GENERAL CONDITIONS

1. Schedule of site visit

The site visit shall be permitted till 10 days from the date of publication of this Corrigendum document. The site visit schedule shall be executed as per schedule tabulated below:

Track	Site Address	Time	Contact Person & Ph. Number
Track-I	C-DAC Innovation Park, Panchavati, Pashan, Pune 411008	10:30 Hrs to 17:00 Hrs	Suresh: +91-9011032754
Track-II	C-DAC Sector 12, Near TATA Material Gate, Chikhali Pune 411062	10:30 Hrs to 17:00 Hrs	Nitesh:+91-7007287913 Yash: +91-97655 39959

The request for the site visit should be sent over email on *mmg@cdac.in* on prior basis with details of members visiting the site along with photo-id proof. C-DAC shall intimate the visiting time and slot to the respective bidders over email.

2. Submission of queries:

- **Queries generated using AI tools shall not be considered and shall be summarily rejected, without any intimation to the sender**.
- Queries shall be raised strictly with reference to the relevant clauses of the tender/ATC document. Repetitive, duplicate queries, as well as queries not pertaining to any specific clause, shall be rejected.
- Query submission shall be permitted till 10 days from the date of publication of this Corrigendum document.

Note:-Bidders are requested to regularly check GEM website for updates ,revisions/corrigendum's and addendums. Considering the strategic importance of the project, prospective bidders shall submit a duly signed and stamped Non-Disclosure Agreement (NDA) to C-DAC via email at mmg@cdac.in to obtain access to the original, revised (if any) and supplementary site-related drawings and documents. Bidders shall be responsible for regularly checking the designated online drawings and documents repository for any updates, revisions or additional documents issued by C-DAC from time to time. Such updates shall be deemed to form part of the bidding documents, and bidders shall take due cognizance of the same while preparing and submitting their bids.

3. Bid Submission, Indexing and Document Referencing

Bidders shall submit bids and collaterals as per the RFP format, with a complete index and sequential page numbers. All compliance responses shall reference the RFP clause number and the page number of the supporting document. Where any document is cited as reference, the section, clause, paragraph and page number shall be clearly mentioned for verification

4. **Corrigendum-I** / Revised GeM ATC document, presented as a clean, unmarked copy with changes/addendum incorporated. Please note that all subsequent queries and clarification requests must be referenced strictly against Corrigenda-I.

5. **The tender copy along with corrigendum and other details have been published on the C-DAC's website as well, which can be accessed from the following url : https://cdac.in/index.aspx?id=tenders. Bidders are requested to keep visiting the C-DAC's tender and GeM websites for further updates**

CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

A Scientific Society of Ministry of Electronics & Information Technology,
Government of India
Innovation Park, Panchvati, Pashan Road, Pune - 411008
Tel: +91-20-25503671 / 25868086
Fax: +91-20-25694004
www.cdac.in / mmg@cdac.in

CORRIGENDUM-I

"Supply, Installation, Commissioning & Operations of Sovereign AI Cloud and DC Infrastructure" THROUGH THE GeM PORTAL.

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SECTION I - INVITATION FOR BIDS (IFB)

1. Introduction

Centre for Development of Advanced Computing (C-DAC) - is a scientific society of Ministry of Electronics & Information Technology, Government of India. C-DAC invites '**ON-LINE' bids through GEM** from eligible bidders **for Supply, Installation, Commissioning & Operation of Sovereign AI Cloud and DC Infrastructure** as per schedule of requirements, terms and conditions stipulated in this document.

2. Documents to be submitted along with bid (Technical Cover)

a) Covering letter, as per **Annexure A.**
b) Authority letter, as per **Annexure B.**
c) The undertakings from the Principal Manufacturers (OEMs) of equipment/ items offered as per Annexure – C.
d) A copy of Certificate of Incorporation, Partnership Deed / Memorandum and Articles of Association / any other equivalent document showing date and place of incorporation, as applicable, in support of eligibility criteria of this document.
e) Copies of PAN and GST registration certificates, as applicable.
f) Details of EMD amount.
g) Copies of documents in support of eligibility requirements stipulated in this RFP along with all required Annexures provided in this RFP.
h) The copies of balance sheets **OR** the certificate from a Chartered Accountant certifying the annual sales turnover of the bidder for the **last 3** financial years (F.Y. 2023-24, 2024-25 & 2025-26).
i) Bidder shall submit the online links / documents, data and specification sheets pertaining to the quoted Hardware and Software.
j) Integrity pact as per the format provided in **Annexure H** to be submitted by the bidder.
k) Certificates from respective OEMs, as per format given in Annexures –F & G, declaring the country of OEM, country of manufacture and percentage of local contents for all associated components.
l) The product offered should be in compliance with the Order No.F.7/10/2021-PPD (1) (Public Procurement No. 4) dated 23.02.2023 issued by Procurement Policy Division, Department of Expenditure, Ministry of Finance, GOI. Bidder has to submit a declaration in this regard as per Annexure G. Also, bidder has to declare the COUNTRY OF ORIGIN OF OEM and COUNTRY OF MANUFACTURING of the offered product as per Annexure G.
m) As per the Make In India Order No. P-45021/2/2017-PP(BE-II)-Part (4)Vol.II dated 19.07.2024 issued by Public Procurement Section, Department of Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI kindly mention the MII (%) of the offered product as per Annexure F. Bidder should declare and abide by the Terms and Conditions of the mentioned Annexure F.
n) Any other related documents as required in this RFP.

Note: C-DAC reserves the right to reject the bid if any of the above listed documents are not submitted.

(END OF SECTION I)

SECTION II - INSTRUCTIONS TO BIDDERS (ITB)

1. Contact Information

Materials Management Group, 2nd Floor,
Centre for Development of Advanced Computing (C-DAC), Innovation Park, PANCHAVATI, Pashan Road, Pune 411009 Tel No.: +91-20–2550 3671, Fax No.: +91-20–25694004.
E-mail: mmg@cdac.in

2. Site Visit and Clarifications – Date/ Time/ Venue / Online:

The prospective bidders requiring any clarification of the bidding document may send their queries in writing through e-mail in the format given below at mmg@cdac.in.

In case of any doubts, and/ or queries about the technical solution, specifications terms and conditions of the tender, the prospective bidder may send their queries in writing through e-mail (mmg@cdac.in). The queries, requests for clarifications etc. must be sent within 10 days from the date of publication of the Tender. The bidders are requested to go through the entire tender document thoroughly, before raising any query. C-DAC, Pune shall address the queries raised by the bidders. The replies to queries would be made available on the portal in due course of time. All the queries, doubts, clarifications etc. must be submitted in xls format only as below.

Name of the bidder:				
Sl. No.	Section / Page No	Clause Reference	Query from bidder	C-DAC Response

C-DAC, Pune will respond to these queries during the pre-bid meeting or through clarification published as Reply to Queries/ Corrigendum. The queries/doubt/clarifications etc. must be sent at least two days prior to the date of pre-bid meeting.

(i) C-DAC shall respond to the 2nd set of queries received from the prospective bidders after publishing the Corrigendum 1. The Bidders will have to ensure that all their queries are submitted in one consolidated mail in a single excel sheet as per the format given above only referring to the reworked Corrigendum 1. No queries will be attended after the last date for submission of the 2nd set of queries.

(ii) The bidders are requested to go through the entire reworked tender document **[Corrigendum 1]** thoroughly, before raising any query. C-DAC, Pune shall address the 2nd set of queries raised by the bidders post publishing of the Corrigendum 1. The replies to 2nd set of queries would be made available on the portal in due course of time. All the queries, doubts, clarifications etc. must be mandatorily submitted in xls format only as above.

(iii) C-DAC shall not be responsible for ensuring that the bidders' queries have been received. Any requests for clarifications received after the indicated date and time of the 2nd set of queries shall not be entertained by C-DAC.

(iv) At any time prior to the last date for receipt of bids, C-DAC may, for any reason, whether at its own initiative or in response to clarifications requested by prospective Bidders, modify the RFP Document by clarifications.

(v) Clarifications (if any) issued by C-DAC at any time before the due date of submission of the bid will become a part of the RFP document and would be notified on the GeM Portal.

(vi) To provide prospective bidders reasonable time for taking the clarifications into account, C-DAC may, at any time prior to the date of bid submission extend the date for the submission of Bids.

(vii) Requests for clarification over call/ telephone shall not be entertained.

(viii) The Bidder must undertake a mandatory physical site visit both for the Track-I & Track-II implementations.

(ix) The request for such meeting should be sent over email on mmq@cdac.in on prior basis with details of members visiting the site along with photo-id proof. C-DAC shall intimate the visiting time and slot to the respective bidders over email.

(x) Documentary evidence towards the same (viz. Visiting Slip / Image with GeO location / Undertaking signed by C-DAC officials etc.) should be submitted by the bidder along with their Technical bid.

(xi) Completion of the physical site visit is mandatory prerequisite for participating in the bidding process.

(xii) Only Bidders who have completed the mandatory site visit shall be eligible to submit the bid.

3. Locations for Supply, Installation and Integration

- **Track-I:** Centre for Development of Advanced Computing (C-DAC)

C-DAC Innovation Park, Panchavati, Pashan, Pune 411008

- **Track-II:** Centre for Development of Advanced Computing (C-DAC)

Sector - 12, Near TATA Material Gate, Chikhali Pune 411062

4. Eligibility Criteria

4.1 General Qualification Criteria for Bidder

A sole bidder/ Consortia must meet **all** of the technical eligibility criteria stated below.

<table>
<tr><th>Sr.</th><th>Eligibility Criterion</th><th>Documents to be Submitted</th></tr>
<tr><td>1</td><td>Sole bidder may engage with only one named DC/IT partner to fulfill the eligibility criteria of either DC experience or IT experience. A Named IT/DC Partner is a sub-contractor of the Sole Bidder.
OR
Consortium can be formed having Maximum 2 members viz. “Lead Bidder” & “Consortium Member”, jointly meeting the eligibility criteria of IT & DC experience. Named DC/IT partner participation is not allowed under consortium bidding.</td><td>Undertaking on Sole bidder letterhead.
OR
Consortia Agreement and Consortia undertaking.
(as applicable)</td></tr>
<tr><td>2</td><td>The Sole Bidder/Lead Bidder shall quote for and agree to execute the entire scope of work as per this RFP, covering both the IT scope and the Data Centre scope. Partial bids shall be rejected.</td><td>Undertaking on letterhead; complete BoQ as per Section V.</td></tr>
<tr><td>3</td><td>Technical Eligibility:
Following IT and DC experience shall be met through projects executed in India within last 10 years preceding the last date of bid publication.

I. IT experience:
Single purchase order for successful supply, integration and commissioning of 500 AI Accelerators OR 500 Servers/Nodes, connected with minimum 25 Gbps Network, for a third-party client.

II. DC experience:
a. Successful execution and commissioning of One(1) Data Centre with facility power of at least One (1) MW (combined IT & NON-IT loads), having Tier III (Uptime) / Rated III (ANSI/TIA-942) or above with Certification</td><td>
<table>
<tr><td>IT Experience</td><td>Client Purchase Orders/ Contracts.
AND
Completion/ Acceptance Certificates.</td></tr>
<tr><td>DC Experience</td><td>1. Work order/ purchase order, completion or satisfactory- performance certificate from the end user or self-Certification of Company Secretary in case of DC- colocation bidder along with supporting documentary proofs , and copies of the Tier III or above Certification of Design Documents (TCDD) & Tier III or above Certification of Constructed Facility (TCCF) by Uptime Institute OR Rated III or above Certification of Design Documents(ANSI/TIA-942) & Rated III or above Certification of</td></tr>
</table>
</td></tr>
</table>

Sr.	Eligibility Criterion	Documents to be Submitted
	of Design Documents & Constructed Facility from respective certification body. b. Successful execution and commissioning of total DC with facility power of at least 3.5MW (combined capacity of IT and NON-IT loads). ***(The Data Centre execution experience shall pertain to Data Centres established and owned by the bidder for commercial use (Colocation) OR DC built for the third party client).*** c. Shall have on their roll at least following technical manpower: (i) Four (4) Nos. ATD certified personnel OR Two (2) Nos. ATD certified personnel & Two (2) Nos. CDCS/ CDCE certified personnel, (ii) Five (5) Nos. PMP certified personnel, & (iii) Twenty-Five (25) with B.E./ B.Tech. qualification (Discipline: Electrical /Mechanical / Electronics /Instrumentation) as on date of bid publication.	Constructed Facility (ANSI/TIA-942) by TIA-licensed Certification Bodies. 2. Work order/ purchase order, completion or satisfactory- performance certificate from the end user, or self-Certification of Company Secretary in case of DC- colocation bidder along with supporting documentary proofs. 3. For technical manpower, an HR certificate on the company's letterhead stating the above, with employee name, qualification and certification, shall be submitted along with copies of the relevant certificates. All other documentary proofs with reference to eligibility criteria's.
4	(i) The Sole bidder and their Named IT/ Name DC partner (if applicable) **OR** Lead bidder & the Consoritum Member shall be an established company registered under the Indian Companies Act 1956/2013, or a partnership firm registered under the LLP Act 2008 or the Indian Partnership Act 1932, for at least the last five (5) years as on the date of bid publication. (ii) **Demerger/Subsidiary of Firm:** If the bidding company/firm is hived off from the parent company or in the case of a subsidiary company, the experience, eligibility, and turnover of the parent company shall be considered for eligibility; provided that the subsidiary company is 100% owned by the parent company, and both companies do not apply in the same RFP process. The demerger or creation of the Indian subsidiary shall not have taken place more	(i) Certificate of Incorporation issued by the Registrar of Companies with full address of the registered office, along with MoA & AoA / Partnership Deed for all members (as applicable). **AND** (ii) Guarantee with regard to demerger/ formation of Subsidiary, as per (Annexure P) – if applicable.

Sr.	Eligibility Criterion	Documents to be Submitted
	than five (5) years prior to the date of publication of this RFP.	
5	A. Sole Bidder shall have a minimum average annual turnover of Rs. 2,000 crores and positive net worth in each of those years. Their Named DC/IT partner (as applicable) shall have a minimum average annual turnover of 300 crores during the last three (3) years, and positive net worth in each of those years. B. In case of Consortium, a minimum combined average annual turnover of Rs. 2,000 crores during the last three (3) financial years with "Lead Bidder" having a minimum average annual turnover of Rs. 1000 crore and "Consortium Member" having minimum average annual turnover of Rs. 300 crores. All Consortia members shall also have a positive net worth in each of those years.	Audited profit and loss account and balance sheet for the last three financial years (i.e. 2023-24, 2024-25 and 2025-26) , OR a CA certificate bearing the CA's registration number / seal from each member (as applicable).
6	The Sole Bidder/ Lead Bidder/Consortium Member/ Named DC partner/Named IT Partner shall not be blacklisted or debarred by C-DAC or any Educational / R&D / Government organization or PSU as on the date of bid publication.	Undertaking as per Annexure A, from each member (as applicable).
7	The principal manufacturer (OEM) of the Cloud CPU compute server or the AI accelerator server, and its Indian subsidiary, agent, dealer or authorized System Integrator, shall not both participate in this Tender. If an OEM participates in any capacity (Sole Bidder, Lead Bidder, Consortium Member or Named Partner), it shall not authorise or allow its products to be quoted by any other bidder, and any bid quoting its products through another bidder shall be rejected.	Undertaking from the Sole Bidder/Lead Bidder and OEM along with Manufacturer's Authorization Form as per Annexure C, quoting the GeM bid number. Where the Sole Bidder/Lead Bidder is an Indian subsidiary, a letter from the Principal Manufacturer certifying the subsidiary relationship. Where the Sole Bidder/ Lead bidder is an authorized Bidder , Annexure C issued by the OEM or by its Indian subsidiary is acceptable.
8	Should have well established Installation, Commissioning, Training, Troubleshooting and Maintenance **Service Centre** in Pune for attending the after sales service. Details of Service Centers near consignee destinations are to be uploaded along with the bid.	Declaration on letterhead by the Sole Bidder / Lead Bidder with details of service centers near the consignee destination. **OR** Undertaking by the Sole Bidder / Lead Bidder to establish the same within the 60 days of award; single point of contact for system and applications; support and escalation matrix with e-mail IDs and phone numbers

Sr.	Eligibility Criterion	Documents to be Submitted
9	The offered products shall comply with Order No. F.7/10/2021-PPD (1) (Public Procurement No. 4) dated 23.02.2023, and the country of origin of the OEM and country of manufacture shall be declared for every offered item.	Declaration as per Annexure G to be submitted by all the members (As applicable) i.e. The Sole Bidder / Named DC / IT Partner / Lead Bidder and Consortia Member.
10	The offered services, goods and works shall be in compliance to the Make In India Order No. P-45021/2/2017-PP(BE-II)-Part(4)Vol.II dated 19.07.2024 issued by Public Procurement Section, Department of Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI along with achieving Minimum Local Content as declared by the relevant Ministries/Departments Including MeitY Notification F. No. W-43/4/2019-IPHW-MeitY dated 07.09.2020, as amended from time to time, as applicable to the items/ services /works offered.	Declaration as per Annexure-F To be submitted by Sole Bidder / Lead Bidder and OEMs (as declared under Annexure J).

