



భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్  
भारतीय प्रौद्योगिकी संस्थान हैदराबाद  
Indian Institute of Technology Hyderabad

**NOTICE INVITING TENDER  
(NIT)**

**Name of the work: Supply, Installation, Testing and Commissioning of 11kV, 630kVA Compact Sub-Station (CSS) with CRT DRY Type Transformer for TiHAN complex expansion, IIT Hyderabad campus, Kandi, Sangareddy.**

**Executive Engineer - Electrical  
IIT Hyderabad**

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# INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

## NOTICE INVITING TENDER

NIT No. IITH/CMD/ELE/NIT/2023-24/06

Indian Institute of Technology Hyderabad invites on behalf of the President of India online bids (e-tenders) in Item rate / ~~Percentage rate~~ in Two Bid (Technical Eligibility + Financial) system, from the approved OEMs of Compact secondary substation (CSS) or the authorized channel/business partners with CSS OEM or eligible Electrical contractors of CPWD and those of appropriate list of M.E.S. / BSNL/ Railways/ State P.W.D./Central PSUs/State Govt. departments/Central Govt. Departments /working Electrical contractors of IIT Hyderabad for the following work as per the stipulated terms and conditions mentioned below:

Copy of valid Registration of Firm (ROF) certificate, PAN card, GST Registration certificate & GSTIN should accompany the Technical Bid and those certificates should be valid on the last date of submission of bid.

1.1	NIT No.:	IITH/CMD/ELE/NIT/2023-24/06
1.2	Name of Work:	Supply, Installation, Testing and Commissioning of 11kV, 630kVA Compact Secondary Sub-Station (CSS) with CRT DRY Type Transformer for TiHAN complex expansion, IIT Hyderabad campus, Kandi, Sangareddy.
1.3	Location of work	Indian Institute of Technology (IIT) Hyderabad campus, Kandi-502284, Sangareddy, Telangana, India
1.4	Estimated Cost: (given merely as a rough guide)	Rs. 1,35,71,056/-
1.5	Earnest Money Deposit (EMD):	Rs. 2,71,500/-
1.6	Period of Completion:	120 days
1.7	Date of Online Publication/Download of Tender	13/12/2023 @ 14:00hrs
1.8	Last Date for Submission of Bids	26/12/2023 @ 15:00hrs
1.9	Date and time of Opening of Technical Bids	27/12/2023 @15:30hrs
1.10	Date and time of Opening of Financial Bids	To be Finalized
1.11	Cost of Bid Document:	NIL

## **Instructions to the Bidders for Online Bid Submission**

The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, preparing their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

More information useful for submitting online bids on the CPP Portal may be obtained at: <https://eprocure.gov.in/eprocure/app>.

### **REGISTRATION**

- 1) Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal ([URL: https://eprocure.gov.in/eprocure/app](https://eprocure.gov.in/eprocure/app)) by clicking on the link "Online bidder Enrollment" on the CPP Portal which is free of charge.
- 2) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- 3) Bidders are advised to register their valid email addresses and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
- 4) Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.), with their profile.
- 5) Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC's to others which may lead to misuse.
- 6) Bidder then logs in to the site through the secured log-in by entering their user ID/password and the password of the DSC / e-Token.

### **SEARCHING FOR TENDER DOCUMENTS**

- 1) There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.
- 2) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.
- 3) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

## **PREPARATION OF BIDS**

- 1) Bidder should take into account any corrigendum published on the tender document before submitting their bids.
- 2) Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- 3) Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document/schedule and generally, they can be in PDF / XLS / RAR / DWF/JPG formats. Bid documents may be scanned with 100 dpi with black-and white option which helps in reducing the size of the scanned document.
- 4) To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates, etc.) has been provided to the bidders. Bidders can use the “My Space” or “Other Important Documents” are available to them to upload such documents. These documents may be directly submitted from the “My Space” area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

*Note: My Documents space is only a repository given to the Bidders to ease the uploading process. If Bidder has uploaded his Documents in My Documents space, this does not automatically ensure these Documents being part of Technical Bid.*

## **SUBMISSION OF BIDS**

- 5) Bidder should log into the site well in advance for bid submission.
- 6) Bidder should ensure that they can upload the bid in time i.e., on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
- 7) The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- 8) Bidder has to select the payment option as “offline” to pay the tender fee / EMD as applicable and enter details of the instrument.
- 9) Bidder should prepare the EMD as per the instructions specified in the tender document. The original should be posted/couriered/given in person to the concerned official, latest by the last date and time of bid submission or as specified in the tender documents. The details of the DD/any other accepted instrument, physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise, the uploaded bid will be rejected.

- 10) Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard BoQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BoQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BoQ file is found to be modified by the bidder, the bid will be rejected.
- 11) The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc., The bidders should follow this time during bid submission.
- 12) All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128-bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid opener's public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 13) The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 14) Upon the successful and timely submission of bids (i.e., after Clicking "Freeze Bid Submission" in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
- 15) The bid summary has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgment may be used as an entry pass for any bid opening meetings.

#### **ASSISTANCE TO BIDDERS**

- 16) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.
- 17) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact details of the helpdesk are 0120-4711508, 0120-6277787, 0120-4001002, 0120- 4001005 and support-eproc@nic.in.

**NOTICE INVITING TENDER**  
**NIT No. IITH/CMD/ELE/NIT/2023-24/06**

**Technical Eligibility Criteria:**

1. Bidders shall produce definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below:

Experience of having successfully completed similar works during the last 7 years ending last day of the month previous to the one in which tenders are invited.

**Three similar completed works each costing not less Rs. 54,28,422/- or**

**Two similar completed works each costing not less than Rs. 81,42,634/-or**

**One similar completed work costing not less than Rs. 1,08,56,845/-**

The value of executed works shall be brought to current costing level by enhancing the actual value of work at the simple rate of 7% per annum, calculated from the date of completion to the last date of submission of tender.

***“Similar work” shall mean the SITC (supply, installation, testing and commissioning) of 11kV or above compact secondary substation (CSS) with dry type transformer of minimum rating 500 kVA or SITC of any 11kV or above Indoor/Outdoor substation with minimum transformer rating of 500kVA in any research laboratories/ educational institutions/ universities/hospitals/ commercial complexes/municipal corporations and other organizations etc. The reference substation need to be successfully commissioned and shall be fully operational for a minimum period of 01 year as on previous day of due date of submission of bid.***

(For private works TDS certificate or Form-26 AS in support of value of work done.)

2. **Turnover:** Average annual financial turnover on ~~construction~~ works should be at least **Rs 40,71,317/-** only during the immediate last three consecutive financial years ending 31<sup>st</sup> March 2023. The value of annual turnover figures shall be brought to current value by enhancing the actual turnover figures at simple rate of 7% per annum. The annual turnover certificate from the chartered accountant need to be enclosed by the bidder.
3. **Profit/loss :** The bidder should not have incurred any loss (profit after tax should be positive) in more than two years during available last five consecutive balance sheet (balance sheet in case of private/public limited company means its standalone financial statement and consolidated financial statement both), duly audited and certified by the Chartered Accountant.
4. **Banker's Certificate** from a Commercial Bank or Net worth Certificate:  
Banker's Certificate of the amount equal to **Rs. 54,28,422/-** only issued by any scheduled bank,  
or  
Net worth certificate of minimum **Rs. 13,57,106/-** only issued by certified Chartered Accountant with UDIN as per format enclosed as Annexure-V.
5. The bidder shall submit the Indemnity bond as per format provided in Annexure-II.

6. The bidder shall have a valid electrical contractor license of 11 kV or above voltage levels.
7. The bidder shall submit the authorization certificate from the approved OEM of Compact secondary sub-station (CSS) as per the format enclosed as Annexure-IV.
8. The bidder shall have Employees Provident Fund (EPF) enlistment and proof of the same shall be attached along with the Technical Bid clearly showing the Provident Fund Code number.
9. To become eligible, the tenderer shall have to furnish an affidavit as per Form 'J' of the NIT.
10. Agreement shall be drawn with the successful tenderer on prescribed Form which is available in the website: [https://drive.google.com/file/d/19\\_LkFZ1IeQb\\_3BznXQtinslcLISYVdbo/view](https://drive.google.com/file/d/19_LkFZ1IeQb_3BznXQtinslcLISYVdbo/view) **(with up to date correction slips/amendments if any in accordance with the CPWD guidelines/GOI orders)** Tenderer shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.
11. The time allowed for carrying out the work will be as stated at para 1 from the date of start as defined in schedule 'F' or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the tender documents.
12. The site for the work is available.
13. Tender documents consisting of plans, specifications, the schedule of quantities of the various classes of work to be done and the set of terms & conditions of contract to be complied with by the contractor whose tender may be accepted, and other necessary documents can be seen for information at the above-mentioned website.
14. Applicants are advised to keep visiting the above-mentioned website from time to time (till the deadline for bid submission) for any updates in respect of the tender documents, if any. Failure to do so shall not absolve the applicant of his liabilities to submit the applications complete in all respects including updates thereof, if any. An incomplete application may be liable for rejection.
15. The contractor whose tender is accepted, will be required to furnish performance guarantee of 5% (Five Percent) of the tendered amount within the period specified in Schedule F. This guarantee shall be in the form of Deposit at Call receipt of any scheduled bank/Banker's cheque of any scheduled bank/Demand Draft of any scheduled bank/Pay order of any scheduled bank or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule 'F'. including the extended period if any, the Earnest Money deposited by the contractor shall be forfeited automatically without any notice to the contractor.
16. The description of the work is as follows:

**Supply, Installation, Testing and Commissioning of 11kV, 630kVA Compact Secondary Sub-Station (CSS) with CRT DRY Type Transformer for TiHAN complex expansion, IIT Hyderabad campus, Kandi, Sangareddy.**



Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders 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 tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The tenderer 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 tender by a tenderer 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.

17. Tenders with any condition including that of conditional rebates shall be rejected forthwith.
18. Cost of **Bid document cost** and **EMD** may also be remitted to Institute's account number as per bank particulars given below:

<b>Name of the Account Holder</b>	<b>: Indian Institute of Technology Hyderabad</b>
<b>Account Number</b>	<b>: 30412797764 (Current Account)</b>
<b>Name of the Bank</b>	<b>: State Bank of India</b>
<b>Address of the Bank</b>	<b>: IIT Kandi, IIT Hyderabad Campus, Kandi, Sangareddy, Telangana - 502284</b>
<b>Branch code</b>	<b>: 14182</b>
<b>IFSC code</b>	<b>: SBIN0014182</b>
<b>MICR code</b>	<b>: 502002528</b>
<b>SHIFT code</b>	<b>: SBININBB762</b>

19. The competent authority on behalf of the President of India does not bind itself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the tenders received without the assignment of any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.
20. Canvassing whether directly or indirectly, in connection with tenderers is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.
21. The competent authority on behalf of President of India reserves to himself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.
22. The contractor shall not be permitted to tender for works if his near relative is posted a Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior Engineer (both inclusive). Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Institute.
23. No Engineer of gazette rank or other Gazetted Officer employed in Engineering or Administrative

duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the previous permission of the Government of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractor's service.

