobstructed at all times. Nothing extra shall be paid on this account.

12. CONFORMITY TO IE ACT, IE RULES AND REGULATIONS

All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act 1910, Indian Electricity Rules 1956 amended upto date (date of call of tender unless specified otherwise) and the State Electrical Inspectorate. The works shall also conform to relevant Indian standard Codes of Practice (COP) for the type of work involved.

All materials to be used in work shall be ISI marked, wherever applicable. In all electrical works, relevant safety codes of practices shall be followed.

13. OPERATION AND MAINTENANCE MANUALS

For all the equipments supplied by the contractor, he shall submit to the owner one set of copy of the O&M manuals. The manual shall contain the operational features of the equipments, DOS & DON'TS, Trouble shooting, maintenance schedules for preventive maintenance, detail dimensional drawings, cross sectional drawings, method of assembly, dismantling, etc. to make the owners staff acquainted with the equipments as well as to enable them to operate and maintain the same in prescribed manner. Manuals shall contain all information for ordering of the spares, like part name, part

no., etc. Contractor shall ensure that these O&M manuals are made available to the owner well before starting of initial trials of equipments.

14. DETAILED WORKING DRAWINGS

The detailed execution drawings are to be prepared by the contractor as per the MSEDCL standard and relevant IS specifications and the State Electrical Inspectorate standards/ specifications/ guidelines and should obtain necessary statutory approvals prior to execution.

Drawings provided by NCCS, if any, shall at all times be properly correlated before execution. In case of any discrepancy, the same should be brought to the notice of NCCS immediately. However, the discrepancy in the item given in the Schedule of Quantities appended with the tender drawings relating to the relevant item, the former shall prevail unless and otherwise given in writing by NCCS.

15. WARRANTIES AND GUARANTEES:

The following Warranty will form part of the contract placed on the successful Bidder: -

a. Except as otherwise provided, the Contractor hereby declares that the services, stores articles sold / supplied to NCCS. under this contract shall be of the best quality and workmanship and new in all respects and shall be strictly in accordance with the specification and particulars contained/mentioned in contract. The Contractor hereby ensures Guarantee that the said service/goods would continue to conform to the description and quality aforesaid for a period of 12 months from the date of handing over of the said services/goods to the NCCS., if during the aforesaid period of 12 months the said services/stores be discovered not to conform to the description and quality aforesaid not giving satisfactory performance or have deteriorated, and the decision of the NCCS. in that behalf, shall be final and binding on the CONTRACTOR and the NCCS. shall be entitled to call upon the CONTRACTOR to rectify the services/stores or such portion thereof as is found to be defective by the NCCS. within 12 months, or such specified period as may be allowed by the NCCS. in his discretion on application made thereof by the CONTRACTOR, and in such an event, the above period shall apply to the services/stores rectified from the date of rectification mentioned in warranty thereof, otherwise the Contractor shall pay to the NCCS. such compensation as may arise by reason of the breach of the warranty therein contained.
b. NCCS. reserves the right to declare any defect/short comings as critical to the extent that Contractor will replace the item rather than rectifying.

16. MATERIALS AND WORKMANSHIP

Unless some special Warranty/Guarantee clause has been stipulated elsewhere in the invitation to the tender or any it's annexure, the following warranty shall form part of the contract placed on successful tender: -

a) Contractor shall fully warrant that all the equipment and components supplied under the order shall be new and of first quality according to the specifications and shall be free from defects (even concealed fault, deficiency in design, materials and workmanship).

b) Should any defects be noticed in design, material and/or workmanship within 15 months from the date of shipment/dispatch of last consignment or 12 months from the date of commissioning and handing over of the equipment whichever is later, NCCS shall inform Contractor and Contractor shall immediately on receipt of such intimation, depute their personnel as soon as practicable but use reasonable efforts to commence such work in no event later than 7 days to investigate the causes of defects and arrange rectification /replacement/modification of the defective equipment at site without any cost to NCCS. within a reasonable period. If the Contractor fails to take proper corrective action to repair/replace the defects satisfactorily within a reasonable period, this Organisation shall be free to take such corrective action as may be deemed necessary at Contractor risk and cost after giving notice to the Contractor.

c) If in an emergency warranty service situation exists, the Contractor and NCCS. determines On-site Technical assistance is necessary, the Contractor shall dispatch emergency service personnel to the site to attend to the problem and rectify the defect as promptly as practicable. The Contractor shall maintain a Technical assistance centre and shall have technical support available to NCCS. in accordance with the requirement.

d) If the Contractor subcontracts any part of the system or any of the services to a Third party the Contractor is still liable for the Warranty /guarantee of the equipment/services so subcontracted as per the above clauses.

e) Damage to the machinery and/or equipment due to incomplete and erroneous instructions issued by Contractor will be responsibility of the Contractor and will be treated according to the provisions of Warranty clause. Normal wear and tear shall not come under purview of this clause.

f) In case defects are of such nature that equipment shall have to be taken to Contractor works for rectification etc. Contractor shall take the equipment at his cost after giving necessary undertaking or security as may be required by NCCS.

g) Equipment or spare parts thereof replaced shall have further warranty for a period of 12 months from the date of putting into beneficial use.

h) The Contractor shall guarantee that they will supply spare parts if and when required on agreed price. The agreed price should include but without any limitation to agreed discount on the published catalogue price or on agreed percentage or profit on the landed cost.

i) The Contractor will Warranty that before going out of production for any of spare parts, they will give adequate advance notice to the purchaser so that the latter may undertake to procure, if necessary, the balance of the life time requirements.

j) If the repairs, replacement or modification referred are of such nature as may affect the efficiency of the equipment NCCS. shall have the right to give to the Contractor within one month of such replacement/renewal notice in writing to carry out test as may be required for acceptance of the equipment.

k) If the Contractor fails to honour his obligation to repair or replace defective goods/services within a reasonable period of time, or if Contractor refuses to carry out work under the guarantee clause and implied guarantee condition, if danger is anticipated or in case of severe urgency, NCCS shall be entitled to carry out, at Contractor cost and risk, repair work or replacement deliveries or have it done by a third party. In case not all goods /services have been delivered by supplier, this Organisation is entitled to procure the remaining goods/services at Contractor cost and risk. This does not relieve Contractor of any of his guarantee obligations. Taxes and duties of any kind whatever imposed by the authorities of the country of the Contractor or his sub-Contractors until delivery shall be borne by Contractor.

17. PERFORMANCE GUARANTEE:

Contractor shall guarantee that the performance of the EQUIPMENT/MATERIAL supplied under the order shall be strictly in conformity with specification and shall perform the duties specified under the ORDER.

The Contractor shall guarantee that the materials/equipment that shall be purchased from the sub-Contractor(s) shall be such as to fulfill the requirements laid down above and shall undertake to ensure fulfillment of these requirements.

18. REJECTION

If the NCCS finds that the goods supplied are not in accordance with the specification and other condition stated in the order or its sample(s) are received in damaged conditions (of which matters NCCS will be the sole judge), NCCS shall be entitled to reject the whole of the goods or the part, as the case may be and intimate to the Contractor the rejection without prejudice to other rights and remedies to recover from the Contractor any loss which it may be put to, also reserving the right to forfeit the security deposit/performance bond if any made for the due fulfilment of the contract. The goods shall be removed by the Contractor and if not removed within 7 days of the date of communication of the rejection NCCS will be entitled to dispose-off the same on account and at the risk of the Contractor and after recovering the storage charges at the rate of 5% of the value of goods of each month or part of month and loss and expense if any caused to NCCS and pay balance to the Contractor.

TECHNICAL SPECIFICATION

CONTENTS

1. INTRODUCTION:

National Centre for Cell Science (NCCS) is a premier autonomous research institute, under the Department of Biotechnology, Govt. of India located at Savitribai Phule Pune University Campus, Ganeshkhind, Pune- 411007.

Under the aegis of the National Biopharma Mission, NCCS has be entrusted with responsibility to establish a state-of-the-art National cGMP-compliant mammalian cell line repository in the existing building of NCCS at Jidnyasa Bldg, near Vanaz Engineers Ltd., S.No. 85/2, Paud Road, Kothrud, Pune- 411038.

The plot area of the site is approximately 14500 Sq. Ft. The existing building consists of a basement + 3 floors with a total built up area of approximately 9000 Sq. Ft. The approximate area available on average per floor is 2500 Sq. Ft. The building is a complete empty shell with no activities presently and also there is no power supply to this bldg.

The proposed repository would be required to be established in par with international cell repositories using global benchmarks, stringent quality control parameters in GMP as per National (DGCI-CDSCO-India) and International (FDA-US & EMA-EU) regulatory requirements along with compliance with Environmental norms.

2. DESIGN BRIEF: -

- Design of HT works including RMU (2VD+1OL), metering cubicle, RMU (1VD+1OL), with 400 KVA Oil Type Distribution Transformer with off- load tap changer to meet the requirement of facility load.

- Considered 1 x 380 kVA DG set as standby power source (Not in the scope of this tender).

- Proposed 22KV / 0.415kV, 400 KVA Distribution Transformer with off load tap changer as per the equipment load list.

- 22KV HT Cable taps from MSEDCL RMU opposite side of main road having approx. 160mtr distance from NCCS campus and considered one additional RMU as per MSEDCL order.

- Supplying & laying underground HT cable, road crossing etc from MSEDCL RMU to NCCS campus and obtaining permission/ approval from PMC for the same.

- 22KV HT cable routing is proposed from the RMU (2VD+1OL) to the metering cubicle, from metering cubicle to RMU (1VD+1OL), from RMU (1VD+1OL) to HT side of Distribution Transformer.

- LT Kiosk is proposed near the Transformer unit since the distance is more than 15mtrs between Transformer to Main Panel.

- LT Cables are proposed from LT side of Distribution Transformer to LT Kiosk& LT Kiosk till Main LT Panel.

- Following type of earthing are considered as per IS 3043.
  - Dedicated GI Plate Earthing for RMU panel Body earthing.
  - Dedicated GI Plate Earthing for Metering cubical panel Body earthing.
  - Dedicated GI Plate Earthing for VCB panel Body earthing.
  - Dedicated GI Plate Earthing for Transformer Body earthing.
  - Dedicated GI Plate Earthing for LT Kiosk Body and Fencing earthing.
  - Dedicated Copper Plate Earthing for Transformer Neutral earthing.

- GI earth strips shall run below the floor up to the equipment and raised and also terminated to the equipment body.

- Copper earth strips with PVC sleeves shall run below the floor up to the Transformer and raised and also terminated to Transformer Neutral point.

ELECTRICAL LOAD SUMMARY

Sr. No.	DESCRIPTION	LOAD IN KW	LOAD FACTOR	LOAD IN KW AFTER LOAD FACTOR	LOAD IN KVA	POWER FACTOR CONSIDERED
1	LAB EQUIPMENT	168	40%	67	84	PF 0.8
2	UTILITY EQUIPMENT	30	70%	21	26	PF 0.8
3	HVAC EQUIPMENT	171	70%	120	149	PF 0.8
4	LIGHTING LOAD	6	100%	6	6	PF 1.0
5	LV SYSTEM, EMS & NETWORKING SYSTEM - ACTIVE SWITCHES	14	100%	14	14	PF 1.0
6	MISCELLANEOUS LOAD	10	80%	8	8	PF 1.0
	TOTAL LOAD	399		236	288	
	TOTAL IN KW (AFTER LOAD FACTOR)	236				
	TOTAL IN KVA (AFTER LOAD FACTOR)	288				
	CONSIDERING ABOVE LOAD AND CONSIDERING TRANSFORMER BEING LOADED MAXIMUM 80%, REQUIRED TRANSFORMER IN KVA	360				
	SUGGESTED TRANSFORMER CAPACITY IN KVA	400 KVA				
	CONSIDERING ABOVE LOAD AND CONSIDERING DG SET BEING LOADED MAXIMUM 80%, REQUIRED DG IN KVA	360				
	SUGGESTED D.G SET RATING IN KVA	380 KVA				
	CONTRACT DEMAND					
	CONVERTING KW TO KVA AT 0.95 PF	248				

SEAL AND SIGN. OF THE BIDDER

3. SCOPE:

Electrical contractor scope is to design, engineering, and supply, testing, loading, transfer to site, unloading, shifting to NCCS, installation & commissioning of as per BOQ to meet the successful operation & functional requirements as per MSEDCL/ Electrical norms, practices and local standards. Handing over and training to the NCCS.

Preparation of execution drawings with section details and as built drawings in Vendor scope only. Consultant will provide the basic Electrical drawings. Electrical contractor has to develop drawing further up to the equipment termination with sizing, support structure & submit the same for approval.

Preparation of panel GA drawings, control wiring details, Bill of Materials, Short circuit calculation and panel location drawings in Vendor scope only & submit the same for approval. Consultant will provide the basic Electrical SLD.

Transformer Installation vendor should commission the Transformer in the presence of Manufacturer or as per Manufacturer Standards.

Co-ordination with other service contractors with respect to the installation activity without affecting the project schedule is in Electrical Contractor’s scope.

Certification of equipment and materials for duty, rating, hazardous area use, etc., shall be obtained from recognized National or International testing authorities. Evidence of the appropriate certification shall be obtained prior to commitment to purchase.

Equipment of Indian origin selected for installation in hazardous areas shall have a test certificate from the Central Mining Research Institute (CMRI) or equivalent certifying authority and approval certificates from the Chief Controller of Explosives (CCE).
Billing shall be considered for actual installed quantity only.

4. TECHNICAL SPECIFICATIONS:

4.1. GENERAL

This specification covers the requirements of design, manufacture, assembly, testing, delivery and assistance during installation and commissioning of 22KV Outdoor Switchgear Panels works.

The installation shall be carried out in accordance with Indian Electricity Rules, Stipulations of local statutory authorities, this specification, design drawings and applicable Engineering Standards. Any variations or changes to be carried out at site shall be done with the prior approval of the Consultant/ Client's representative.

4.2. CONSTRUCTION:

The design of the switchgear shall be based on safety to personnel and equipment during operation and maintenance, reliability of service, ease of maintenance, mechanical protection of equipment, interchangeability of equipment and ready addition of future loads.

4.3. OUTDOOR HT RING MAIN UNIT PANEL

The HT RMU Panel at point of supply shall be of the outdoor type, housed in a weatherproof kiosk fabricated from 2.0 mm thick CRCA sheet steel.
The sheet steel used shall undergo surface treatment using 7 tank process involving, degreasing, rust removal and pickling before phosphating. The panel shall be thereafter epoxy powder coated to Siemens gray shade RAL-7032.

All live parts/terminals, which become accessible on opening any compartment, shall be provided with insulating shrouds. The instrument/relay terminals on the front panel shall be shrouded.

Provision shall be made for earthing the panel at two points. A continuous copper earth bus of 50x6 mm size shall be run along the switchboard and the break switch carriage shall have a scraping earth connection, which shall earth the trolley before the break switch safety shutters are opened.

The panel shall be totally enclosed dust, vermin proof, waterproof, whether proof with a degree of protection of not be less than IP 55 with canopy.
Height of switch boards including canopy not to be more than 2450 mm.
Maximum operating height not more than 1800 mm.
Minimum operating height not less than 400 mm.
The door shall have padlocking provision.
Base frame Fabricated ISMC-100x50mm
Separate gland plate for control cable entry shall be provided.
Lifting eyebolts shall be provided on each shipping section.
Inspection window shall be provided for checking the break switch position.
All bolted covers & doors shall have provision for sealing.
The panel shall ensure complete safety of operating personnel.
Rating plate and nameplate shall be provided on front and rear side of the panel.
Danger boards with voltage rating shall be fixed both on the front and rear side.
The design shall have the approval of the power supply Authority designated for the region.
The panels and the busbars should be extendable type with the provision to add breakers in future (at both ends).

4.4. OUTDOOR METERING PANEL

The Metering Panel shall be of the outdoor type fabricated out of 2.0mm thick CRCA sheet steel.

The sheet steel used shall undergo surface treatment using 7 tank process involving, degreasing, rust removal and pickling before phosphating. The panel shall be thereafter epoxy powder coated to Siemens gray shade RAL-7032.

The Metering Panel shall be a part of 22kV substation yard as indicated in the SLD.
The metering panel shall house epoxy resin cast single phase PTs, CTs and the electronic Tri-vector meter.

All live parts which become accessible when the doors are open shall be provided with the insulating shrouds.

The panel including view window shall be totally enclosed, dust, water proof& vermin proof with a degree of protection of not be less than IP 55.