4.2 Primary Qualification Criteria & Technical Eligibility of OEM

Sr.	Applies to	Eligibility Criterion	Documents to be Submitted
1.	**The Bidder**	The Bidder shall submit an OEM declaration confirming the AI Accelerator Servers quoted are in current production, is not End-of-Life or End-of-Sale as on the date of bid publication and will be supported for the warranty period plus two (2) years.	OEM declaration on letterhead, item-wise as per Annexure-C.
2	**AI Accelerator Server OEM**	Should have well established Installation, Commissioning, Training, Troubleshooting and Maintenance Professional Support Service Centre in India for attending the after sales service. AND **Manufacturing and deployment record** : Shall have supplied, installed and commissioned in India at least 1000 AI Accelerators of the same AI Accelerator OEM as quoted against this RFP within the last ten (10) years preceding the last date of bid publication, either directly or through Authorized Partner. AI Accelerator Server OEM must have deployed at least one liquid cooled technology-based AI Accelerator Cloud / AI Cluster / HPC	Declaration by the OEM on its letterhead with service center address and details and Annexure-C. **AND** Declaration by the OEM on its letterhead, supported by at least one purchase orders or work orders and the corresponding installation or satisfactory-performance certificates from the end users.

Sr.	Applies to	Eligibility Criterion	Documents to be Submitted
		with the same AI Accelerator / AI Accelerator OEM, in last 10 years in India preceding the last date of bid publication, either directly or through Authorized Partner.	
3	AI Accelerator OEM	The proposed AI Accelerator OEM must have a continuous track record of supplying enterprise data center AI Accelerators for a minimum of five (5) years. preceding the last date of bid publication.	Declaration by the OEM on its letterhead with service center address and details and Annexure-C.
4	Non-IT OEMs	OEM of UPS, Chillers, Compact Sub-station and Generators should be ISO-9001, ISO-14001 and ISO-45001 Certified. AND OEM of UPS, Chillers and Generators shall have executed at least one order under which they have supplied at least 5 MW capacity of equipment's for respective individual equipment category within the last five years in India preceding the last date of bid publication.	Submit valid certificates towards ISO requirements. **AND** Work order / purchase order, completion or satisfactory-performance certificate from the end user towards the supplied equipments/ items.
5	Non-IT OEMs	The Sole bidder / Lead Bidder must submit Manufacturer authorization certificates in the technical bid as per Annexure-C for Chillers, Cooling Distribution Units, Fan Wall Units, PAHU, Compact Substation & Transformers, IEC 61439 LT Panels, HT Panels, DG sets, UPS and batteries, BMS Software, Pumps, Gas Suppression System, etc., issued by respective OEMs.	Annexure C, one per OEM per item, issued by the respective OEMs (as mentioned in Annexure J).
6	All OEMs	Every OEM shall declare the country of origin of the OEM, the country of manufacture, and the percentage of local content for its supplied components.	Certificate from the respective OEM in the prescribed format (Annexure F and G).
7	IT OEMs	The Sole bidder / Lead Bidder must submit Manufacturer authorization certificates in the technical bid as per Annexure-C for all IT component OEMs.	Annexure C, one per OEM per item, issued by the respective OEMs.
8	HT Storage OEM	**High-throughput storage — capacity and performance** At least one (1) deployment of high-throughput multi-tier storage of minimum 10 PB for a AI Accelerator cluster in last 10 years in India preceding the last date of bid publication.	Declaration by the OEM on its letterhead, supported by at least one purchase orders or work orders and the corresponding installation or

Sr.	Applies to	Eligibility Criterion	Documents to be Submitted
		OR Shall have deployed and demonstrated an aggregate sustained throughput of not less than 100 GB/s read and 100 GB/s write in India preceding the last date of bid publication.	satisfactory-performance certificates from the end users and the acceptance test or benchmark report for that deployment stating the aggregate sustained read and write throughput achieved.
9	Cloud Storage OEM	**Unified storage deployment** Must have at least one (1) successful, unified installation (e.g., Object/S3, File/NFS/SMB, or Block) in India of a minimum capacity of 5 PB in a single deployment in last 10 years in India preceding the last date of bid publication.	Declaration by the OEM on its letterhead, supported by at least one purchase orders or work orders and the corresponding installation or satisfactory-performance certificates from the end users.
10	DC LAN OEM	**Data centre LAN deployment** Must have supplied 200 Gb/s per-port switching infrastructure that was successfully integrated and commissioned to connect to a minimum of 100 servers within a single Data Centre in last 10 years in India preceding the last date of bid publication.	Declaration by the OEM on its letterhead, supported by at least one purchase orders or work orders and the corresponding installation or satisfactory-performance certificates from the end users.
11	Compute Fabric OEM	**High-performance compute fabric** High Performance Compute Fabric (InfiniBand or equivalent lossless, RDMA-capable fabric). The OEM of the compute fabric offered shall have been engaged in the manufacture and supply of high-performance compute fabrics for not less than five (5) years as on the last date of bid publication, and shall satisfy both of the following within the last five (5) years in India , preceding the last date of bid publication: (i) at least one fabric supplied, installed and commissioned operating at not less than 200 Gb/s per port and interconnecting not less than 250 accelerators or compute nodes under a single subnet manager or equivalent centralized fabric management; AND	Declaration by the OEM on its letterhead, supported for each requirement by a purchase order or work order, the corresponding installation or satisfactory-performance certificate from the end user, and a statement of the fabric topology giving the per-port line rate, the number of endpoints, the blocking ratio and the fabric management platform deployed.

Sr.	Applies to	Eligibility Criterion	Documents to be Submitted
		(ii) at least one fabric supplied, installed and commissioned in India or overseas operating at not less than 400 Gb/s per port and interconnecting not less than 500 accelerators in a single non-blocking fabric	

Note:

1. The Sole bidder / Lead bidder should provide necessary and sufficient documentary evidence to support the eligibility criteria stipulated above. C-DAC reserves the right to reject any bid not fulfilling the eligibility criteria.
2. C-DAC reserves the right to verify the documents submitted by the bidder directly with the respective purchaser to confirm the details of the supply and performance.
3. C-DAC reserves the right to reject a bid if the OEM/bidder has a record of non-fulfilment of contractual obligations or unsatisfactory performance in any previous contracts with C-DAC, as documented by the respective end-user.
4. Please note, the word bidder in this RFP means Sole Bidder / Lead Bidder as applicable.

5. Delivery and Payment Milestone

All the components shall be supplied, and the entire solution should be made operational as per below milestone.

5.1. DELIVERY MILESTONES

Sr. No.	MILESTONE	PAYMENT REF
1.	Track-I: Supply , Installation, commissioning, benchmarking, and operationalization of the AI Cloud IT infrastructure.	VALUE1
2.	Track-II: Non-IT and DC infrastructure installation and commissioning.	VALUE2
3.	Track-II: Installation, commissioning, benchmarking, and operationalization of the AI Cloud IT infrastructure.	VALUE3
4.	*Track-II: Operations and Management of DC Infrastructure** To be quoted under "Item Sr. No. 4. of the BOQ - Any other services, allied works etc." With a minimum value of 3.5% of the VALUE2 (all inclusive) quoted by the bidder.*	*VALUE4***

5.2. PAYMENT MILESTONES

Sr. No.	MILESTONE	Delivery Timelines (In Days)	Payment Milestone	PAYMENT REF
	AWARD OF CONTRACT	T0		
1.	Track-I: Supply , Installation, commissioning, benchmarking, and operationalization of the Cloud IT infrastructure			
1(A)	Delivery of Track-I IT equipment preparation & rack mounting along with submission of Performance Security (Track-I).	T0 + 90	80 % of VALUE1	VALUE1
1(B)	Installation, commissioning, Benchmarking of Track-I IT Infrastructure and start of operations.		20 % of VALUE1	
2.	Track-II: Non-IT and DC infrastructure installation and commissioning			
2(A)	Track-II: Non-IT and DC infrastructure – ALL MAJOR EQUIPMENT DELIVERY (Chillers, Cooling Distribution Units, Fan Wall Units, PAHU, Other Cooling Units ,Compact Substation with Transformers, IEC 61439 LT Panels, HT Panels, DG sets, UPS and batteries ,all containers, BMS Software, Pumps, Gas Suppression System, raised floor,Chilled water pipes, etc).	T0 + 240	50% of VALUE2	VALUE2
2(B)	Track-II: Non-IT and DC infrastructure ISAT.		20% of VALUE2	
2(C)	Track-II: Uptime Tier-III constructed facility certification.		30% of VALUE2	
3.	Track-II: Installation, commissioning, benchmarking, and operationalization of the AI Cloud IT infrastructure			

3(A)	Delivery of Track-II IT equipment, Rack Mounting, Power On Selftest of all IT equipment & Acceptance by C-DAC.	T1=T0 + 310	80% of VALUE3	VALUE3
3(B)	Installation, commissioning, benchmarking of Track-II IT Infrastructure and start of operations.		20% of VALUE3	
4	***Track-II: Operations and Management of DC Infrastructure****	T1+ 1096	***Post Quarterly Payment - 100% of Quarterly payments of VALUE4****	***VALUE4****

***Note:**

1. *VALUE4 is the total price (all inclusive) for 3 years (12 quarters) of Operations and Maintenance of the Track-II DC, and shall be quoted as a single value under "Item Sr. No. 4 – Any other services, allied works etc." on the GeM portal.*
2. *VALUE4 shall not be less than 3.5% of VALUE2, both all-inclusive of GST.*
3. *VALUE4 shall be paid in 12 equal quarterly instalments (all inclusive), each after completion of the quarter and submission of a valid invoice.*
4. *A financial bid that does not comply with Notes 1 and 2 shall be summarily rejected.*
5. *C-DAC reserves the right to continue O&M for the 4th and 5th year. The price for each year shall not exceed 110% of the preceding year's price, the 3rd year's price being one-third of VALUE4.*

5.3. PAYMENTS:

(A) No payments shall be made without submission of Performance Security. The bidder must mandatorily submit the Performance Security as detailed in the RFP, immediately after order placement.

(B) All the payments are subject to submission of the valid and complete tax invoices.

(C) Payments shall be made against deliverable / payment milestones mentioned above against submission of documentary evidences and acceptance by C-DAC.

5.4. Advance Payment

(a) C-DAC may, on the Contractor's formal written request, pay an advance of up to 30% of the Contract Value (inclusive of GST, excluding Value 4, i.e. O&M), in multiple lots.

(b) Before the release of each lot, the Contractor shall submit, along with the formal request, an irrevocable Bank Guarantee (or e-Bank Guarantee) from a Nationalized/Scheduled Bank covering 110% value of that lot. The advance released shall be 100% value of the lot. These guarantees are separate from the Performance Security. No advance shall be released before the Performance Security is furnished, and the insurance required under this RFP.

(c) Each Bank Guarantee shall be valid for one (1) year from the date of issue, covering the complete execution period. If the related advance is not fully adjusted before expiry, the Contractor shall extend the validity until it is adjusted. If the extension is not furnished at least 30 days before expiry, C-DAC may invoke the Bank Guarantee in full.

(d) Any advance paid shall be adjusted in full against the first payment/ milestone due to the Contractor. If any part remains unadjusted, it shall be adjusted against each subsequent payment/ milestone until fully recovered, and only the balance of each payment after such adjustment shall be released.
(e) The Bank Guarantee(s) furnished against the advance shall be returned once the advance, or the lot covered by that Bank Guarantee, is fully adjusted.
(f) If the Contract is terminated for the Contractor's default, the unrecovered advance shall be treated as an interest-bearing advance from the date of release, at the GPF rate prevailing on that date plus 2%, compounded quarterly.
(g) The advance shall be used only for this Contract. Misutilization entitles C-DAC to recover it immediately and invoke the Bank Guarantee.

6. Exemptions

No exemption will be granted on eligibility criteria.

7. Bid Security / EMD

The Sole Bidder / Lead Bidder shall submit along with their bid ***total EMD amount of Rs. 42,00,00,000/- (Rupees Forty Two Crores Only)*** to be submitted by the bidder.

a) The EMD may be submitted in the form of Demand Draft / NEFT/ RTGS / Direct Bank Credit/ Insurance Surety Bonds (ISBS) / Bank Guarantee. In case of Demand Draft, Bank Guarantee & Insurance Surety Bond (ISBS), same should reach C-DAC before the due date of the Tender. Similarly in case of NEFT/ RTGS/ Direct Bank Credit the amount should be credited in C-DAC's account before the due date and time of this RFP/ GeM bid.
b) However, in case of irrevocable & unconditional Bank Guarantee (BG) / Insurance Surety Bond (ISBS), two (2) separate BGs/ISBS needs to be submitted as detailed below:
   (i) For **Track-I,** an EMD amount of ***INR 2,00,00,000/- (Rupees Two Crores Only)*** unconditional and irrevocable Bank Guarantee (BG) / Insurance Surety Bond (ISBS) (as per format given in Annexure-E: Bank Guarantee for EMD/ Annexure O : ISBS for EMD) needs to be submitted by the bidder.
   (ii) For **Track-II** an EMD of ***INR 40,00,00,000/- (Rupees Forty Crores Only)*** in the form of unconditional and irrevocable Bank Guarantee (BG) / Insurance Surety Bond (ISBS) (as per format given in Annexure-E: Bank Guarantee for EMD/ Annexure O : ISBS for EMD) needs to be submitted by the bidder.
   (iii) If BGs are submitted, it should be executed by a Nationalized/ Scheduled Bank acceptable to C-DAC.
   (iv) If ISBS are submitted, it should be issued by IRDAI registered general insurance companies in India.
c) The bank details are provided in the GeM bid document.
d) No exemption shall be provided for EMD to any bidder.
e) EMD shall be valid for a period of 180 days from the last date of submission of the bid.
f) Non submission of EMD along with Bid Document will disqualify the Bidder.
g) The EMD will not carry any interest.
h) The EMD of those Bidders, who do not qualify in the eligibility evaluation or technical evaluation, will be returned without interest after completion of the RFP process.
i) The EMD will be refunded to the successful bidder after:
   (i) Acceptance of Purchase Order,
   (ii) Signing of the Contract(s),
   (iii) Submission of required Performance Bank Guarantee (PBG),

j) C-DAC reserves the right to forfeit the EMD submitted by the bidder, in full or part thereof along with blacklisting/ debarring the bidder, and other action(s) may be taken against bidder if:
   - **(i)** The bidder backs out of the RFP process after the last date and time for submission of bids.
   - **(ii)** The bidder is found to be indulging in Fraudulent & Corrupt practices as defined in this RFP.
   - **(iii)** The Bidder withdraws or amends its Bid during the period of Bid validity.
   - **(iv)** The Bidder makes any written statement or encloses any form which turns out to be False/ incorrect at any time prior to signing of Contract.
   - **(v)** Bidder does not respond to requests for clarification of its Proposal.
   - **(vi)** Bidder fails to provide required information during the evaluation process or is found to be non-responsive.
   - **(vii)** The successful bidder does not accept the Purchase Order issued by C-DAC or fail to sign the Contract(s) within the time prescribed by C-DAC.
   - **(viii)** In the case of a successful Bidder, the bidder qualifies and backs out of their commercial quotes or, if the Bidder fails
     - (I) to sign the Contract; or
     - (II) to furnish unconditional and irrevocable Guarantee towards the Performance Guarantee as mentioned in this RFP or
     - (III) to furnish Non-Disclosure Agreement (NDA) as per C-DAC's format

k) In exceptional circumstances, C-DAC may seek the Bidders' consent for extension of the period of validity of bids. The request and the responses thereto shall be made in writing. In such a case, the EMD provided shall also be suitably extended. A Bidder may refuse the request without forfeiting its EMD unless it is the shortlisted bidder who has been notified by C-DAC that its bid has been shortlisted. A Bidder granting the request will not be required nor permitted to modify its bid.

l) Bids submitted without EMD or EMD not submitted conforming to the above criteria, will be treated as non-responsive and will be summarily rejected by C-DAC.