24. The tender for the works shall remain open for acceptance for a period of Ninety (90) days from the date of opening of tenders/Sixty days from the date of opening of financial bid in case tenders are invited on 2/3 envelop system (strike out as the case may be) if any tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the tenderer shall not be allowed to participate in the retendering process of the work.

25. **(A) All taxes, Labor Cess etc., as applicable shall be borne by the contractor himself. The contractor shall quote his rates considering all such taxes including GST on works. Any recovery towards GST is notified by the competent authority, the same shall be effected and no claim what so ever shall be entertained by IITH. The contractor shall quote his rates accordingly.**  
**(B) 2% as TDS amount of GST amount payable on the bills will be deducted as per the Govt. of India, Ministry of Finance, Department of Revenue notification vide No.65/39/2018-DOR, dtd: 14-09-2018.**

26. ***GST registration certificate of the state in which the work is to be taken up, if already obtained by the bidder.***

***If the bidder has not obtained GST registration in the state in which the work is to be taken up or as required by GST authorities, then in such a case the bidder shall scan and upload following under taking along with other bid documents.***

***"If the work awarded to me, I/We shall obtain GST registration certificate of the state, in which work is to be taken up, within one month from the date of receipt of award letter or before release of any payment by IIT Hyderabad, whichever earlier, failing which I/We shall responsible for any delay in payments which will be due towards me/us on a/c of the work executed and/or for any action taken by IIT Hyderabad or GST department in this regard."***

27. ***Bidder has to submit Undertaking on their letter head pursuant to the Section 206AB (as applicable) of the Income Tax Act,1961 in prescribed format as enclosed at Annexure-A along with each and every bill submitted for payment.***

28. This notice inviting Tender shall form a part of the contract document. The successful tenderer/contractor, on acceptance of his tender by the Accepting Authority shall within 15 days from the stipulated date of start of the work, sign the contract consisting of :-

a) The Notice Inviting Tender, all the documents including additional conditions, specifications and drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.

- b) Standard Contract form (General Conditions of Contract) as posted in the website of the Institute. The bidder is deemed to have gone through and understood the Standard Contract Form and the General Conditions of Contract.



**Executive Engineer-Electrical  
IIT Hyderabad**

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(Signature of bidder)

**FORM 'I'**

**AFFIDAVIT**

I/we undertake and confirm that our firm/partnership firm has not been blacklisted by any state/Central Departments/PSUs/Autonomous bodies during the last 7 years of its operations. Further that, if such information comes to the notice of the department then I/we shall be debarred for bidding in IIT Hyderabad in future forever. Also, if such information comes to the notice of IIT Hyderabad on any day before date of start of work, the Engineer-in-charge shall be free to cancel the agreement and to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee (Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid)

***NOTE: Affidavit to be furnished on a 'non-Judicial' stamp paper worth Rs.100/-***

Signature of Bidder(s) or an authorized Officer of the firm with stamp

Signature of Notary with seal

**Checklist of documents to be submitted along with Technical Bid**

Sl. No.	Doc Ref	Description of the Document	Enclosed Yes/No	Remarks
	<b><i>Bidder shall submit the following documents for technical scrutiny</i></b>			
1	Registration of Firm (ROF)	Copy of valid Registration of Firm (ROF)		
2	PAN details	Copy of PAN card		
3	GST registration details	Copy of GST Registration certificate & GSTIN should accompany the Technical Bid		
4	Details of similar works executed.	Not less than Rs. 54,28,422/- only of estimated cost (Three similar works)		
		Not less than Rs. 81,42,634/- only of estimated cost (Two similar works)		
		Not less than Rs. 1,08,56,845/- only of estimated cost (One Similar work)		
5	As per Para No. 1.5 of NIT	Cost of EMD Rs. 2,71,500/- only		
6	As per Sl. No.2 of NIT	Copy of Certificate from CA for Average Annual Financial Turnover of Rs. 40,71,317/- only.		
7	As per Sl.No. 3 of NIT	Profit and loss statement with balance sheets for Last 5 financial years		
8	As per Sl.No. 4 of NIT	Copy of Bankers Certificate / Net worth certificate		
9	As per Sl. No. 5 of NIT	Copy of Indemnity bond		
10	As per Sl. No. 6 of NIT	Copy of Valid electrical contractor license for 11kV or above voltage levels.		
11	As per Sl. No. 7 of NIT	Copy of Authorization certificate from CSS OEM		
12	As per Sl. No. 8 of NIT	Copy of EPF enlistment		
13	As per Form-J	Affidavit		
14	As per Sl.No.26 of NIT	Undertaking for GST registration in the state in which the work is to be taken up		
14	As per Sl.No.27 of NIT	Undertaking pursuant to Section 206AB (as applicable) of the Income Tax Act, 1961 (Proforma enclosed as Annexure-A)		

**On Contractor/ Agency's Letter Head**

**Undertaking pursuant to Section 206AB (as applicable) of the Income Tax Act, 1961**

To,  
Registrar  
IIT Hyderabad  
Kandi, Sangareddy- 502284.

Dear Sir/Madam,

**Subject:** Declaration confirming filing of Income Tax Return for immediate two preceding years.

I, Ms./Mrs./Mr. \_\_\_\_\_ in capacity of Authorized Signatory of \_\_\_\_\_ having PAN \_\_\_\_\_ and registered office at \_\_\_\_\_ do hereby declare that \_\_\_\_\_ has filed Income Tax Returns for immediately last 2 preceding Financial Years as mentioned below per due dates under Section 139 (1) of the Income Tax Act, 1961 ('the Act') and details of which are as given under:

<b>Financial Year for which Income Tax Return was due as per Section 139(1)</b>	<b>Acknowledgment no. of ITR filed under Section 139(1)</b>	<b>Date of Filing</b>
2022-23 <i>(if applicable on date of this declaration)</i>		
2021-22		
2020-21		

Further, I confirm that \_\_\_\_\_ has lined the above PAN with Aadhaar number as on this date.

I also undertake that \_\_\_\_\_ hereby indemnify ***Indian Institute of Technology Hyderabad*** for any loss/liability (including any Tax, interest, penalty, etc.) that may arise due to incorrect reporting of above information.

For \_\_\_\_\_

Signature: \_\_\_\_\_

Name of person:

Designation:

Place:

Date:

**PROFORMA OF SCHEDULES**

**SCHEDULE 'A'**

Schedule of quantities (Enclosed): Volume -2 (Price Bid)

**SCHEDULE 'B'**

Schedule of materials to be issued to the contractor

Sl. No.	Description of item	Quantity	Rates in figure & words at which the material will be charged to the Contractor	Place of issue
..... <b>NIL</b> .....				

**SCHEDULE 'C'**

Tools and plants to be hired to the contractor.

Sl. No.	Description	Hire Charges per day	Place of issue
..... <b>NIL</b> .....			

**SCHEDULE 'D'**

Extra schedule for specific requirements/documents for the work, if any.

--- NIL ---

**SCHEDULE 'E'**

Reference to General Condition of Contract.: *Posted in the website of the Institute.*

Name of the work : ***Supply, Installation, Testing and Commissioning of 11kV, 630kVA Compact Secondary Sub-Station (CSS) with CRT DRY Type Transformer for TiHAN complex expansion, IIT Hyderabad campus, Kandi, Sangareddy.***

Estimated cost of work : ***Rs. 1,35,71,046/-***

Earnest money : ***Rs. 2,71,500/-***

Performance Guarantee : ***5.0% of the accepted tendered value***

Security Deposit : ***2.5% of the tendered value***

## **SCHEDULE 'F'**

### **GENERAL RULES AND DIRECTIONS:**

- Officer inviting tender: : ***Executive Engineer-Electrical, IITH***
- Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3 : ***1) Electro-Mechanical works...97.81%***  
***2) Civil foundation works: 2.19%***

### **Definitions:**

- 2(v) Engineer -in- Charge : ***Executive Engineer-Electrical, Indian Institute of Technology, Hyderabad.***
- 2(viii) Accepting Authority : ***Superintending Engineer, Indian Institute of Technology, Hyderabad.***
- 2(x) Percentage on cost materials and Labour to cover all overheads and profit : ***15% (Fifteen) per cent.***
- 2(xi) Standard Schedule of Rate : ***CPWD, Delhi Schedule of Rates (DSR) 2022 E &M, with up to date correction slips.***
- Standard Contract Form : ***IITH General Conditions of Contract for Construction Works***

### **Clause 1**

- i) Time allowed for submission of Performance Guarantee, Programme Chart (Time and Progress) and applicable licenses, registration with EPFO, ESIC and BOCW Welfare Board or proof of applying thereof from the date of issue of letter of acceptance, in days : ***15 (Fifteen) Days***
- ii) Maximum allowable extension beyond the period provided in (i) above : ***7 (Seven) Days with late fee @0.1% of PG Amount***

### **Clause 1A**

- Whether Clause 1A is applicable : ***Yes***

### **Clause 2**

- Authority for fixing Compensation under Clause 2 : ***Superintending Engineer, Indian Institute of Technology, Hyderabad***

**Clause 3 (VII):** If the contractor had secured the contract with Government as a result of wrong tendering or other non-bonafide methods of competitive tendering or commits breach of Integrity Agreement-will be made ineligible.



**Clause 5:**

Number of days from the date of issue of letter of acceptance for reckoning date of start : 15 Days from the date of issue of LOA or handing over of site, whichever is later

Milestones : Not Applicable

Time allowed for execution of work : 120 Days

Authority to give fair and reasonable Extension of time for completion of work (Web based hindrance register) : Superintending Engineer, IITH

Rescheduling of mile stones

: Superintending Engineer, IITH

**Clause 6:- Measurement Book**

Clause applicable, 6

: (i) For works having estimated cost more than Rs 15 Lakh – Clause 6

(ii) For works having estimated cost Rs. 15 Lakh or less – Contractor's option of Clause 6 or to be exercised at the time of Tender Submission

**Clause 7:**

Gross work to be done together with net payment /adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment

: Rs. 5 Lakhs/-

**Clause 7A:**

Whether Clause 7A is applicable

: Yes.  
No running account bill shall be paid for the work till the applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board, whatever applicable are submitted by the contractor to the Engineer-in-charge.