The panel shall ensure complete safety of operating personnel.
View window shall be provided for the meter.
The door shall have the padlocking provision.
Separate gland plate shall be provided for the incoming and outgoing cables.
Lifting eyebolts shall be provided.
Danger boards with voltage rating shall be fixed both on front and rear.
All bolted covers & doors shall have provision for sealing.
Cable terminal compartment for outgoing cable either at the rear bottom side or in a separate enclosure attached on one of the sides as specified.
The metering compartment design shall have the approval of the local power supply Authority.
The meter shall be protected from direct sunrays in any part of the day. Necessary canopy shall be provided for this purpose.

4.5. OUTDOOR HT CIRCUIT BREAKER PANELS

The HT Circuit Breaker Panels at point of supply shall be of the outdoor type, housed in a weatherproof kiosk fabricated from 2.0 mm thick CRCA sheet steel.

The sheet steel used shall undergo surface treatment using 7 tank process involving, degreasing, rust removal and pickling before phosphating. The panel shall be thereafter epoxy powder coated to Siemens gray shade RAL-7032.

All live parts/terminals, which become accessible on opening any compartment, shall be provided with insulating shrouds. The instrument/relay terminals on the front panel shall be shrouded.

Provision shall be made for earthing the panel at two points. A continuous copper earth bus of 50x6 mm size shall be run along the switchboard and the circuit breaker carriage shall have a scraping earth connection, which shall earth the trolley before the circuit breaker safety shutters are opened.

The panel shall be totally enclosed dust, vermin proof with a degree of protection of not be less than IP 55 with canopy.

Height of switch boards including canopy not to be more than 2450 mm.
Maximum operating height not more than 1800 mm
Minimum operating height not less than 400 mm
The door shall have padlocking provision.
Base frame Fabricated ISMC-100x50mm
Separate gland plate for control cable entry shall be provided.
Lifting eyebolts shall be provided on each shipping section.
Each Panel shall be compartmentalized into five sections viz.
Circuit breaker compartment with drawable trolley at the front bottom.
Relay and metering compartment at the front on top of Circuit Breaker compartment.
Totally segregated bus bar compartment at the top on the rear side of metering compartment wherever specified.
Cable termination compartment for incoming cable either at the rear or on the side. This shall have a caution plate fitted outside the rear cover.
Cable terminal compartment for outgoing cable either at the rear bottom side or on one of the sides.
Inspection window shall be provided for checking the circuit breaker position.
All bolted covers & doors shall have provision for sealing.
The panel shall ensure complete safety of operating personnel.
Rating plate and nameplate shall be provided on front and rear side of the panel.
Danger boards with voltage rating shall be fixed both on the front and rear side.
The design shall have the approval of the power supply Authority designated for the region.
The panels and the busbars should be extendable type with the provision to add breakers in future (at both ends).

4.5.1. 22kV CIRCUIT BREAKERS

The circuit breaker shall be of the VCB type conforming to IS 13118.
The circuit breaker design shall have been type tested at reputed test house and copies of type test certificates shall be furnished.
Unless otherwise specified, the circuit breaker shall be of the triple pole, single break horizontal draw out type with self-aligning contacts.
The Circuit breaker trolley shall have 3 positions viz. service, test and isolated. The operation of VCB shall not be possible at any other intermediate position.
The closing mechanism shall be of the motor operated spring charged type. Manual spring charging and closing facility shall also be provided.
The circuit breaker shall be trip free.
The operating mechanism shall be designed for 30000 operations and shall not call for any maintenance for the first 10000 operations.
The contact life shall not be less than 10000 operations at rated current.
The circuit breaker ratings shall be as follows:

Service voltage (Nominal)	:	22KV
Maximum voltage	:	24KV
Fault interrupting capacity	:	Not less than 25kA RMS at 22kV
Fault withstand time	:	3sec for incomers & 1sec for outgoings.
Continuous current rating	:	630A OR as per the BOQ
Power frequency withstand	:	61kV for 1 Min
Impulse withstand voltage	:	125Kv
Operating Duty Cycle	:	0-3 min-CO-3 min-CO
Standard applicable	:	IS: 13118

The circuit breakers shall be complete with the following: -
Vacuum interrupter with facility to check healthiness of vacuum.
Electrically Operated Spring charged closing & tripping mechanism. A manual closing provision shall also be provided.
Closing coil and shunt trip coils suitable for 24V, 2 wire DC supply. These shall operate satisfactorily between 70% to 110% of rated voltage.
8 NO + 8 NC Auxiliary contacts wired to external terminals.
Safety shutters of the self-locking type with pad locking facility wherever draw out arrangement is specified.
Mechanical `ON-OFF' indicators and operation counter.
Emergency trip button.
Positive sliding contact arrangement for earthing on the draw out carriage.
Safety interlocks to prevent inadvertent contact with live parts and faulty operation.
Provision for housing the control units for remote monitoring and operation.
Manually operated earth switch shall be provided at the incomers of the VCB.
Electromechanical interlock to be provided for the incoming Breakers.
Pressure switch with alarm and trip settings and lamp indications for CB.
Auxiliary relays for remote indication & operation.

4.5.2. CURRENT TRANSFORMERS (C.Ts)

The C.T's shall be of the wound primary, 24KV class epoxy resin cast type conforming to IS: 2705.
The C.T's shall have 5A secondary and multi-cores, with accuracy class & VA burden as specified in BOQ.
The metering core shall have class 0.5 accuracy for check metering & class 1 for other metering and 10/15VA burden while the protection core shall be of 5P20 class and requisite VA burden. Class `B' insulation shall be provided. The CT ratio and rating in the Metering panel shall be as per the stipulations of Electricity board.
The short time rating shall match that of the circuit breaker.
The instrument Accuracy Limit Factor / security factor shall be less than 5.
The C.Ts shall be housed in the cable terminal compartment.
The C.Ts shall be tested as per IS and the tests shall include partial discharge test conforming to IEC60044. Test certificates shall be furnished.

C.T secondary wiring shall be carried out using 660V grade, copper conductor, and wires with FRLS grade insulation.

4.5.3. POTENTIAL TRANSFORMERS (P.T)

The P.T's shall be of the single phase 24 kV class epoxy resin cast type conforming to IS: 3156.
The P.T's shall have Class 'B' insulation and voltage factor of 1.2
The P.T's shall be provided on the incoming side and mounted separately.
The P.T's shall be provided with HRC fuse protection on H.T side and MCBs on secondary side.
The P.T's shall be of class 0.5 0.2 accuracy and 50 100VA burden and connected in star / star, YYO configuration.
The P.T s shall be tested as per IS and the tests shall include partial discharge test conforming to IEC 60044.
The Type test and routine test Certificates to be submitted.

4.5.4. INDICATING LAMPS & PUSH BUTTON'S

INDICATING LAMPS

Type	:	Panel mounting, LED type.
Standard applicable	:	IS 6875
Diameter	:	22 mm
Lamp voltage	:	240V A.C / 24 OR 30V DC
Lamp wattage	:	Less than 0.5 W.
Terminals	:	Finger touch proof.
Electric shock protection	:	Class-2 (IEC 60536)
Degree of protection	:	IP65 (IEC 60259)
Color of indicators	:	OFF – Red, ON – Green, TRIP - Amber
Phase Indication	:	R .Y. B

PUSH BUTTONS

Type	:	Manually operated spring return type. Illuminated push buttons with LED lamps wherever specified.
Standard applicable	:	IS 6875
Diameter	:	22 mm
Type of mounting	:	Snap type
Terminals	:	Finger touch proof
Switch Type	:	TNC Type Switch with Spring returns to Neutral with NAC & NAT Contacts
Electric shock protection	:	Class-2 (IEC 60536)
Degree of protection	:	IP65 (IEC 60259)
Color of actuator	:	Start PB – Green, Stop PB – Red Test / reset PB – Black, Accept-Blue, Ack-White
Contact configuration	:	2 NO + 2 NC. 1NAC + 1 NAT

4.5.5. POWER PACK:

The Power pack shall provide auxiliary power for the operation of relays and circuit breaker tripping. The capacity of the power pack shall be suitable for 3 consecutive tripping operations after input supply failure. The unit shall be housed in the metering compartment and shall be suitable for 240V single phase input. The unit shall provide 24V or 30V DC output. One power pack each should be provided in all the 22KV outdoor switchboards at the point of supply. The specifications of the power pack shall ensure that the unit shall perform continuously without any failure under the worst power supply conditions specified.

4.5.6. METERS:

Type	:	Solid state Digital, Trivector meter shall have RS 485 port for PC communication to down load the data in the PC. Specification should be got approved from Local Electricity supply company before procurement. All other meters also shall be true RMS type with RS 485 ports and THD (current) measurement reading display.
Standard applicable	:	IS 1248
Mounting	:	Flush Panel mounting
Range	:	To suit specific requirements.
Size	:	96 x 96mm
Accuracy class	:	0.5
Test Certificates	:	To be furnished.

4.5.7. RELAYS:

Relays shall confirm to IEC60255 / 610000 OR IS 3231/8686

IDMT OVER CURRENT & EARTH FAULT RELAY:
The Relay shall be of Numerical draw out type with display of currents, Settings, Trip data & Trip History for Analysis and troubleshooting.
The relay should have 4 user programmable output relays with the RS485 port for communication with PLC and Breaker Control.

Aux. voltage 24V OR 30V DC.
The relay shall be similar to L&T type MC61C or latest model/ C&S type MRI1-1E latest model/ approved equivalent of Siemens / ABB

IDMT OVER CURRENT / EARTH FAULT RELAY WITH INSTANTANEOUS OVER CURRENT & EARTH FAULT ELEMENTS:
The Relay shall be similar to the above and shall have high set instantaneous units for O\C & E/F with a provision for setting for intentional time delay.

AUXILIARY /SECONDARY RELAYS:
The Relay shall be voltage operated type with auxiliary contacts & flag. These shall be suitable for the specified applications and include 94, 95 & 60

MASTER TRIPPING RELAY WITH HAND RESET:
The Relay shall be voltage operated with High speed pickup and hand reset type.

PHASE SEQUENCE RELAY:
This Relay shall determine the phase sequence and detect any discrepancy. This shall measure the amplitude and angle of the voltages. The relay shall be of solid-state automatic type.
This shall be similar to C&S Type BV1 or latest model.

U/V & O/V relay
Relays shall be suitable for 240V AC supply and shall have setting range of 110 to 170% for over voltage and 50 to 90% for under voltage.

Relays shall have 1NO + 1NC self reset contacts. The relay shall have built-in timers. Alternatively, static relays of reputed make may also be offered.

The relays shall be of Alstom type VDG 11 or latest model and VDG 13 or latest model or approved equivalent.
The Test certificates for Relays and Meters to be furnished.

4.5.8. BUSBARS

Bus bars shall be of 99% pure aluminium.
Bus bars shall be enclosed in a separate compartment and busbars shall be sleeved.
Bus bars shall be supported on non-hygroscopic epoxy resin cast insulators. Type test certificates of resin cast insulators shall be furnished.
The bus bars shall have continuous current rating as specified elsewhere and busbars shall be designed to withstand the specified fault level for 3sec, without any deformation / damage.
All bus bar joints shall be tinned and provided with high tensile passivated bolts and nuts. Spring washers shall be provided. The joints shall be tightened using torque wrench only the specified torque tightness shall be followed as per the relevant standards. Top of bolt and nut shall be marked with red paint for tightness is ensured. The joints shall be covered with insulating shrouds.
Complete bus bar shall be suitably insulated and phase indications shall be provided at sufficient intervals for easy identification of phase.
Maximum permissible temperature – 90Deg C for non-silver plated joints and 105Deg C for silver plated joints.
Phase to earth clearance shall be of not less than 75mm and phase to phase clearance shall be of not less than 125mm.

4.5.9. AUXILIARY WIRING

The internal wiring for signaling, protection and instrumentation shall be carried out using 660V FRLS grade PVC insulated, multi strand copper conductors. The sizes of wires shall be as follows:
For Controls & Signaling: 1.5sqmm for internal wiring, 2.5sqmm for external cabling.

For C. T's : 2.5sqmm for internal wiring, 4.0sqmm for external cabling.

Inter compartment wiring shall be carried out using PVC troughs.

Each wire shall preferably be terminated at a separate terminal. Appropriate type of terminals shall be used where more than one wire has to be terminated at one point. Wires shall not be joined between terminal points. Shorting links shall be provided for all CT terminals. Wiring shall be neatly bunched.

Each wire shall be identified at both ends by yellow color PVC ferrules marked with black letters. Supporting facilities shall be provided for clamping the control cables.

Rubber grommets shall be provided so that metal parts should not come in contact with any power or control wires/cables. Control wiring for the door mounted equipments to be sleeved & dressed properly.

Minimum size of terminals for control wiring shall be 2.5sqmm or higher to suit the wiring sizes stipulated. Clipon type terminals shall be provided. 20% spare terminals shall be provided on each terminal block. The terminal blocks for C.T connections shall have C.T disconnection and shorting facility.

Multistrand conductors shall be terminated using suitable sleeves such that the entire wiring is rendered finger touch proof.

Wires of different voltages shall be identified by color code.

Test terminal blocks shall be provided for the relays.

All spare contacts of the Breaker/ Relays/ Contactor shall be wired to external terminals.

4.5.10. TESTS & INSPECTION

The switchgear shall be tested in accordance with the Indian Standards and all routine tests shall be conducted in the presence of client's representatives. These tests shall include the following:

Operation and continuity tests.
Milli-volt drop test of C.B contacts.
Megger test with 5 KV Megger.
Power frequency high voltage withstand test.
Relay operation test by secondary/. Primary injection

Mechanical operating tests
Interchangeability check of the withdrawable parts and of other components with same construction and operating characteristics.
Measuring of partial discharge on Instrument transformers (type test reports shall be submitted)
For testing, the panel shall be completely assembled, wired and set up at supplier's premises with all necessary metering and protection equipments.

4.5.11. SPECIAL TOOLS / OPERATING HANDLES

One set of special tools / operating / withdrawing handle required for the routine operation maintenance shall be supplied with the panel.

4.5.12. GUARANTEE

The switchboard shall be guaranteed for trouble-free operation for period 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier. Any defects noticed during this period, shall be rectified free of charges at the shortest possible time.

4.5.13. SHIPPING

The panels shall be shipped in fully packed condition.
Delicate instruments and relays shall be packed separately to avoid transit damage.
All movable parts of relays, C.B s. etc., shall be locked in position before dispatch.

4.5.14. TRAINING OF CLIENT's PERSONNEL

The bidder shall include in his scope the training of client's Maintenance personnel on operation and maintenance of the equipment.

5. TRANSFORMER TECHNICAL SPECIFICATION

SCOPE:

Supplying, installing, testing & commissioning 3 phase, 22/0.415KV, 50 Hz., 400 KVA, HV side cable entry Box and LV side Cable Box, Mineral oil immersed and naturally cooled outdoor type, Copper wound, without gas cushioning , hermetically Sealed transformer, delta/star connected with additional neutral brought out on load side, temperature rise should not exceed 45°C by thermometer in oil and 50°C by the resistance method in winding at full load rating, using type A winding insulation (kraft paper) with HV tapping (with off load tap changer) off Load +5 to -10 in steps of 2.5%, having 7 number of tap positions with standard accessories complete with test certificate with losses below 1286 Watts at 50% load, 3623 Watts at 100% load as per IS:1180 (part 1) : 2014 or amended upto date with necessary permissions of Electrical Inspector.

SITE CONDITION

Ambient Air Temperature	:	min 10°C max 45°C
Relative Humidity	:	min 29% max 95%

SYSTEM DETAILS

Grid Voltage	:	22 KV +/- 5%, 3 phases, 3 wire
Frequency	:	50 Hz +/-3%
System Fault Level	:	25KA (as per IS 1180 PART-1)
Neutral Earthing	:	Solidly Earthed

LOAD/DUTY

The plant operation will be on 24 x 7 basis and will consist of: Laboratory equipment. HVAC system, Utility equipment required for LAB operations. Indoor and Outdoor lighting and landscaping.

STANDARDS

Distribution Transformer shall generally comply with the latest revision of IS 1180 PART-1 (As per Latest Amendment)
Oil used in Distribution Transformer shall comply with latest revision of IS 335.
Porcelain Bushings shall conform to IS 2099.