8. Purchaser's Right to amend / cancel

a) C-DAC reserves the right to amend the eligibility criteria, commercial terms & conditions, Scope of Supply, technical specifications, etc.

b) C-DAC reserves the right to cancel the entire tender without assigning any reasons thereof.

9. The legal actions may be taken as per the Declaration in following cases:

a. If the bidder withdraws the bid during the period of bid, validity specified in the tender.

b. In case a successful bidder fails to furnish Performance Security (Refer Clause 3 of Section II).

c. If the bidder fails to furnish the acceptance in writing, within 7 days of award of contract/order.

10. Corrupt or Fraudulent Practices

a) It is expected that the bidders who wish to bid for this project have the highest standards of ethics.

b) C-DAC will reject bid if it determines that the bidder recommended for award has engaged in corrupt or fraudulent practices while competing for this contract.

c) C-DAC may declare a vendor ineligible, either indefinitely or for a stated duration, to be awarded a contract if it at any time determines that the vendor has engaged in corrupt and fraudulent practices during the award / execution of the contract.

11. Interpretation of the clauses in the Tender Document / Contract Document

In case of any ambiguity/ dispute in the interpretation of any of the clauses in this Tender Document, the interpretation of the clauses by Director General, C-DAC shall be final and binding on all parties.

12. Risk Purchase:

a) In the event the successful Bidder/Contractor fails to supply, deliver, install, commission, integrate or provide any equipment, system, component, software, service or other deliverable within the stipulated timelines, or supplies/provides any item or service which does not conform to the specifications, requirements, performance parameters, SLAs or other contractual obligations, C-DAC shall be entitled to issue a written notice requiring the Contractor to remedy such failure/default within 30 (thirty) days from receipt of the notice, or within such shorter reasonable period as may be specified by C-DAC in cases involving critical infrastructure, cybersecurity, safety, operational continuity or risk of material disruption.

b) If the Contractor fails to remedy the default within the stipulated period, or where the Contractor abandons the work, repudiates the contract, becomes incapable of performing its material obligations, or where immediate action is reasonably necessary to protect C-DAC's infrastructure, systems, data, security or continuity of operations, C-DAC shall be entitled, without prejudice to its other contractual and legal rights, to procure the same or equivalent goods, equipment, systems or services from an alternative source, either for the affected portion or for such larger portion as may reasonably be necessary to ensure project completion and continuity.

c) The Contractor shall be liable to reimburse C-DAC for the reasonable, actual and documented incremental expenditure incurred by C-DAC in procuring equivalent goods, equipment, systems or services from an alternative source, over and above the corresponding price payable under the Contract, together with reasonable and directly attributable incidental costs of such alternative procurement, including transportation, installation, integration, testing and commissioning, where applicable.

d) C-DAC shall, wherever reasonably practicable, follow a competitive procurement process for such alternative procurement. However, in cases of urgency, critical operational requirements, security considerations or other circumstances warranting immediate action, C-DAC may adopt any procurement method.

e) The Contractor shall not be liable for the portion of the delay or failure which it establishes, through contemporaneous documentary evidence, was directly and solely caused by C-DAC's failure to fulfil an expressly stipulated dependency or by a Force Majeure event recognised under the Contract. The Contractor shall promptly notify C-DAC of the relevant event, its anticipated impact and mitigation measures. Delays or failures of OEMs, subcontractors, suppliers, logistics providers or other entities engaged by the Contractor shall not, by themselves, absolve the Contractor of its contractual responsibility.

f) The amount recoverable under this clause may be adjusted against pending payments, Performance Security, Bank Guarantee or any other security furnished by the Contractor, without prejudice to C-DAC's right to recover any remaining amount through appropriate legal proceedings.

g) The invocation of this clause shall be without prejudice to C-DAC's rights to levy liquidated damages, impose applicable SLA deductions, terminate the Contract, invoke securities, claim indemnification or pursue other remedies available under the Contract or applicable law. However, C-DAC shall not recover the same loss or expenditure more than once.

h) The Contractor shall provide all reasonable assistance, documentation, technical information, access, transition support and cooperation required by C-DAC or the alternative supplier to ensure completion of the affected scope and continuity of operations.

13. Fall Clause:

a) During the currency of the Contract, the Contractor shall not supply or offer to supply, in India, identical goods/equipment of the same make, model and technical configuration as those supplied under this Contract, to any Ministry/Department of the Government of India, State Government, Government-funded institution or Public Sector Undertaking, at a price lower than the corresponding price payable by C-DAC, where such supplies are made under substantially comparable commercial conditions.
b) For the purpose of this clause, a comparison shall be made only where the supplies are substantially comparable in respect of make, model, technical configuration, warranty and support obligations.
c) This clause shall not apply to:
   (i) supplies to private-sector organisations;
   (ii) export supplies or supplies outside India;
   (iii) supplies involving materially different configurations, quantities, specifications, delivery schedules, warranty or support obligations;
   (iv) supplies under contracts entered into prior to the date of this Contract, where the commercial terms are materially different; or
d) The Fall Clause shall apply only to the corresponding identical goods/equipment supplied under this Contract. It shall not operate to reduce the price of unrelated equipment, integration, installation, commissioning, operations, maintenance, manpower, support or other services forming part of the integrated project.
e) If C-DAC establishes, on the basis of documentary evidence, that the Contractor has supplied identical goods/equipment in India to an entity covered under Clause 13.1 at a lower price under substantially comparable commercial conditions during the currency of this Contract, the Contractor shall extend the corresponding lower price to C-DAC for the relevant undelivered goods/equipment. In respect of goods already supplied, the price adjustment/refund shall be limited to the corresponding comparable goods and shall be subject to verification by C-DAC.
f) The Contractor shall, upon reasonable written request by C-DAC, provide relevant information and documentary evidence necessary to verify compliance with this clause, subject to reasonable protection of confidential information not relevant to such verification.

14. Limitation of Liability:

a) General Liability Cap: Subject to the exclusions set out in Clause (b) below, the aggregate and cumulative liability of the Contractor arising out of or in connection with the Tender, Contract, Work Order or any amendment thereto, whether in contract, tort (including negligence), indemnity, breach of statutory duty or otherwise, shall not exceed 100% (one hundred percent) of the Total Contract Value (TCV). The said cap shall apply to the aggregate of claims arising under or in connection with the Contract
b) The limitations in Clauses (a) shall not apply to:
   (i) fraud, fraudulent misrepresentation, wilful misconduct or deliberate default of the Contractor;

(ii) death or bodily injury caused by any act or omission of the Contractor, its personnel, agents, OEMs or subcontractors;
(iii) loss of or damage to tangible property, including C-DAC's existing infrastructure, equipment, facilities, systems and assets, caused by the Contractor or its personnel, agents, OEMs or subcontractors; (e.g., DCLC leaks, electrical fires, structural failures).
(iv) infringement or misappropriation of intellectual property rights of C-DAC or any third party;
(v) breach of confidentiality, data sovereignty, data protection, information security or cybersecurity obligations, including unauthorised access to, disclosure, alteration, loss, destruction or misuse of C-DAC data or systems;
(vi) statutory, tax, employment, labour, social security or other third-party liabilities for which the Contractor is responsible under the Contract or applicable law;
(vii) the Contractor's obligations to repair, replace, rectify or remedy defective or non-conforming goods, equipment, software, systems or services under the warranty, support or defect-liability provisions; and
(viii) any liability which cannot be limited or excluded under applicable law.

c) Liquidated damages, SLA deductions, penalties, risk-purchase recoveries, indemnity payments and other contractual remedies shall be governed by their respective provisions. They shall not automatically be treated as the same loss or be deducted from the general liability cap merely because they arise under the Contract. However, C-DAC shall not recover the same loss or expenditure more than once.
d) Nothing in this clause shall restrict C-DAC's right to seek specific performance, injunctive or other equitable relief, require rectification or replacement of defective deliverables, invoke securities, or exercise any other remedy available under the Contract or applicable law.

15. Indemnification:

a) The successful Bidder/Contractor shall indemnify, defend and hold harmless C-DAC, its officers, employees and authorised representatives against all claims, demands, proceedings, losses, damages, liabilities, penalties, costs and expenses (including reasonable legal and professional expenses) arising out of or in connection with:
   (i) Infringement or alleged infringement of any patent, copyright, trademark, design, trade secret, licence or other intellectual property right by any goods, equipment, software, technology, system or service supplied or provided by the Contractor;
   (ii) Violation of applicable laws, rules, regulations, statutory requirements, licences, permits or approvals by the Contractor or its personnel, agents, OEMs or subcontractors;
   (iii) Death, bodily injury or damage to property, including C-DAC's existing infrastructure, facilities, equipment, systems or assets, caused by any act, omission, negligence, wilful misconduct or default of the Contractor or persons engaged by it;
   (iv) Breach of confidentiality, data protection, data sovereignty, information security or cybersecurity obligations, including unauthorised access to, disclosure, loss, alteration, destruction or misuse of C-DAC data or systems;
   (v) Claims by the Contractor's employees, personnel, agents, subcontractors or other persons engaged by it in relation to wages, salaries, employment, social security, statutory dues, compensation, benefits or other employment-related entitlements;
   (vi) Infringement of third-party rights or claims arising from the Contractor's failure to obtain or maintain necessary licences, authorisations, consents or permissions; and

(vii) Any other act, omission, breach, negligence, default or failure of the Contractor or persons engaged by it in performing its obligations under the Contract.

b) The indemnity shall cover both third-party claims and C-DAC's direct losses and reasonable expenses arising from the events specified in Clause 15.1. Such direct losses may include reasonable costs of investigation, containment, remediation, restoration, data/system recovery, replacement, mitigation and ensuring continuity of operations.

c) Procedure for Third-Party Claims: Where a third-party claim is made against C-DAC for which indemnity is claimed:
   (i) C-DAC shall, where reasonably practicable, notify the Contractor in writing of the claim within a reasonable period after becoming aware of it;
   (ii) Any delay or failure in notification shall relieve the Contractor only to the extent that it establishes that it has been materially prejudiced by such delay or failure;
   (iii) The Contractor may, with C-DAC's prior written approval, assume conduct of the defence of the claim through competent legal counsel, at its own cost;
   (iv) C-DAC shall be entitled to participate in the defence through its own counsel, at its own cost, or at the Contractor's cost where a conflict of interest exists or where the claim involves matters materially affecting C-DAC's interests, reputation, data or statutory obligations; and
   (v) The Contractor shall not admit liability, make any statement on behalf of C-DAC or settle any claim in a manner that imposes any payment obligation, admission, restriction, continuing obligation or adverse consequence upon C-DAC without C-DAC's prior written consent.

d) The Contractor shall not be relieved of its indemnity obligations merely because a claim has not been finally adjudicated by a court, where C-DAC has reasonably incurred expenditure or taken necessary steps to address an actual or imminent threat to its systems, infrastructure, data, personnel or operations. Any settlement or payment to a third party shall, however, be supported by reasonable documentary evidence.

e) Intellectual Property Claims: If any goods, equipment, software, technology or service supplied by the Contractor is held, or is reasonably likely, to infringe a third-party intellectual property right, the Contractor shall, at its own cost and without disruption to C-DAC's operations:
   (i) Procure for C-DAC the right to continue using the affected item; or
   (ii) Modify or replace the affected item with a non-infringing equivalent or superior solution acceptable to C-DAC without material reduction in functionality, performance, interoperability, security or capability; or
   (iii) Where the above options are not reasonably available, refund the amounts paid for the affected item and bear the reasonable costs of removal, replacement, migration and transition.

f) The Contractor shall remain primarily and fully responsible for the acts, omissions, defaults and performance of its OEMs, subcontractors, suppliers, agents and personnel. Any back-to-back indemnity, warranty or remedy available to the Contractor from an OEM or subcontractor shall not reduce or delay the Contractor's obligations towards C-DAC.

g) The Contractor shall maintain appropriate insurance, as required under the Contract, without prejudice to its indemnity obligations. The availability or adequacy of insurance shall not limit the Contractor's liability.

h) The indemnity obligations under this clause shall be subject to Limitation of Liability, except for the categories of liability expressly excluded from the cap under Limitation of Liability Clause (b) and any liability which cannot be limited under applicable law.

i) The obligations under this clause shall survive expiry or termination of the Contract to the extent they relate to events occurring during the term of the Contract or obligations which by their nature are intended to survive.

16. Termination

a) **Termination for Default:** In the event of any delay, failure, deficiency, non-conformance, breach of SLA, under-performance or other material breach of the Contract by the Contractor, C-DAC may issue a written notice requiring the Contractor to remedy the default within 30 (thirty) days or such other reasonable period as may be specified by C-DAC. If the Contractor fails to remedy the default within the stipulated period, C-DAC shall be entitled to terminate the Contract, in whole or in part, cancel the relevant Work Order/Purchase Order, invoke Performance Security or other securities, recover damages and costs, invoke Risk Purchase provisions and exercise any other contractual or legal remedies.

b) **Immediate Suspension/Termination:** Notwithstanding Clause 16(a), C-DAC may suspend the affected services, restrict access or terminate the Contract or relevant portion thereof with immediate effect in cases involving fraud, corruption, wilful misconduct, abandonment, serious or repeated cybersecurity breaches, unauthorised access to or disclosure of C-DAC data, serious safety/security risks, unlawful conduct, insolvency affecting performance or any imminent threat to C-DAC's infrastructure, systems, data or critical operations. Wherever practicable, reasons for such action shall be recorded and the Contractor may be given an opportunity to respond.

c) **Termination by Contractor:** The Contractor may terminate the Contract only if an undisputed and duly certified invoice remains unpaid for more than 60 (sixty) days after its contractual due date, provided a further written notice allowing 30 (thirty) days for payment has been issued to C-DAC. The Contractor shall not be entitled to terminate for disputed invoices, contractual deductions, withholding, set-off, recoveries or amounts not certified as payable. The Contractor shall continue performing its critical obligations during the notice/dispute period to ensure continuity of services.

d) **Termination for Convenience by C-DAC:** C-DAC reserves the right to terminate the Contract, in whole or in part, for its convenience by giving 30 (thirty) days' written notice or such longer period as C-DAC may specify. In such cases, subject to verification and supporting documentary evidence, the Contractor shall be entitled only to payment for (a) goods/equipment duly delivered and accepted; (b) services satisfactorily performed and accepted up to the effective date of termination; (c) reasonable and unavoidable costs of approved project-specific work-in-progress, goods/equipment and non-cancellable OEM/subcontractor commitments; and (d) reasonable and unavoidable demobilisation and wind-down costs, provided such commitments were disclosed to and approved by C-DAC.

   Any such settlement shall be subject to the Contractor taking reasonable steps to mitigate costs, deducting refunds, credits, salvage/resale value and other recoveries, and vesting title in C-DAC to goods/equipment for which payment is made, free from encumbrances. No payment shall be made towards anticipated profits, loss of business opportunity, unearned future service charges, speculative costs, unapproved commitments or costs attributable to the Contractor's default. The Contractor shall submit an itemised claim with supporting documents within 30 (thirty) days of termination.

   Disclosure of OEM Commitments: Within 30 (thirty) days of award of the Contract, the Contractor shall submit details of material project-specific OEM purchase orders, long-lead items and non-cancellable third-party commitments, including their value, delivery schedule, cancellation/refund terms and payment status. Undisclosed or unapproved commitments shall not automatically qualify for compensation upon termination. C-DAC's acknowledgement of such details shall not constitute acceptance of goods or an undertaking to reimburse the stated amounts.

e) **Force Majeure: Where a Force Majeure event continues for 60 (sixty) consecutive days and materially prevents performance, the parties shall consult in good faith to identify measures for resumption or modification of the affected obligations. If performance cannot reasonably be resumed, C-DAC may terminate the affected portion or the entire Contract, as appropriate, in accordance with the Force Majeure provisions and applicable law. Settlement shall be governed by the applicable contractual provisions.**

f) **Consequences and Survival:** Upon expiry or termination, the Contractor shall cease work as directed by C-DAC, ensure safe shutdown and continuity of critical operations, hand over all completed and paid-for deliverables, equipment, documentation, configurations, credentials and project data, provide reasonable transition, migration and knowledge-transfer assistance, and return or securely delete C-DAC's confidential information and data as directed, subject to applicable legal retention requirements. The Contractor shall also remove its personnel and equipment from C-DAC premises without disrupting operations.