**Clause 10A:**

List of testing equipment to be provided by the contractor at site lab

: As given in additional specifications

**Clause 10B (i)- Secured advance on Materials:**

Whether Clause 10 B (i) shall be applicable

: NA

**Clause 10C:**

Component of labour expressed as percent of value of work

: NA

**Clause 10CA** : Not Applicable

**Clause 10CC** : Not Applicable

**Clause 10D** : Applicable

**Clause 11:**

Specification to be followed for execution of work

: **For ELECTRICAL AND MECHANICAL WORKS**

1. CPWD General Specifications for Electrical works:  
Part I Internal 2023/ Part-II External /  
Part IV Substations 2013
2. CPWD Specifications for Civil Volume-I & II
3. Particular specifications given in the tender.

**Clause 12:**

**12.2 & 12.3:** Deviation limit beyond which Clause 12.2 & 12.3 shall apply for building work

: *100% (One hundred per cent)*

**12.5 :** Deviation Limit beyond which clauses 12.2 & 12.3 shall apply for foundation work

: *100% (One hundred per cent)*

**Clause 14:**

Whether Clause 14 is applicable

: *Yes.*

**Clause 16**

Competent Authority for deciding reduced rates.

: *Superintending Engineer, IIT Hyderabad up to 5% of tendered amount, beyond which, Director, IITH.*

**Clause 18:**

List of mandatory machinery, tools & plants to be deployed by the contractor at site

: *As required for the work.*

**Clause 25:**

Settlement of disputes by Conciliation and Arbitration:

Conciliator

: *Dean (Planning)*

Authority to appoint arbitrator

: *Director, IIT Hyderabad*

Place of arbitration

: *Hyderabad*

Venue of arbitration

: *IIT Hyderabad*

Type of Arbitration Tribunal

: *Sole Arbitrator*

*Note: Provisions of Arbitration and Conciliation Act 1996 with latest amendments in force shall be applicable.*

**Clause 32:** *As required for the work.*

**Clause 38**

(i): Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates

: *Not applicable*

**(ii): Variations permissible on  
theoretical quantities:**

**Applicable**

- |   |  |
|---|--|
| (a) Cement  | <i>2% plus/minus</i>                           |
| (b) Bitumen All Works   | <i>2.5% plus only &amp; nil on minus side.</i> |
| (c) Steel Reinforcement and structural steel sections for each diameter, section and category | <i>2% plus/minus</i>                           |

## **Special Conditions of Contract**

1. Before tendering, the agency shall inspect the site of work and shall fully acquaint himself about the conditions prevailing at site, availability of materials, availability of land and suitable location for construction of godowns, stores and camp, transport facilities, the extent of lead and lifts involved in the work (over the entire duration of contract) including local conditions, as required for satisfactory execution of the work and nothing extra whatsoever shall be paid on this account.
2. The Agency shall at his own expense and risk arrange land for accommodation of labour, setting up of office, the storage of materials, erection of temporary work-shops, and construction of approach roads to the site of the work including land required for carrying out of all jobs connected with the completion of the work. In any case. **IIT Hyderabad (Institute) shall not permit setting up of labour camps within its premises.** If during construction it becomes necessary to remove or shift the stored materials shed workshop, access roads, etc. to facilitate execution of any other work by any other agency, the contractor shall do as directed by the Engineer-in-charge and no claim whatsoever, shall be entertained on this account.
3. It shall be deemed that the contractor shall have satisfied himself as to the nature and location of the work, transport facilities, availability of land for setting up of camp etc. The department will bear no responsibility for lack of such knowledge and the consequences thereof.
4. The Agency shall have to make approaches to the site, if so required and keep them in good condition for transportation of labour and materials as well as inspection of works by the Engineer-in-charge. Nothing extra shall be paid on this account.
5. The Agency shall at his own cost submit samples of all materials sufficiently in advance and obtain approval of the Engineer-in-charge. Subsequently, the materials to be used in the actual execution of the work shall strictly conform to the quality of samples approved by the Engineer-in-charge and nothing extra shall be paid on this account. The acceptance of any sample or material on inspection shall not be a bar to its subsequent rejection, if found defective.
6. The contractor shall at his cost, make all arrangements and shall provide necessary facilities as the Engineer-in-charge may require for collecting, preparing, packing forwarding and transportation of the required number of samples for tests for analysis at such time and to such places as directed by the Engineer-in-charge, and bear all charges and cost of testing unless specifically provided for otherwise elsewhere in the contract or specifications. The cost of tests shall be borne by the contractor/Institute in the manner indicated below (except for water):
  - a) By the contractor, if the results show that the material does not conform to relevant specifications and BIS codes or any other relevant code for which conformity test is carried out.
  - b) By the Institute, if the results show that the material conforms to relevant specifications and BIS codes or any other relevant code for which conformity test is carried out.
7. Materials used on work without prior inspection and testing (where testing is necessary) and without approval of Engineer-in-charge are liable to be considered unauthorized, defective and not acceptable. The Engineer-in-charge shall have full powers to require removal of any or all of the materials brought to site by contractor which are not in accordance with the contract, Specifications or do not conform in character or quality to the samples approved by the Engineer-in-charge. In case of default on the part of the contractor in removing rejected materials, the Engineer-in-charge shall be at liberty to have them removed at the risk and cost of the contractor.

8. The work shall be carried out in such a manner so as not to interfere/or effect or disturb other works being executed by other agencies, if any.
9. Any damages done by the contractor to any existing work or work being executed by other agencies shall be made good by him at his own cost.
10. The work shall be carried out in the manner complying in all respects with the requirement of relevant rules and regulations of the local bodies under the jurisdiction of which the work is to be executed and nothing extra shall be paid on this account.
11. The contractor shall maintain in good condition all work executed till the completion of the entire work entrusted to the contractor under this contract and nothing extra shall be paid on this account.
12. No payment will be made to the contractor for damage caused by rain, floods and other natural calamities whatsoever during the execution of the works and any damage to the work on this account shall have to be made good by the contractor at his own cost and nothing whatsoever shall be paid on this account.
13. The Item Rates or ~~Percentage Rates~~ for all items of work, unless clearly specified otherwise shall include the cost of all labour for materials, de-watering and other inputs involved in the execution of the items.
14. No claim whatsoever for idle labour, additional establishments, costs of hire and labour charges for tools and plants etc. would be entertained under any circumstances.
15. For the safety of all labour directly or indirectly employed in the work for the performance of the contractor's part of this agreement, the contractors shall, in addition to the provisions of Safety code and directions of the Engineer-in-charge make all arrangements to provide facility as per the provisions of Indian Standard Specifications (Codes) listed below and nothing extra shall be paid on this account.
  - (a) IS 3696 Part I Safety Code for scaffolds and ladders
  - (b) IS 3696 Part II Safety Code for scaffolds and ladders Part II ladders
  - (c) IS 764 Safety Code for excavation work
  - (d) IS 4081 Safety Code for Blasting and Drilling operations,
  - (e) IS 4138 Safety Code for working in compressed air.
  - (f) IS 7293 Safety Code for working with construction machinery
  - (g) IS 7969 Safety Code for storage and handling of building materials
  - (h) IS 5216:1982 code of safety procedures and practices in electrical works
16. The contractor shall take all precautions to avoid all accidents by exhibiting necessary caution boards and by providing red flags, red lights and barriers. The contractor shall be responsible for any accident at the site of work and consequences thereof.
17. **Water & Power :** The contractor shall make his own arrangements for the water and power required for discharging his obligations under the scope of this tender. In case the Institute supplies water and or power, the contractor shall be liable to pay the charges on actual consumption basis at the same prevailing rates that the local authorities charge the Institute.
18. The ESI and EPF Contribution on the part of the employer in respect of the contract shall be paid by the contractor.
19. The contractor shall obtain a valid licence under the contract labour (R A) Act, 1970 and the contract

labour (Regulation and Abolition) Central Rules, 1971 before the commencement of the work, and continue to have a valid licence until the completion of the work. The contractor shall also comply with provision of the Inter- State Migrant Women (Regulation of Employment and conditions of service) Act 1979.

20. All tools, tackles, safety equipment and labours required for maintenance and testing works / AMC at all levels and heights shall have to be provided by the tenderer at no extra cost.
21. Spare parts used by vendor should conform to IS specifications as applicable.
22. Any damaged due to mishandling by the person deputed by the vendor shall have to be restored back to its original condition by the vendor at their own cost.
23. **Inspection before Dispatch:** All routine tests shall be conducted before dispatch of equipment's. No equipment shall be dispatched out from the manufactures premises before such tests are conducted and test result recorded. These test certificates shall be given along the supply of equipment. The Engineer-in-charge shall, if he so desires inspect and witness the pre-delivery tests. For this purpose, the agency shall give 15-day advance notice. The contractor shall arrange for inspection/Factory Acceptance Test (FAT) of the department authorized personnel. The main contractor has to organize the FAT inspections with IITH personnel by intimating them in advance. However, the inspection shall be done at the discretion of the Engineer-In-charge without any additional cost implication by the contractor to IITH for FAT but ROUTINE TEST & TYPE TEST Certificates shall have to be submitted for equipment.

Prior to dispatch, all equipment's shall be adequately protected & insured for the whole period of transit, storage and erection against corrosion and incidental damages etc. from the effect of vermin, sunlight, rain, heat, humid climate and accidents etc.

### **Payment of Running bills**

The running bills shall be submitted by the contractor as per the progress of work done at site. However, the following will be the basis of payment for the items claimed under running bills:

- a) Gross Payment to be made on supply of material at site: 70% of Item value.
- b) Gross Payment to be made on installation of material at site: 15% of Item value.
- c) Gross Payment to be made on satisfactory Testing & Commissioning of material at site: 15% of Item value.

After receipt of running bill at IITH, the contractor shall get the work executed/claimed in bill checked and verified from the Engineer-In-charge within 02 weeks' time and after satisfactory verification of work executed at site, the payment to the contractor shall be released.

### **Defect-liability period(DLP)/Warranty Period:**

The DLP/Warranty period shall be **60 months** from the date of Handing over of the works after successful commissioning. If the contractor or his working people or servants shall break, deface, injure or destroy any part of equipment in which they may be working, or if any damage shall happen to the work while in progress, from any cause whatever or if any defect, shrinkage or other faults appear in the work within twenty four six months after a certificate final or otherwise of its completion shall have been given by the Engineer In Charge as aforesaid arising out of defect or improper materials or workmanship the contractor shall upon receipt of a notice in writing on that behalf make the same good at his own expense or in default the Engineer In charge cause the same to be made good by other workmen and deduct the expense from any sums that may be due or at any time thereafter may become

due to the contractor, or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof. The security deposit of the contractor shall not be refunded before the expiry of thirty-six months after the issue of the certificate final or otherwise, of completion of work, or till the final bill has been prepared and passed whichever is later.

## Scope of work & Technical Specification for Compact Secondary Substation (CSS)

### History

The Department of Science and Technology (DST) under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), Govt. of India has sanctioned the prestigious Technology Innovation Hub (TIH) in the technological vertical of Autonomous Navigation and Data Acquisition Systems (UAVs, ROVs, etc.).