BRIEF PARTICULAR SPECIFICATIONS

Rated Capacity	:	Self-Cooled: (ONAN): 400kVA
No Load Voltage Ratio	:	22 KV / 0.415 KV
Vector Group	:	Dyn 11 (HV: Delta, LV: Star)
Transformer Neutral	:	Directly earthed
Losses	:	50% Load Loss: 1286W, 100% Load Loss: 3623W as per IS1180 PART-1
Impedance	:	4.50%
Type of Transformer	:	Core Type, Double Wound
Tap Changer (22kV Class)	:	HV tapping (with off load tap changer) off Load +5 to -10 insteps of 2.5%,having 7 number of tap positions
HV Winding	:	Electrolytic Copper, Interleaved type, uniformly insulated.
LV	:	Electrolytic Copper, Continuous disc type, uniformly insulated.
Insulation Level of Windings	:	HV – 50 kV RMS (power frequency) – 125 kVp (lightning impulse) LV– 3 kV RMS (power frequency)
Core Laminations	:	ZDKH grade or better
Flux Density	:	< 1.7 Tesla at rated voltage and frequency
Current Density @rated load	:	< 3 Amps / sq.mm.
Cooling	:	Oil Natural, Air Natural (ONAN)
Max. Temperature Rise	:	45˚C of Top Oil measured by thermometer in accordance with IS: 1180 over an ambient air temperature of 50˚C and 50˚C of Winding measured by resistance in accordance with IS:1180 over an ambient air temperature of 50˚C
Terminations	:	Primary (HV) Line side cable box Secondary (LV) Load side cable Box
Mounting	:	Outdoor, on concrete foundation, with wheels, on rails
Paint	:	As per NCCS requirement.
Safety Devices	:	Winding Temperature Indicator (WTI)
	:	Oil Temperature Indicator (OTI)
	:	Buchholz Relay (BR)
	:	Magnetic Oil gauge (MOG)
	:	Pressure Relief Device with valve(PRD)

CONSTRUCTION

Tank:
The transformer tank and cover shall be fabricated from good, low carbon steel plates suitable for welding, of minimum thickness 6 mm for side wall and 8 mm for top cover and bottom plate. The tank cover shall be sloped towards secondary side by 15mm to prevent retention of water. All inspection covers, pockets shall be suitably labeled / marked.

The tank should withstand, without permanent distortion, the following conditions:
Oil filling under vacuum, internal gas pressure of 0.35 bar, Vacuum pressure of 68 kN/sq.m, normal loading & unloading. Pads, lifting eyes and lugs shall be provided for all parts which require independent loading, unloading assembly or dismantling.

In addition, the transformer tank shall be provided with lifting lugs, bosses and jacking pads properly secured to the sides of the tank for lifting the transformer complete with oil either by crane or by jacks. The transformer shall also be provided with suitable haulage holes on the four sides with suitably braced, pulling eyes for haulage of the transformer in longitudinal as well as transverse directions.

The base of the tank shall be so designed that it shall be possible to move the complete transformer by skidding on plates or rails in any direction without damage. The tank cover and the inspection covers shall be provided with suitable lifting arrangements. Inspection covers shall not weight more than 25 kg,each. Disconnection chamber on LV side shall be provided in such a manner that it shall be possible to disconnect the tank from cable box and slide the tank independently without removing the cables or lowering the oil in the main tank. Four (4) earthing terminals shall be provided, one on each side of the tank. The transformer shall be provided with flanged wheels suitable for use on 1436 mm Rail Gauge and suitable for turning 90˚ and locking.

Radiators:

Pressed Steel Radiators shall be detachable and with individual shut-off valves and air release plug. The number of radiators/fins and heat dissipation calculation to justify the area of radiators for ONAN cooling should be submitted along with the offer.

Conservator:

A conservator complete with sump and drain valves shall be provided in such a position as not to obstruct the electrical connections to the transformer, having a volumetric of at least 10% of total volume of oil in the transformer at the minimum ambient temperature i.e. 5˚C to 98˚C. The minimum indicated oil level shall be with the feed pipe from the main tank covered with not less than 25 mm depth of oil and the indicated range of oil level shall be from minimum to maximum. The oil in conservator upto the minimum level mark on the oil level gauge should be at least 3 % of the total volume of oil in the transformer. The conservator shall also be provided with oil filling hole, cap, drain valve, 15-mm air release plug and silica gel breather of requisite grammage. It shall be possible to completely drain the oil from conservator when it is installed in its normal position on the transformer. Equalizer pipe shall be provided. The oil connection from transformer tank to the conservator tank shall be arranged at a rising angle up to the Buchholz Relay

Painting:

Before painting or filling with oil, the external surfaces of transformer tank and structural steel work shall be completely cleaned and made free from rust, scale and grease by shot blasting or sand blasting. Cavities on castings shall be filled by metal depositions.
The interior of transformer tank, other oil filled chambers and internal structural steel work shall be cleaned of all the scales and rust by standard approved methods. Thereafter these surfaces shall be painted with hot-oil resistant varnish or paint.

All external surfaces shall receive minimum of 4 coats of paint. The total paint thickness shall be approximately 60 microns. The 1st and 2nd coats of shall be of primer and shall be applied immediately after cleaning. Primer paint shall be ready mix Zinc Chromate. The 3rd coat shall be of an oil and weather resisting synthetic enamel paint preferably with a fungicide additive and of a shade easily distinguishable from the primer coats. The final coat shall be of glossy oil finish and weather resisting non-fading paint as per client requirement. Final coat shall be applied by spray gun and with all radiators assembled to give a uniform and elegant finish.

Fasteners:
All fasteners used i.e. hex bolts, nuts, washers, hinges etc. shall be hot dip galvanized.

Gaskets Joints:

For gasket joints wherever used, nitrite butyl rubber gasket or Neoprene cork gasket shall be used. The gaskets shall be placed in properly machined grooves with adequate space for accommodating the gaskets under compression. Suitable mechanical stops shall be provided to prevent crushing of gaskets.

Nameplates:

The following engraved brass plates shall be riveted to the transformer body
Rating & Diagram Plate as per IS 1180 –part-1
A plate showing the location and function of all valves and air release plugs

WINDINGS

The HV winding shall be connected in delta and LV winding in star as per vector group Dyn 11 so as to produce a positive displacement of 30º from the primary to the secondary vector of the same phase (Vector rotation assumed counterclockwise).

The neutral point of the secondary winding shall be solidly earthed and should be brought out to separate insulated terminal through an earthing current transformer for an earth leakage relay to be connected whenever required.

Insulation of winding shall be adequate to withstand surge voltages. The stacks of windings shall receive adequate shrinkage treatment before and after final assembly. Adjustable devices if necessary, shall be provided for taking up possible shrinkage of coils if any, in service. The conductor used for the coil shall be electrolytic grade copper conforming to the relevant Indian Standard specification. The conductors shall be

transposed (interleaved) at suitable intervals in order to minimize eddy current and to equalize the distribution of current and temperature along with windings. The winding shall be so designed that all coil assembly of identical voltage rating shall be interchangeable and field repairs to the windings can be made without any special equipments.

TRANSFORMER OIL

The oil used in the transformer and OLTC shall be uninhibited EHV grade, clear & transparent and free from suspended matter or sediments. The transformer is filled with oil for the purpose of cooling as well as insulation. The important characteristics of which are: (values within 3 months of filling):

Electric Strength (Break Down Voltage) : 60kV (min.)
Dielectric Dissipation Factor (Tan Delta) at 900C : 0.002 (max.)
Specific Resistance (Resistivity) at 270C : 1500 x 10^{12} Ohm-cm (min.)
Flash Point P.M. (closed) : 1400C (min.)
Interfacial Tension at 270C : 0.03 N/m (min.)
Neutralization Value (Total Acidity) : 0.03mg. KOH/gm (max.)
Water content: 25 ppm (max.)
Density at 29.5ºC in g/cm² : 0.89 (max.)
Pour Point in ºC : -6ºC (max.)
Kinematic Viscosity at 27ºC in centistokes : 27 (max)
In addition, the oil should conform to the IS 335:1993 and a valid test certificate shall be submitted at the time of acceptance trial.

6. TRANSFORMER INSTALLATION

The Transformer shall be transported from the manufacturers' works after due inspection by the supplier.
This specification covers the requirements for unloading from container/truck, shifting, unpacking, positioning, Installation on ready foundation and commissioning of Transformer & RTCC panel. The installation shall be carried out in accordance with the drawing issued.
Adequate clearances shall be maintained all around the transformer. A minimum clearance of 6 to 8 inches below the transformer enclosure for the free movement of air shall be ensured.
Inside the enclosure all bolts in the current carrying parts shall be tightened. All the shrouds shall be fixed in position.
Any of the components such as Marshalling Box dismantled for transportation shall be assembled and connected.
22kV XLPE Cables shall be terminated using heat shrinkable indoor type cable termination kits and properly secured.
OLTC shall be tested for all operations as per manufacturer's recommendations in the presence of manufacturer's representative.
All control cables shall gland and termination at the terminal blocks in the marshalling box. The contractor shall study manufacturer's wiring diagram before making any connections.

Provision for neutral and safety Earthing connections using Copper / GI Strips respectively shall be provided at manufacturer works to enable energizing the transformers.
The neutral earth conductor to be sleeved in the visible portion and the exposed Neutral / earth joint at the transformers to be insulated in the Electrical contractor scope.
The neutral CT shall be installed and connected.
The Safety and Neutral earth conductors shall be connected to the earth pits provided.

FIELD PERFORMANCE TEST

Pre-Commissioning Checks has to be done as below:
Check the oil level in the conservators for transformer and tap changer, bushings.
Check the radiator valves, valves between conservators and main tank, valves between conservator and tap changer for opening.
Check for oil leakage in all gasketed joints and any crack in bushings.
Release the trapped air in radiators, Main tank, Relays, Bushing turrets and bushings.
Check the calibration of OTI & WTI.
Check the drain valve, filter valves, sampling valves for closing.
Check the transformer for proper earthing and neutral earthing.
Check for the locking of off circuit tap switch wheel at one tap setting.
Check the indication of the Magnetic oil level gauge.
Check whether the thermometer pockets are filled with oil.
Check the external electrical connections.
Check the silica gel in the breather for its blue color and oil level at the bottom cup.
Check the clamping of rollers.
Check for any tools lying above the transformers.
Check the diaphragm in the explosion vent for damage.

7. OUTDOOR LT CIRCUIT BREAKER PANELS

This specification covers the covers design, manufacture, testing and supply and installation of All Panels up-to 1000 V.
The LT Circuit Breaker Panels at point of supply shall be of the outdoor type, housed in a weatherproof kiosk fabricated from 2.0 mm thick CRCA sheet steel and gland plate will be 3.0mm thick.
The sheet steel used shall undergo surface treatment using 7 tank process involving, degreasing, rust removal and pickling before phosphating. The panel shall be thereafter epoxy powder coated to Siemens gray shade RAL-7032.
The panels shall be powder coated as per specified colour. All metal surfaces shall be thoroughly cleaned and degreased to remove oil, grease and dirt. Rust and scales shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline water and drying. After phosphating, thorough rinsing shall be done with clean water followed by final rinsing with dilute dichromate solution and oven drying. The final finished thickness of paint film on steel shall not be less than 60 to 80 microns (Powder coated). Finished painted appearance of equipment shall present an aesthetically pleasing appearance free from dents and uneven surfaces. The required colour for the panels shall be as per the particular specification. Panels meant for

Outdoor locations shall have double doors with water-tight gaskets and epoxy paint, and that for interior shall be white. All unpainted steel parts shall be plated or suitably treated to prevent rust and corrosion.
All live parts/terminals, which become accessible on opening any compartment, shall be provided with insulating shrouds. The instrument/relay terminals on the front panel shall be shrouded.
Provision shall be made for earthing the panel at two points. A continuous copper / Aluminium earth bus of 50x6 mm size shall be run along the switchboard and the circuit breaker carriage shall have a scraping earth connection, which shall earth the trolley before the circuit breaker safety shutters are opened.
The panel shall be totally enclosed dust, vermin proof with a degree of protection of not be less than IP 55 with canopy.
Height of switch boards including canopy not to be more than 2450 mm.
Maximum operating height not more than 1800 mm
Minimum operating height not less than 400 mm
The door shall have padlocking provision.
Base frame Fabricated ISMC-100x50mm
Separate gland plate for control cable entry shall be provided.
Lifting eyebolts shall be provided on each shipping section.
Each Panel shall be compartmentalized into five sections viz.
Circuit breaker compartment with drawable trolley at the front bottom.
Relay and metering compartment at the front on top of Circuit Breaker compartment.
Totally segregated bus bar compartment at the top on the rear side of metering compartment wherever specified.
Cable termination compartment for incoming cable either at the rear or on the side. This shall have a caution plate fitted outside the rear cover.
Cable terminal compartment for outgoing cable either at the rear bottom side.
Inspection window shall be provided for checking the circuit breaker position.
All bolted covers & doors shall have provision for sealing.
The panel shall ensure complete safety of operating personnel.
Rating plate and nameplate shall be provided on front and rear side of the panel.
Name plates shall be of anodized aluminium with white engraving on black background and shall be properly secured with fasteners. Name plate shall be provided for each feeder and equipment i.e. indicating lamps, push buttons, switches, relays, auxiliary contactors etc. mounted on the switchboard. Special warning labels shall be provided wherever necessary. A name plate with switchgear designation shall be fixed at the top of the Panel
Danger boards with voltage rating shall be fixed both on the front and rear side.
The design shall have the approval of the power supply Authority designated for the region.
The panels and the busbars should be extendable type with the provision to add breakers in future (at both ends).
All panel feeder must possess the LOTO facility.

7.1. COMPONENTS

7.1.1. AIR CIRCUIT BREAKERS:

GENERAL:

The ACBs shall conform to IS 13947-1 / IEC 60947-1 for general rules and IS 13947-2/IEC 60947-2 for Circuit Breakers. The ACBs shall be suitable for 3 phases 415 Volts. Air Circuit Breakers shall be provided in fully drawout cubicles, unless otherwise stated. These cubicles shall be such that drawout is possible without disconnection of the wires and cables. The power and control circuits shall have self-aligning and self-isolating contacts. Mechanical latches shall be integrated in ACB at service, test and isolated position to ensure that Breaker is firmly latched in respective position. It shall not be possible to move the breaker from the position unless latch is manually operated. ACBs shall meet the following minimum parameters, ACBs must be considered with a provision to integrate with EMS System of communication models (RS 485) and all ACBs should have a provision for LOTO facility. And The Main incomer for Transformer, DG ACB and all panel incomers must display the THDI and 4th pole is 100 % Netural.

Rated operational Voltage	:	690V
Rated insulation Voltage	:	1000V
Rated impulse withstands Voltage	:	12 Kv
Protection	:	As per SLD & BOQ.
Trip history with time stampings	:	30
Event history with time stampings	:	100
No. of mechanical operations	:	20,000(up to 2000A)
	:	15,000(above 2000A, up to 4000A)
No. of electrical operations	:	10,000(up to 2000A)
	:	5,000(above 2000A, up to 4000A)

CONSTRUCTION:

The Breaker shall be suitable for load and line reversibility. The draw out type breaker shall be with service-test-isolated positions.

The ACB shall have front face with Insulation Class II ia for safety as per IEC 60947-2 allowing class II installations with breaker control from outside.

ACB shall be of 3pole or 4pole (as per BOQ), air break longer life along with less maintenance requirement.

All ACBs shall be with Icu=Ics=Icw (1Sec)

There shall be 3 distinct and separate positions of Test/Isolated/Service on circuit breakers on cradles which are self-lockable at each position:

ACB shall have Safety Shutter as standard with provision for locking for safety.

ACB shall conform to stringent environmental directives i.e. ROHS and WEEE norms.

ACB front must be with IP54 protection.

ACB shall be provided with Arc Chute Cover and stainless-steel filters to absorb all gases which are released in the event of Short circuit which ensures better safety

All accessories like Shunt trip/Under voltage/Closing Coils shall be common for all Breakers. Shunt trip shall be continuous rated coil
Draw-out ACBs shall preferably be provided with a mechanical latch on chassis which latches the ACB at Connected-Test-Disconnected positions while racking in and racking out the circuit breaker. This feature will help the operator in placing the circuit breaker at right position inside the chassis and can help in avoiding the accident.
All ACBs shall be provided with Ready to Close Contacts as standard feature to check in the event of Closing under the following conditions:
ACB is in OFF position
Spring Mechanism is charged
Opening order is not present
Device not completely racked in

CONTROL UNITS / PROTECTIONS:

The Control Units shall be housed in a separate enclosure and there shall be total insulation of the control unit with respect to the power unit.
The Control Unit shall be of Microprocessor type & suitable to provide short circuit, overload and earth fault protection, which should be self-powered type without the need of any auxiliary power supply during normal operation of the breaker.
The protection release shall have following protections as standard: -
Adjustable overload current (Ir) settings from 40% to 100% of rating of ACB (In). Overload time setting (tr) from 0.5s, 1s, 2s, 4s…….24s as field selectable curves.
Short circuit setting (Isd) from 1.5 to 10 times of Ir setting, short circuit time delay adjustable from 0 to 400 msec.
Instantaneous (Ii) protection with an adjustable pick-up and an OFF position.
Earth fault setting adjustable in absolute Ampere with time delay settings from 0 to 400ms.
Separately powered, individual fault trip indication LEDs (For overload, short circuit, earth fault and trip unit failure) shall be available on the trip unit which shall function even if the display fails.
ON / OFF options shall be available for short-circuit & earth fault protections which can be used to ensure discrimination with upstream circuit breaker or fuse.
The trip unit shall have integral test facility to verify the healthiness and to avoid external calibration.
It shall be possible to change the protection settings online and the circuit breaker need not be switched off while adjusting the settings.
All ACBs in PCC panel shall be provided with zone selective interlocking which helps in reducing the thermal and dynamic stress on installation during short circuit and ground faults. The releases shall be suitable to communicate between incomer breaker and outgoing breakers enabling zone selective interlocking.
It shall be possible to view the percentage loading of three phases at once on trip unit via LEDs or LCD display to help the user in identifying the current load balancing of the network. This will help in preventing the deterioration of loads affected by load balancing by identification of the balancing related issue.
ACB shall be provided with Energy Release (wherever specified) and will measure the following with class 1 accuracy:

Current – Phase and Neutral
Voltage – Phase to Phase and Phase to Neutral
Power- KW, KVAR, KVARH for all phase individually and total 3 phases.
Energy- KWH
Power Factor
The above parameters along with the status of breaker shall be displayed on front door of the panel. Also, trip unit shall provide last 20 trip histories which include date and time stampings.
It shall be possible to upgrade the breakers with Communication feature at Site to Ethernet connectivity.