Release of Performance Security shall be subject to fulfilment of contractual obligations, settlement of recoveries and dues, handover of deliverables and data, completion of transition obligations and compliance with the security instrument and applicable contractual conditions. Termination or expiry shall not affect accrued rights, liabilities, claims, indemnities, confidentiality, intellectual property, data protection/security, audit and dispute resolution obligations or any other provisions intended to survive termination.

17. Assignment:

Selected bidder/ Party shall not assign, delegate or otherwise deal with any of its rights or obligations under this Contract without prior written permission of C-DAC.

18. Evaluation of bids and award of contract stages

The duly constituted Tender Evaluation Committee (TEC) shall evaluate the bids. The TEC shall be empowered to take appropriate decisions on minor deviations, if any. The decisions of TEC shall be final and binding on all the bidders.

Bids will be evaluated in the following stages:

I. **STAGE A:** The bids will be examined based on eligibility criteria stipulated in this RFP to determine the eligible bidders.
II. **STAGE B :** As part of Technical Evaluation, the eligible bidders would be required to present their proposed solution at date and place intimated by C-DAC.
III. **STAGE C :** The technical bids of only the eligible bidders shall be further evaluated based on the technical specifications of the required items as mentioned in this RFP/ Corrigendum and the proposal submitted by the bidder.
IV. **STAGE D :** The financial bids of all the technically qualified bidders shall than be opened on the GeM portal. If required, negotiations may be held with the Lowest (L1) bidder.

(END OF SECTION II)

SECTION III - SPECIAL CONDITIONS OF CONTRACT (SCC)

1. Prices

a) The price shall be considered firm. No price escalation will be permitted (except Govt. Statutory Levies if changed by Govt after submission of the bid).
b) The prices will be compared on GST-inclusive rates quoted/calculated by the bidder and as per the GeM GTC. In case of errors, the bidders will not be permitted to change the GST percentage.
c) The prices quoted must be "All inclusive- till destination", (including local freight, insurance, forwarding, loading/unloading, installation, testing, commissioning and all incidental charges till destination.
d) The responsibility, cost and risk of the consignment shall rest with the bidder till receipt of goods is acknowledged by the end user at site(s). However, such receipt/ acknowledgement shall not be treated as acceptance of goods.
e) Prices should be submitted in INR only on the GeM portal.

2. Completeness Responsibility

Notwithstanding the scope of work, supply and or services stated in bid document, any equipment or material, engineering or technical services which might not be even specifically mentioned under the scope of supply of the bidder and which are not expressly excluded there from but which – in view of the bidder - are necessary for the performance/ execution of work in accordance with the specifications are treated to be included in the bid and has to be performed by bidder. The items which are over & above the scope of supply specified in the Schedule of Requirements may be marked as "Additional Items" and the details of the same must be provided in their Technical Bids. The price(s) of such items/services / software etc. may be filled in the additional line item of the BoQ.

3. Performance Security

Within 10 days of placement of order on GeM portal, the selected bidder should submit a Performance Security, for an amount equivalent **to 5% of the total contract/order value**. This performance security can be in the form of a Demand Draft or a Bank Guarantee or Insurance Surety Bonds (ISBS), in the name of C-DAC, Pune for minimum duration of **48 months** from the date of order placement, covering the implementation period, operation and maintenance period and warranty. The performance of security (if submitted in the form of a Bank Guarantee) shall remain valid for a period of 60 days beyond the date of completion of contractual obligations as specified in the order including warranty. The Performance Security will be returned/refunded within two weeks of completion of contractual obligations. ***Further, C-DAC may ask for multiple bank guaranties/ ISBS of different values totaling to the consolidated amount of 5% of contract value, however the decision on value and number of these BGs/ ISBS shall reside with C-DAC and shall be binding on the bidder.***

C-DAC reserves the right to invoke the Performance Security(ies) submitted by bidder, in case of the following:

a. The vendor fails to supply/install / test/commission / execute any other associated activity; or
b. The Item/Components fail to achieve the performance as stipulated in this document or

c. The bidder fails to provide the warranty and other services in scheduled time frame, as stipulated in this document or
d. The bidder delays to provide the warranty & O&M services as stipulated in this document.

4. Insurance:

The bidder shall take out and maintain, at its cost, a Contractor's All Risk policy covering the full contract value, O&M services, third-party liability, workmen's compensation cover for all personnel deployed, and marine/transit insurance for all equipment for the duration covering installation, commissioning, acceptance.

Separate insurance policy for the complete facility including IT equipment , Non-IT equipment and workmen's compensation cover for all personnel deployed for the entire period warranty & DC O&M services shall be procured on C-DAC name by the bidder. Copies of all policies shall be provided as and when required by C-DAC.

5. Warranty, Support and Licenses

The following terms shall apply uniformly to all Goods, devices, components and accessories supplied under this RFP, covering both IT and Non-IT items, under the scope of Section-IV.

A. The Supplier warrants that all the Goods are new, unused, and that they incorporate all recent improvements in design and materials unless provided otherwise in the order. The supplier further warrants that all Goods supplied shall have no defect arising from design, materials or workmanship (except when the design and/or material is required by the Purchaser's specifications) or from any act or omission of the supplier. The warranty should be comprehensive on site, repair/replacement basis free of cost covering 3 years period after successful supply, installation, testing, commissioning and acceptance by C-DAC. OEM professional services shall be employed & OEM must send the engineers onsite for any hardware replacement and software upgrade.

B. The Bidder shall ensure that the respective OEMs for components/items supplied under this RFP, should provide comprehensive OEM professional services and technical support for their respective products throughout the implementation, commissioning, warranty and support period.

C. The supplier also warrants that the said goods would continue to conform to the description and quality aforesaid for a period of min. 3 years from the date of acceptance by the end user and that notwithstanding the facts that the Purchaser/ end user (Inspector) may have inspected and/or approved the said Goods. If during the aforesaid period of 3 years the Goods be discovered not to conform to the description and quality aforesaid or have deteriorated Purchaser will be entitled to reject the Goods or such portion thereof as may be discovered not to conform to the said description and quality. On such rejection, the Goods will be at the supplier's risk and all the provisions herein contained relating to rejection of Goods shall apply. The supplier if called upon to do so, shall replace within one month or such further period as may be extended by the Purchaser on his discretion on an application made thereof by the supplier the goods or such portion thereof as is rejected by Purchaser and in such an

event the above mentioned warranty period shall apply to the Goods replaced from the date of acceptance of the replacement otherwise , the supplier shall pay to the Purchaser such damages as may arise by reason of breach of the conditions therein contained.

D. All the Goods supplied must have 3 (Three) years onsite comprehensive warranty with support along with 4 hours response time and 48 hours resolution time , covering all parts & labor starting from the date after the successful installation and acceptance by C-DAC, Pune. During the warranty period, suppliers will have to undertake comprehensive maintenance of all the items/components, support, and accessories supplied at the place of installation of the equipment.

E. For delay in services/support during the Warranty period , if the Vendor fails to complete service / rectification within the defined time limit, a penalty of 0.5% of value of the corresponding product value for the delayed products/service , beyond the allowed resolution time shall be charged as penalty for each week of delay from the Vendor. Vendor can deposit the penalty with C-DAC directly else the C-DAC shall have a right to recover all such penalty amount from the Performance Security.

F. The defects, if any, during the guarantee/warranty period, are to be rectified free of charge by arranging free replacement wherever necessary. Goods requiring warranty replacements must be replaced on free of cost basis.

G. Onsite comprehensive warranty and support for complete supplies for three years from the date of acceptance of the solution.

H. The Bidder shall maintain adequate onsite spare parts and components at the installation site throughout the warranty period to ensure timely replacement and minimize equipment downtime.

I. The onsite spares inventory shall be replenished promptly after utilization, and all spare parts shall be genuine, new, and compatible with the supplied equipment,

J. The warranty support will be backed by supplier by submitting a Performance Bank Guarantee.

K. All items of supply shall include 3 (Three) years onsite comprehensive warranty with support under the scope of Section-IV. The following warranty terms shall be uniformly applicable to all supplied devices and components:
   a) All supplied devices shall carry a 3-year onsite comprehensive warranty at no additional cost for change or replacement of parts, labor charges, consumables, shipment, and insurance.
   b) The warranty shall include support with a 4-hour response time and **48 hours resolution** time.
   c) The Bidder shall deploy four (4) dedicated manpower resources data centre infrastructure and hardware related activities, including but not limited to hardware installation, removal, replacement, maintenance, troubleshooting, for RMA management, warranty support, call logging and tracking, and coordination/liaison with the respective OEMs. The deployed resources shall be

responsible for timely follow-up, issue resolution, status tracking, and closure of all warranty and RMA-related matters throughout the contract period.

d) Hardware replacement or resolution shall be completed within 24 hours of issue of reporting.
e) The warranty shall cover and support all software, firmware, and associated licenses (including all subscribed features and periodic updates/upgrades) effective from Day One.
f) Telephonic, Email, and Chat support with a single point of contact for 24x7x365 call logging shall be provided by the OEM, along with an escalation matrix.
g) The devices shall not go out of support/warranty for at least 2 years after the expiry of the initial warranty period excluding exception mentioned in this RFP.
h) The Post Warranty Comprehensive Annual Maintenance Charges (CAMC) charges shall not be more than 5% of the IT (hardware and software) and Non-IT items, as per requirements. Further, the same shall be confirmed by the respective OEMs as well in the MAF given in the Annexure.
i) All cables and accessories supplied shall be covered under standard warranty and support.
j) New version upgrades, updates, patches, etc for all the components/ sub-components through the period of contract shall be provided. 24/7 telephonic and email OEM support.
k) All software licenses shall be issued in the name of the Buyer. Licenses shall be supplied in paper or electronic form as applicable and shall be perpetual to use for complete solution, with no reduction of function on expiry of support.
l) All licensed features, asked functionality, supported functionality and capacity shall be enabled from Day One for the full quoted scale. No feature required by the specification shall be withheld pending a further purchase. The software may be offered under a subscription-based licensing model. However, the complete licensed functionality shall remain operational and accessible even after the expiry of the subscription period. Expiry of the subscription shall not result in disabling , restricting or degrading any of the licensed software functionalities
m) All warranty and subscription will start after the acceptance and sign of from C-DAC.
n) The warranty shall cover and support all software, firmware and associated licenses, including all subscribed features, effective from Day One.
o) New version upgrades, updates, patches and security fixes for all components and sub-components shall be provided throughout the contract period at no additional cost, together with release notes and a supported upgrade path. The bidder shall submit with the bid a complete license schedule listing every license required, with SKU or part number, quantity, licensing metric.

6. Penalty for delayed Delivery

If the Seller/Service Provider fails to deliver the scope of this RFP, as defined under delivery milestones, within the original/ re-fixed delivery period(s) specified in the contract, the Buyer will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force Majeure conditions mentioned in this RFP, @0.5% of the respective Track-I and Track -II value within the contract (excluding O&M Charges) mentioned in the RFP, per week or part of the week of delayed period, until actual delivery or performance, as pre-estimated damages,

not exceeding 5% of the total contract value (excluding O&M Charges) without any controversy/ dispute of any sort whatsoever.

If delay exceeds 10 weeks, C-DAC may issue notice under the Termination for Default clause. The delay in delivery and/or execution, not attributed to supplier viz. delay in site allocation / availability, delay in submission of required documents (by C-DAC), approval etc. and the conditions arising out of Force Majeure will not be considered for the purpose of calculating penalties.
All delays occurring/envisaged by the vendor need to be intimated at least two weeks in advance from the occurrence. In case of Force Majeure, the vendor need to intimate the delay within two weeks of occurrence of the event.

7. Governing Law and Dispute Resolution

a. Governing Law
   This Contract, including all matters relating to its execution, validity, interpretation, performance, breach, or termination, shall be governed by, interpreted, and construed exclusively in accordance with the substantive laws of India.
b. Amicable Resolution
   Any dispute, difference, or claim arising out of or in connection with this Contract shall first be referred to mutual consultations between authorized representatives of C-DAC and the Contractor. If unresolved within 30 calendar days, the dispute shall be resolved strictly as per the provisions below.
c. Monetary Threshold & Forum
   Disputes below ₹10 Crore: In compliance with Ministry of Finance OM No. F.1/2/2024-PPD (dated 03.06.2024), where the aggregate value of claims and counterclaims is less than ₹10,00,00,000/- (Rupees Ten Crore), the dispute shall be referred to a Sole Arbitrator mutually appointed within 30 days of notice, failing which appointment shall follow the Arbitration and Conciliation Act, 1996 (as amended). The seat, venue, and place of arbitration shall be Pune, Maharashtra, and the language shall be English.

   Disputes of ₹10 Crore and Above: Arbitration is expressly excluded. Unresolved disputes shall be adjudicated exclusively by the competent courts at Pune, Maharashtra.
d. Continuation of Obligations
   Pending dispute resolution, arbitration, or litigation, the Contractor shall not suspend, delay, or withhold performance of any contractual obligations (including supply, installation, commissioning, operations, AI/DC maintenance, cloud, security, and support services). C-DAC shall continue releasing payments for undisputed amounts under the Contract.
e. Exclusive Jurisdiction
   Subject to above, the courts at Pune, Maharashtra, shall have exclusive jurisdiction over all disputes, applications, interim relief petitions, and legal matters arising out of or in connection with this Contract, to the exclusion of all other courts.

8. Force Majeure

C-DAC may consider relaxing the penalty and delivery requirements, as specified in this document, if and to the extent that, the delay in performance or other failure to perform its

obligations under the contract is the result of a Force Majeure. Force Majeure is defined as an event of effect that cannot reasonably be anticipated such as acts of God (like earthquakes, floods, storms etc.), acts of states / state agencies, the direct and indirect consequences of wars (declared or undeclared), hostilities, national emergencies, civil commotion and strikes at successful Bidder's premises or any other act beyond control of the bidder.

9. Risk and Ownership

Upon 100% of payment and post successful acceptance testing, C-DAC shall become owners of goods / software ordered.
However, all risks, responsibilities, and liabilities thereof in all goods shall remain with selected bidder till installation, commissioning, integration, training and knowledge transfer, operation and maintenance of all goods to the end user. Part deliveries shall not be treated as deliveries. Only full deliveries of all items ordered will be considered as delivery.

10. Severability

If any provision of this Contract is determined to be invalid or unenforceable, it will be deemed to be modified to the minimum extent necessary to be valid and enforceable. If it cannot be so modified, it will be deleted, and the deletion will not affect the validity or enforceability of any other provision.

11. Sub-Contracting

The supplier shall notify the Procuring Entity in writing all subcontracts awarded under the contract. In its original bid or later, such notification shall not relieve the contractor from any of its liability or obligation under the terms and conditions of the contract. Subcontracts must comply with and should not circumvent Contractor's compliance with its obligations as per this tender, based on which the contract was awarded to him.