The existing power supply to TiHAN-Hub was connected from the SV-11 electrical substation under IITH Phase-1 construction. Now, the TiHAN complex is under expansion at present and for that the additional power provision to TiHAN-Hub is not feasible to extend from the SV-11 Electrical Sub-Station due to other building loads added on SV-11 as per the original master plan. Hence it is proposed that the power source shall be extended to the TiHAN-Hub from AC Plant-2, 11KV HT Sub-Station within the IITH campus only.

### Broad outlines of scope:

- i) Supply, Installation, Testing and Commissioning of 11kV,630kVA Compact Secondary Sub-Station (CSS) with CRT DRY Type Transformer at TiHAN-Hub(location map attached).
- ii) Extension of 11KV Bus, Augmentation and installation of 800A, 11KV VCB at AC Plant-2 Electrical Substation along with all the necessary earthing system.
- iii) Supply, laying and termination of 800 mtrs, 3core x120 sq mm, 11KV aluminium armoured XLPE insulated HT cable from AC Plant-2 to TiHAN CSS(routing map attached).
- iv) Supply, installation, testing and commissioning of the 02 nos. LT Power Control Center (PCC) Panels in TiHAN-Hub.
- v) Supply and laying of 500 Mtrs of 3.5core 400 sq mm, 1.1KV, aluminium armoured XLPE insulated cable from TiHAN CSS to various upcoming load centers in TiHAN-Hub.
- vi) Civil foundation works for the CSS bed and remove and relay the pavers block in the parking area along the 11kV HT Cable routing layout.

#### 1.0.0 CODE & STANDARDS:

- 1.1.0 All equipment and material shall be designed manufactured and tested in accordance with the latest applicable IEC standards. The 11KV Package Substation design must be as per IEC 61330/62271-202.
- 1.2.0 The Package Sub-station offered shall in general comply with the latest issues including amendments of the following standards.

Title	Standards
<b>High Voltage Low Voltage Pre-Fabricated Substation</b>	<b>IEC:61330/ 62271-202</b>
<b>High Voltage Switches</b>	<b>IEC 60265</b>
<b>Metal Enclosed High Voltage Switchgear</b>	<b>IEC 60298/IEC62271-200</b>
<b>High Voltage Switchgear</b>	<b>IEC 60694</b>
<b>Low Voltage Switchgear and Control gear</b>	<b>IEC 60439</b>
<b>Power Transformers</b>	<b>IEC 60076</b>

#### 2.0.0 DESIGN CRITERIA

- 2.1.0 Package Sub-station consisting of **11KV Non-Extensible SF6 Ring Main Unit with VCB as protection + Transformer + Low Voltage Switchgear** with all connection accessories, fitting & auxiliary equipment in an Enclosure to supply Low-voltage energy from high-voltage system as detailed in this specification. The complete unit shall be installed on a substation plinth (base) as an **Outdoor substation** located at very congested places. 11KV Isolators control incoming-outgoing feeder cables of the 11KV distribution system. The Vacuum Circuit Breaker shall be used to control and isolate the 11kV/433V Distribution transformer. The transformer Low Voltage side shall be connected to Low



Voltage switchgear. The connection cables to consumer shall be taken out from the Low Voltage switchgear.

2.2.0 The prefabricated-package substation shall be designed for a) Compactness, b) fast installation, c) maintenance free operation, d) safety for worker/operator & public.

2.3.0 The Switchgear and component thereof shall be capable of withstanding the mechanical and thermal stresses of short circuit listed in ratings and requirements clause without any damage or deterioration of the materials.

2.4.0 For continues operation at specified ratings temperature rise of the various switchgear components shall be limited to permissible values stipulated in the relevant standard and / or this specification.

**2.5.0 Service Conditions:**

The Package substation shall be suitable for continuous operation under the basic service conditions indicated below:

Ambient Temperature: 40 Deg C  
 Relative Humidity upto 95%  
 Altitude of Installation upto 1000m

The Enclosure of High Voltage switchgear-control gear, Low Voltage switchgear-control gear and transformer of the package substation shall be designed to be used under **normal outdoor service conditions** as mentioned. The enclosure should take minimum space for the installation including the space required for approaching various doors & equipment inside.

**3.0.0 SPECIFIC REQUIREMENT**

3.1.0 The main components of a prefabricated- package substation are Transformer, High-voltage switchgear-control gear, Low-voltage switchgear-control gear and corresponding interconnections (cable, flexible, bus bars) & auxiliary equipment. The components shall be enclosed, by either common enclosure or by an assembly of enclosure. All the components shall comply with their relevant IEC standards.

**3.1.1 Ratings:**

<b>Description</b>	<b>Unit</b>	<b>Value</b>
Rated Voltage / Operating Voltage	kV rms	11
Rated frequency & Number of phases	Hz & nos.	50 & 3
Rated maximum power of substation	kVA	630kVA.
Rated Ingress protection class of Enclosure	IP:	IP-23 for Transformer Compartment and IP:54 for LT & HT Switchgear Compartment.
Rated temp Class of Transformer Compartment		K10 upto 1000kVA
<b>HV Insulation Level</b>		
Rated withstand voltage at power frequency of 50 Hz	kV rms	28
Rated Impulse withstand Voltage	kV peak	75

<b>HV Network &amp; Busbar</b>		
Rated current	Amp	630A
Rated short time withstand current	kA rms / 3 sec	21
Making capacity for switch-disconnector & earthing switches	kA peak	50kA
Breaking capacity of Isolators (rated full load)	A	630A
<b>LV Network</b>		As per requirement.

## OUTDOOR ENCLOSURE

### 3.2.0 Outdoor enclosure:

3.2.1 The outdoor enclosure shall be made up of Galvanized Iron sheet instead of CRCA tropicalized to local weather conditions. Painting with Powder coating 7 tank process.

3.2.2 **The enclosure shall be of partially modular design of GI sheets fastened by riveting. Enclosure construction is with Steel Rivets instead of Nut-Bolt/welding.**

3.2.3 **The thickness of enclosure shall be 1.5 mm for non-load bearing members & 2mm for load bearing members.**

3.2.4 **The enclosure shall be painted with Powder Coating/polyurethane paint.**

3.3.0 The metal base shall ensure rigidity for easy transport & installation. Baseframe made up of 4mm HRCA Material with HOT DIP GALVANIZATION Process to enhance the life of the product and avoid rusting.

3.2.5 Substation will be used in outdoor application hence to prevent enclosure from rusting/corrosion, welding should be avoided.

3.2.6 The protection degree of the Enclosure shall be **IP54 for LT & HT switchgear compartment & IP23 for Transformer compartment**. Proper / adequate ventilation aperture shall be provided for natural ventilation by way of Louvers etc.

3.2.7 Considering the outdoor application of the substation the doors shall be provided with proper interlocking arrangement for safety of operator and to avoid corrosion door should have stainless steel hinges. Door should be provided with stoppers.

3.2.8 Interconnection between HT switchgear and transformer shall be using 1Cx3x95 sq.mm al. unarmored XLPE cable and between transformer and LT switchgear shall be using busbar.

3.2.9 **Internal Fault** : Failure within the package substation due either to a defect, an exceptional service condition or mal-operation may initiate an internal arc. Such an event may lead to the risk of injury, if persons are present. It is desirable that the highest practicable degree of protection to persons shall be provided. The Design shall be tested as per IEC61330/62271-202. **Type test report of arcing due to internal fault should submitted with offer. The Compact substation shall be tested for internal arc test –AB for 21KA for 1 sec (A-operator ,B-pedestrian) ( Test done with RMU inside CSS Enclosure )**

3.2.10 **Covers & Doors** : Covers & doors are part of the enclosure. When they are closed, they shall provide the degree of protection specified for the enclosure. Ventilation openings shall be so arranged or shielded that same degree of protection as specified for enclosure is obtained. Additional wire mesh may be used with proper Danger board for safety of the operator. All covers, doors or roof shall be provided with locking facility or it shall not be possible to open or remove them before doors used for

normal operation have been opened. The doors shall open outward at an angle of at least 90° & be equipped with a device able to maintain them in an open position. **The doors shall be lockable type with cylindrical shooting bolt and the locking arrangement shall be covered by magnetic flap pad Lock arrangement instead of Al-Drop(Normal Kundi tala). Roof is 6 Degree Inclined to avoid Water coggng during rainy season.The roof of the transformer compartment shall be detachable type to access the transformer for maintenance purpose.**

- 3.2.11 **Earthing** : All metallic components shall be earthed to a common earthing point. It shall be terminated by an adequate terminal intended for connection to the earth system of the installation, by way of flexible jumpers/strips & Lug arrangement. The continuity of the earth system shall be ensured taking into account the thermal & mechanical stresses caused by the current it may have to carry. The components to be connected to the earth system shall include :
- a) The enclosure of Package substation,
  - b) The enclosure of High voltage switchgear & control gear from the terminal provided for the purpose,
  - c) The metal screen & the high voltage cable earth conductor,
  - d) The transformer tank or metal frame of transformer,
  - e) The frame &/or enclosure of low voltage switchgear,
- 3.2.12 There shall be an arrangement for internal lighting activated by associated switch for HV , Transformer & LV compartments separately.
- 3.2.13 **Labels**: Labels for warning, manufacturer's operating instructions etc. shall be durable & clearly legible.
- 3.2.14 **Cleaning & Painting** :
- 3.2.15 The paints shall be carefully selected to withstand tropical heat and rain. The paint shall not scale off or crinkle or be removed by abrasion due to normal handling. **The enclosure shall be painted with Powder Coating.**

## **TECHNICAL SPECIFICATION OF 11KV SF6 METAL ENCLOSED, INDOOR RING MAIN UNIT (RMU).**

This RMU should be complete with all components necessary for its effective and trouble-free operation along with associated equipment etc. such components should be deemed to be within the scope of supplier's supply.

**The RMU should be fixed type SF-6 insulated with Vacuum circuit breakers** with O/C & E/F relay for the protection of the transformer. It should be maintenance free equipment, having stainless steel robotically welded IP67 enclosure.

### **4.0 STANDARDS AND REFERENCE DOCUMENTS**

#### **4.1 Codes and Standards**

The **RING MAIN UNIT (RMU)** should be designed, manufactured and tested to the latest version of:

IEC 60694 Common specifications for high-voltage switchgear and control gear standards.

IEC 62271-200 : A.C metal-enclosed switchgear and control gear for rated voltages above 1KV and up to and including 72KV and the IEC Codes herein referred.

IEC 60129/ IEC 62271-102: Alternating current disconnections (isolators) and earthing switches

IEC 60529 : Classification of degrees of protection provided by enclosures

IEC 60265 High-voltage switches-Part 1: Switches for rated voltages above 1kV and less than 52 kV

IEC 60056 : Circuit breakers

IEC 60420 High-voltage alternating current switch-fuse combinations

IEC 60185 Current transformers

IEC 60186 Voltage transformers

IEC 60255 Electrical relays

Any other codes recognized in the country of origin of equipment might be considered provided that they fully comply with **IEC standards**.