ACCESSORIES:

The connection for the auxiliary shall be accessible from the front.
ACB shall be provided with following accessories, in addition to the item specified in Bill of Quantities. Further these devices shall be fit table at site from the front and common for all ratings.
Under Voltage trip coil.
Shunt trip coil.
Closing coil,
4NO + 4NC auxiliary switches.
Fault indicator/Reset unit.
The closing time shall be less than or equal to 70ms, and of fast opening type with break time of breaker should be <30ms to ensure higher life of distribution cables.

INTERLOCKING:

ACBs shall be provided with the following interlocking: -
Pad lock to prevent unnecessary manipulations of the breaker.
Electrical interlock shall be done by using breaker aux-contacts only
Al the ACBs of EDO and MDO modules must have a provision for all type of interlocking.
The features like COM port with RS 485 communication port, measurement functions (DLM), IDMTL settings, interrupted current values, rating plugs etc. shall be provided in the breakers as feature.

7.1.2. MOULDED CASE CIRCUIT BREAKER:

MCCBs shall comply with standards IS/IEC 60947-1 & 2. The breaking capacity performance certificates shall be available for category A to the above-mentioned standards.

MCCB shall have a rated operational voltage (Ue) of 415V, insulation voltage (Ui) of 690 V (AC 50/60 Hz) & impulse voltage (Uimp) of not less than 8kV.
MCCBs rating up to 630Amp shall be current limiting type preferably having an encapsulated double break design having two fixed contacts, one moving contact and

two arc chutes per pole. The design is required to minimize the effects of short circuit currents i.e. limit the let through energy and improve the life of cables.
MCCB shall comply with the environmental directives like RoHS and WEEE.

Performance:

The MCCBs shall have a rated service breaking capacity (Ics) equal to the ultimate breaking capacity (Icu) at 415V. MCCB's Manufactures can optimize breaking capacity of outgoing MCCB's by using cascading technique.
The limiting capacity of a circuit breaker is expressed by two curves which are a function of the prospective short-circuit current (the current which would flow if no protection devices were installed): The thermal stress (A2s), i.e. the energy dissipated by MCCB during fault should be as low as possible. Cable selection to be done as per Maximum permissible cable stresses for which manufacture should produce current limiting and energy limiting curves of MCCB's.

Safety:

For maximum safety, the power contacts shall be insulated in an enclosure made of a thermosetting material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries (ON/OFF/Trip Contact, Shunt, Under Voltage etc.). All poles shall operate simultaneously for circuit breaker opening, closing, and tripping. MCCBs shall be actuated by a toggle or rotary handle that clearly indicates the three distinctive positions: ON, OFF and TRIPPED. MCCB shall clearly indicate the suitability for isolation in the name plate identified by the symbol  .
MCCBs shall be equipped with a "push to trip" button in front to test operation and simultaneous opening of all poles together.
MCCBs shall be designed to prevent access to live parts when the cover is removed, means main current path of the circuit breaker should be isolated from auxiliary section i.e. MCCB shall offer class –II front face as per IEC standards 61140 and 60664-1.
The electrical life of MCCBs shall be 8,000 operations up to 250A & 4000 operations up to 630A.
All MCCBs shall have cross bolted type termination where bus bars or cable lugs can be terminated by crossing the bolt between the lugs/bus bars and MCCB connections, to enhance safety and reliability of the terminations. In case spreaders/rear connectors are used in between MCCB and bus bar/lugs then the spreaders shall be cross bolted with the MCCB connectors.

Separate Field installable auxiliary contacts for signalizing ON/OFF indication shall be provided with all MCCBs.

Rotary handle shall ensure IP40 for direct type and IP 55 for extended Rotary handle.

MCCB shall have provision for Rear connection - MCCB mounting on a back plate with suitable holes enables rear connection. The rear connections are simply fitted to the device connection terminals.

Protection's requirements:

All MCCBs shall be thermal magnetic type and microprocessor based as per the SLD & BOQ.
For Thermal Magnetic MCCB shall be adjustable overload settings from 0.6 to 1 time In and fixed magnetic settings.
For shall be self-powered microprocessor-based type to have wide range of settings and advanced information over and above thermal magnetic trip units
LED indication on trip unit shall be there for trip unit ON indication.
Test port on trip unit shall be there for testing the trip unit.
Overload alarm indication LED shall be there on trip unit.
Overload settings adjustment from 40% to 100% shall be possible
It shall be possible to set the overload time delay from 0.5 to 16 secs at 6xIr.
Short circuit settings shall be adjustable from 1.5 to 10 times Ir. Fine adjustment of settings shall also be possible. Short circuit time delay shall be adjustable from 0.1 to 0.4 secs. It shall be possible to switch the I2t protection ON or OFF to achieve discrimination between upstream fuse or circuit breaker.
Instantaneous settings shall be adjustable from 1.5 In to 10 In.
Earth fault protection shall be adjustable from 20% to 100% or OFF. It shall be possible to switch the I2t protection ON or OFF to achieve discrimination between upstream fuse or circuit breaker.
In case of 4 pole microprocessor based MCCBs neutral shall be protected & adjustable as a Neutral unprotected / Neutral protected at 0.5 In/ Neutral protected at In.
All MCCBs in PCC panels with inbuilt earth fault protection shall also be provided with zone selective interlocking feature, which helps in reducing the thermal and dynamic stress on installation during short circuit and ground faults. The releases shall be suitable to communicate with upstream ACBs enabling zone selective interlocking.
All MCCBs with earth fault shall display the type of fault (overload, short circuit, earth fault, instantaneous tripping), the phase concerned and interrupted current value, on occurrence of fault.
All MCCBs with earth fault protection shall store last trip record. The record shall be viewable on display modules or communication or shall be downloadable using MCCB test port.

Communication specifications:

All Incoming MCCB's (Microprocessor based LSIG release) shall have communication provision with the following features.
It shall be possible to communicate ON, OFF and Trip status of all Incomer MCCBs over modbus TCP/ Ethernet port (with at least 10mbps speed on Ethernet network).
Incomer MCCB's shall provide following information which shall be displayed on inbuilt webpages/software
MCCB ON/OFF/Trip status indication
Total number of ON/OFF and trip operations
Total number of operating hours & % Contact wear for all MCCBs where LSIG protection is asked

Last trip record of the circuit breaker with interrupted current value and phase in which the fault occurred for all MCCBs where LSIG protection is asked.

7.1.3. CURRENT TRANFORMER (CTs) AND VOLTAGE TRANSFORMER (VTs)

CTs and VTs shall comply with IEC 61869/BSEN 61869 and CTs shall be of the epoxy resin encapsulated ring type. The ratings specified on the Drawings are indicative only and it shall be contractor/manufacturer's responsibility to ensure that the ratings offered are adequate for the relays/meters provided considering lead resistance, etc.
Current transformers shall comply with approved standard and shall be compatible with and provide the necessary accuracy, over current factors, characteristics, performance and VA rating for the satisfactory operation of the relevant protection devices, instruments and meters.
All CTs shall have a short-time current rating as specified in IEC 60044-1.
CTs for protection shall be compatible with the protection relays to ensure that the CTs will not be saturated up to the maximum prospective fault current.
CTs designed for unit protection schemes shall be able to withstand a stability of not less than the maximum through-fault of the units.
In balanced circuits, the spill current with maximum stability conditions shall not exceed one quarter of the operating current of the relay.
CTs for use in conjunction with protection relays shall be of class 5P accuracy or better. CTs for use in conjunction with measuring instruments shall be of Class 1 accuracy. The product of rated accuracy limit factor and rated output of the protection CTs shall not be less than 20 times the total rated burden of the trip circuit including the relay, connection leads and O/C release where applicable.
All CTs shall have output ratings adequate to cater for the burden connected to them. The Contractor shall demonstrate to the satisfaction of the Employer representative. By calculation or by test, that each group of the CTs, when installed and having the secondary burden connected, is capable of operating the relays and other measuring instruments in accordance with the manufacturer's published characteristics and the requirements of the system, with a reasonable margin of safety.

7.1.4. SELECTOR SWITCHES:

All control switches shall be 16 Amps. Rated, back connected, rotary type having a cam operated contact mechanism. Type and the number of ways shall be clearly mentioned on the switches. Ammeter selector switches shall have make before break feature on its contacts. Selector switches for the motor feeders shall be lockable in OFF position.

7.1.5. PROTECTIVE RELAYS:

All protective relays used shall conform to the relevant Indian Standards and meant for the specific type of protection envisaged. Static type/microprocessor-based relays shall be preferred. The relays shall have a minimum of one NO and one NC alarm/trip contacts of rating not less than 5 amperes at 230 V AC supply. Wherever relay inputs

are from current transformers, protection type CTs Class 5P10/Class PS shall be used. All relays shall be suitably calibrated / compensated for the site conditions and with variable settings adjustable at site.

7.1.6. MEASURING INSTRUMENTS:

All measuring instruments shall be of 96 sq.mm/144 sq.mm as per Particular Specification and shall be flush mounting type and complete with all auxiliary equipments such as shunts, transducers, current and voltage transformers as required.
Electrical meters shall conform to IS 13779 / IEC - 1036, 687, 1286 suitable for single phase /three phase supply system in all respects. Accuracy of meters shall be of class as specified in BOQ.
All meters shall be digital type and multifunction Meters with RS 485 connectivity to suit BMS system wherever mentioned in BOQ. Suitable memory and software for logging the information along with real time metering information must be available. The meters must have required level of protection and sufficient number of auxiliary contacts.
Meter shall be suitable for 3 phase, 4 wire systems, and balanced as well as unbalanced load. All instruments and associated apparatus shall be capable of carrying their full-load current without undue heating. They shall not be damaged by the passage of fault currents up to the rating of the associated switchgear through the primaries of their associated instrument transformers. The instrument meter shall be earthed by a conductor of not less than 2.5 mm2 cross-sectional area.
Selector switches shall be inbuilt in voltmeters such that voltmeter can read voltages between phase and phase and between phase and neutral.
Ammeters shall normally be suitable for 5 A secondary of current transformers
Voltmeter circuits shall be provided with protection through MCB as required Separate current transformers for feeder shall be provided for protection device and for instrumentation.

7.1.7. INDICATING LAMPS AND PUSH BUTTONS:

Indicating lamps shall be of LED type and of low watt consumption, easily replaceable from the front. Lamps shall be uniformly bright and provided with translucent covers of appropriate colours. Push buttons shall have a minimum of 1 set of NO/NC contacts. As per IEC/NFPA standard Colour coding for Indicating Lamps and Push-buttons shall be as follows:

STOP/OPEN/EMERGENCY TRIP	:	RED
START/CLOSE	:	GREEN
RESET/TEST/HEALTHY	:	YELLOW / BLACK / WHITE.
TRIP	:	AMBER

Emergency lock and key type push buttons shall be installed wherever required or specified in BOQ to de-energize the Electrical Panels in the event of an emergency. The Emergency Push Button shall be button type with flat surface protection guard ring and pressed-in design with key reset so that accidental triggering and vandalism shall be avoided as far as possible. Transparent hinged cover shall be provided in front.

7.1.8. INSPECTION & TESTING:

Routine tests as per Indian Standards shall be carried out on the panel. This shall comprise physical inspection of panel including wiring and fittings, and operational and functional tests where necessary. The routine rests to be carried will be as follows:
High Voltage Test: To test high voltage withstands capacity for power and control circuits. Test certificate to be submitted along with the panels.

Megger test: To check the insulation resistance between pole and neutral, pole and pole and all secondary wiring between phase and earth. These should be recorded and submitted.

Phase sequence test: To check phase configuration.

Bill of materials check

Functional tests

Design ambient temp: For all the switch gear shall be considered 45Deg C.

8.0. TECHNICAL SPECIFICATION FOR CABLES:

HT CABLES:

The scope of this package, covers the design, manufacture, stage inspection at works, inspection and testing of finished cables at manufacture's works, testing at independent test house, packing, transport and delivery to consignee's address of 22KV 3C, Aluminium conductor, XLPE insulated, screened, underground Cables as per specified construction.

Three Core 6.35/ 11KV grade, 900C rating heavy duty power cable with stranded compacted circular aluminium conductor shielded with extruded semi conducting compound, cross linked polyethylene insulated, shielded with extruded semi conducting compound and copper tape, shielded cores laid up with fillers inner sheath of extruded PVC, Galvanized round steel wire Armour and PVCST-2 overall sheath.

GENERAL TECHNICAL PARTICULARS:
Nominal System Voltage (rms) 11 KV
Highest System Voltage (rms) 24 KV
Number of Phases (for 3 core cables)
Frequency 50 Hz
Variation in frequency ±3%

Type of Earthing Solidly Earthed
Basic impulse level (1.2/50 Microsecond Wave - 125 KV
Total relay & circuit break operating time 15-20 Cycles
One-minute power frequency withstand voltage - 50 KV

MANUFACTUREPROCESS, CROSS LINKING OF INSULATION:

Cross linking of the insulation materials (pre compounded polyethylene) shall be conforming to IS:7098 (Part-II).
The conductor screen shall be of extruded semi conducting compound. The insulation screen shall consist of the non-metallic part extruded semi conducting compound with nonmagnetic metallic port. The XLPE insulation and the shields for conductor and insulation shall be extended in one operation.

MATERIALS:

CONDUCTOR:

The conductor shall be of stranded construction. The material for conductor shall consist of plain aluminium of H2 or H4 grade as per clause-3 of IS:8130/ 1984.

INSULATION:

The insulation shall be cross linked polyethylene conforming to the requirements given in Table-1 of IS:7098 Part-II.

SCREENING:

The screening shall consist of semi conducting compound. The metallic screen for core shall consist of copper tape. The metallic screen with Armour shall be designed to carry the minimum short circuit rating for 1 second.
The semi-conducting compound shall withstand the operating temperature of the cable and shall be compatible with the insulting materials.

ARMOURING FOR 3 CORE CABLES:

The armour shall be galvanized round steel wire, complying with the requirements of IS:3975. The Single Core Cables shall be armoured with hard drawing Aluminium round wire. A binder tape may be applied on the armour.

OUTER SHEATH:

The outer sheath shall consist of Poly Vinyl Chloride (PVC) compound, confirming to the requirements of Type ST-2 of IS:5831 suitable additive shall be added to give anti termite protection.

CONDUCTOR:

The conductor shall be stranded, compact, circular of aluminium wires of H2 or H4 grade plain aluminium wires.
The conductor shall be clean, uniform in size and shape smooth and free from harmful defects.
Not more than two joints shall be allowed in anyone of the single wire forming every complete length of conductor and no joint shall be within 300 mm of any other joint in the same layer. The joint shall be made by brazing, silver soldering or electric or gas welding.
No joints shall be made in the conductor after it has been stranded.

TYPE TESTS:

The following type tests will be conducted on the cable.
Test on conductor
Test on armour wires
Test for thickness of XLPE insulation and inner and outer sheaths
Physical test on XLPE insulation
Physical test for outer sheath
Partial discharge test
Bending test
Di-electric power factor test
As a function of voltage
As a function of temperature 151
Insulation resistance (Volume resistivity) test
Heating cycle test
Impulse withstand test
High voltage test
Flammability test

ACCEPTANCE TEST:

The sampling plan for acceptance test shall be as per IS:7098 Part (2)
The following shall constitute the acceptance test.
Tensile test for aluminium
Wrapping test for aluminium
Conductor resistance test
Test for thickness of insulation
Test for thickness of inner and outer sheath
Hot-set test for insulation
Tensile strength and elongation at break test for insulation and outer sheath
Partial discharge test (on full drum length)
High voltage test
Insulation resistance (volume resistivity) test.