12. Integrity Pact

The bidder is required to enter into an Integrity Pact with C-DAC. For this, the Sole Bidder / Lead Bidder / Consortium Member / Named DC partner / Named IT Partner shall (as applicable – to be submitted by all parties) submit the scanned copy of signed, stamped, and notarized Integrity Pact on minimum Rs. 100 stamp paper, as part of technical bid, failing which, the Proposal submitted by the concerned bidder will be summarily rejected. The original document should be couriered to C-DAC. The format for the Integrity Pact is provided in Annexure H

Details of IEM is provided below:
Shri. M P Johnson - Email ID- johnsonmp1961@gmail.com
Shri. Vijay Kumar Singh - Email ID - vijaysinghsls10@gmail.com

(END OF SECTION III)

SECTION IV - SCHEDULE OF REQUIREMENTS / SCOPE OF WORK

1. Scope of Work

a. The objective shall be to design, deploy, commission, and operate a cutting-edge sovereign AI cloud infrastructure & Software stack built on high-density AI Accelerator clusters, high-speed networking, scalable storage systems, advanced orchestration platforms, and secure cloud-native environments. The project will be executed in two Tracks: The Track-I engagement shall be for AI compute capacity commissioning at C-DAC Innovation Park HPC-AI DC with 168 AI Accelerators in a total of 7 RDHX Racks. The Track-II involves the commissioning of the DC & AI IT Infrastructure at C-DAC Pune (CHIKHALI) with a compute capacity of a minimum of 15 Exaflops of FP16 (with sparsity) performance, with a minimum of 3,000 industry-standard AI Accelerators. Both the 15 Exaflops and the 3,000 AI Accelerators are independent minimum and shall be met concurrently.

b. OEM Professional Services of the respective OEM of each Item supplied under Track-I and Track-II (IT and Non IT) shall be engaged for the complete lifecycle of that Item, covering solution design and design validation, installation, configuration, integration, performance tuning, commissioning, acceptance testing, and warranty and support for the entire contract period. OEM Professional Services shall additionally support end-to-end AI activities including model training, fine-tuning, inference, deployment, Agentic AI and AI application hosting.

c. Track-II: The facility shall leverage advanced orchestration and workload management tools such as Kubernetes and SLURM to ensure efficient resource allocation, scheduling, and utilization. It will also include centralized data management, model repositories, AIOps/MLOps pipelines, monitoring systems, and performance optimization frameworks to support reliable and continuous AI operations. The data centre will be designed with energy-efficient cooling systems, redundant power infrastructure, and high availability.

d. The AI Infrastructure shall be designed and commissioned to support IT load not exceeding 7.0 MW, & in addition 1.0 MW IT spare Load capacity shall be provisioned along with associated non-IT infrastructure requirements. The overall facility shall be designed to meet an annualized **Power Usage Effectiveness (PUE) not exceeding 1.3.**

e. The Annualized Power Usage Effectiveness (PUE) target of the Data Centre shall be equal to or below 1.30, while the Design PUE at the extreme outdoor dry-bulb temperature (ASHRAE N-20 yr) shall be equal to or below 1.45. PUE shall be calculated, measured and reported in accordance with the latest applicable edition of ISO/IEC 30134-2. Annualized PUE shall be calculated using actual cumulative energy consumption over a continuous 12-month period. The Contractor shall demonstrate compliance with the specified PUE targets while maintaining the stipulated IT load , Tier III redundancy and operational reliability.

f. The vendor shall accommodate all outdoor infrastructure within a single contiguous land parcel not exceeding 44,000 sq. ft. and shall submit a space-optimized Master Plan demonstrating compliance with the stipulated land area.

g. The bidder shall be responsible for the planning, design and engineering of a Tier-III or higher certified Data Centre to meet the requirements of the Track-II IT infrastructure at C-DAC, including the supply and installation of IT, power and cooling infrastructure and implementation of an integrated DCIM/BMS solution for real-time monitoring and control of power, cooling and IT loads, including dynamic control, redundancy and associated management functions.

h. The Bidder shall be responsible for 24x7 operation, support, performance management and maintenance of the Data Centre for a period of three (3) years from Final Acceptance(including Benchmark and Acceptance Testing) and sign-off of Track-II by C-DAC. The Bidder shall establish and implement an industry-standard Service Management framework and deploy adequate and suitably skilled manpower for comprehensive Non-IT Data Centre Operations and Management, including critical facilities, HVAC, BMS, electrical systems.

i. The AI Accelerator IT Infrastructure solution for Track-II shall be accommodated within a maximum of 44 DCLC Racks, & the ancillary IT Infrastructure (Storage, CPU nodes, N/W etc.) should not occupy a maximum of 18 Air Cooled Racks. There should be be a provision of 4 spare DCLC Racks with min. 150 kW (cooling & power) each; & 14 additional Air-Cooled Racks, each with min. 25kW (cooling & power).

j. The bidder has to plan and execute power and cooling infrastructure (both high and low side) considering minimum 150 KW rack power density for all the DCLC racks and minimum 25 kw rack power density for all the Air-Cooled racks to enable client for any vertical scaling within racks.
   All supplied upstream and rack-level systems shall be engineered from Day 1 to provide electrical and thermal headroom to accommodate full in-rack vertical compute scaling up to the above stated thresholds.

k. All personnel engaged by the Bidder for the design, planning, installation, commissioning, operation & maintenance (O&M), and warranty support of the proposed system shall be Indian nationals ordinarily residing in India.

l. The proposed solution shall be derived from an officially published quad-rail or eight-rail AI Accelerator OEM's any Reference Architecture (RA), adapted as necessary to meet the platform and cluster design requirements specified in this tender. The scope shall include, but not limited to, data centre design, AI accelerator compute, High speed compute fabric, High throughput storage, and Storage Delivery Network. The bidder shall document the design adaptations and demonstrate alignment with the applicable architectural principles and technical requirements of the published RA.

m. Balanced Architecture:
   1. Every populated DCLC rack shall contain an identical number of AI Accelerator compute nodes and AI Accelerators.
   2. Each populated DCLC rack shall have the same configured power density and corresponding cooling requirement.
   3. Each populated AIR cooled rack shall have the same configured power density and corresponding cooling requirement.
   4. All host ports on the leaf switches shall be fully populated and connected to hosts.

2. Technical documents to be submitted along with the technical bid

The Bidder shall submit the technical documents as part of the Technical Bid for evaluation of compliance with the technical specifications and scope of work. These documents are mandatory for technical evaluation. Failure to submit any of the required technical documents may result in rejection of the bid. The list of mandatory submissions is given at **ANNEXURE J**

3. Track-I

Detailed Scope

a. Design, supply, installation, commissioning and integration of accelerated AI compute capacity of not less than 756 Petaflops (FP16 with structured sparsity) with a minimum 168 industry-standard AI Accelerators in the existing Data Centre at C-DAC Innovation Park, Pune. Both the 756 Petaflops and the 168 AI Accelerators are independent minimum and shall be met concurrently.

b. Supply, installation and commissioning of the High-Speed Compute Fabric complete with all switches, adapters, optics, transceivers and cabling. Cabling, labeling, cable rerouting and integration of the accelerated compute nodes with existing 100 GbE, 10 GbE and 1 GbE switches.
c. Safe disconnection, dismantling, removal of the existing 42 nos of NVIDIA DGX-A100 compute nodes from the racks(currently occupying seven(7) RDHX racks) and secure packing with Heavy duty double-wall or triple-wall corrugated boxes, make it ready for transport . C-DAC will have the responsibility for ensuring that the required warranty remains fully valid and intact throughout this process.
d. Racking, stacking and mounting of the newly supplied compute nodes in the seven (7) RDHX racks provided by C-DAC, including rail kits, cable management arms, blanking panels and all mounting hardware. C-DAC will have the responsibility for ensuring that the required warranty remains fully valid and intact throughout this process.
e. Complete structured cabling of the newly supplied nodes — power, low-latency compute fabric, storage, DC LAN and out-of-band management — including cable routing, labeling, dressing, trays and cable management in accordance with C-DAC's data centre.
f. Bidder needs to extend Infiniband HDR based storage delivery network and provide 1 nos. of infiniband HDR 200 connectivity on the supplied compute nodes. C-DAC will provide the compatible lustre-client package and CSI driver for installation of lustre client by bidder for integration with existing 11 PiB lustre storage. **C-DAC has NVIDIA / Mellanox QM8700 switches and 200G QSFP56 to QSFP56 infiniband HDR cables for storage delivery. Bidder needs to extend Infiniband HDR based storage delivery network and provide 1 nos. of infiniband HDR 200 connectivity on each of the supplied compute nodes using the twenty-one (21) active HDR InfiniBand ports and cables provided by C-DAC. C-DAC will provide the compatible lustre-client package and CSI driver for installation of lustre client . Bidder needs to carry out the** adapter configuration, Lustre client installation, persistent mounting on the base operating system and within containers, and validation of GPUDirect Storage or equivalent data paths for integration with existing 11 PiB lustre storage. C-DAC has NVIDIA / Mellanox QM8700 switches and 200G QSFP56 to QSFP56 infiniband HDR cables for storage delivery.
g. Labelling of every node, switch, port, power lead and cable at both ends in accordance with C-DAC's naming convention, and submission of an as-built cable schedule.
h. Supply of all network cables, optics, transceivers, DAC/AOC, breakout, splitter and transition cables required for the complete deployment, together with 2% spares of each cable and transceiver type.
i. Supply of spare NVMe disks at not less than 2 % of the quantity supplied, and a spare kit of field-replaceable units including power supplies, to be retained at site. Standard RMA procedure to be followed for replacement of faulty spares.
j. Benchmarking and Acceptance Testing of the proposed nodes and of the integrated environment, to meet the criteria set out in this document in section “Benchmark and Acceptance Testing”.
k. The Bidder shall enage respective OEM Professional Services of quoted items for the implementation of the solution, covering design validation, installation, configuration, integration, performance tuning, acceptance testing, warranty and support.
l. Any additional items required for the complete and successful execution of the scope shall be identified and provided by the Bidder as part of the solution.

A. Accelerated Compute Solution

Sr. No.	Description
1.	The complete solution shall deliver a minimum aggregate theoretical peak compute performance of 756 Petaflops (FP16 with structured sparsity) or higher and shall support Compute/Vector/Matrix/Tensor/Equivalent floating-point operations. Provided nodes in solution should be Air Cooled using RDHX.
2.	The solution accelerator shall support precision modes including FP32, FP16, FP8/MXFP8, FP4/MXFP4, INT8 natively for AI training and inference workloads. The Bidder shall declare the dense and sparse FP16, FP8/MXFP8 and FP4/MXFP4 figures per accelerator and for the complete solution.
3.	Each compute node shall be a multi-CPU, multi-accelerator system in which all accelerators are hosted within a single chassis. The CPUs shall be server-class, of the current or immediately preceding generation of the CPU OEM's server product line as on bid due date, with not less than 56 cores per socket with minimum 2 sockets, supporting PCIe Gen5 or higher and full memory-channel population consistent with the offered system memory.
4.	The inter-node compute fabric shall provide a minimum usable bandwidth of 400 Gb/s per accelerator over a lossless, RDMA-capable, ultra-low-latency interconnect (InfiniBand, RoCEv2 or equivalent), architected in a multi-rail, 100% non-blocking configuration. Each node shall provide one (1) dedicated compute-fabric port of not less than 400 Gb/s for each accelerator in the node. Adapters of a higher native line rate may be offered and operated at 400 Gb/s where required.
5.	The intra-node AI Accelerator-to- AI Accelerator communication fabric shall support a minimum of 1.8 TB/s bi-directional bandwidth per accelerator (or higher) using high-speed accelerator interconnect technology. Peer-to-peer bandwidth shall be uniform between every pair of accelerators in the node, and accelerator-to-accelerator traffic shall not traverse the host I/O bus or any general-purpose PCIe path.
6.	. Each compute node shall include not less than one (1) dedicated RDMA-capable interface of not less than 200 Gb/s for storage connectivity, with a second such interface provisioned in the node for future expansion. The offered adapters shall support direct accelerator-to-storage transfer without host CPU involvement (GPUDirect Storage or equivalent). The adapters shall also provide intelligent network offload, storage acceleration, virtualization offload, and secure hardware-based multi-tenant isolation. All transition cabling required to connect these interfaces to C-DAC's existing HDR storage Infiniband switches(NVIDIA QM8700 200 Gb/s Infiniband), including splitter cables and transceivers, shall be supplied

Sr. No.	Description
7.	The solution shall include a comprehensive software stack featuring native, accelerated support for industry-standard AI training and inferencing frameworks e.g., PyTorch, TensorFlow, Megatron, DeepSpeed,, vLLM ..etc. Additionally, it must provide seamless access to a repository of pre-configured, tuned, and optimized AI models natively compatible with the proposed AI Accelerator accelerators. The bidder is responsible for providing all required enterprise software licenses and support subscriptions necessary to train, serve, and manage these workloads. For Warranty, Support and LIcenses refer section-III (5. Warranty, Support and Licenses)
8.	The complete solution shall provide minimum aggregate AI Accelerators in memory of 48 TB HBM3e/HBM4 (or higher) across the cluster.
9.	The complete solution shall provide a minimum aggregate system DDR5/LPDDR5/LPDDR5x memory deployed in balanced configuration consistent with the processor architecture of **384 GB Memory per accelerator or higher.**
10.	Each compute node shall include a minimum of two (2) internal NVMe disks of 1.9 TB each, configured in RAID-1 or an equivalent redundant configuration. Additionally, each node shall provide not less than eight (8) hot-swappable NVMe drive bays, each capable of accepting a PCIe Gen5 or higher device of not less than 3.84 TB. 2 Bays shall be populated with 3.84TB NVMe disks. . Where supplied unpopulated, the backplane, drive carriers, PCIe lanes, controller, power and cooling shall be provisioned, enabled and licensed at the time of supply, so that a bay can be populated by inserting a device alone.
11.	All internal NVMe disks shall support PCIe Gen5 or higher interface technology.
12.	The accelerator shall support AI Accelerator hardware virtualization, enabling partitioning of AI Accelerator memory and compute resources into not fewer than four(4) isolated instances per AI accelerator, with hardware-enforced isolation of memory capacity, memory bandwidth and compute resources between instances. The AI Accelerator Server OEM shall declare the maximum number of instances per accelerator, the isolation mechanism, any licence required to enable it, and the method of exposing instances to the container orchestration platform. Software time-slicing without hardware-enforced memory and bandwidth isolation shall not be accepted. The licence required to enable partitioning of the AI accelerators shall be perpetually provided by the bidder.
13.	The solution shall support high-density rack deployment architecture enabling a minimum of 24 AI Accelerators/Accelerators per rack, while maintaining optimal thermal and power efficiency within the specified rack power envelope as mentioned in this table
14.	The memory-to-compute and storage-to-compute ratios shall be balanced and architected to avoid performance bottlenecks.

Sr. No.	Description
15.	7 RDHX racks will be provided by C-DAC each with 40Kw rated capacity. The rack architecture shall support a maximum IT power capacity of 40 kW per rack under full-load AI training conditions, inclusive of compute and associated intra-rack networking components. RDHX Rack depth is 1200 mm & width is 600 mm. Solution should fit in the existing Rack.
16.	The system shall support N+1redundant power supplies and high-availability design across compute infrastructure.
17.	The solution shall include all licenses required for access to the accelerator vendor's certified enterprise AI/HPC software catalogue (or equivalent), including frameworks, SDKs, pre-trained models, workflow tools and associated development utilities required for AI/ML workloads.
18.	The bidder shall ensure enterprise-grade support for all supplied software components, including periodic updates, security patches, defined service level agreements (SLAs), and 24x7 call logging and incident management facility. Standard RMA procedures shall be applied.
19.	All necessary software, SDKs, libraries, drivers, tools, and runtime components required to design, develop, deploy, and operate end-to-end AI/ML workloads shall be provided as part of the complete solution.
20.	The solution shall include comprehensive software frameworks to support: (a) Accelerated machine learning and data processing pipeline development; (b) Microservices-enabled frameworks for API-based LLM deployment and model serving; (c) End-to-end conversational AI workflows including Automatic Speech Recognition (ASR), Neural Machine Translation (NMT), and Text-to-Speech (TTS); (d) Video, audio, and image processing pipelines for multimodal AI workloads or equivalent capability from the accelerator OEM's software catalogue.
21.	The software offering shall include customizable pre-built reference workflows for generative AI use cases to enable rapid deployment and production readiness or equivalent
22.	The compute nodes should be integrated and commissioned with the existing system. Successful Bidder, AI Accelerator Server OEM for the Bid in context will be responsible for integration of new nodes with the existing storage and switches.
23.	The proposed system shall be compatible with the existing network switches, namely Mellanox MSN2410-CB2F (10 GbE), Mellanox SN2700 (100 GbE), and Mellanox SN3700 (100 GbE). Bidder must carry out the connecting the proposed system to this switches. The required cables, are already available and are connected to the respective switches. Recabling, rerouting and labeling would be required to be executed by the bidder as part of the scope.