**The design of the switchgear should 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.**

#### **4.2 Salient Technical feature of "SF-6 RMU."**

11KV SF6 INDOOR, NON-EXTENSIBLE, Ring Main Unit (RMU), comprising of 3No. 630 A Vacuum Circuit Breaker with (3 O/C & 1E/F ) Relays with AIS Metering Module.

##### **(A) Circuit Breaker (630A)**

**Circuit Breaker should have the following:**

- Manually operated 630 A Vacuum circuit breaker and Earthing Switch with making capacity
- Mechanical tripped on fault indicator
- Auxiliary contacts 1NO and 1NC
- Anti-reflex operating handle
- "Live Cable" LED Indicators thru Capacitor Voltage Dividers mounted on the bushings.
- 3O/C + 1E/F self powered relay with Low and High set for Over current and Earth Fault. Relay should have facility to display the maximum loaded phase current also. Relay should have facility to trip the breaker from remote commands without shunt trip coil.
- Mechanical ON/OFF/EARTH Indication

**(B) Metering Module** having the following:

M: Air insulated metering module 12kV, 630A

Protection CT shall be 100/1A 2.5VA 5P10. (Make: ECS/Ericon/Vidyut/equiv)

Metering CT shall be 100/1A 2.5VA Class 1.0 accuracy (Make:ECS/Ericon/Pragati/Eq)

Metering PT:  $11000/\sqrt{3}$  110V/ $\sqrt{3}$  50VA Class 1.0 accuracy ( Make: ECS/Pragati/Eq)  
24V DC battery (Make: HBL/equiv) & Charger 12Ah Capacity (Make: Alan/equiv)  
Multifunction meter, CL-1.0 Accuracy with RS485 Port (Make: Secure/Rishabh/Conzerv)

### **INDOOR RMU**

1. Modular design, panel type with front cable access.
2. RMU must be made of robotically welded Non Ferrite, Non magnetic stainless steel with thickness of 2-2.5 mm with all live parts inside stainless steel tank
3. Offered RMU must be Non extensible.
4. RMU with VI (Vacuum Interrupter) for 30000 Operations.
5. RMU with Solid Copper Busbar
6. Maximum Modules can be accommodated in a single robotically welded Stainless steel Tank so as to make it more compact and reliable.
7. Cable covers must be interlocked with Earth switch to have complete safety of operating person. The cable bushings shall be bolted type design

### **4.3 DIELECTRIC MEDIUM**

**SF6 GAS shall be used for the dielectric medium, Arc quenching should take place in vacuum** for 11KV RMU's in accordance with IEC376. It is preferable to fit an absorption material in the tank to absorb the moisture from the SF6 gas and to regenerate the SF6 gas following arc interruption. The SF6 insulating medium shall be constantly monitored via a temperature compensating gas pressure indicator offering a simple go, no-go indication.

The RMU should have provision of Gas filling at site, in case there is some leakage of the gas.

### **4.4 GENERAL TECHNICAL REQUIREMENTS**

- 4.4.1 **Fixed type Vacuum breakers insulated in SF6 gas.** It should be maintenance free, having stainless steel robotically welded enclosure for INDOOR RMU application.
- 4.4.2 **Low gas pressure devices- 1.4 Bar pressure.** RMU should have full rating with Bar gas pressure.
- 4.4.3 Live cable indicators- High operator safety.
- 4.4.4 Fully Rated integral earthing switch for Switches and Breakers.
- 4.4.5 Self-powered Microprocessor Based 30/C + 1E/F self powered relay with Low and High set for Overcurrent and Earth Fault - Does not require any external source of power.
- 4.4.6 Units fully SCADA compatible. Retrofitting at site possible at a later date. Line switches (Load break switches) as well as T- OFF circuit Breaker can be operated by remote.
- 4.4.7 Cable boxes should be front access and interlocked with earth switch. No rear access required.
- 4.4.8 Cable testing possible without disconnection of cables.
- 4.4.9 Compact in dimension.
- 4.4.10 Low pressure, sealed for life equipment,
- 4.4.11 Cable earthing switch on all switching device-standard, for operator safety.
- 4.4.12 All live parts should be inside a hermetically sealed Stainless Steel enclosure for indoor RMU.
- 4.4.13 Indoor unit should be classified as sealed pressure system with gas leak rate of less than 0.1% per year requiring no gas filling for 30+ years of functional life.

### **4.5 TECHNICAL AND GUARANTEED PARTICULARS.**

The bidders shall furnish all guaranteed technical particulars as called for this specification.

### **5.0 DESIGN CRITERIA**

#### **5.1 Service conditions**

The offered switchgear and control gear should be suitable for continuous operation under the basic service conditions indicated below. Installation should be in normal indoor conditions in accordance with IEC 60694.

Ambient temperature -10C to +45oC  
 Relative humidity up to 95%  
 Altitude of installation up to 1000m, IEC 60120

**5.2 General structural and mechanical construction**

The offered RMU should be of the fully arc proof metal enclosed, free standing, floor mounting, flush fronted type, consisting of modules assembled into one or more units. Each unit is made of a cubicle sealed-for life with SF6 and contains all high voltage components sealed off from the environment. The overall design of the switchgear should be such that front access only is required. It should be possible to erect the switchboard against a substation wall, with HV and LV cables being terminated and accessible from the front.

The units should be constructed from robotically welded NON Ferrite ,Non Magnetic grade stainless steel sheets of 2-2.5mm thickness to ensure very high degree of precision in sealing of SF6 tank. **The design of the units should be such that no permanent or harmful distortion occurs either when being lifted by eyebolts or when moved into position by rollers.**

The cubicle should be have a pressure relief device. In the rare case of an internal arc, the high pressure caused by the arc will release it, and the hot gases is allowed to be exhausted out at the bottom of the cubicle. A controlled direction of flow of the hot gas should be achieved.

The switchgear should have the minimum degree of protection (in accordance with IEC 60529)

- IP 67 for the tank with high voltage components
- IP 2X for the front covers of the mechanism
- IP 3X for the cable connection covers

**The RMU shall be internally arc tested for 21kA for 1 sec for the gas tank & it should be internally arc tested for cable compartment- 20kA for 1sec. Relevant type test reports should be submitted by the manufacturer.**

**6.0 TECHNICAL DATA**

**6.1 Ring Main Unit, Electrical data**

**Electrical data and service conditions**

<b>No</b>	<b>Rated voltage</b>	<b>KV</b>	<b>12KV</b>
1	Power frequency withstand voltage		28
2	Impuls withstand voltage		95
3	Rated frequency	Hz	50
4	Rated current busbars	A	630
5	Rated current (cable switch)	A	630
6	Rated current (T-off)	A	630

**Breaking capacities:**

7	active load	A	630
8	closed loop (cable switch)	A	630
9	off load cable charging (cableS witch)	A	135
10	earth fault (cable swich)	A	200
11	earth fault cable charging (cable switch)	A	115
12	short circuit breaking current (T-off circuit breaker)	kA	20
13	Rated making capacity	kA	50
14	Rated short time current 3 sec.	kA	21

**Ambient temperature:**

15 Maximum value	°C + 45
16 Maximum value of 24 hour mean	°C + 35
17 Minimum value	°C 0
18 Altitude for erection above sea level 4m ...1000	
19 Relative humidity	Max 95%

**6.2 Ring Main Unit Technical data(11KV) INDOOR**

**General data, enclosure and dimensions**

1 Standard to which Switchgear complies	:	IEC
2 Type of Ring Main Unit Module.	:	Metal Enclosed, Panel type, Compact
3 Number of phases	:	3
4 Whether RMU is type tested	:	Yes
5 Whether facility is provided with pressure relief	:	Yes
6 Insulating gas	:	SF6
7 Nominal operating gas pressure	:	1.4 bar abs. 20° C
8 Gas leakage rate / annum %	:	0.1% per annum
9 Expected operating lifetime	:	30 years
10 Whether facilities provided for gas	:	Yes, temperature compensated manometer monitoring can be delivered
11 Material used in tank construction	:	Stainless steel sheet

**No Operations, degree of protection and colours**

1 Means of switch operation	:	separate handle
2 Means circuit breaker operation	:	separate handle and push buttons
3 Rated operating sequence of Circuit Breaker	:	0 -3min-CO-3min-CO
4 Total opening time of Circuit Breaker	:	approx. . 40-50ms
5 Closing time of Circuit Breaker	:	approx. . 30-45ms
6 Mechanical operations of switch	:	CO 1000
7 Mechanical operations of CO earthing switch	:	1000
8 Mechanical operations of circuit breaker	:	CO 2000
9 Principle switch / earth switch	:	3position combined switch

**Degree of protection:**

10 High Voltage live parts,	:	<u>SF6 tank IP 67</u>
11 Front cover mechanism	:	IP 2X for Indoor
12 Cable covers	:	IP 3X for Indoor

**Colours:**

14 Front cover	:	7035
15 cable cover	:	7035

**7.0 PANEL CB DESCRIPTION**

**7.1 CIRCUIT BREAKERS**

Vacuum bottles should be use as interrupters of the currents. The circuit breaker main circuit should be connected in series with a three-position disconnecter-earthing switch. The operation between circuit breaker and disconnecter ear thing must be interlocked.

- 1.VCB must self tripping and has a self powered relay
- 2.The RMU must be non-extensible type

**8 OTHER MAIN FEATURES**

### 8.1 *Bus bars*

Comprising the 3 single phases copper bus bars and the connections to the switch or circuit breaker. The bus bar should be integrated in the cubicle Bus bars should be rated to withstand all dynamic and thermal stresses for the full length of the switchgear.

### 8.2 *Earthing Switch*

Earthing switches should be rated equal to the switchgear rating.

Earthing switches should be quick make type capable of making Rated Fault Current. Ear thing switch should be operated from the front of the cubicle by means of a removable handle.

### 8.3 *The mechanisms*

All mechanisms should be situated in the mechanism compartment behind the front covers outside the SF6-tank. The mechanism for the switch and the earthing switch is operating both switches via one common shaft. The mechanism provide independent manual operation for closing and opening of the switch, independent closing of the earthing switch and dependent opening of the earthing switch.