ROUTINE TEST :
The following shall constitute routine tests:

Conductor resistance test
Partial discharge test on full drum length
High voltage test.

LT CABLES
GENERAL:
Cables shall be selected from one manufacturer who has been manufacturing such cables for at least ten (10) years using the Indian Standard Institution (ISI) certification produced for each cable.

SCOPE:
This specification is intended to cover the technical requirements of design, manufacture, testing at works, inspection, supply and delivery at site of LT Cable.
The cable shall be rated for a voltage rating of 1.1 KV up to 11 KV.
Frequency 50 Hz
Variation in frequency ±3%

CONDUCTOR:
The conductor shall be Aluminium or Copper as stated in BOQ.
The conductor shall be stranded, compact, and circular of aluminium wires of H2 or H4 grade plain aluminium wires.
The conductor shall be clean, uniform in size and shape smooth and free from harmful defects.
Not more than two joints shall be allowed in anyone of the single wire forming every complete length of conductor and no joint shall be within 300 m of any other joint in the same layer. The joint shall be made by brazing, silver soldering or electric or gas welding.
No joints shall be made in the conductor after it has been stranded.

INSULATION:
The conductor shall be insulated with suitably compounded PVC/XLPE applied to the conductor by the extrusion. Insulation shall withstand to thermal and thermo mechanical stresses safely at continuous normal and short circuit temperature conditions.
The PVC/XLPE compound used for insulation shall have reduced flame propagation property.
This shall also have reduced emission of hydrogen-chloride gas fumes etc. when severely overheated during fires. It shall be capable to limiting displacement of cores in cables during short circuit.
The cables shall be manufactured with latest manufacturing process to get improved reliability and compactness of cables.

INNER SHEATH:

Inner sheath shall be provided thermoplastic material softer than insulation compatible with thermal rating of insulation. Inner sheath shall be applied either with extrusion or

by wrapping closely on the laid of cores and stripped with ease without damaging insulation.

ARMOURING:

The armouring shall be used for mechanical protection of the insulated conductors (cables). The armouring is applied over the inner sheath for multicore cables and over the core or inner sheath for single core cables. The direction of lay of armouring shall be opposite to that of the cores.
The multicore cable shall be armoured with either GI round steel wires or GI flat strips and in case of single core cable armouring shall be of non-magnetic material such as hard drawn aluminium or aluminium alloy wires or strips to avoiding magnetic hysteresis losses on AC system.

OUTER SHEATH:
The Outer sheath shall be provided with an extruded PVC/Polymer on armouring. The PVC/polymer compound used for outer sheath shall be resistant to termites, fungus and rodent attacks and shall also have reduced flame propagation property.
Tests for cable flame retardancy shall be in accordance with the referenced standards.
The outer sheath of cables shall be embossed or engraved with
The voltage designation
Manufacturers identification
Number of Cores and nominal cross-sectional area of conductors
The drum progressive length of cable at every meter. (The starting point being the cable end at its inner coil on the cable drum.)
In case of XLPE insulated PVC sheathed cables, cable filler, inner and outer sheath shall confirm to ST-2 compound as per standard. The inner sheath shall be applied over laid cores by extrusion.

CORE IDENTIFICATION
The cores of the cables shall be provided with the Indian colour scheme of XLPE/PVC insulation as per IS for any easy identification.
Different cores in a cable are identified by colours. Flowing colour scheme is followed.

1 Core	Red / Black/Yellow/ Blue
2 Core	Red and Black
3 Core	Red, Yellow and Blue
3.5 Core	Red, Yellow, Blue, and Black
4 Core	Red, Yellow, Blue, and Black

Wherever the number of cores exceeds 5, two adjacent cores (counting core and direction core) in each layer are coloured blue and yellow respectively and the remaining cores are Grey.

All multi core cables are laid up as per the colour scheme indicated above with thermoplastic fillers in the centre and the interstices whenever applicable to make the cable circular. Top layer of the laid up is always with right hand direction.

IDENTIFICATION:

The outer sheath shall have the following information embossed or indented on it; the manufacturer's name or trade mark, the voltage grade, the year of manufacture. The identification shall repeat every 300/350-mm along the length of the cable.

TYPE TESTS:

The following type tests will be conducted on the cable:
Test on conductor
Test on armour wires
Test for thickness of XLPE insulation and inner and outer sheaths
Physical test on XLPE insulation
Physical test for outer sheath
Partial discharge test
Bending test
Di-electric power factor test
As a function of voltage
As a function of temperature 151
Insulation resistance (Volume resistivity) test
Heating cycle test
Impulse withstand test
High voltage test
Flammability test

ACCEPTANCE TEST:

The sampling plan for acceptance test shall be as per IS:7098 Part (2)
The following shall constitute the acceptance test.
Tensile test for aluminum
Wrapping test for aluminum
Conductor resistance test
Test for thickness of insulation
Test for thickness of inner and outer sheath
Hot-set test for insulation
Tensile strength and elongation at break test for insulation and outer sheath
Partial discharge test (on full drum length)
High voltage test
Insulation resistance (volume resistivity) test.

ROUTINE TEST:
The following shall constitute routine tests:

Conductor resistance test
Partial discharge test on full drum length
High voltage test.

9.0. STORING, LAYING, JOINTING AND TERMINATIONS

STORING:

Cables shall be stored in accordance with the manufacturer's recommendations and labeled with its Manufacturing Date, Indian Standard for manufacture, cable grade, and description, number of cores and cross-sectional area, and length. On receipt of cables at site the cables shall be inspected and stored in a safe place.

The ends of cable shall be in sealed condition. After inspection, cable shall be located in a proper place with battens of cable drums being replaced. The cable drums shall not be stored 'on flat' with flanges horizontal.
Client/Consultant/PMC will inspect the cables before storing. Contractor shall take out samples from the drums as per their instructions and send them to the manufacturers to conduct the approval tests. After the receipt of the test analysis, the cable will be accepted by the Owner.

CABLES AND CABLE ENTRIES:

Particular attention is drawn to the Contractor's responsibilities in safeguarding cables installed in outdoor locations and unfinished buildings. Such equipment is particularly vulnerable to damage from water and dust penetration. The Contractor shall ensure that cables are adequately protected in this respect while installation work is proceeding. Covers temporarily removed from trenches/entries for purpose of installation shall be reassembled on completion of the Work and replaced when such work is suspended or otherwise left incomplete. Similarly, all entries shall at times be effectively sealed against ingress of water and dust, eg. Duct entries shall be sealed by the insertion of proprietary stopper plugs or approved means.

CABLE LAYING

Cables shall be laid in a manner to prevent strain and damage with no kinks or twists or stripping and be mechanically supported throughout their length. An adequate number of cable rollers, each of which shall be undamaged and completely free to rotate shall be used to support the cable during pulling in such a manner that not part of the cable can touch the ground, the trench bottom or side, or the wall of the buildings or the tray.

Winches whether power driven, or hand operated and other mechanical aids shall only be used with the prior authorization of the main contractor. Whenever a winch or similar appliance is used, an approved tension gauge shall be fitted into the haulage line between the winch and the cable. The pulling tension must at all times be within

the limit advised by the cable manufacturer, which shall be communicated in writing to the main contractor before the laying is commenced.

All cables shall be pulled into position in such a manner as to avoid any damage whatsoever to the cable or its sheath. Cables shall wherever possible, be pulled directly from the top of the drum, which shall be supported throughout the operation in such a manner that it is completely free to rotate. In the event of damage to the sheath or armouring of any cable, the cable shall be replaced throughout its entire length at no cost to the contract.

During the course of pulling operations, the cable shall not be allowed, under any circumstances, to twist or rotate about its longitudinal axis because of excessive pulling tension or for any other reason.

Cables used on 415V system shall be of 1.1KVgrade, aluminium/Copper stranded/single conductor, XLPE insulated PVC / FRLS outer sheath, PVC inner sheath, upto 10Sq.mm Copper with Round Strip, from 16Sq.mm and above Aluminium / Copper Multistrand Flat Strip as per the ST2 type 7098 Part-1 Cables Standards.

Cable shall generally be installed in ladder type / perforated trays in trenches or buried in ground except for some short runs in conduit for protection or crossings the roads etc.
Approximate lengths of cables run will be given in the cable schedule. Before commencement of work the Contractor shall take actual measurements and prepare his own cable cutting schedules to reduce wastage to a minimum.
Each length of run shall be physically measured at site before cutting the cable. Contractor shall furnish cable cutting schedule to engineer in charge with respect to able drum length available at site and runs of cables & sizes of cables.
Cable may also be laid through hume pipes/corrugated high density PVC pipes (as approved by the consultant/owner) in road crossings etc. The pipes shall be supplied and placed in position by the Contractor.
Cable laid on trays and risers shall be neatly dressed and clamped at an interval of 2000 mm and 500 mm for horizontal and vertical cable run respectively and at each bend of cable.
All power cables shall be clamped individually, and control cables shall be clamped in groups of three or four cables.
Clamps for multi-core cables shall be fabricated of 25 x 3 mm G.I. flats. Single core power cables shall be laid in trefoil formation and clamped with trefoil clamps made of Fiber glass/PVC.
Cable openings etc. in walls/floor made by the Contractor or by others shall be sealed by the Contractor suitably by Hessian tape and bitumen compound or by any other proven method to prevent ingress of water.

Cables shall be neatly arranged on trays and neatly clamped / tied to prevent sagging.
Wherever cables are laid in trenches (outdoor), depth of trenches shall not be less than 750mm and width 600mm, after cable has been laid and straightened, it shall be covered with 75mm thick layer of sand. Similarly, the excavated trenched should be

filled upto 75mm sand prior to cable lying. Over this sand layer a course of cable protection tiles to overlap cables by 50mm on either side shall be laid. Trenches shall then be backfilled and consolidated. The suitable markers shall be provided at regular intervals to the 200mm above the ground level (MGL).
After completion of installation and prior to connection, all High Voltage Power cables shall be given a high potential test. The contractor shall provide this Hi pot Test set having provision of leakage current measurement.
Cable identification tags shall be of 2 mm thick, 20mm wide aluminium strip of suitable length to contain cable identification.

CABLE BENDING
At all times almost care shall be exercised to prevent excessive bending or twisting of cable during installation.
Changes in direction in cable trenches, racks or trays shall provide for a minimum cable bending radius of twelve times the overall cable diameter.
JOINTING AND TERMINATION:
Cable jointing shall be done as per the recommendations of the cable manufacturer. Jointing shall be done by qualified & skilled cable jointers.
HT Cable Termination:
All HT cable termination/22kV Incoming and outgoing cables shall be terminated using heat shrinkable indoor type cable termination kits Terminal pothead shall be used at the Transformer / Switchgear terminals. The termination kits should be of approved make.
Cable Termination:
Glands shall be selected for appropriately for the environment in which the cable is to be used. Each termination shall be carried out using brass double compression glands and cable sockets. Hydraulic crimping tool shall be used for making the end terminations. Cable gland shall be bonded to the earth by suing suitable size Cu/G.I. wire/tape.
The general requirements for all joints and terminations of aluminium cables shall be:
To remove oxide from the conductor and prevent the oxide re-forming.
To prevent corrosion resulting from contact between dissimilar metals.
To retain contact pressure under cyclic loading conditions.
For all aluminium cables, the oxide shall be removed by thoroughly wire-brushing the bare end of the cable. After brushing, a liberal coating of approved oxide-inhibiting, moisture-excluding thermally stable grease shall be applied, and the cable shall be wire-brushed again through the grease. Cable strands shall not be separated before brushing.
Bare aluminium / copper lugs, ferrules and other connectors, unless factory-tinned or factory pre-filled with inhibiting grease, shall be wire-brushed and grease coated in the same way as cables.
Before making any joints or terminations in aluminium cables, the Contractor shall submit the proposed method for the Consultant / Main Contractor approval. Notice of at least three working days shall be given before making any joints or terminations, to enable the Consultant / Main Contractor to witness the work.
Aluminium crimp lugs or tinned copper lugs and ferrules.

Tinned copper ferrules shall be terminated using the compression method. For compression connections on stranded cables, a hexagonal die shall be used, on solid conductor cables, indent type dies shall be used, with at least two indentations per cable connection. Lugs of ferrules shall be selected to suit the size and shape of the conductor. Compression dies shall be selected to suit the lug or ferrule. Aluminum crimp lugs shall be filled with oxide inhibiting grease.

Aluminum to copper connections shall be made by one of the following methods:

Bi-metal connectors, or

Tinned copper ferrules. Or

Electro-tinned cast aluminium lugs.

Bi-metal connections shall consist of lugs or pin type connectors having a cast copper palm or pin, friction-welded to an aluminium barrel section which is subsequently factory filled with oxide-inhibiting grease. The aluminium cable shall be inserted in the barrel section and fixed using the compression method as detailed above. The copper pin or palm section shall be fixed to copper or brass connectors or bus-bars in the conventional manner. Tinned copper ferrules shall be terminated using the compression method.

Where electro-tinned aluminum lugs are used, they shall be fixed to the cable using the compression method. The palm of the lug shall be bolted to the copper bus-bar or terminal using a stainless-steel bolt and nut, with one large diameter stainless steel flat washer and two "Belleville" spring cup washers.

All nuts shall be adequately torque tightened to manufacturer's recommended levels. Identification tags for feeder designation shall be by using `Phoenix' plastic cable markers, tied to either end of each cable.

The cable termination includes drilling of Gland plate as require size of the cable and no. of cables in each section/cable alley.

The termination, Joints and connections of cables shall be done by qualified jointers strictly in accordance with manufacturer’s instruction drawings and/or as directed by the Engineer. The cost of end termination of all the LT cables shall be excluded in the quoted price for laying of the cables and extra payment on this will be quote.

The work shall include all clamping, fittings, fixing, plumbing, soldering, taping, compound filling, epoxy cable jointing, crimping, connecting, shorting and earthing as required for all such operations should be available with concerned contractor. For all size of LT termination, crimping tool (Hydraulic type) shall be used. Further, inhibiting compound shall be provided before termination.

The equipment will be generally provided with blank plates for cable/conduit entry and cable end box for power cables.

The Contractor shall perform all drilling, cutting on the blank plates and any minor modification work required to complete the job.

If the cable-end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the Contractor as extra work item.

Control cable cores entering control panel / switch gear /PCC/ MCC etc. shall be neatly bunched and served with nylon cord or PVC perforated tape to keep in position at the terminal block.

The contractor shall provide oil resistance ferrules for all control cable cores at all terminations including at all junction boxes and at all terminations. The ferrules shall

carry terminal numbers as per drawing. The ferrules shall be of interlocked plastic type or approved equal.
Spare cores shall be similarly tagged, crimped with lug and taped on the ends. Spare cores shall be tagged with individual cable number.
Terminations and connections shall be carried out in such a manner as to avoid strain on the terminals.
All cable entry points shall be sealed and made vermin and dust proof. Unused opening, if any shall be effectively closed.
Glands, Seals and Shrouds
The entire body of a cable shall enter a gland, & the outer sheath of a cable shall not be removed before entering the weatherproof seal. Cable shall be on a straight axis from a point immediately before entering a gland.
Cable glands shall securely retain the cable without damage to the outer sheath or armour.
Glands shall be correctly sized and of a type suitable for installation in each respective type of enclosure.
All glands shall be correctly sized and of a type which will maintain the integrity of the equipment within into which they are to be installed. Such factors as use of insulated plastic enclosure and explosion proof type protection shall be taken into account when selecting glands. Mechanical glands shall be of the hexagon double compression type, knurled type glands shall not be used.
Earth continuity of brass glands & termination's shall be achieved by rigid clamping of armour within each gland and intimate contact between threaded components of glands and equipment.
Brass glands terminating in unthreaded enclosures shall be provided with earth continuity by attachment of earth continuity bonds.
Terminations of mineral insulated cable shall be provided with sleeves having a temperature rating equal to that of the seals.
Cores of sheathed cables, from which the sheath has been removed, and non-sheathed cables at terminations of conduit, ducting or trunking, shall be enclosed according to the design specification.
Identification:
A permanent non-corroding securely retained identification label shall be provided at both ends of each cable identifying its cable schedule reference and at all termination points including joint boxes. An acceptable means of identification is an engraved trifoliate label fixed to the cable with plastic cable ties. Self-adhesive labels will not be accepted.
Route markers
Route markers shall be provided along straight runs of the cables at locations approved and generally at intervals not exceeding 25 meters. Markers shall also be provided to identify change in the direction of the cable route and also for location of every underground joint.
Route markers shall be made out of 100mm x 100mm x 5mm GI/aluminium plate welded or bolted onto 35 mm x 35 mm x 6 mm angle iron 600 mm long duly painted with anti-corrosive paint/ embossed. Such plate markers shall be mounted parallel to and 300.mm or so away from the edge of the trench/pipe/duct, or as directed at site.