Sr. No.	Description
24.	Bidder will be required to carry out mounting of Rack Servers quoted in standard data center rack including rack mounting rail kits (Racks would be provided by C-DAC). RDHX Racks are 42 U racks with depth of 1200 mm (including RDHx unit) & width of 600 mm. The PDU Sockets are IEC 19-20 type. There are 6 nos. of IEC 13 Type sockets and 18 nos. of IEC 19 type sockets across 3 PDUs on one side of the rack. The same goes for other side of the rack as well. The rack architecture shall support a maximum IT power capacity of 40 kW per rack under full-load AI training conditions, inclusive of compute and associated intra-rack networking components.
25.	Bidder should provide all required support for integration and persistent mounting of existing PFS based storage on base operating system and containers on the offered compute nodes. The successful bidder would be required to integrate existing 11PB Lustre storage with the supplied Compute Node.
26.	Bidder shall provide all required support and software (with perpetual to use licenses) to integrate with monitoring and management tools for compute, network (InfiniBand, Ethernet)
27.	Development tools (compilers, libraries, SDKs and AI frameworks): the quoted system shall be certified on the accelerator OEM's enterprise AI software stack, comprising AI Accelerator-accelerated data-analytics and dataframe libraries, a training and transfer-learning toolkit, a graph-level inference optimiser/compiler, and a production inference-serving framework, supplied as OEM-published and OEM-supported container images, or equivalent, **including all entitlements required for the offered node count w.r.t as per the license requirement (refer section III Warranty,Support,License)**
28.	1. Provided nodes should be compatible. Total of twenty-one (21) active HDR InfiniBand ports will be provided on the high-performance storage switches by C-DAC to connect solution to existing storage if additional switches are required to connect to be provided. 2. The proposed compute solution must include all necessary network adapters, transceivers, and cabling to successfully interface and interconnect the compute servers with these provided storage ports without performance bottlenecks. C-DAC's existing forty-eight (48) nodes are already connected to the storage fabric and are outside this scope.

3. In addition to the compute-fabric and storage interfaces specified, each node shall provide:
   - **(a)** one (1) Ethernet interface of not less than **100 Gb/s** for host access, provisioning, cluster management and monitoring, for connection to C-DAC's DC LAN switches;
   - **(b)** one (1) Ethernet interface of not less than **10 Gb/s** for connection to C-DAC's 10 GbE DC LAN switches; and
   - **(c)** one (1) dedicated **1 Gb/s** out-of-band management port served by an onboard BMC or equivalent supporting IPMI 2.0 and Redfish, with remote KVM, virtual media, remote power control and telemetry, accessible on standby power. All licenses required to enable these functions shall be included, as per the license requirement (refer section III Warranty, Support, License).

4. The DC LAN and out-of-band management networks shall be physically separated.

5. The proposed accelerated compute nodes must be fully compatible with C-DAC's existing network switches for Storage Delivery, DC LAN and In and Out of Band Management

   Mellanox HDR IB switches NVIDIA Quantum (Mellanox) QM8700 and QM8790 - Storage Delivery Network - 1 port per compute node

   Mellanox MSN2410-CB2F (10 GbE) switches - DC LAN Network - 1 port per compute node

   Mellanox SN2700 (100 GbE) & Mellanox SN3700 (100 GbE) switches- DC LAN network - 1 port per compute node

   Mellanox EdgeCore AS4610 (1 GbE) - In and Out of Band managmenrt network switches - 1 port each for In Band and Out of Band managment network per compute node

   Bidders must explicitly confirm this interoperability in their technical bid by specifying the interface type and form factor offered for each port.
   Bidder needs to label and reroute the existing 100GbE, 10 GbE and 1 GbE cables from the existing RDHx racks to the compute nodes.

Connectivity in the Bidder's scope. The Bidder shall carry out all work required to connect the offered nodes to C-DAC's DC LAN and out-of-band management switches, including cable laying, dressing, labelling, port configuration and validation of end-to-end connectivity. This work shall be carried out without disruption to C-DAC's existing services.

6. Cables: C-DAC will provide following cable type for connecting the provided nodes to switches
   - 10G cables: LCD-LCD 50/125 OM3

Sr. No.	Description
	• 100G Cables: NVIDIA/Mellanox MFA1A00 100G QSFP28 Active Optical Cable • 1G cables: Edge Core AS4610-54T-O-AC-B 7. Bidder needs to check the compatibility of these cables with provided solution if these cables are non-compatible, then bidder needs to provide the required number of cables with transceiver to connect C-DAC mentioned switches.
29.	Each node shall support platform security features including UEFI Secure Boot, a hardware root of trust, TPM 2.0 or equivalent, cryptographically signed firmware, and firmware rollback protection.
30.	All cables, transceivers, optics, connectors, rail kits, uplinks and mounting hardware required for a complete and functional deployment of the compute nodes, and for their integration with C-DAC's existing management and LAN infrastructure, shall be supplied with 2 % spares.
31.	The bidder shall ensure enterprise-grade support from AI Accelerator Server OEM for all supplied software components, including periodic updates, security patches, defined service level agreements (SLAs), and 24x7 call logging and incident management facility.
32.	Quoted system should be compatible for the k8s stack, openstack, openshift and KVM
33.	An enterprise-grade operating system shall be provided, along with enterprise-level support from the OEM for the operating system.
34.	AI Accelerator Server OEM should be an OEM partner of the Accelerator OEM. Documentary evidence (partnership certificate, official partner listing or joint confirmation, valid on bid submission date) should be submitted. AI Accelerator servers should be AI Accelerator OEM certified/Qualified

B. High Speed Compute Fabric

Sr. No.	Description
1	The solution shall provide high-speed, ultra-low latency, lossless interconnect fabric optimized for large-scale distributed AI training and inferencing workloads.
2	The compute system shall provide a fully connected intra-node accelerator fabric delivering high aggregate bandwidth and low latency suitable for large-scale model training.
3	The inter-node compute fabric shall support a minimum of 400 Gb/s per accelerator-class interface (InfiniBand NDR, RoCEv2 or equivalent), architected in a multi-rail configuration.

Sr. No.	Description
4	The overall compute fabric shall be designed in a 100% non-blocking architecture to ensure deterministic performance under full cluster load. Non-blocking capacity shall be computed at each node's native port rate.
5	The compute fabric shall support native RDMA/RoCEv2, direct accelerator-to-network memory access (GPUDirect RDMA or equivalent), adaptive routing, in-network computing, hardware-accelerated collective operations, congestion control and low-latency MPI communication.
6	The architecture shall support optimized multi-rail deployment to maximize bandwidth utilization and eliminate network contention.
7	The compute fabric shall eliminate single points of failure and support redundant pathing across the cluster.
8	Bidder needs to provide the required number of servers to run fabric manager in HA mode considering the reliability and high performance. The fabric shall be managed by a subnet manager/SDN Fabric Manager or equivalent with redundancy. The solution shall include centralised fabric management, real-time telemetry, topology visualisation, performance analytics and proactive fault detection. All fabric management software licences including enterprise OS shall be included as per the license requirement (refer section III Warranty, Support, License)
9	All required high-speed switches, interface adapters (HCAs or equivalent), optics, transceivers, splitter and transition cables required to connect both port rates, and cabling necessary to implement the complete compute fabric shall be provided as part of the solution, with 2% spares of each cable and transceiver type. Bidder shall provide not less than 10% spare port capacity for expansion at High Speed Compute Fabric Switches Side, as part of the solution
10	The Bidder shall submit a port-allocation map and a rail-assignment diagram , and shall declare the switch count, tier structure, end-to-end latency, and the rack space, power and cooling required by the fabric switches.
11	The offered switches shall support single-hop switch port-to-port forwarding latency of not more than 1 microseconds (µs), as per OEM-published specifications.

4. Track-II (IT)

Detailed Scope

- The Bidder shall engage respective OEM Professional Services of quoted items for the implementation of the solution, covering design validation, installation, configuration, commissioning, integration, performance tuning, acceptance testing, warranty and support.
- Racks and physical deployment
    - The accelerated compute infrastructure shall be accommodated within a maximum of forty-four (44) DCLC racks; the ancillary IT infrastructure (storage, CPU nodes, networking and similar) shall not exceed eighteen (18) air-cooled racks.
    - Supply of four (4) spare DCLC racks of not less than 150 kW power and cooling capacity each, and spare fourteen (14) additional air-cooled racks of not less than 25 kW power and cooling capacity each.
    - Supply of all racks, power distribution units/PSUs/busbars, manifolds, rail kits, cable management and blanking panels, with rack elevations submitted for every rack type stating rack height, depth, weight rating and required voltage.

    - Racking, stacking, mounting and complete structured cabling of all supplied IT infrastructure — power, compute fabric, storage delivery network, DC LAN ,in-band and out-of-band management — including routing, dressing, trays and cable management .
    - Labelling of every node, switch, port, power lead, coolant hose and cable at both ends per C-DAC's naming convention, with an as-built cable schedule and coolant schematic.
- IT infrastructure supply
    - Supply, installation, testing and commissioning of all IT infrastructure specified under Track-II (IT)— in accordance with the technical specifications at Section IV, together with all associated hardware, software, operating systems, drivers, firmware, tools and licenses required to make each item complete and operational.
    - Supply of all cables, optics, transceivers, DAC/AOC, breakout, splitter and transition cables, connectors and mounting hardware required for a complete and functional deployment, with 2% spares of each cable and transceiver type.
    - Supply of spare NVMe disks at not less than2% of the quantity supplied, and a site-retained spare kit of field-replaceable units including power supplies.
    - Supply of all software, operating systems, drivers, SDKs, libraries, development tools, AI/ML frameworks, fabric management, monitoring and security software, etc… with licenses on the terms specified in the technical specification.
- Integration and commissioning
    - Integration of all items into a single operational environment.
    - Configuration of the parallel file system and unified/cloud storage clients on all compute nodes, with persistent mounting on the base operating system and within containers, and validation of GPUDirect storage or equivalent, DirectGMA or equivalent data paths.
    - Configuration of network segmentation, tenant isolation at the fabric and LAN layers, and the security controls required by the technical specification.
    - Firmware and BIOS update of all supplied equipment to the OEM-recommended stable release at the time of commissioning, and configuration of platform security settings including secure boot, hardware root of trust and TPM.
    - Integration of all supplied compute, fabric, storage, network and facility equipment into the monitoring, alerting and DCIM/BMS platforms, including metrics, telemetry and inventory registration
- Testing and acceptance
    - Benchmarking and acceptance testing of the complete Track-II solution against the criteria set out in the Benchmark and Acceptance Test section of this document.
    - Rectification of all deficiencies observed during acceptance, and re-testing at no additional cost.
- Documentation, training, and support
    - Submission of as-built documentation — rack elevations, port-allocation maps, fabric and LAN topology diagrams, coolant schematics, IP and VLAN schema, cable schedules, firmware and software versions, and configuration backups — together with standard operating procedures for routine operation, expansion, firmware update, failure diagnosis and escalation.
    - Delivery of the training programme specified in the Training sectionThe Bidder shall provide documented APIs, integration points, interface documentation and technical support to enable integration of the supplied infrastructure with the cluster management, cloud stack and AI cloud management platform
    - Support: Refer Section-III Warranty, Support and Licenses

- Data center Server Lift
    - Details has been provided in Non-IT section
- Any additional items required for the complete and successful execution of the scope shall be identified and provided by the Bidder as part of the solution.

A. Accelerated Compute Solution

Sr. No.	Description of Requirements
1.	The complete solution shall deliver a minimum aggregate theoretical peak compute performance of 15 ExaFLOPS (FP16 with structured Sparsity) or higher with support Compute/Vector/Matrix/Tensor/Equivalent floating-point operations. AI Accelerator Server OEM shall be same as that for Track-I Accelerated Compute solution.
2.	Bidders shall provide the AI Accelerator models that were released in 2025 or later. The OEM shall confirm that the offered accelerators & compute node shall remain supported and shall not reach End-of-Support-Life for a minimum period of **five (5) years from the date of** acceptance. The accelerators & compute nodes shall also meet the specified requirements for precision modes, memory capacity, interconnect bandwidth, and per-accelerator performance under this Item. An OEM declaration confirming the above, along with the relevant product roadmap, shall be submitted with the bid.
3.	The solution shall include a comprehensive software stack featuring native, accelerated OEM support for industry-standard AI training and inferencing frameworks e.g., PyTorch, TensorFlow, Megatron, DeepSpeed, vLLM ..etc. Additionally, it must provide seamless access to a repository of pre-configured, tuned, and optimized AI models **catalog** natively compatible with the proposed AI Accelerator accelerators. The bidder is responsible for providing all required enterprise software licenses and support subscriptions **all the AI Accelerators** necessary to train, serve, and manage these workloads. For Warranty, Support and Licenses refer section-III (5. Warranty, Support and Licenses)
4.	The solution's accelerator shall support precision modes including FP32, FP16, FP8/**MXFP8**, FP6, FP4/**MXFP4**, INT8 natively for AI training, finetuning and inference workloads. The Bidder shall declare the dense and sparse FP16, FP8/MXFP8 and FP4/MXFP4 figures per accelerator and for the complete solution.
5.	The solution shall include accelerator compute nodes utilizing a Direct Liquid Cooling (DLC) architecture. The OEM must guarantee and provide documentation proving that the DLC system covers at least 80% of the accelerator compute node heat-generating components by thermal wattage and minimize reliance on supplementary air cooling. The Bidder shall declare the required coolant supply temperature, flow rate, pressure drop and approach temperature per rack, the liquid-cooled and air-cooled split per node and the residual air-cooled heat load per rack in kW and shall confirm compatibility with the facility cooling design of the Track-II Data Centre scope.

Sr. No.	Description of Requirements
6.	The inter-node (scale out) compute fabric shall provide a minimum of 800 Gb/s per accelerator over a lossless, RDMA-capable, ultra-low-latency interconnect (**InfiniBand or RoCEv2 or equivalent**), architected in a multi-rail, 100% non-blocking configuration. **Each node shall provide one (1) dedicated compute-fabric port of not less than 800 Gb/s for each accelerator in the node.** Fabric switching, topology, and management are specified at Item (b).
7.	Scaleup bi-directional bandwidth for each AI Accelerator shall be minimum of **1.8 TB/s** .
8.	Storage and DC LAN connectivity. Each accelerated compute node shall provide network connectivity as follows: (a) The delivery network for the High Throughput Storage Item and the Cloud Storage Item is provided over a single network, irrespective of whether the storage requirements are met by a single storage platform or separate storage platforms, - not less than one (1) **RDMA-capable** Ethernet interface of not less than 400 GbE connected to the DC LAN Fabric, carrying both storage traffic and the DC LAN traffic. (b) Where the delivery networks for the High Throughput Storage Item and the Cloud Storage Item are provided over separate networks — not less than one (1) RDMA-capable interface of not less than 200 Gb/s connected to the High Throughput Storage Delivery Network Fabric, and not less than one (1) RDMA-capable Ethernet interface of not less than 200 GbE connected to the DC LAN Fabric. In both cases the aggregate network bandwidth per node, excluding the compute fabric, shall be not less than 400 Gb/s. The offered adapters shall support direct access to storage without involvement of the CPU (GPUDirect Storage or equivalent), intelligent network offload, storage acceleration, virtualization offload mechanisms, and secure hardware-based multi-tenant isolation. The Bidder shall declare whether a single or separate delivery network architecture is proposed, and the resulting per-node and aggregate bandwidth, in the technical bid.
9.	Each node shall additionally provide one (1) dedicated 1 GbE BMC / out-of-band management interface supporting IPMI 2.0 and Redfish, with remote KVM, virtual media, remote power control, telemetry and firmware management, accessible on standby power. The DC LAN and out-of-band networks shall be physically separate, and all licenses required for these functions shall be included, perpetual. For Licenses details Refer Section-III : Section Warranty, Support and Licenses

Sr. No.	Description of Requirements
10.	The CPUs shall be server-class, of the current or immediately preceding generation of the CPU OEM's product line as on the bid due date, with not less than 56 cores per socket and full memory-channel population consistent with the offered system memory. In case the proposed AI Accelerator Compute Node uses a non-x86 CPU architecture, the Bidder shall mandatorily supply four (4) additional CPU Compute Nodes with the same CPU architecture as the AI Accelerator Compute Node. The Bidder shall also provide, configure and commission the complete cross-compilation toolchain, including required compilers, SDKs, libraries, headers, build tools and debuggers, for developing, compiling and validating software for the proposed architecture. Successful cross-compilation and execution of representative applications shall be demonstrated during acceptance testing. All such nodes and toolchain facilities shall be included in the scope of supply at no additional cost. Each such additional CPU Compute Node shall be provided with the same connectivity as the AI Accelerator Compute Node.
11.	The solution shall be with HBM3e/HBM4 (or higher) across the cluster with the memory bandwidth per AI Accelerator should be 8TB/s
12.	The complete solution shall provide a minimum aggregate system DDR5/LPDDR5/LPDDR5x memory deployed in balanced configuration consistent with the processor architecture of: 256 GB Memory per accelerator or higher for coherent unified memory address space architecture, OR 384 GB Memory per accelerator or higher for systems with independent memory address space for AI Accelerator memory & Server.
13.	Each compute node shall include a minimum of one (1) internal NVMe devices of 1.9 TB each, dedicated to OS configuration. Additionally, each node shall provide not less than four (4) hot-swappable NVMe drive s populated with 3.84TB NVMe disks.
14.	The accelerator shall support AI Accelerator hardware virtualization, enabling partitioning of AI Accelerator memory and compute resources into not fewer than four (4) multiple isolated instances per AI accelerator, with hardware-enforced isolation of memory capacity, memory bandwidth and compute resources between instances. AI Accelerator Server OEM shall declare the maximum number of instances per accelerator, the isolation mechanism, any licence required to enable it, and the method of exposing instances to the container orchestration platform. Software time-slicing without hardware-enforced memory and bandwidth isolation shall not be accepted. The licence required to enable partitioning of the AI accelerators shall be perpetually provided by the bidder.