**The mechanism for the T-off switch and earthing switch is operating both switches via one common shaft. The mechanism has stored spring energy and provide independent manual operation for closing and opening of the switch, independent closing of the ear thing switch and dependent opening of the ear thing switch. The mechanism for the vacuum circuit breaker (VCB) and disconnector- earthing switch is operating the VCB and the disconnector earthing switch via to separate shafts. The mechanism for the VCB has stored spring energy and provides independent manual operation for closing and opening of the VCB. The mechanism has a relay with related CT's and/or remote tripping device. The mechanism for the disconnector earthing switch provide independent manual operation for closing and opening of the disconnector, independent closing of the earthing switch and dependent opening of the earthing switch.**

### 8.4 *Front covers*

**The front cover contains the mimic diagram of the main circuit with the position indicators for the switching devices. The voltage indicators are situated on the front panels. Access to the cable bushings is in the lower part of each module.**

### 8.5 *Position indicators*

The position indicators are visible through the front cover and are directly linked to the operating shaft of the switching devices.

### 8.6 *Voltage indicator*

**The voltage indicators are situated on the front cover, one for each module, and indicate the voltage condition of each incoming cable. Identification of the phases is achieved with labels L1, L2 and L3 on the front of the voltage indicators. The voltage indicator satisfies the requirements of IEC61243.**

### 8.7 *Cable compartment*

The Cables access in the RMU shall be from the front. **The cable bushings shall be easily site-replaceable type.**

**It should be possible to terminate up to a 1x 3c x300sqmm core HV cables in each cable compartment. The access to the compartment will be possible by removing the cable cover, hinged to the main frame only when earth switch is ON. Cable Compartments of Indoor RMU should be Arc Proof tested for 10kA for 0.1sec (the type test report for the same shall be submitted by the vender) and interlocked with respective Earth Switches. Each module has**



**a separate cable compartment that is segregated from each other by means of a partition wall. A partition wall should be fitted to divide the cable compartment from the rear side of the switchgear. In case of an arc inside the tank, followed by the opening of the pressure relief, the partition wall prevents the hot gases flowing out from the pressure relief to enter the cable compartments. All covers are removable. The ground continuity is achieved when the covers are in place by means of Hinged connections.**

**Interconnection between HT switchgear and transformer shall be using 1Cx3x95 sq.mm Al. unarmored XLPE Cable.**

#### **8.8. Power connection.**

The cables are installed in the dedicated compartment below the mimic front cover. At the bottom of the cable compartment, an earthing bar system made of copper/GI with a minimum cross section of 120 mm<sup>2</sup> should be fitted. In each compartment the earthing bar should be fitted with 4 screws M10. The earthing system is connected to the tank by a copper/GI bar, which rises up to the connecting point of the tank behind the rear partition wall on the middle of the switchgear.

#### **8.9 INTERLOCKING.**

**The mechanism for the cable switch should be provide a built in interlocking system to prevent operation of the switch when the earthing switch is closed, and to prevent operation of the earthing switch when the switch is in the closed position.**

The mechanism for the T-off switch should be provide a built in interlocking system to prevent operation of the switch when the earthing switch is closed, and to prevent operation of the earthing switch when the switch is in the closed position. The mechanism for the VCB and the disconnect-earthing switch should be has a built in interlocking system to prevent operation of the disconnect-earthing switch when the VCB is in the closed position.

Further is should not be possible to Open the Cable doors unless the Earthing Switch is Turned ON. In case the Cable door is accidentally left open a positive interlock shall prevent operation of Load Break Switch and Isolators / Breaker from any operation.

#### **8.10 Current Transformers**

**All current transformers should be complying with IEC 60185.**

Current transformers should be of dry type, with ratings and ratios as required.

**Cable current transformers used in circuit breaker modules should be maximum 100mm wide. Current transformers used in metering cubicles should be having dimensions according to DIN 42600, Narrow type. Current transformer shall be placed in the cable covers so that it can be easily replaced at site without removing the bushings.**

#### **8.11 Auxiliaries.**

The switchgear should be prepared for options like motor operation, auxiliary contacts and short-circuit indicators. Necessary terminal blocks and wiring etc. should be placed behind the front cover of each module.

#### **8.12 Fault Passage Indicators.**

**These shall facilitate quick detection of faulty section of line. The fault indication may be on the basis of monitoring fault current flow through the device. The unit should be self-contained requiring no auxiliary power supply. The FPI shall be integral part of RMU to avoid thefts. The FPI shall have clear display, automatic reset facility and shall be SCADA compatible.**

## 9 TESTING AND CERTIFICATION.

### 9.1 TYPE TESTS.

Units should be type tested in accordance with IEC standards 60056, 60129, 60265, 60298,60420,60529 and 60694. The following type tests should perform on the HT Switchgear and report should submit with offer.

- Short time and peak withstand current test
  - Temperature rise tests
  - Dielectric tests
  - Test of apparatus i.e. circuit breaker and earthing switch
  - Arc fault test
  - Measurement of resistance of main circuit.
  - Mechanical endurance test.
  - Duty cycle test.
  - Internal arc test for HT chamber.
- Type test reports for above type shall be submitted with the offer.

### 9.2 ROUTINE TESTS.

Routine tests should be carried out in accordance with IEC 60298 standards. These tests should be ensure the reliability of the unit.

**Below listed test should be performed as routine tests before the delivery of units;**

- Withstand voltage at power frequency
- Measurement of the resistance of the main circuit
- Withstand voltage on the auxiliary circuits
- Operation of functional locks, interlocks, signaling devices and auxiliary devices
- Suitability and correct operation of protections, control instruments and electrical connections of the circuit breaker operating mechanism
- Verification of wiring
- Visual inspection
- Time travel characteristics measurement facility for Breaker should be available with the manufacturer to asses the quality of RMU.

## Distribution Transformer

### 10.0 Cast Resin Dry Type Transformer

This specification covers the requirements of design, manufacture, testing and supply of cast resin dry type transformers complete with all the accessories and fittings for efficient and trouble-free operation.

### 10.1 CODES & STANDARDS

The equipment covered by this specification shall, unless Other wise stated to be designed, constructed and tested in accordance with latest revisions of relevant Indian standards / IEC publications.

IS 1271	-	Classification of Insulating Materials.
IS 2026	-	Power transformers (part I - V)

IS 2099	-	Bushing for alternating voltages above 1000 V
IS 2705	-	Current transformers
IS 3202	-	Code of practice for climate proofing
IS 3639	-	Power transformer fittings and accessories
IS 4257	-	Porcelain bushings for transformers
IS 11171	-	Dry type Transformer
IS 8478	-	Application guide for tap-changers
IS 10028	-	Code of practice for selection, installation and maintenance of transformers.

## 10.2 GENERAL DESIGN FEATURES:

- 10.2.1 All transformers shall be of the latest design, dry type Cast Resin only.
- 10.2.2 The type of cooling shall be Natural Air cooled (AN) and the corresponding ratings for each transformer shall be as indicated in the specific requirements.
- 10.2.3 Each transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise.
- 10.2.4 It shall be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.
- 10.2.5 The transformers shall be designed to be capable of with-standing, without injury, the thermal and mechanical effects of short-circuits between phases or between phase and earth at the terminals of any winding with full voltage applied across the other winding for periods given in relevant standards. There shall be no limitations imposed by any part/component of the transformer/off load tap links to meet the short circuit level Specified.
- 10.2.6 Each transformer shall be designed for minimum no-load and load losses within the economic limit and shall be able to have minimum loss at the rated load condition.
- 10.2.7 All electrical connections and contacts shall be of ample cross sections for carrying the rated current without excessive heating.
- 10.2.8 The transformer shall be capable of continuous operation at full load rating under the following conditions.
- a) Voltage variation =  $\pm 10\%$
  - b) Frequency variation =  $\pm 5\%$
  - c) Combined voltage and frequency variation (Absolute sum) = 10%

## 10.3 CONSTRUCTION

- 10.3.1 The transformer shall be dry type, AN cooled suitable for Compact substation application.
- 10.3.2 The core-clamping frame shall be provided with lifting eyes having ample strength to lift the complete core and winding assembly.
- 10.3.3 Off circuit tapings shall be provided on the HV windings. Tap changing is done by means of off-circuit links accessible through openings provided.
- 10.3.4 The lifting lugs and rollers shall be provided. A winding temp. Scanner shall be provided and is actuated by means of resistance temperature detectors embedded in LV windings of all three phases. It should have alarm and trip contacts at a specified temperature.
- 10.3.5 The transformer shall be of IP00 protection class and will be installed in the transformer compartment of compact substation having IP23 protection class.

## **10.4 WINDINGS**

- 10.4.1 The winding insulation shall be of Class “F/H” and temperature rise limit i.e. 90 deg. C/ 115 Deg C over ambient of 50 Deg C.
- 10.4.2 Windings shall be of electrolytic copper conductors (circular in shape) of high conductivity and 99.9% purity.
- 10.4.3 Windings shall be designed to withstand the specified thermal and dynamic short circuit stresses.
- 10.4.4 The windings shall be duly sectionalized. Accessible joints brazed or welded and finished smooth shall connect similar sections. No corona discharge shall result on the winding upon testing the transformer for induced voltage test as specified in IS.
- 10.4.5 The end turns of the high voltage windings shall have reinforced insulation to take care of the voltage surges likely to occur during switching or any other abnormal condition.
- 10.4.6 The high voltage and low voltage winding are shall be made of copper Conductors. HV winding will be always be resin casted under vacuum while LV winding can either be casted or pre-impregnated with resin.

## **10.5. CORE**

- 10.5.1 The double wound Core shall be constructed from non-ageing cold rolled Grain oriented steel sheets. The built core shall be painted with high temperature resistant paint to prevent corrosion at the edges of core plates and to withstand high temperatures. By using different core material optimization of core losses shall be achieved. The yokes shall be firmly clamped between yoke channels or plates. The top & bottom yoke frames shall be secured to each other by means of tie-rods, which help in securing the winding in place.
- 10.5.2 The design of the magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earthed clamping structure and the production of flux component at right angles to the planes of laminations which may cause local heating.

## **10.6 OFF-CIRCUIT TAP CHANGING LINKS**

- 10.6.1 Off circuit tapings are provided on HV windings. Tap changing is done by means off circuit links. Use of tap changing links eliminates any moving parts as against a manually operated tap changer.
- 10.7 Terminal Arrangement  
HV side and LV side of transformer will have the top busbar arrangement for connection of HT side by means of cable and LT side by means of busbar.