Plastic identification tags shall be provided at every 30m. Cables shall be identified at end terminations indicating the feeder number and the Panel/Distribution board from where it is being laid.

Road Crossings:

All cables laid below roads shall be taken through suitable underground Hume pipes / GI Pipes / trenches. The size of Hume pipes / GI pipes/ trenches shall be as per drawings.

Construction across Roads:

All works across roads shall be carried out as per the directions of the Project Manager. Necessary safety measures shall be taken to divert traffic. Care shall be taken not to disturb other service lines.

Protection of Existing Services:

All pipes, water mains, cables, etc. met with during the course of excavation shall be carefully protected and supported. In any case damage is caused, the same shall be made good at no extra cost, failing which necessary rectification will be done by Project Manager at the risk and cost of the Contractor.

Megger test and continuity test shall be conducted on the cable after carrying out the end termination.

PROTECTION FROM MOISTURE:

Each cable system shall be installed either where it will not be exposed to rain, dripping water, steam, condensed water, etc., or be of a type designed to withstand such exposure.

In damp situations and wherever they are exposed to weather, all metal sheaths and armour of cables, metal conduit, ducts, ducting trunking clips and their fixings, shall be of corrosion-resistant material or finish, and shall not be placed in contact with other metal with which they are liable to generate electrolytic action.

For conductors insulated with impregnated paper, exposed conductor & insulation at termination’s and cable joints shall be protected from ingress of moisture by being suitably sealed.

TESTING:

Cables shall be tested at site as follows:

Before shifting of cables drums from the yard to the site, insulation resistance shall be carried out on the cable and readings recorded in the presence of the Site Representative.

On cable being laid prior to sand bedding an I.R. shall conducted and recorded in the presence of the Site Representative.

On the cable trench route being completed and compassion done an I.R shall be conducted and recorded in the presence to the Site Representative.

No backfilling of trenches shall be done till the trench/sand padding/ cables are inspected and tested.

Before end terminations are made an I.R shall be conducted to ensure the cable is in order.

On termination’s being completed prior to connecting to the equipment. The following test shall be conducted.

An I.R. done on the cable/Termination.

Cable/term subject to a pressure test for 15 minutes. The voltage to be applied shall be as per manufacturer's recommendations and in co-ordination with Owners/Consultants.
An I.R. Done on completion of the above Hipot test. All tests shall be done and recorded in the presence of the Site Representative.

10.0. TECHNICAL SPECIFICATION OF EARTHING

Indian TNS system of earthing as shown on IS: 3043 – 1987 shall be followed for the entire installation under the scope.
All non-current carrying metal parts of electrical installation shall be earthed as per IS 3043. All metal conduits, metal race way, bus trunking, process equipment, motor, switch gear, DB's, lights fixtures, fan and all other metal parts forming part of the works shall be bonded together and connected by two separate and distinct conductors to earth electrodes. All earthing shall be in conformity with Indian Electricity Rules and CEA safety regulation in vogue.
In case of star connected systems with earthed neutrals:
The neutral point of every generator and transformer shall be earthed by not less than two separate and distinct connections with the earth having its own electrodes of ratings according to the respective technical specification.

Plate Earthing Station
The earthing station shall be as shown on the approved working drawing. The earth electrodes shall be 600 x 600 x 6.3 mm GI plate / 600 x 600 x 3.15 mm copper plate electrode as required. The earth resistance shall be maintained with a suitable soil treatment and watering arrangement as per approved working shown on drawings or as directed at site. Excavated soft soil shall be thoroughly mixed with 6% by weight of common salt with 10% by weight of water and alternate layers of charcoal and filled in the earth pit. Independent earth shall have same specification subject to meeting the earthing value criterion for communication system.
In the case of plate earth electrode, a watering pipe of 50mm diameter of B class GI Pipe shall be provided and attached to the electrode. A funnel with mesh shall be provided at the top of this pipe for watering the earth. The watering funnel attachment shall be housed in masonry enclosure of not less than 300 x 300 x 300 mm. A cast iron/MS frame with cover having identity mode "EARTH" and having locking arrangement shall be suitably embedded in the masonry enclosure.
The resistance of each earth station should not exceed 1 Ω.
The earth lead shall be connected to the earth plate through copper/brass bolts as per approved working drawings.

Pipe Earthing Station
Pipe electrode shall comprise of 100 mm dia. GI pipe class "C" as per IS 1239 and not less than 3.0 mtrs long buried vertically in a pit of 350x350 mm size and filled with alternate layers of charcoal, salt and river sand and pipe with a funnel at the other end, clamped to the pipe electrode with brass bolts, nuts and washers. GI pipe electrodes shall be cut tapered at the bottom and provided with holes of 12 mm dia. drilled not less than 75mm from each other upto 2 Mtrs. length from bottom. The top

end of the pipe shall be threaded and provided with G.I cap. A hole shall be provided at 100 mm from the top end to receive a 13 mm bolt with double nuts and washers. The funnel and the earth lead connections shall be enclosed in a masonry precast chamber/inspection pit. The chamber shall be provided with C.I frame and C.I cover. A proper permanent identification tag/label/earth cable marker shall be provided for each electrode.
All earth strips shall be jointed as follows:

Copper: Copper riveting with 80mm fish plate and brazing with at least 80mm brazing as a lap joint along the length.

Galvanized: Lap welding with 50mm minimum lap Steel: Overlay - not less than 50 mm in all cases.
General

Earthing material:
Materials of which the protective system is composed shall be resistant to corrosion or be adequately protected against corrosion. Adequate margin for corrosion should be taken for the selection of the size. The material shall be as specified in the schedule of quantities BOQ and shall comply to the following requirements:-
Copper - When solid or stranded copper wire is used it shall be of the grade ordinarily required for commercial electrical work generally designated as being of 97% conductivity when annealed, conforming to Indian standard specifications as per IEEE 80 A.

Galvanized Steel - Galvanized steel used shall be thoroughly protected against corrosion by hot dipped Zinc coating. The material coating shall withstand the test specified in IS/IEC 62305.
Each installation shall have one common earth grid connected to at least two groups of earth electrodes.
The earth grid shall extend throughout the installation in the form of a ring circuit with branch connections to the equipment and structures to be earthed.
The Contractor shall install the entire earthing system and complete all earth connections for the plant. Installation of earthing electrode, earthing conductor, excavation, back filling etc. wherever required is in the scope of Contractor.
Above ground, 50x 6 mm Tinned copper flat / GI strip shall be run on cable trays or any support by clamping at interval not exceeding 1500mm. These earth conductors shall be connected to the earth mat through 50 x 6mm M.S. riser. Taps from the above earth conductor shall be used in earthing equipment and structure.
When riser from underground mat have been provided for equipment earthing, the equipment conductor shall be welded to the riser at one end and its other end shall be connected to the equipment, in case the riser length is not adequate.
All earth conductors shall be painted black for easy identification. Wherever earthing strips are welded bituminous paint shall be applied. All earth conductor connection shall be made by electric arc welding unless otherwise specified.
Bolted earthing connection shall be used for equipment earthing. The contact surface shall be thoroughly cleaned before connection.

Equipment will generally be furnished with two separate earth pads with tapped holes, bolts and spring washers. If however, the same are not furnished, Contractor shall drill and tap holes and provide bolts and spring washers for connection.
Equipment earth connection, after checked and tested by the Engineer, shall be coated with anti-corrosive paint/cold compound.
Whether specifically shown or not, all conduits, trays, cable armour and end box, electrical equipment such as switchboards, panels, cabinets, junction boxes, local push button stations etc. shall be effectively earthed.
To make an effectively earthed 415V system, the earth bus of all 415V switchboards, MCCs shall be connected to earth grid at two different and distinct points unless otherwise specified.

Resistance to Earth
No earth electrode shall have a greater ohm resistance than 1 Ω as measured by an approved earth testing apparatus. In rocky soil the resistance may be up to 10 Ω.

11.0. ABBREVIATIONS:

ACB	Air Circuit Breaker
AHU	Air Handling Unit
APFC	Automatic Power Factor Correction
BMS	Building Management System
DB	Distribution Board
DG	Diesel Generator
DP	Double pole
ELDB	Emergency Light Distribution Board
FF	First Floor
FFL	Finished Floor Level
FRLS	Fire Retardant Low Smoke
GF	Ground Floor
GI	Galvanized Iron
HP	Horse Power
IEC	International Electrotechnical Commission
IP	Ingress Protection
IS	Indian Standard
KV	Kilo Volt
KVA	Kilo Volt Ampere
KW	Kilo Watts
LDB	Light Distribution Board(s)
LED	Light Emitting Diode
LT	Low Voltage Transmission / Low Tension
LV	Low Voltage
MCB	Miniature Circuit Breaker
MCC	Motor Control Centre
MCCB	Moulded Case Circuit Breaker
MDO	Mechanical Draw out

MFM	Multi-Function Meter
MLP	Main Lighting Panel
MPPL	MJA Pharmatech Private Limited
MS	Mild Steel
OLTC	On Load Tap Changer
PCC	Power Control Centre
PDB	Power Distribution Board
PLC	Programmable Logic Controller
PVC	Poly Vinyl Chloride
RCBO	Residual Current & Over current Circuit Breaker
RCCB	Residual Current Circuit Breaker
RMU	Ring Main Unit
RPDB	Raw Power Distribution Board
SDP	Sub-Distribution Panel
SLD	Single Line Diagram
SPD	Surge Protection Device
SP	Single pole
SS	Stainless Steel
SWG	Standard Wire Gauge
TN-S	Terra Neutral - Separate
TP	Triple pole
UPS	Uninterrupted Power Supply
UPSDB	Uninterrupted Power Supply Distribution Board
VCB	Vacuum Circuit Breaker
VFD	Variable Frequency Drive
XLPE	Cross Linked Polyethylene

12.0. ANNEXURES:

1	TENDER DRAWINGS – ANNEXURE-2 (ATTACHED SEPERATELY)
2	TRANSFORMER TECHNICAL DATA SHEET- ANNEXURE-3 (ATTACHED SEPERATELY)

13.0. SAFETY REQUIREMENTS

SCOPE

This section covers the requirements of items to be provided in the sub-station for compliance with statutory regulations, safety and operational needs or as per MSEDCL requirements.

REQUIREMENTS

Safety provisions shall be generally in conformity with appendices (A) and (C) of CPWD General Specifications of Electrical Works (Part I-Internal), 2013. In particular following items shall be provided:

Insulation Mat

Insulation mat (Rubber Checker mat) conforming to IS 15652: 2006 or amended upto date shall be provided in front of main switch boards as well as other control equipments having mat size 2000 x 1000 x 12 mm thick, 1100 V grade.

First Aid Charts and First Aid Box

Wooden framed glass fronted shock treatment chart written in English & Local Language as per IE rules fixed to wall. Standard first aid boxes containing materials as prescribed by St. John Ambulance brigade or Indian Red Cross should be provided in each sub-station.

Danger Plate

Danger Plates shall be provided on HV and LV equipments. LV danger notice plate shall be 200 mm x 150 mm made of mild steel at least 2 mm thick vitreous enameled white on both sides and with the descriptions in signal red colour on front side as required. Notice plates of other suitable materials such as stainless steel, brass or such other permanent nature material shall also be accepted with the description engraved in signal red colour. Danger boards written in English & Local Language of appropriate voltage grade, size and style as required by Electrical Inspectorate.

Fire Extinguishers

Portable CO2 type fire extinguisher 4.5 KG CAP confirming to IS 217185 & having complete erected with necessary clamps made from 50x6 mm M.S. flat with nuts & bolts grounded in wall complete.

Fire Buckets

G.I. bucket round bottom duly painted, & filled with dry sand on floor mounting stand for keeping 3 nos. of bucket made out of 30x30x4mm angle iron welded with 3 hooks & duly painted with one coat of red lead & two coats of sliver paint.

Tool Box

A Standard tool box containing necessary tools with rubber hand gloves required for operation and maintenance shall be provided in the sub-station.

Caution Board

Necessary number of caution boards such as “Man on Line” ‘Don’t Switch on’ etc. shall be available in the sub-station. Approved Single Line Diagram framed in A2 size glass frame in the substation.

***Note*:**

1. ***These specifications are not meant to be exhaustive and prescribe the minimum acceptable standards. Where these do not cover certain items and aspects, the best engineering practice/NCCS's instructions shall be followed.***

2. ***All codes and standards means the latest. Necessary I.S. Codes are mentioned alongwith these specifications and all relevant codes with divisions published on date shall be applicable.***

8.19. **LIST OF APPROVED MAKES**:

Distribution Transformer	:	ABB / SCHNEIDER/ KIRLOSKAR /SIEMENS / CROMPTON/ VOLTAMP/ CG/ CAHORS
Transformer Oil	:	APAR/ OEM STD
LT Panel/ Feeder Pillar	:	TRICOLITE/ ADLEC MUNDKA/ MILESTONE/ STERLING WILSON/ NEPTUNE/ ADVANCE PANLES & SWITCHGEAR LTD/ SHRI SIDDHALINGESHWARA POWER GEARS / LOTUS POWER GEAR/ IMPERIAL ELECTRO CONTROLS PVT LTD./ HERTZ ENTERPRISES ELECTRICALS
HT VCB panel / RMU Panel / HT Metering Panel	:	ABB / SCHNEIDER/ SIEMENS/ CG/C&S/LUCY
APFC Panel	:	TRICOLITE/ ADLEC MUNDKA/ MILESTONE/ STERLING WILSON/ NEPTUNE/ ADVANCE PANLES & SWITCHGEAR LTD/ EQUIVALENT BRAND APPROVED BY NCCS
Metering Kiosk	:	HUPHEN / MSEDCL APPROVED BRAND
Trivector Meter	:	MSEDCL APPROVED BRAND
Cables	:	
HT Cable	:	HAVELLS/RAYCHEM/UNIVERSAL/FINOLEX/ RR KABEL/KEI
LT Cables (Power And Control/Armoured And Unarmoured)	:	HAVELLS/ FINOLEX/ KEI / RR KABEL/BELDEN/POLYCAB
LT 1.1 KV PVC Insulated / FR / FRLS Flexible Cables	:	HAVELLS/ FINOLEX/ KEI / RR KABEL/BELDEN/POLYCAB
PVC Insulated / FR / FRLS Copper Wires	:	HAVELLS/ FINOLEX/ KEI / RR KABEL/BELDEN/POLYCAB
Cable Lug	:	DOWELL/COMET/JAINSON/BRACO/CONNECTWELL
Cable Glands	:	DOWELL/COMET/JAINSON/BRACO
Ht Jointing Kit /Touch proof joint	:	RAYCHEM/DENSON/3M/M-SEAL
Cable Tray	:	BEC/ OBO BETTERMANN/ STEELCRAFT/ MEM/ SLOTCO/ LEGRAND/ MK
Race Ways / Floor Trunking / Wall Channels/ Dlp Trunking	:	MK / OBO BETTERMANN/ LEGRAND / MEM