Sr. No.	Description of Requirements
15.	The solution shall support high-density rack deployment architecture enabling 72 AI Accelerators or more per DCLC rack, while maintaining optimal thermal and power efficiency.
16.	The memory-to-compute and storage-to-compute ratios shall be balanced and architected to avoid performance bottlenecks. The Bidder shall declare these ratios in the technical bid.
17.	The DCLC rack architecture shall support IT power & cooling capacity of 150 kW per rack or more under full-load AI training conditions, inclusive of compute and associated intra-rack networking components. The Bidder shall declare the maximum rated and sustained operating power per node and per rack, the number of racks required, and shall submit rack elevation, airflow, power, coolant and heat-load calculations with the technical bid.
18.	The offered nodes and their management software shall support configurable, enforceable accelerator and node-level power capping.
19.	The required number of racks, including all accessories shall be provided by the Bidder. The Bidder shall declare the rack height, depth, weight rating, and busbar/PSU/PDU/power self-voltage assumed.
20.	The system shall support not less than N+1 redundant, 90% efficient hot-swappable power supplies or rack-level power shelves with N+1 redundancy and high-availability design across compute infrastructure.
21.	Each node shall support platform security features including UEFI Secure Boot, a hardware root of trust, TPM 2.0 or equivalent, cryptographically signed firmware and firmware rollback protection.
22.	The solution shall be delivered as a scalable multi-node cluster architecture capable of performance scaling with node addition. Each node shall be a standalone, fully functional, independently deployable and maintainable, serviceable unit, capable of operation, servicing, replacement and maintenance without dependency on rack or other nodes for its intended functionality.
23.	The solution shall include appropriate licensing for access to the accelerator vendor's AI Accelerator software catalogue, including frameworks, SDKs, pre-trained models, workflow tools, and associated development utilities required for AI/ML workloads.
24.	The bidder shall ensure enterprise-grade support for all supplied software components, including periodic updates, security patches, defined service level agreements (SLAs), and 24x7 call logging and incident management facility.
25.	All necessary software, SDKs, libraries, drivers, tools, and runtime components required to design, develop, deploy, and operate end-to-end AI/ML workloads shall be provided as part of the complete solution.

Sr. No.	Description of Requirements
26.	The solution shall include comprehensive software frameworks to support: (a) Accelerated machine learning and data processing pipeline development; (b) Microservices-enabled frameworks for API-based LLM deployment and model serving; (c) End-to-end conversational AI workflows including Automatic Speech Recognition (ASR), Neural Machine Translation (NMT), and Text-to-Speech (TTS); (d) Video, audio, and image processing pipelines for multimodal AI workloads , or equivalent capability from the accelerator OEM's software catalogue; (e) High-performance distributed inference across multiple AI Accelerators and nodes with support for continuous batching, dynamic batching, request disaggregation, tensor, pipeline and expert parallelism, elastic scaling, and intelligent AI Accelerator-aware scheduling; (f) Advanced inference memory optimization through distributed Key-Value (KV) cache management, including paged KV cache, prefix caching, cache reuse, cache sharing across AI Accelerators, and long-context inference optimization; (g) Containerized inference microservices optimized for production deployment with automated hardware acceleration, Kubernetes-native orchestration, lifecycle management, rolling upgrades, and high availability; (h) Hybrid deployment supporting on-premises, cloud, and edge environments with secure API-based inference services and standardized model interfaces; (i) Optimized inference execution supporting speculative decoding, chunked prefill, prefix-aware scheduling, Flash Attention, FP4/FP8/INT8 quantized inference, and streaming token generation for maximum throughput and reduced latency; (j) Comprehensive observability including Time-to-First-Token (TTFT), inter-token latency, tokens-per-second, request tracing, AI Accelerator utilization, memory utilization, KV cache metrics, throughput, and integration with industry-standard telemetry and monitoring frameworks; and (k) Secure multi-tenant operation with authentication, authorization, role-based access control (RBAC), API rate limiting, audit logging, encrypted communications, and workload isolation.
27.	An enterprise operating system certified by the Server OEM for the offered platform shall be provided, with enterprise-level support from the operating system vendor for the full contract period.
28.	The solution shall support enterprise-grade virtualization platforms compatible with OpenStack, KVM or equivalent environments.
29.	All licenses quoted shall be perpetual to use.
30.	AI Accelerator Server OEM should be an OEM partner of the Accelerator OEM. Documentary evidence (partnership certificate, official partner listing or joint confirmation, valid on bid submission date) should be submitted. AI Accelerator servers should be AI Accelerator OEM certified/Qualified

B. High Speed Compute Fabric

Sr. No.	Description
1.	The solution shall provide a high-speed, ultra-low latency, lossless interconnect fabric optimized for large-scale distributed AI training and inferencing workloads connecting all Accelerated Compute Solution - II
2.	The solutionshall provide a fully connected non-blocking inter-node High Speed Compute fabric delivering high aggregate bandwidth and low latency suitable for large-scale model training and inferencing
3.	The inter-node compute fabric shall support a minimum 800Gb/s per accelerator-class interface (InfiniBand, RoCE or functional equivalent), architected in a multi-rail configuration.
4.	The inter-node compute fabric shall connect to all the accelerated compute nodes.
5.	The overall compute fabric shall be designed in a 100% non-blocking fully rail-optimised architecture to ensure deterministic performance under full cluster load.
6.	The compute fabric shall support native RDMA, AI Accelerator Direct RDMA (or equivalent accelerator direct memory access), adaptive routing, ,in-network computing, in-network collective operations, hardware-accelerated collective operations, congestion control, and low-latency MPI communication.
7.	The architecture shall support optimized multi-rail deployment to maximize bandwidth utilization and eliminate network contention.
8.	The compute fabric shall eliminate single points of failure and support redundant pathing across the cluster.
9.	Bidder needs to provide the required number of servers to run fabric manger in HA mode considering the reliability and high performance. The fabric shall be managed by a subnet manager/SDN fabric manager or equivalent with redundancy, The solution shall include centralised fabric management, real-time telemetry, topology visualisation, performance analytics and proactive fault detection covering the entire cluster. All fabric management software licences including enterprise OS shall be included **as per the license requirement (refer section III Warranty,Support,License)**
10.	The solution shall include centralized fabric management, real-time telemetry, topology visualization, performance analytics, and proactive fault detection capabilities.
11.	Unified Fabric manager license for all AI Accelerators, fabric manager shall manage subnet management/fabric management, topology visualization, congestion control, telemetry, and proactive fault detection across all AI Accelerator fabric. FM must cover full cluster port count.

Sr. No.	Description
12.	All required high-speed switches, interface adapters (HCAs or equivalent), optics/transceivers, splitter and transition cables and cabling necessary to implement the complete compute fabric and deliver the stated performance, shall be provided as part of the solution. with 5% spares of each cable and transceiver type.
13.	Solution should connect to all accelerator nodes with one physical link for each accelerator.
14.	The Bidder shall submit a port-allocation map and a rail-assignment diagram, and shall declare the switch count, tier structure, pod boundaries, blocking ratio, worst-case hop count and end-to-end latency.
15.	The Bidder shall declare the rack space, sustained operating power and cooling required by the fabric switches, and shall include them in the rack schedule submitted with the technical bid.
	The offered switches shall support single-hop switch port-to-port forwarding latency of not more than 1 microseconds (µs), as per OEM-published specifications.

C. Cloud CPU Compute Solution

Sr. No.	Description
1.	The solution shall include a dedicated CPU-based compute infrastructure, separate from the accelerated compute, comprising **one hundred sixty** (160) servers supplied to a common hardware specification, for deployment as cloud compute, under-cloud and management/service nodes.
2.	Each server shall include two (2) internal NVMe devices of not less than 960 GB each, configured in RAID-1 or an equivalent redundant configuration, dedicated to the operating system.
3.	Each server shall have two (2) enterprise data-centre-class x86-64 processors (Intel Xeon, AMD EPYC or equivalent), each with a minimum of 64 cores of the current or immediately preceding generation of the CPU OEM's product. End of life and End of support should not have for 5 years from the date of commissioning & acceptance.
4.	Processor Base clock frequency should be 1.9 GHz or more and maximum turbo frequency not less than 3.5 GHz.
5.	**Cache and memory subsystem's** Last-level (L3) cache not less than 256 MB per socket
6.	The Bidder shall declare the SPECrate®2017_int_base and SPECrate®2017_fp_base results for the offered two-socket configuration, with the spec.org submission reference / report.

7.	The server shall be supplied with an enterprise Linux distribution (RHEL, Ubuntu LTS or equivalent) with support subscription for all CPU compute, under-cloud and management nodes, for the full contract period. The operating system shall support and compatible for the AI software stack and shall support the KVM hypervisor and container runtime.
8.	The CPU-based computer systems shall be based on latest-generation, data center-class processors that are commercially available and not End-of-Life at the time of bid submission.
9.	Each Cloud CPU Compute Solution server shall provide high core-count processors (minimum 64 cores per processor or higher) optimized for virtualization, cloud, and enterprise workloads.
10.	Each Cloud CPU Compute Solution server shall provide a minimum of 1 TBDDR5 (5600 MT/s or higher) RAM, with all memory channels populated in a balanced configuration consistent with the processor architecture
11.	The processors shall support hardware-assisted virtualisation extensions (VT-x / AMD-V or equivalent), IOMMU, SR-IOV, PCIe pass-through, NUMA awareness and secure memory isolation features, and shall expose NUMA topology, CPU pinning, resource isolation and affinity controls to the hypervisor.
12.	Each server shall provide not less than one (1) Ethernet port of not less than 200 GbE for connectivity to the DC LAN fabric, and one (1) dedicated out-of-band management port of not less than 1 Gb/s. The in-band and out-of-band networks shall be physically separate.
13.	Each server shall include a baseboard management controller supporting IPMI 2.0 and Redfish, with remote KVM, virtual media, remote power control, telemetry streaming and firmware management, accessible on standby power. All licenses required to enable these functions shall be included, perpetual, for the full contract period. All licenses required to enable these functions shall be included, as per the license requirement (refer section III Warranty,Support,License)
14.	Each server shall provide a minimum of two (2) unused PCIe Gen5 x16 slots, with the required PCIe lanes, power, and cooling fully enabled and available at the time of supply, after installation of the network adapter(s) required to meet the above network requirements.
15.	The platform shall support NUMA-aware workload optimization, CPU pinning, resource isolation, and affinity controls for performance-sensitive workloads.
16.	Each CPU compute system shall provide high-speed local Minimum 3.8 TB of NVMe storage (PCIe Gen5 or higher) for hypervisor, caching, logging, and temporary workload storage.
17.	The above service workloads shall not be co-hosted on accelerated compute nodes and shall be provisioned with sufficient compute and memory resources to prevent contention.

18.	The offered server shall be certified by the Server OEM for enterprise Linux distributions (RHEL, Ubuntu LTS or equivalent) and for KVM-based virtualisation, and shall expose the hardware features required for live migration, NUMA-aware placement, CPU pinning and SR-IOV
19.	The CPU infrastructure shall support hardware root of trust, secure boot, TPM 2.0 or equivalent, cryptographically signed firmware and platform-level security hardening.
20.	All CPU systems shall include dual redundant hot-swappable power supplies and enterprise-class RAS (Reliability, Availability, Serviceability) features.
21.	Servers shall fit in the air-cooled racks as mentioned in the track-II DC requirement. Rack mountable, supplied with rail kits, cable management and all mounting hardware. The Bidder shall declare the rack units, sustained operating power and heat load per server.
22.	The architecture shall support seamless horizontal scalability without redesign of topology.
23.	The bidder shall provide detailed sizing justification and role-to-node mapping for cloud compute, under cloud, and service workloads as part of the technical bid.
24.	The Cloud CPU Compute infrastructure shall integrate seamlessly with the DC LAN fabric, Cloud Storage, In & Out Band N/W and Data protection backup defined under this RFP.

D. High Throughput Storage

Sr. No.	Description
1	The offered solution shall be a high-performance, distributed File Storage or PFS Storage System with single unified global namespace and linear scalability in both capacity and performance, without disruption to production workflows.
2	The system shall provide a minimum 50 PB usable capacity at user level (df -h) after RAID-6 / De-clustered RAID / Erasure Coding protection, metadata overhead, hot spares, and system reserve allocations, without deduplication or compression assumptions.
3	The architecture shall ensure network bandwidth between storage nodes and accelerated compute nodes to sustain minimum committed throughput of 500 GB/s read and 500 GB/s write performance on flash tier and 400 GB/s read and write on NLSAS Tier
4	The storage architecture shall support scale-out expansion with distributed metadata services across all nodes, /controllers or multiple nodes/controllers to avoid No Single Point of Failure, eliminating bottlenecks.
5	The solution shall support multi-tier architecture (NVMe Flash + HDD tier) within the same global namespace OR a single-tier 100% end-to-end NVMe architecture, optimized for AI/ML workloads.

6	Data protection shall be enterprise-grade using dual parity RAID-6 / De-clustered RAID / Erasure Coding or equivalent, protecting against simultaneous failure of minimum two storage nodes/controllers per tier.
7	The storage system shall be connected to the accelerated compute nodes and clients using 200 Gb/s RDMA-capable interfaces per client (InfiniBand NDR/XDR, RoCEv2 or equivalent low-latency fabric), ensuring non-blocking, low-latency data delivery and supporting direct accelerator-to-storage transfer (GPUDirect Storage or equivalent).
8	The storage network architecture shall ensure subscription ratio between storage nodes and AI Accelerator compute to sustain minimum committed throughput and IOPS. The storage network architecture shall ensure no oversubscription between storage nodes and Storage Delivery Network Internode and inter-tier communication shall use dedicated redundant network components supplied as part of the solution.
9	The above performance values shall represent sustained throughput and shall not be based on burst, cache-only, or short-duration peak performance. The solution shall support both high transactional and bandwidth-based performance on a single file system
10	The solution shall support POSIX compliance along with native support for NFSv3, NFSv4, SMB/CIFS, S3-compatible object protocol, CSI, and direct AI accelerator-to-storage transfer (GPUDirect Storage or equivalent). The Storage OEM shall provide a production-supported CSI (Container Storage Interface) driver for Kubernetes, enabling dynamic provisioning of file volumes for containerized AI workloads, and supporting CSI snapshot, clone, volume expansion, ReadWriteMany and topology awareness If required, Gateway Nodes/Servers/ Hardware Appliance considering high availability, with required S/W stack from OEM, shall be provided for protocol translation to S3, SMB/CIFS, NFS.
11	The system shall support user and group quotas, LDAP/Active Directory integration, and role-based access control (RBAC).
12	The solution shall support minimum 256 snapshots/clones per file system, including immutable snapshots or equivalent functionality that enables recovery of accidentlly deleted or modified data, The functionality shall support instantaneousand differential operations without performance degradation.
13	The system shall allow filesystem expansion and scale-out up to at least double the usable capacity (100 PB) within the same namespace without requiring additional controllers and switch ports
14	The system shall deliver a minimum aggregate sustained sequential throughput of 500 GB/s read and 500 GB/s write across the unified architecture on 1MB transfer size, 400 GB/s read, and 400GB/s write on NLSAS tier when benchmarked separately with 1MB transfer size and a minimum of 2,000,000 random 4 KiB read IOPS and 1,000,000 random 4 KiB write IOPS from the all-flash tier. All benchmarks should be with DIRECTIO bypassing storage cache. Benchmarking report on the same quoted model should be submitted along with the bid on OEM letterhead.