## 10.8 Technical particulars of dry-type transformer

S. NO.	DESCRIPTION	PARTICULARS
01	Type	Three Phase, 50 Hz, Core type, two winding, Cast Resin Dry type Transformer
02	Rating ( KVA )	630kVA
03	Winding material	Copper
04	No load voltage ratio	11 / 0.433
05	Connection a) HV b) LV	Delta Star with neutral
06	Vector group	Dyn11
07	Insulation level (KVp/ KVrms) a) HV b) LV	75 / 28 -/ 03
09	Type of Tap Changer for giving voltage variation to HV	Off ckt tap links
10	Tapping range	+5 % to -5 % in step of 2.5%
11	Temperature rise winding over ambient temperature	90 Deg C/ 115 Deg C
12	Class of Insulation	Class 'F/H'
13	Enclosure	IP 23 (With Enclosure )
14	Method of Cooling	AN (Air Natural)
15	No Load losses	As per IS 2026
16	Full load losses	As Per IS 2026
17	Termination HV LV	Busbar Busbar
18	Fittings for Dry type	2 Numbers Earthing Terminals, Rating and Diagram Plate, Lifting Lugs, Winding Temp Scanner.
19	Paint	Enamel-RAL 7032 (Siemens Grey)

## 10.8 PAINTING

10.8.1 All steel surfaces shall be thoroughly cleaned by sand blasting or chemical agents as required to produce a smooth surface free of scale, grease and rust

10.8.2 The external surface, after cleaning, shall be given a coat of high quality red oxide or yellow quoted primer, followed by filler coats.

## 10.9 Routine Test

All Routine Tests in accordance with IEC 60076 / IS 2026 shall be carried out on each transformer.

### L.T. Panel

#### 11.1 System:-

- a) **Declared voltage** :- 3 Phase,400V ( $\pm 6\%$ ) 50 Hz,
- b) **Neutral** :- Solidly earthed at substation.
- c) **Busbar** - Aluminum

11.2 **General finish**:- Tropical, totally enclosed, metal-clad, weather-proof, vermin and dust proof.

### 11.3 Construction :

**Enclosure:-** Dead Front type of enclosure shall be able to provide the minimum degree of Protection IP:2X. Panel main Busbar shall be of Aluminum Material.

### 11.4 Circuit Ways: As per BOQ with Aluminum Busbar

630 kVA Dry type Transformer – Incomer ACB– 1000A,4P, 66KA Fixed manual EDO Type Air Circuit Breaker (ACB) Outgoings MCCB- 800A, 4P MCCB microprocessor based released for OC,SC and EF-4 Nos Air Circuit breaker will be of 3P/4P, 50/65KA Electrical Draw out (EDO) microprocessor based over current, short circuit and earth fault release.

### 11.5 GENERAL CHARACTERISTICS OF ACB

#### 11.5.1) Conformity with Standards

The air circuit-breakers used in low voltage installations are constructed and tested in accordance with the IEC 947/IS 947 Standards and respect the following EC directives:

- “Low voltage Directive” (LVD) No. 73/23 EEC
- “Electromagnetic compatibility Directive” (EMC) No.89/336 EEC

#### 11.5.2) Functional characteristics

- The circuit-breakers must have a rated service voltage of 690 V AC and a rated insulation voltage of 1000 V.
- The circuit-breakers must have a rated impulse withstand voltage of 12 kV.
- The rated uninterrupted current must be between 800 and 6300 A with the possibility of selection of ratings from 400 A.
- Different versions shall be available with rated ultimate short circuit breaking capacity(Icu) from 50kA at 415V and shall have rated short circuit service breaking capacity(Ics) equals to Icu.
- Different versions of circuit-breakers shall be available with rated short-time withstand current (Icw -1 sec) for 50kA for 1sec in category B.
- It must be possible to supply the circuit-breakers both from the top and bottom terminals without derating their performances and without jeopardising their functionality.
- The mechanical life must be at least 12000 operations, without the need for maintenance of the contacts and arcing chambers.
- The electrical life at a voltage of 440 V AC must be and without the need for maintenance of the contacts and arcing chambers:
  - at least 9000 operations up to 2000 A
  - at least 6000 operations up to 3200 Athese values are intended to be valid only for CAT B circuit-breakers.

#### 11.5.3) Environmental characteristics

- Operating temperature: -25 °C...+70 °C (-13 °F...158 °F)
- Storage temperature: -40 °C...+70 °C (-40 °F...158 °F)
- Altitude: operation without derating up to 2000 m a.s.l. (6600 ft), and with derating up to 5000 m a.s.l. (16500 ft)
- Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers must undergo a tropicalisation process which makes them suitable for use in a hot-humid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

#### 11.5.4) Construction characteristics

- The circuit-breaker structure must be made of steel sheet.
- There must be total segregation between power and front shield, using double insulation where suitable so as to guarantee maximum operator safety.
- Total segregation between the phases must be guaranteed for safety reasons.
- The main contacts must be separate from the arcing contacts in cat. B circuit-breakers only.
- It must be possible to inspect easily the arcing chambers easily and to check main contact wear with the circuit-breaker racked-out, by removing the arcing chambers.
- All the circuit-breakers in the range have the same height and depth with the aim of standardising the supporting structures of the switchgear and the switchgear itself as far as possible.
- The circuit-breakers must indicate the precise position of the main contacts and the condition of springs charged/discharged on the front, by means of certain and reliable signals.
- The operating mechanism must be of the stored energy type with operation by means of precharged springs fitted with antipumping device. The springs are charged manually by activating the front lever, or by means of a geared motor, supplied on request.
- The whole range of air circuit-breakers must be fitted with electronic protection releases. It must be allowed the interchangeability of protection releases from skilled personnel.
- ACBs shall have minimum watt losses in order to restrict temperature rise inside the breaker.

#### 11.5.5) RELEASES

##### 1) Release (Protection functions)

- The release must not require auxiliary power supplies since the power is taken from the current transformers.
- The signals supplied by the release must not operate with power supply supplied by internal batteries. The basic version of the release must provide:
  - protection against overload with trip with inverse long time delay (L)
  - protection against instantaneous short-circuit (I)
  - Selective short-circuit (S)
  - Earth fault (G)

##### The setting ranges shall be:

- Protection against overload (L)  
Characteristic  $t=k/I^2$   
Trip threshold  $I_1=(0.4...1) \times I_n$  with timing adjustable from 3 to 144 sec. (value referred to a current equal to  $3 \times I_1$ )
- Protection against selective short-circuit (S)  
Characteristics  $t=k$  and  $t=k/I^2$   
Trip threshold  $I_2=(1...10) \times I_n$  with timing adjustable from 0.1 to 0.8 sec.  
(value referred to a current equal to  $10 \times I_n$  for curves at  $t=k/I^2$  and referred to currents  $>I_2$  for curves at  $t=K$ )
- Protection against instantaneous short-circuit (I)  
Trip threshold  $I_3=(1,5...15) \times I_n$
- Protection against earth fault (G)  
Characteristics  $t=k$  and  $t=k/I^2$   
Trip threshold  $I_4=(0.2...1) \times I_n$  with timing adjustable from 0.1 to 0.8 sec. (value referred to a current equal to  $4 \times I_4$ )
- Neutral protection level:  
50% - 100% - 200% - excluded

All the protection functions except protection against overload must be excludable

User interface and signalling LEDs

- The release shall allow parameterisation of the trip thresholds and timing by means of dipswitches.
- alarm and trip signalling for all the protection functions by means of LEDs located on the release shall be available. No batteries or external power supplies shall be necessary for powering these indicators. The indication shall be available for not less than 48 hours after the trip, even with the circuit-breaker open
- An alarm shall indicate by means of LEDs located on the release the disconnection of opening solenoid and current transformers. A trip shall also occur, after a short time delay, when the disconnection is detected.
- It shall be possible, with the aid of external devices, to read currents, and information on last 10 trips (currents, protection tripped) occurred to the unit

### **13.0 CSS Earthing:**

Earthing arrangement shall be provided for earthing each cable, PVC cable gland, neutral busbar, chassis and frame work of the cubicle with separate earthing terminals at two ends. The main earthing terminals shall be suitably marked .The earthing terminals shall be of adequate size, protected against corrosion, and readily accessible. These shall be identified by means of sign marked in a legible manner on or adjacent to terminals.

Neutral bus bar strip shall be connected to Earthing terminal with help of GI strip of suitable capacity & nut-bolt arrangement.



#### **14.0. TYPE TESTS FOR THE PACKAGE SUBSTATION:**

14.1 The Package Substations offered must be type-tested as per IEC 61330/62271-202. The copy of type test summary should be submitted along with the tender. CSS manufactured at in JV consortium/ System Houses/ System Integrator shall not be accepted. Only Original Equipment Manufacturers are accepted.

14.2 **Routine Tests:** The routine tests shall be made on each complete prefabricated substation.

- a) Voltage tests on auxiliary circuit.
- b) Functional test.
- c) Verification of complete wiring.

14.3 **Test Witness:** Routine test shall be performed in presence of Owner's representative if so desired by the Owner. The Contractor shall give at least fifteen (15) days advance notice of the date when the tests are to be carried out.

#### **14.4 Test Certificates:**

**Certified reports of all the tests carried out at the works shall be furnished in three (3) copies for approval of the Owner.**

14.5 Performance Certificate to Qualify Technical Bid :

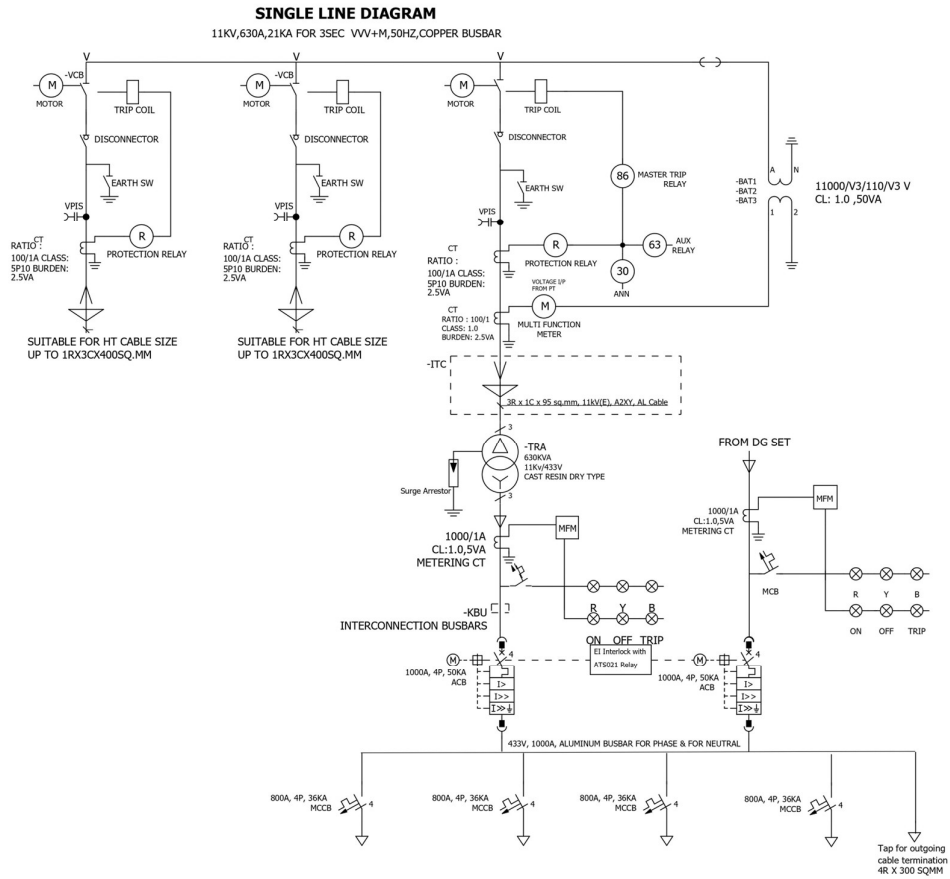
##### Packaged Substation Enclosure:

- **Tests to verify the degree of protection.**
- **Arcing due to internal fault**
- **Test to prove enclosure class - Temperature rise of the transformer inside the enclosure.**
- **Short circuit test to prove the capability of the earthing circuits to be subjected to the rated peak and the rated short-time withstand currents.**
- **Tests to verify the withstand of the enclosure of the prefabricated substation against mechanical stress.**

**11KV HT Cable routing tentative layout from AC Plant-2 to TiHAN-Hub Complex**



# INDICATIVE ELECTRICAL SINGLE LINE DIAGRAM FOR PROPOSED CSS



**Approved Makes List**

<b>Sl. No.</b>	<b>Name of the Equipment/Item</b>	<b>Makes</b>
1	11kV Compact secondary Sub-Station	ABB/Siemens/Schneider Electric
	630kVA dry type transformer	ABB/Voltamp/Kirloskar/Schneider/Siemens
2	LT Cables (ISI Approved)	Polycab/Finolex/Havells/KEC
3	Cable Lugs	Comet/ Cosmos/ Dowell's ( Biller India) / Jainson
4	Cable Glands (Double compression )	Comet /Cosmos/ Dowell's /Jainson
5	MCCBs	Schneider / Siemens/ L&T/ ABB/Legrand
6	MCB	Leorand,Schneider, Haqer, L& T,
7	L.T.Panel Boards	CPRI Approved System Integrators
8	Protective Relays (Numeric Type)	Areva/ABB/Siemens/ L&T/Schneider/ Alstom
9	Push Buttons	ABB, L&T, Schneider, Rishabh
10	Multifunction Meters	Conzerv/ Rishab/ Elmeasure/Secure
11	Protection CT	ECS/Ericon/Vidyut
12	Metering CT	ECS/Ericon/Pragati
13	Metering PT	ECS/Ericon/Pragati
14	Indicating Lamps	L&T, Siemens, Schneider, ABB, RASS control/Teknic

**Note: Any other item makes not specified in the NIT then the has to be got approved from the Engineer In charge (EIC) on site.**

# Annexures

## Annexure-I

### On non-judicial stamp paper of minimum Rs. 100

#### **Guarantee offered by Bank to IITH in connection with the execution of contracts) Form of Bank Guarantee for Earnest Money Deposit /Performance Guarantee/Security Deposit/Mobilization Advance/ Refund of milestone with held amount**

1. Whereas the Executive Engineer ..... (name of division) ....., IITH on behalf of the President of India (hereinafter called "The Government") has invited bids under (NIT number)..... dated ..... for ..... (name of work)..... The Government has further agreed to accept irrevocable Bank Guarantee for Rs. .... (Rupees ..... only) valid up to ..... (date)\* ...as Earnest Money Deposit from ..... (Name and address of contractor) (hereinafter called "the contractor") for compliance of his obligations in accordance with the terms and conditions of the said NIT.

OR\*\*

Whereas the Executive Engineer ..... (name of division) ....., IITH on behalf of the President of India (hereinafter called "The Government") has entered into an agreement bearing number..... with .....(name and address of the contractor).....(hereinafter called "the Contractor") for execution of work ..... (name of work) ..... The Government has further agreed to accept an irrevocable Bank Guarantee for Rs. .... (Rupees ..... only) valid upto ..... (date)..... as Performance Guarantee/Security Deposit/Mobilization Advance/Refund of mile stone withheld amount from the said Contractor for compliance of his obligations in accordance with the terms and conditions of the agreement.

2. We, .....(indicate the name of the bank)..... (herein after referred to as "the Bank"), hereby undertake to pay to the Government an amount not exceeding Rs. .... (Rupees.....only) on demand by the Government within 10 days of the demand.

3. We, .....(indicate the name of the Bank)..... , do here by undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor. 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).

4. We, ..... (indicate the name of the Bank) ....., further undertake to pay the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceeding pending On non-judicial stamp paper of minimum Rs. 100 before any Court or Tribunal, our liability under this Bank Guarantee being absolute and unequivocal. The payment so made by us under this Bank Guarantee shall be a valid discharge of our liability for payment there under and the Contractor shall have no claim against us for making such payment.

5. We, ..... (indicate the name of the Bank)..... , further agree that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligation here

under to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor and to forbear 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 or for any forbearance, act of omission on the part of the Government or any indulgence by the Government 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. We, ..... (indicate the name of the Bank) ....., further agree that the Government at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor at the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee the Government may have in relation to the Contractor's liabilities.
7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.
8. We, ..... (indicate the name of the Bank) ....., undertake not to revoke this guarantee except with the consent of the Government in writing.
9. This Bank Guarantee shall be valid up to ..... unless extended on demand by the Government. 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 the date of expiry or extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Date .....

Witnesses:

- |                    |  |
|--------------------|--|
| 1. Signature.....  | Authorized signatory<br>Name and address<br>Name<br>Designation Staff code no. |
| 2. Signature ..... | Bank seal<br>Name and address  |

\* Date to be worked out on the basis of validity period of 90 days where only financial bids are invited and 180 days for two/three bid system from the date of submission of tender.

\*\*In paragraph 1, strike out the portion not applicable. Bank Guarantee will be made either for earnest money or for performance guarantee/security deposit/mobilization advance/Refund of mile stone withheld amount, as the case may be.

**Annexure-II**

**INDEMNITY BOND (VIOLATION OF LAWS, NORMS, ACCIDENTS, DAMAGES ETC)**  
**(On Non-Judicial Stamp Paper of Rs.100/-only)**

**Name of the work Supply, Installation, Testing and Commissioning of 11kV, 630kVA Compact Sub-Station with CRT DRY Type Transformer for TiHAN complex expansion, IIT Hyderabad campus, Kandi, Sangareddy.**

KNOW all men by these presents that I/We \_\_\_\_\_ (Name of Contractor with address) do hereby execute Indemnity Bond in favour of Indian Institute of Technology (IIT) Hyderabad having their office at Kandi, Sangareddy-502284, Telangana, India and for the project ..... IIT Hyderabad under consideration.

On this day of .....2023

THIS DEED WITNESSETH AS FOLLOWS:

I/We, (Name of Contractor) hereby do indemnify and save harmless IITH having their office at Kandi-502284, Sangareddy, Telangana, India from the following: -

1. Any third party claims, civil or criminal complaints/liabilities/material/life loss during site mishaps and other accidents such as snake bites etc or disputes and/or damages occurring or arising out of any mishaps at the site due to faulty work, negligence, faulty construction and/or for violating any law, rules and regulations in force, for the time being while executing/executed civil works by me/us.
2. Any damages, loss or expenses due to or resulting from any negligence or breach of duty on the part of me/us or any sub-Contractor/s if any, servants or agents.
3. Any claims by an employee of mine/ours or of sub-Contractors if any, under the workman compensation act and employers' Liability act, 1939 or any other law rules and regulations in force for the time being and any acts replacing and/or amending the same or any of the same as may be in force at the time and under any law in respect of injuries to persons or property arising out of and in the course of execution of the Contract work and/or arising out of and in the course of employment of any workman/employee.
4. Any act or omission of mine/ours or sub-Contractor/s if any, our/their servants or agent which may involve any loss, damage, liability, civil or criminal action.

IN WITNESS WHEREOF THE HAS SET HIS/THEIR HANDS ON THIS DAY OF SIGNED AND DELIVERED BY THE AFORESAID IN THE PRESENCE OF WITNESSES:

- 1.
- 2.

**Annexure-III**

**FORM OF BANKERS' CERTIFICATE" FROM A SCHEDULED BANK**

The Executive Engineer -Electrical  
Construction and Maintenance Division,  
IIT Hyderabad.

This is to certify that to the best of our knowledge and information that Ms./Shri.....  
..... having marginally noted address, a customer of our bank are/is respectable and can be treated as  
good for any engagement up to a limit of Rs.....(Rupees.....).

This certificate is issued without any guarantee or responsibility on the bank or any of the  
officers. This certificate is valid for six months from the issued of this letter.

(Signature of Branch Manager)

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For the Bank NOTE: (1) In case of partnership firm, certificate should include names of all  
partners as recorded with the Bank.



**ANNEXURE-IV**

**Proforma for Authorization certificate from OEM**

REF.No. \_\_\_\_\_

Dated \_\_\_\_\_

To,  
The Executive Engineer-Electrical,  
Indian Institute of Technology (IIT) Hyderabad  
Kandi-502284, Sangareddy, Telangana, India

Dear Sir,

We \_\_\_\_\_ who are established and reputed manufacturers/Technology Providers of \_\_\_\_\_ having factory/factories at \_\_\_\_\_ (*address of factory*) do hereby authorize M/s \_\_\_\_\_ (*Name and address of bidder*) to submit a bid, negotiate and receive the order from you against your Tender enquiry no. IITH/CMD/ELE/NIT/2023-24/06 for the

***Supply, Installation, Testing and Commissioning of 11kV,630kVA Compact Secondary Sub-Station (CSS) with CRT DRY Type Transformer for TiHAN complex expansion, IIT Hyderabad campus, Kandi, Sangareddy.***

We ensure that we shall support/ facilitate the M/s \_\_\_\_\_ on regular basis with technology / product updates for up-gradation / maintenance / repairing / servicing of the Compact Sub Station at IIT Hyderabad (if awarded) as per the terms and conditions mentioned in this tender document on direct payment basis from the successful bidder.

We hereby extend our full guarantee for the services offered by the above firm.

Yours faithfully,

(Name of authorised signatory with signature)

(Name of manufacturer with stamp)

**Note:** This letter of authority should be on the **letter-head of the Technology Provider** and should be signed by an authorised person. It should be enclosed by the Bidder with the tender documents.

**ANNEXURE-V**

**FORM FOR CERTIFICATE OF NET WORTH FROM CHARTERED ACCOUNTANT**

It is to certify that as per the audited balance sheet and profit & loss account during the financial year 2020-21, the Net Worth of M/s \_\_\_\_\_( Name & Registered Address of contractor/ Individual/firm/company), as on \_\_\_\_\_(the relevant date) is Rs. \_\_\_\_\_after considering all liabilities. It is further certified that the Networth of the company has not eroded by more than 30% in the last three years ending on (the relevant date).

Signature of Chartered Accountant

Name of Chartered Accountant

Membership No. of ICAI

Date and Seal