DWC/HDPE Pipe	:	DURA-LINE / REX / CARLON/ EMTELLE/ GEMINI
Panel Accessories	:	
Potential Transformer	:	AE/PRAGATI/GILBERT & MAXWELL/ MATRIX/ RISHABH/ KAPPA/KALPA / VOLTAMPS / PROK DEVICE
Current Transformer (Cast Resin)	:	AE/PRAGATI/GILBERT & MAXWELL/ MATRIX/ RISHABH/ KAPPA/KALPA / VOLTAMPS / PROK DEVICE
Static Power Meter & Logger	:	ENERCON SYSTEM PVT. LTD. / CG SCHLUMBERGER / L&T
ACB	:	SCHNEIDER / L & T / SIEMENS / ABB /LEGRAND
Moulded Case Circuit Breaker (MCCB), Miniature Circuit Breakers (MCBS), MPCB, Earth- Leakage Circuit Breakers, RCBO, SPD	:	SCHNEIDER / L&T / SIEMENS / ABB /LEGRAND /HAGER
Power/Aux. Contactor	:	SCHNEIDER / L&T / SIEMENS / ABB / LEGRAND
Change Over Switch	:	SCHNEIDER / L&T / SIEMENS / ABB/ LEGRAND
Protection Relay (Numeric Type)	:	AREVA/SIEMENS/L&T/SCHNEIDER
Bi-Metallic Overload Relays	:	ABB / LEGRAND / SCHNEIDER/ SIEMENS/L&T
Earth-Leakage Relays	:	PROK DEVICES / VOLTAMP / L&T / ABB/ SIEMENS
Auxiliary Relay	:	ABB / SCHNEIDER / L&T / SIEMENS
Timers	:	L & T/ MINILEC/ SEIMENS / GE/ SCHNEIDER/ EQUIVALENT
Annunciator	:	MINILEC / EQUIVALENT
Terminals	:	ELMEX / CONNECTWELL/ WAGO/ EQUIVALENT
Push Button	:	TECKNIK / EQUIVALENT
Selector Switch	:	KAYCEE / TECKNIK / SULZER/ EQUIVALENT
Ms / PVC Conduit	:	PRECISION/ DIAMOND/ ISI MARK
ATS With Controller	:	ASCO/CUMMINS/GE/SOCOMEC/L&T
Indication Lamp And Push Button	:	GE/L&T/SIEMENS/SCHNEIDER /ABB/ TECHNIC
Electronic Meter And Logger	:	L&T/CONZERV/SIEMENS/SCHNEIDER
Selector Switch	:	SIEMENS/ L&T/ SCHNEIDER/ABB
Single Phase Preventer	:	ABB/ SIEMENS/ EMERSON/ LEGRAND/OBO
Surge Protection System (SPD)	:	ABB/ SIEMENS/ EMERSON/ LEGRAND/OBO
Electronic Digital Meter	:	ENERCON SYSTEM PVT. LTD. / CG SCHLUMBERGER / L&T / RISHABH /AE/ ABB / C&S/ MECO/ AE/ CONZERV/ SECURE
Single Phase Preventer	:	ABB/ SIEMENS/ EMERSON/ LEGRAND/OBO
Surge Protection System (SPD)	:	ABB/ SIEMENS/ EMERSON/ LEGRAND/OBO
Detuned Reactors	:	L&T/ SIEMENS / SCHNEIDER/ ABB/EPCOS

Power Capacitor, Capacitors & Capacitor Bank	:	L&T/ SIEMENS / SCHNEIDER/ ABB/ EPCOS/ DUCATI/ LEGRAND
Power Capacitor, Capacitors & Capacitor Bank	:	L&T/ SIEMENS / SCHNEIDER/ ABB/ EPCOS/ DUCATI/ LEGRAND
Porcelain Insulators	:	JAYASHREE / W S INSULATORS
Led Light Fixtures	:	WIPRO / PMEA/ HAVELLS/ LIGHTING TECHNOLOGIES
Led Chips	:	CREE / NCHIA/BRIDGELUX
Earthing System	:	ASHLOK/ 3M/ EQUIVALENT
Hume/Np-2 Pipe	:	KK/JAIN SPUN/DAYA SPUN/INDIAN HUME
GI Pipes	:	TATA/JINDAL-HISSAR/SAIL
Batteries	:	EXIDE/ AMARON/ STANDARD/ PANASONIC
MS Angle, Channel, Beams, Flats, Tees, Insert Plates	:	TATA/JINDAL /SAIL

Note- Where no makes are specified, the Contractor shall indicate the make considered, giving complete Technical and samples if called for, for the approval of the NCCS/Consultant.

9. FORMS AND ANNEXURES:

FORM –I

9.1. INFORMATION REGARDING ELIGIBILITY LETTER OF TRANSMITTAL

[***Note: On the letterhead of the bidder including full postal address, email address, telephone no.***]

From:

_____
_____

To,
The Director
National Centre for Cell Science
Savitribai Phule Pune University Campus,
Ganeshkhind
Pune 411007.

SUBJECT: SUBMISSION OF BIDS FOR THE WORK "SITC OF 22/0.415KV, 400 KVA SUBSTATION WITH ALLIED WORKS AT JIDNYASA BLDG., KOTHRUD, PUNE".
Ref.: NIT No. NCCS/MAINT/HT/454D/2023; DT. 01/11/2023

Dear Sir,

Having examined the details given in press notice and bid document for the above work, I/we hereby submit the relevant information.

1. I/we hereby certify that all the statement made and information supplied in the enclosed forms/ Annexures and accompanying statement are true and correct.

2. I/we have furnished all information and details necessary for eligibility and have no further pertinent information to supply.

3. I/we also authorize Officer of NCCS to approach individuals, employers, firms and corporation to verify our competence and general reputation.

4. I/we submit the following certificates in support of our suitability, technical knowledge and capability for having successfully completed the following works:

Name of work :
Certificate from :
Enclosures :
Seal of bidder
Date of submission :

Seal and sign of the bidder

FORM -II

9.2. GENERAL INFORMATION

1	Name of firm	:	
2	Head office address	:	
3	Telephone No.	:	
4	Name of Contact Person	:	
5	Mobile No.	:	
6	E-mail No.	:	
7	Place of incorporation/ registration Year of incorporation/ registration	:	
8	Electrical Contractor License	:	
9	BIS license of Transformer Manufacturer	:	
10	ISO Certification of Transformer & RMU manufacturer	:	

Seal and sign of the bidder

FORM -III

9.3. FINANCIAL CAPABILITIES/ INFORMATION

Financial Analysis – Details to be furnished duly supported by figures in balance sheet/ profit & loss account for the last three years duly certified by the Chartered Accountant, as submitted by the Bidder to the Income Tax Department (Copies to be attached).

Sr. No.	Details	Financial Year		
		2020-21	2021-22	2022-23
i.	Annual Turnover as per Audited Balance Sheet			
ii.	Net Profit			
iii.	Loss if any			

Note : The above data is to be supported by audited balance sheets.

Attach copies of audited balance sheets duly certified by the chartered accountant for all three years (2020-21, 2021-22 & 2022-23). Audited Balance sheet should mention the membership number of chartered accountant issued by ICAI along with full address.

Signature of Chartered Accountant with Seal

SEAL AND SIGN. OF THE BIDDER

FORM -IV

9.4. EXPERIENCE OF COMPLETION OF PROJECTS OF SIMILAR NATURE

(During last seven years ending last day of month previous to the one in which applications are invited)

SR No	Name of work / project and location	Type of work, size and qty	Cost of Work (Rs.)	Date of Commencement	Stipulated date	Actual date	Name and Contact number of the Officer to whom reference may be made

Note: Please attach supporting documents (completion certificates along with order copies) for the above information.

FORM –V

SIMILAR WORKS IN HAND

SR No	Name of work / project and location	Type of work, size and qty	Cost of Work (Rs.)	Date of Commencement	Stipulated date	Name and Contact number of the Officer to whom reference may be made

Note: Please attach supporting documents (order copies) for the above information.

SEAL AND SIGN. OF THE BIDDER

FORM -VI

9.5. DECLARATION FOR NOT BLACK LISTED

(**Affidavit to be furnished on a "non-Judicial" stamp paper worth Rs.100/-)**

Date .....

To,
The Director
National Centre for Cell Science,
Savitribai Phule Pune University Campus,
Pune- 411007.

Dear Sir,

SUBJECT: SITC OF 22/0.415KV, 400 KVA SUBSTATION WITH ALLIED WORKS AT JIDNYASA BLDG., KOTHRUD, PUNE".
Ref.: NIT No. NCCS/MAINT/HT/454D/2023; DT. 01/11/2023.

I / We ..... hereby confirm that our firm has not been banned or blacklisted by any government organization/Financial institution/Court /Public sector Unit /Central Government.

In case the above statement made by us are found to be false or incorrect, you have right to reject our bid at any stage including forfeiture of our EMD and / or PBG and / or cancel the award of contract.

Signature of Bidder : Place :

Name : Date :

Designation :

Seal

SEAL AND SIGN. OF THE BIDDER

FORM -VII

9.6. DETAILS OF TECHNICAL & ADMINISTRATIVE PERSONNEL

SR No	Name	Designation	Qualifications	Professional experience	How these would Be involved in this work
1	2	3	4	5	6

Seal and sign of the bidder

FORM -VIII

9.7. DETAILS OF PLANT AND EQUIPMENT

Sr.No	Name of equipment	Qty	Capacity or Type	Remark
1	2	3	4	5

Seal and sign of the bidder

FORM IX

9.8. SOLVENCY CERTIFICATE FROM BANKERS

This is to certify that to the best of our knowledge and information M/s./Sri._____ having marginally noted address_____, a customer of our Bank are / is respectable and can be treated as good for any engagement upto a limit of Rs. ___ (Rupees ____ only).

This certificate is without any guarantee or responsibility on the Bank or any of the officers and valid for one year from date of issue.

(Authorized Signature)

For the Bank

NOTE –

(1) Banker's certificates should be on letter head of the Bank, sealed in cover addressed to tendering authority.

(2) In case of partnership firm, certificate should include names of all partners as recorded with the Bank.

ANNEXURE- I

9.9. FORM OF BANK GUARANTEE

In consideration of the Director (herein after called “National Centre for Cell Science, Pune”) having offered to accept the terms and conditions of the proposed agreement between_____ and _____ (Hereinafter called “the said Contractor(s)”) for the work_____ (Hereafter called “the said agreement”) having agreed to production of an irrevocable Bank Guarantee for Rs.__. (Rupees_____ only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We__(Hereinafter referred to as “the Bank”) hereby (Indicate the name of the Bank) undertake to pay to the National Centre for Cell Science, Pune an amount not exceeding Rs.__. (Rupees_____ only) on demand by the National Centre for Cell Science, Pune.

2. We__ do hereby undertake to pay the amounts due (indicate the name of the Bank) and payable under this Guarantee without any demure, merely on a demand from the National Centre for Cell Science, Pune 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 Rs.__. (Rupees_____ only).

3. We, the said bank further undertake to pay to the National Centre for Cell Science, Pune any money so demanded notwithstanding any dispute or disputes raised by the 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 there under and the contractor(s) shall have no claim against us for making such payment.

4. We __further agree that the guarantee herein (indicate the name of the bank) contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the National Centre for Cell Science, Pune 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 National Centre for Cell Science, Pune 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__ further agree with the National Centre for Cell Science, Pune that (indicate the name of the bank) the National Centre for Cell Science, Pune 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 any time or from time to time any of the powers exercisable by the National Centre for Cell Science, Pune against the said contractor(s) and to for bear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance, act of omission on the part of the National Centre for Cell Science, Pune or any indulgence by the National Centre for Cell Science, Pune to the said Contractor 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 contractor(s).

7. We__ lastly undertake not to revoke this (indicate the name of the bank) guarantee except with the previous consent of the National Centre for Cell Science, Pune in writing.

8. This guarantee shall be valid upto__ unless extended on demand by National Centre for Cell Science, Pune. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs.__. (Rupees_____ only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated the__ day of__ for__.

(Name of Bank)

SEAL AND SIGN. OF THE BIDDER

ANNEXURE- II

9.10. ARTICLES OF AGREEMENT

(*ON NON-JUDICIAL STAMP PAPER OF RS. 500/-*)

This Contract Agreement made on this____day of___20__ w.e.f.___ day of _____20__ for the work of _____dated_____Between

M/s._____ (refer note) in the town of _____hereinafter called "THE CONTRACTOR" (which term shall unless excluded by or repugnant to be subject or context include its successors and permitted assigns) of the ONE PART

AND

National Centre for Cell Science, a society registered under the Societies Registration Act and having its office at Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007 hereinafter called the "NCCS" (which term shall unless excluded by or repugnant to the subject or context include its successes and assigns) of the OTHER PART.

WHEREAS

a. The NCCS is desirous that the Works of _____NCCS, Pune (Tender Ref. No. _____dt._____) should be executed as mentioned, enumerated or referred to in the tender including Press Notice Inviting Tender, Detailed NIT, General Conditions of the Contract, Special Conditions of the Contract, Specifications, Drawings, Plans, Time Schedule of completion of jobs, Schedule of Quantities and Rates, Agreed Variations, other documents, Pre bid minutes, has called for Tender.

b. The contractor has inspected the site and surroundings of the work specified in the tender documents and has satisfied himself by carefully examination before submitting his tender as to the nature of the surface, strata, soil, sub-soil and grounds, the form and nature of the site and local conditions the quantities, nature and magnitude of the work the availability of labour and materials necessary for the execution of work, the means of access to site, the supply of power and water thereto and the accommodation he may require and has made local and independent enquiries and obtained complete information as to the matters and things referred to or implied in the tender documents or having any connection therewith, and has considered the nature and extent of all the probable and possible situations, delays, hindrances or interferences to or with the execution and completion of the work to be carried out under the contract, and has examined and considered all other matters, conditions and things and probable and possible contingencies, and generally all matters incidental thereto and ancillary thereof affecting the execution and completion of the work and which might have influenced him in making his tender.

c. The tender documents including the NCCS's Press Notice Inviting Tender, Detailed NIT, General conditions of contract, Special Conditions of Contract, Schedule of Quantities and rates, General obligations, Specifications, Drawings, plan, time schedule for completion of work, Pre bid minutes, TCD Negotiation if any. Letter of Acceptance of tender, Work order, all correspondence related this work and any statement of agreed variations with its enclosures copies of which are hereto annexed form part of this contract though separately set out herein and are included in the expression Contract wherever herein used.

d. Contractor shall not claim any escalation in contract rate for rise in prices of materials/labour etc. during the completion of work and shall complete the work at contracted rate which shall be valid for period ___ month from the date of issue of Work Order. In case of extension in the time period for execution of the contract beyond period ____ month, for any reasons of delay, he shall not be eligible for escalation and the NCCS decision in this respect shall be final and binding on the contractor.

AND WHEREAS

The NCCS accepted the tender of M/s._____ (refer note__) (CONTRACTOR) for the Works of_____ at NCCS, Pune and issued work order letter Ref.No._____ dated ___at the total cost of Rs.__ (Rupees ____) as rates stated in the Schedule of quantities for the work and accepted by the NCCS (hereinafter called the Schedule of Rates) upon the terms and subject to the conditions of the contract.

NOW THIS AGREEMENT WITNESSTH & IT IS HEREBY AGREED AND DECLARED AS FOLLOWS.

1. In consideration of the payment to be made to the contract for the work to be executed by him, the contractor hereby convenient with the NCCS that the contractor shall and will duly provide, execute, complete and maintain the said work and shall do and perform all other acts and things in the contract mentioned or described or which are to be implied and there from or may be reasonably necessary for the completion of the said works and at the said times and in the manner and subject to the terms and conditions or stipulations mentioned in the contract, AND

2. In consideration of the due provisions execution, completion and maintenance of the said work, the NCCS does hereby agree with the contractor that the NCCS will pay to contractor the respective amounts for the work actually done by him and approved by the NCCS at the Schedule or Rates and such other sum payable to the contractor under provision of the contract, such payment to be made at such time in such manner as prescribed for in the contract.

3. It is specifically and distinctly understood and agreed between the NCCS and the contractor that the contractor shall have no right, title or interest in the site made available by the NCCS for execution of the works or in the building, structures or

works executed on the said site by the contractor or in the goods, articles, materials, etc. brought on the said site (unless the same specifically belongs to the contractor) and the contractor shall not have or deemed to have any lien whatsoever charge for unpaid bills will not be entitled to assume or retain possession or control of the site or structures and the NCCS shall have an absolute and unfettered right to take full possession of site and to remove the contractor, their servants, agents and materials belonging to the contractor and lying on the site.

4. The dispute or difference if any, relating to this agreement or any document appended hereto shall be settled by arbitration under the provisions of Indian Arbitration & Conciliation Act, 1996 or any rules and regulations framed there under within the Jurisdiction of Pune and the Jurisdiction of Arbitration shall be the city of Pune only.

In Witness whereof the parties hereto have here-into set their respective hands and seals in the day and the year first above written.

Signed and delivered for and on behalf of NCCS	Signature and delivered for and on behalf of the contractor
NCCS, Pune	CONTRACTOR
Address : Date : Place :	Address : Date : Place :

In presence of following witnesses

1 Signature : Name :	1. Signature : Name :
2 Signature : Name :	2. Signature : Name :

{NOTE:
FOR PROPRIETORY CONCERN
Shri……s/o……r/o……carrying on business under the name and style of……at…… (Hereinafter called the said Contractor which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives).

FOR PARTNERSHIP CONCERN

M/s ……a partnership firm having its registered office at …… (Hereinafter called the said Contractor which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives). The partners of the firms are:
i) Shri …….s/o……, And
ii) Shri ……s/o……etc.

FOR COMPANIES
M/s ……a company duly incorporated under the Indian Companies Act, 1956 and having its registered office at ……in the state of …… (Hereinafter called the said Contractor which expression shall unless the context requires otherwise include its successors and assign). }

ANNEXURE- III

9.11. INDEMNITY BOND

(*ON NON-JUDICIAL STAMP PAPER OF Rs.500/-)*

This deed of Indemnity is made this _____day of___20__ between

M/s._____, (hereinafter called "The Contractor" which expression shall unless repugnant to the context or meaning Thereof include its successors and assigns) of the FIRST PARTY and

Director, National Centre For Cell Science, Pune, an Institute having its Registered Office at Savitribai Phule Pune University Campus, Ganeshkhind, Pune 411007 (hereinafter called the "NCCS" which expression shall unless repugnant to the context or meaning thereof include its successors and assigns) of the SECOND PARTY.

WHEREAS the Contractor has, interalia, agreed with the Institute to execute the work _____on the Terms & Conditions contained in the Notice Inviting Tender No: ____between the Institute and the Contractor.

Whereas the Contractor has to furnish an Indemnity of the said Agreement. It is now agreed by and between the Parties hereto as follows:

1. In accordance with the said Agreement, on the Contractor furnishing this Indemnity, the Contractor hereby undertakes to indemnify the Institute and keep the Institute indemnified from time to time against any loss caused due to mishandling, mis- operating or improper maintenance etc. or damage caused to or suffered by the Institute by reason of any breach or breaches on the Contractor's art of any of the Terms & Conditions contained in the said Agreement and in the event the contractor shall make any default or defaults in carrying out any of the works under the said Agreement or otherwise in observance or performance of any of the Terms & Conditions relating thereto in accordance with the true intent and meaning thereof, the Contractor shall forthwith on demand and without demur pay to the Institute such sum or sums as may be claimed by the Institute as losses, damages, costs, charges or expenses by reason of such default or defaults on the Contractor's part.

2. Notwithstanding anything to the contrary in these presents or in the said Agreement The Institute's decision as to whether the Contractor has made any default or defaults or the amount or amounts to which the Institute is entitled by reason thereof will be binding on the Contractor for the purpose of this Indemnity and the Contractor shall not be entitled to ask the Institute to establish its claim or claims under this Indemnity but will pay the same on demand without any objection provided always the mutual rights under the said Agreement shall not in any way

be prejudiced by reason of such demand by the Institute and payment by the Contractor under this Indemnity and the claims under the said Agreement (which Shall be settled in accordance with the said Agreement) without prejudice to the Institute's rights to demand immediately under this Indemnity and the Contractor's liability to pay the same.

3. This Indemnity shall continue and hold good until it is released by the Institute in writing on the Contractor's application after expiry of relative Guarantee period of the said Agreement and after the contractor has discharged all his obligations under the said Agreement and submitted a “NO DEMAND CERTIFICATE” from the Institute under the said Agreement. The Indemnity Bond shall be valid for a minimum period of CONTRACT PERIOD and renewable thereof (Claim Period).

4. The Institute will have the fullest liberty from time to time to enforce or forbear to enforce any of the Terms & Conditions of the said Agreement and the Contractor shall not be released from his / their liability under this Indemnity by the exercise of the Institute 's liberty with reference to the matters aforesaid or by reason of any time being given to the Contractor or any forbearance, act or omission on the Institute's part or any indulgence by the Institute to the Contractor or by any variations or modifications of the said Agreement or any other act, matter or thing whatsoever on the Institute's part.

5. This Indemnity and the powers and provisions herein contained are in addition to and not by way of limitation or substitution for any other guarantee, indemnities hereto before given to the Institute by the Contractor and this indemnity does not revoke or limit such indemnities or guarantee.

IN WITNESS WHEREOF the Parties hereto have executed these presents the day the year First hereinabove written.

Name and sign of the Contractor

Engineer in Charge
NCCS, Pune

In the presence of following Witness

1. _____

2._____

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10. TECHNICAL SPECIFICATION CHART FOR PRODUCT TO BE OFFERED:

1	Reference Standard	IS 1180 (Part-1):2014 Star rating approved by BEE) or amended upto date	
2	Rating	400 KVA	
3	Type of cooling	Mfg to give details	
4	Number of phases	Mfg to give details	
5	Rated frequency	Mfg to give details	
6	Neutral earthing	Mfg to give details	
7	Rated voltage at no load HV/LV (in kV)	Mfg to give details	
8	Corresponding Highest System Voltage	Mfg to give details	
9	Connection (HV/LV) & Vector group	Mfg to give details	
10	Rated Basic Insulation level- HV line / LV line	Mfg to give details	
11	Type of Tap changer	Mfg to give details	
12	Tap range, Number of steps, Step size & Location	Mfg to give details	
13	% Impedance volts at 75 deg C, rated current	Mfg to give details	
14	Total losses at 50% loading in kW		
15	Total losses at 100% loading in kW		
16	% Efficiency at 75 Deg C @ Unity PF & @ 0.8 PF a. 100% Load b. 75% Load c. 50% Load		
17	% Regulation at Full load and at UPF / at 0.8		
18	Terminal Arrangement	Mfg to give details	Mfg to give details

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ANNEXURE-I

SPECIFIC TECHNICAL REQUIREMENT FOR 22 KV RING MAIN UNIT

Sr.No.	Description	22 kV
1.0	**SWITCHGEAR ASSEMBLY**	
1.1	Make	Mfg to give details
1.2	Type	Outdoor
1.3	Reference Standard	IEC 56, IEC 129,IEC298, IEC694, IEC 265
1.4	Voltage (Normal/Max.) kV	22kV/24 kV
1.5	Phase (Nos.)	3 nos
1.6	Frequency (HZ)	50 □ 3 Hz
1.7	Short Circuit rating	
	a) Breaking Symmetrical (KA)	16 kA
	b) Breaking Asymmetrical (KA)	16 kA
	c) Short time for 1 Sec. (KA)	16 kA
	d) Short time for 3 Sec. (KA)	16 kA
1.8	Insulation Level	
	a) Impulse withstand (KV peak)	125 kVp
	b) 1 Minute 50 Hz. Voltage withstand (KV rms)	50 kV
1.9	Metal Clad Construction	Yes
1.10	a) Degree of protection for outerenclosure: b) Degree of protection for main tank	IP 54 IP 67
1.11	Switchgear completely wire and tested at factory (yes/No)	Yes
2.0	**CONSTRUCTION**	
2.1	Overall Dimensions	Mfg to give details
a	Total Non-Extensible 3 Way RMU	
	i) Width (W) (mm)	Mfg to give details
	ii) Depth (D) (mm)	
	iii) Height (mm)	
2.2	Overall Weight of Total Non-Extensible 3 way RMU Unit	Mfg to give details
3.0	**Bus bar**	
3.1	Make	Mfg to give details
3.2	Material & Grade	Copper
3.3	Reference Standard	IEC 129
3.4	a) Cross sectional area (mm2)	400 sq.mm
	b) Size (mm2)	
3.5	Continuous Current	
	a) Standard	630 A
	b) At site conditions and within cubicle	630A
3.6	Maximum temperature rise overambient (c)	55 □C (above ambient of 50 □C)
3.7	Short time current for 1 Sec. (KA rms)	16

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3.8	Minimum clearance from bare bus bar connection	Mfg to give details
	a) Phase to phase (mm)	
	b) Phase to Earth (mm)	
3.9	Bus Bar provided with	
	a) Insulation Sleeve	Yes
	b) Phase barriers	Yes
	c) Cast Resin shrouds for joints	Yes
3.10	Busbar connection	
	a) Silver Plated	Yes
	b) Made with anti-oxide grease	Yes
3.11	Bus Bar support spacing (mm)	Mfg to give details
3.12	Bus support insulators	
	a) Make	
	b) Type	
	c) Reference Standard	
	d) Voltage Class (KV)	
	e) Minimum creepage distance (mm)	
	f) Cantilever strength Kg/mm2	
	g) Net Weight (Kg)	
3.13	SF6 gas pressure (filing pressure at 20deg. C)	Mfg to give details
4.0	**SF6/VCB CIRCUIT BREAKER**	
4.1	Make	Mfg to give details
4.2	Type (Vacuum/ SF6)	Mfg to give details
4.3	Reference Standard	IEC 56
4.4	Rated Voltage	22 kV
4.5	Rated Frequency	50 Hz
4.6	No. Of Poles	3
4.7	Rated Current	
	a) Normal (Standard) Amps	200 A
	b) Rated (Site) Amps	200 A
4.8	Maximum temperatures rise overambient.(deg. C)	55 °C (above ambient of 50 °C)
4.9	Rated operating Duty	O- 3min- CO-3min- CO
4.10	Rupturing capacity at rated voltage (MVA)	400
4.11	Breaking Capacity at rated voltage &operating duty	
	a) Symmetrical (KA rms)	16
	b) Asymmetrical (KA rms)	16
4.12	Rated making current (KA peak)	40
4.13	a) Short time current for 1 Sec.(KArms)	16
	b) Short time current for 3 Sec.(KArms)	16
4.14	Transient Recovery Voltage	

	a) Rate of rise (KV/ms)	0.34 KV/micro sec (as per IEC)
	b) Peak Voltage (KV)	23 (35 % DC component)
4.15	Insulation Level	
	a) Impulse Voltage with stand on 1/50full wave	125
	b) 1 minute 50Hz voltage withstand	50
4.17	Opening time Maximum No load condition (ms)	40-60
4.18	Opening and closing time under SF6 gas loss or vacuum loss condition (ms)	40-60
4.19	At 100% Breaking capacity	
	a) Opening time – max (ms)	40-60
	b) Arcing time – max (ms)	6-9
	c) Total break time (ms)	40-60
4.20	At 60% Breaking capacity	
	a) Opening time – max (ms)	40-60
	b) Arcing time – max (ms)	6-9
	c) Total break time (ms)	40-60
4.21	At 30% Breaking capacity	
	a) Opening time – max (ms)	40-60
	b) Arcing time – max (ms)	6-9
	c) Total break time (ms)	40-60
4.22	At 10% Breaking capacity	
	a) Opening time – max (ms)	40-60
	b) Arcing time – max (ms)	6-9
	c) Total break time (ms)	40-60
4.23	Number of breaks per pole	Single
4.24	No of breaker operations permissiblewithout requiring inspection replacement of contacts and other main parts.	
	a) At 100% rated current	2000 & 40 Nos at 16 kA
	b) At 100% rated breaking current	
4.25	Type of contacts	
	a) Main	Copper chromium, Butt type
	b) Arcing	Copper chromium
4.26	Material of contacts	
	a) Main	Copper chromium
	b) Arching	NA for VCB 1260 N (126 kg)
	c) Whether contacts silver plated	NA
	d) Thickness of silver plating	NA
4.27	Operating mechanism- closing	
	a) Type	STORED ENERGY
	b) No of breaker operations stored	One Tripp free

	C) Trip free or fixed trip	NA (Anti reflex onEarthing)
	d) Anti pumping features provided	
	e) Earthing for operating mechanism and metal parts furnished	Mfg to give details
	f) Earth terminal size and material	Mfg to give details
4.28	Operating mechanism- tripping	
	a) Type	Mfg to give details
	b) No of breaker operations stored	One
	c) Trip free or fixed trip (V)	Tripp free
	d) Anti pumping features provided (%)	NA
	e) Earthing for operating mechanism and metal parts furnished	Mfg to give details
	f) Earth terminal size and material	
4.29	Spring charging mechanism	
	2) Make	Mfg to give details
	3) Type	
	4) Size	
	5) Rating	
4.30	Breaker suitable for capacity switching 4 operating duty 5Max.rating of capacitor bank that can be safely controlled	Yes
4.31	Tripping coil	
	a) Voltage	Mfg to give details
	b) Permissible voltage variation (%)	
	c) Tripping current at rated voltage (A)	
	d) Power at rated voltage (W)	
	e) 2-Over current trip with TLF (5A) and 1-earth fault furnished as specified	
4.32	Breaker /Accessories such as control switch indication Lamps etc. furnished	Mfg to give details
	as specified :(please attach separate sheet giving details of all accessories, inter locks and safety shutters)	
	a) Mechanical safety Interlock	Yes
	b) Automatic Safety Interlock	No
	C) Operational Interlock	Yes
	d) Emergency manual trip	Yes
	e) Operation counter	Yes
	f) Charge /discharge indicator	Yes
	g) Manual spring charging facility	Yes

4.33	Impact load foundation design (to include dead load plus impact value On opening at maximum interrupting rating) (KG)	Mfg to give details
5.0	**Isolators**	
5.1	Make	Mfg to give details
5.2	Type	Mfg to give details
5.3	Reference standard	IEC129
5.4	Rated voltage (KV)	24
5.5	Rated Frequency HZ	50
5.6	No. Of poles (No)	3
5.7	Rated current	
	i) Normal (Standard) Amps	630
	ii) Derated (site) Amp	630
5.8	Maximum temperature rise overambient Deg. C	55 C (above ambient of 50 C)
5.9	Rated operation duty	O – 3min-CO-3min-CO
5.10	Rupturing Capacity at rated voltage MVA	Mfg to give details
5.11	Rated making current KA peak	Mfg to give details
5.12	Short time current	
	a) For 1 sec KA rms	16
	b) For 3 sec KA rms	16
5.13	Impulse voltage withstand on 1/50 full wave	125
5.14	Maximum over voltage factor whenswitching off a) Loaded feeder cable	Mfg to give details
5.15	Operating SF6 Gas pressure	0.5 bar G at 20 deg C
5.16	No of isolator operation permissiblewithout requiring inspection, replacement of contacts and other main parts At 100% rated current	Yes
	At 100% rated breaking current	
5.17	Isolator provided with the followingMechanical safety Mechanical ON, OFF, CABLE earth indicators Operation counter Manual spring charging facility	Yes
5.18	Impact load for foundation design (Toinclude dead load plus impact Values on opening at maximum interrupting rating) Kg	Mfg to give details
6.0	**CURRENT TRANSFORMER**	
6.1	Make	Mfg to give details
6.2	Type & voltage level	Mfg to give details
6.3	Reference standard	IEC 298
6.4	C.T. ratio as specified	100-50/1 A

6.5	Rated frequency	50
6.6	Short circuit withstand i) Short time current for 1 sec. KA rms j) Short time current for 3 sec. KA rms k) Dynamic current KA peak	Mfg to give details
6.7	Class of insulation	Mfg to give details
6.8	Temperature rises over ambient. Deg.C	Mfg to give details
6.9	Basic insulation level	
6.10	For trippingCT RATIO Class of accuracy	
	Rated Burden VA	
	Knee Point Voltage V	
	Excitation Current at Vk/2 Amps	
	Rated Saturating Current Amps	
	Over Current Rating	
	Continuous % Over Load %	
7.0	**Cable terminations**	
7.1	Circuit Breaker	
	Type	Mfg to give details
	Materials	
	Dimensions	
	Size	
	Height of Cable box from ground Level	
	Arrangement for supplying bus end cable box furnished for extensible ringmain Unit	Mfg to give details
	Arrangement for mounting an extracable box on each equipment furnished	
7.2	Isolator	
	Type	Mfg to give details
	Materials	
	Dimensions	
	Size	
	Height of Cable box from ground Level	
	Arrangement for supplying bus end cable box furnished for extensible ring main Unit	
	Arrangement for mounting an extra cable box on each equipmentfurnished	Mfg to give details
8.0	**Name Plate**	
8.1	Material	Mfg to give details
8.2	Thickness	
8.3	Size for	
	Breaker Cubicle	
	Instruments / Devices	
9.0	**Painting**	
9.1	Finish of Breaker	

	Inside	Mfg to give details
	Outside	
9.2	Finish of Isolator	
	Inside	
	Outside	
10.0	**Drawing / Data**	
10.1	General arrangement for Panel Board	Mfg to give details
10.2	Foundation plan	
10.3	SF6/VCB tripping and material Schematic	
10.4	SF6/VCB LT panel wiring diagram	

11. CHECK LIST OF DOCUMENTS SUBMITTED:

Sr No.	Particulars	Submitted (Yes No)	Remark
1	Two separate bids i.e. Technical and Commercial submitted in single envelope dully sealed.		
2	Earnest Money Deposit (EMD)		
3	Copy of Registration certificate of firm (Shop Act/ Company Registration)		
4	Copy of valid Electrical Contractor License		
5	Copy of PAN card		
6	Copies of IT return and balance sheets for last three years		
7	Copy of GST Registration.		
8	Copy of ISO Certifications for Transformer & RMU Manufacturer		
9	Copy of BIS Certification for Transformer Manufacturer		
10	Copies of similar supporting work orders with completion certificate		
11	List and clients indicating quantum of work executed with them		
12	Form- Letter of Transmittal		
13	Forms / Annexures		
14	Technical Specification of chart of equipment to be offered with OEM catalogues, brochures, Drawings etc.		
15	Seal signed copy of Pre-bid meeting minutes		
16	Detailed tentative BAR Chart		

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