14	The High Throughput Storage system and all subsystems shall be configured with no Single Point of Failure (SPOF) across controllers, disks, metadata services, networking, and storage enclosures.
15	Automated policy-based data placement and movement between tiers (if multi-tier architecture is proposed) shall be supported without administrative intervention. File system for both the tiers (Flash and HDD) must be the same. Storage must be capable to offer independent access of both the tiers
16	The solution shall provide an enterprise-grade GUI-based management platform with single dashboard monitoring of health, performance, alarms, logs, and report generation across the entire 50 PB cluster.
17	Storage OEM shall be solely responsible for the entire storage solution lifecycle and shall provide undertaking to this effect.
18	Must support high-speed checkpoint write (burst buffer capability or NVMe-tiered acceleration).
19	The complete storage solution shall be supplied from a single OEM for seamless integration, support, and accountability.
20	The storage system shall be fully integrated with the AI cluster environment and shall support direct accelerator-to-storage acceleration (GPUDirect Storage or equivalent) for optimised AI training and inferencing workloads.
21	Shall support Per-tenant directory quotas, per-project storage policies, and namespace isolation within PFS.
22	Flash tier should be considered for staging datasets pre-training.
23	The system shall include a minimum 5 PB usable NVMe flash tier integrated as a performance tier (hot tier) within the 50 PB parallel file system, with policy-based data placement/migration.
24	Where the Bidder offers a single storage platform meeting the specifications of this Item and of the Cloud Storage Item in their entirety and independently, that platform shall be deemed compliant with both Items. In that case the storage controllers shall connect to the DC LAN Fabric and no separate Storage Delivery Network Fabric shall be required. The Bidder shall declare which case applies, and the number and rate of controller ports offered, in the technical bid.
25	The model registry shall be provisioned from the storage supplied under this Item, with versioning, immutability and access control.

E. Storage Delivery Network

Sr. No.	Description
1.	The solution shall provide a high-speed, ultra-low latency, lossless Storage Delivery Network Fabric optimized for large-scale AI/ML training, inferencing, and parallel file system workloads.

Sr. No.	Description
2.	The storage delivery fabric shall be based on a 400 Gb/s RDMA-capable, low-latency, lossless fabric (InfiniBand NDR/XDR, RoCEv2 or equivalent) supporting direct accelerator-to-storage transfer.
3.	The Leaf switches for the storage controllers shall be independent of the Leaf switches to which the AI Accelerator Nodes, other storage clients are connected to. There should be a provision for minimum two (2) nos. of Leaf switches for storage controllers, with storage controller ports physically balanced out for HA. The two switches being located in separate racks and served by separate power feeds.
4.	The architecture shall follow a non-blocking Clos-based spine-leaf topology designed to provide deterministic bandwidth between storage nodes and accelerated compute nodes.
5.	The storage delivery network shall provide sufficient ports to connect all storage controllers, metadata nodes, I/O nodes, gateway nodes, and login nodes participating in the Parallel File System cluster.
6.	Each storage controller / storage I/O node shall be connected to the storage delivery fabric using redundant high-speed interfaces to eliminate single points of failure.
7.	The storage interconnect fabric shall provide sufficient uplink capacity to ensure 1:1 non-blocking architecture between storage controllers and storage clients under full cluster load. The fabric shall connect storage controllers to all accelerated compute nodes, gateway nodes, and login nodes that require parallel file system access.
8.	The storage delivery fabric shall support multi-rail connectivity to maximize throughput and eliminate network contention between storage and compute traffic.
9.	The architecture shall ensure zero oversubscription between storage nodes and accelerated compute nodes and shall sustain not less than of 500 GB/s read and 500 GB/s write, consistent with the throughput committed in the High Throughput Storage Item, and read should not be less than 500 GB/s.
10.	The fabric shall support native RDMA /ROCEv2, direct accelerator-to-storage transfer (GPUDirect Storage or equivalent), adaptive routing/equivalent feature, congestion control and QoS enforcement for predictable AI workload performance.
11.	Internode communication between storage metadata, controllers, and data services shall utilize dedicated redundant fabric connectivity.
12.	The entire storage delivery network shall be architected with no Single Point of Failure (SPOF) across switching, links, power supplies, and management modules.
13.	The bidder shall provide required infrastructure to run Subnet Manager / Fabric Manager in High Availability (HA) mode to ensure continuous storage fabric operation.
14.	The solution shall include centralized fabric management with real-time telemetry, topology visibility, performance analytics, congestion monitoring, and proactive fault detection.

Sr. No.	Description
15.	All required high-speed switches, interface adapters , optics/transceivers, cables, fabric management components and necessary items to implement the complete Storage Delivery Network shall be supplied as part of the solution.
16.	The storage delivery fabric shall be integrated with the Accelerated AI Accelerator Compute nodes while ensuring traffic isolation to prevent compute-to-compute traffic from impacting storage performance.
17.	The architecture shall support seamless scale-out expansion aligned with storage capacity growth and accelerator cluster expansion without architectural redesign.
18.	The complete storage delivery network shall be supplied, installed, configured, tested, and supported as a turnkey solution, including all connectivity components required to deliver committed storage performance.
	The offered switches shall support single-hop switch port-to-port forwarding latency of not more than 1 microseconds (µs), as per OEM-published specifications.

F. Cloud Storage

Sr. No.	Description
1	The offered solution shall provide a unified, scale-out storage platform delivering Block, File, and Object services within a single distributed architecture within a single distributed architecture or a tightly integrated modular scale-out architecture managed under a unified management framework, API, and control plane, providing unified data access across all required protocols. Bidder may offer Cloud Storage as part of High Throughput Storage appliance while maintaining physical separation of disks/enclosures, compatibility with the delivery fabric, meeting the performance, capacity and features/requirements in totality of the storage solutions(s) independently.
2	The system shall provide a minimum 10 PB usable capacity at user level after RAID-6 / De-clustered RAID / Erasure Coding or equivalent distributed data protection, without considering deduplication or compression. The protection scheme shall support failure domain awareness across disk, node, rack.
3	Out of total usable capacity, minimum 1 PB shall be provisioned as high-performance all-flash NVMe-based tier (either as a transparent caching tier or an active primary storage pool) , optimized for latency-sensitive and high-IOPS workloads.
4	The remaining usable capacity shall be provisioned using enterprise-grade capacity drives (such as high-density NVMe/QLC flash, SAS, or NL-SAS drives) within the same unified namespace and management framework.
5	The architecture shall support seamless data movement across tiers (where multi-tiering is proposed) with policy-based placement and without disruption to production workloads. All-flash single-tier architectures meeting all performance and capacity criteria shall also be deemed fully compliant.

Sr. No.	Description
6	The solution shall be compatible with with OpenStack (Cinder, Manila), S3-compatible object APIs , Apache Cloud Stack, Cloud Infrastructure Management Platforms and KVM-based virtualization platforms and containerized environments including Kubernetes through native CSI drivers. The solution shall be certified for compatibility with at least one of the following cloud infrastructure platforms: OpenStack or Apache Cloudstack, and shall also be certified for compatibility with Kubernetes. The bidder shall submit supporting OEM documentation, valid certifications and compatibility matrix shall be submitted.
7	The storage shall support multi-tenant logical isolation leveraging using pools, namespaces, or equivalent constructs with QoS policy enforcement per tenant, per volume/pool/client, per namespace, or per workload.
9	The system shall deliver a minimum aggregate sustained sequential throughput of 100 GB/s read and 100 GB/s write across the unified architecture, and a minimum of 2,000,000 random 4 KiB read IOPS and 1,000,000 random 4 KiB write IOPS. Performance shall be sustained and verified at no less than an 80% capacity fill level for a continuous duration of at least 30 minutes, using a 1 MiB block size for sequential I/O and a 4 KiB block size for random I/O, xgenerated concurrently from a minimum of 16 client nodes.
10	Performance values shall represent sustained production-scale throughput and IOPS and shall not be based on short-duration cache-based burst performance.
12	The storage shall support latency-sensitive VM workloads and deliver consistent low-latency response under multi-tenant load conditions using NVMe media and optimized data paths, ensuring predictable performance
13	The architecture shall implement Dual Parity RAID / De-clustered RAID / Erasure Coding or equivalent distributed protection, protecting against minimum two simultaneous disk/node failures. The system shall support automatic data rebalancing and self-healing upon disk or node failure, without manual intervention and with minimal performance impact.
14	The system shall have no Single Point of Failure (SPOF) across controllers, storage nodes, disks, cache, power supplies, fans, and network paths. Shall support Zero data loss by having resiliency, self-healing capabilities and with autonomic failure domain.
15	The storage shall support thin provisioning, space-efficient pointer-based/differential snapshots, clones, replication (sync/async), and instant volume restore with minimal performance impact and shall support API-driven automation.
16	Snapshots shall be differential after the first instance and space efficient.
17	The solution shall support encryption at rest (AES-256 or equivalent) and encryption in transit (TLS 1.2/1.3 or higher).
18	The system shall natively support NFS, SMB/CIFS, iSCSI, iNVMe over Fabrics (NVMe/TCP and/or NVMe/RoCE), iSER, and S3-compatible object protocol within the same architecture and management framework.

Sr. No.	Description
19	The architecture shall allow seamless horizontal expansion up to minimum 20 PB usable capacity, and linear performance (IOPS & Throughput) scalability within the same namespace without downtime or data migration.
20	Storage must provide CSI (Container Storage Interface) driver for Kubernetes dynamic provisioning of block and file volumes for containerized AI workloads. CSI snapshot, clone, volume expansion and ReadWriteMany.
21	Dedicated storage for model registry should be provisioned from unified object tier with versioning, immutability, and access control. The object service shall support S3 Object Lock in governance and compliance modes, with retention period and legal hold, and versioning on any bucket
22	The solution shall provide centralized, enterprise-grade GUI-based management for configuration, monitoring, analytics, alerting, reporting, and capacity forecasting through a unified dashboard with REST API, **syslog forwarding to external SIEM, and automated call-home telemetry.**
23	The storage OEM shall be solely responsible for the entire storage solution lifecycle and shall provide undertaking to this effect.
24	For accelerated computing and containerized AI Accelerator environments, the file storage subsystem must support GPUDirect Storage (GDS) or equivalent and NFS over RDMA (NFSoRDMA) to facilitate direct DMA transfers between storage targets and AI Accelerator memory.
25	The storage solution shall be connected to all Cloud Compute nodes and other CPU-based servers through the Data Centre LAN fabric operating at minimum 200 Gb Ethernet. The connectivity architecture shall be designed as non-blocking with redundant paths to ensure high availability, low latency, and sustained throughput across the unified storage environment.
26	The solution shall support both an integrated/internal key management capability and integration with an external enterprise key management system (KMS) compliant with the KMIP standard.
27	A single storage solution meeting the specifications stipulated under Track-II (IT) item D (High Throughput Storage) as well as the specifications specified herein (Unified / Cloud Storage) shall be deemed compliant with both requirements and shall be considered eligible for qualification
28	The solution shall support enterprise storage efficiency features including deduplication, thin provisioning, compression, space-efficient snapshots, clones, and automated capacity reclamation. The Bidder shall declare the guaranteed effective-capacity ratio; no data-reduction benefit shall be counted towards the 10 PB usable.
29	RBAC with delegated per-tenant administration; call-home and predictive analytics; capacity and performance forecasting alerts; power, cooling, rack footprint and weight limits; all features licensed for the full 20 PB expansion capacity, perpetual

Sr. No.	Description
30	Quotas: per tenant, per bucket, per directory and per user, with soft and hard limits and alerting.
31	Backup: native integration with the Data Protection Item, with snapshot based or S3 interface
32	Identity: IAM with temporary credentials (STS), per-tenant RBAC, delegated administration, and audit logging exported to the SIEM
33	S3 API compliance: versioning, multipart upload, lifecycle policies, bucket policies, presigned URLs, CORS, event notifications, Signature v4, and per-bucket quota and QoS.
34	The storage system shall support tamper-proof, immutable snapshots for both Block and File (WORM/SnapLock equivalent). The OS shall incorporate inline or near-line AI-driven anomaly detection to identify abnormal file entropy, massive file renames, or unexpected data deletion patterns indicative of attack.
35	The solution shall support native zero-RPO, zero-RTO Active-Active synchronous replication / Metro-Clustering across metropolitan data center distances, ensuring transparent application and host failover. The platform must also support multi-volume Consistency Groups across Block and File volumes. The bidder shall declare the mechanism and the suppported distance.
36	The platform shall feature native, policy-driven cloud mobility capable of transparently tiering inactive/cold data from on-premises storage pools directly to public hyperscalers (AWS S3, Azure Blob, GCP) or secondary S3-compliant deep archive appliances.
37	The File (NAS) subsystem shall natively support the Internet Content Adaptation Protocol (ICAP) to integrate with third-party enterprise antivirus engines. The system must support inline, on-access and on-demand scanning of uploaded/modified files.

G. DC LAN Fabric

Sr. No.	Specification Description
1.	The DC LAN fabric shall interconnect all Accelerated AI Accelerator Compute Nodes, Cloud Compute Nodes, Storage Systems, Management Nodes, and other CPU-based infrastructure within the Data Centre. The architecture shall be designed to support high-bandwidth traffic for network virtualization and segmentation, cloud workloads without oversubscription.
2.	The DC LAN shall be based on a minimum 200 GbE Ethernet leaf–spine architecture designed to connect to all endpoints, including, AI Accelerator Nodes, CPU Compute Nodes, Cloud Storage, Management Nodes, High Throughput Storage G/W Nodes (if provided in solution) , Data Protection and backup items with not less than 10% port headroom. Where an Item of this Section specifies a higher access rate for an endpoint, the fabric shall support that rate for that endpoint, including 400 GbE where accelerated compute nodes carry storage traffic on the DC LAN Fabric under Track-II Accelerated Compute Solution.

Sr. No.	Specification Description
3.	The architecture shall provide true 1:1 non-blocking bandwidth at the leaf layer, such that aggregate downlink bandwidth equals aggregate uplink bandwidth per leaf switch. The fabric shall be designed with sufficient spine capacity to accommodate a further 10% endpoint growth without spine redesign or re-cabling of existing pods.
4.	The Leaf switches in DC LAN fabric for Cloud storage controllers shall be independent of the Leaf switches to which the AI Accelerator Nodes, CPU Nodes & other Hosts are connected to. There should be a provision for minimum two (2) nos. of Leaf switches for storage controllers, with storage controller ports physically balanced out for HA.
5.	Supply shall include 4 nos. of dedicated leaf switches for 'Border Leaf' and 'Service Leaf' roles
6.	The DC LAN fabric shall be RDMA-capable (RoCEv2 or later) end to end, to support GPUDirect Storage or equivalent , with priority flow control and explicit congestion notification , and with not less than three (3) distinct traffic classes comprising a class for storage traffic, a class for tenant traffic and a class for management and telemetry traffic with a guaranteed minimum bandwidth.
7.	leaf switches shall be a high-performance data center class switch with minimum 64 × 200/400 GbE ports (natively or breakout) , and should support Advanced ECMP Load Balancing techniques through Dynamic load balancing based on active link load; load-balancing based on custom packet header bit ranges; load-balancing based on RoCEv2 QP info.
8.	The spine tier shall comprise high-performance, data centre–grade switches arranged in a minimum 2 configuration to form an ECMP-enabled Clos fabric. Across the spine tier, each switches must support capacity equivalent to at least 256 × 200 GbE ports or 128 × 400 GbE ports or 64 × 800 GbE ports, achievable via native interfaces or validated breakout configurations.
9.	Spine switches to be deployed for redundancy. Port population on day-1 as per oversubscription, headroom and growth ask.
10.	The fabric shall operate an L3 underlay with equal-cost multipath across all spine paths using BGP dynamic routing protocol with support for IPv4 over IPv6 LLA packet forwarding is required.
11.	The design shall include sufficient spine-layer capacity on day-1 to maintain required bandwidth for all connected leaves + 10% growth.
12.	The solution shall provide centralized management and monitoring GUI dashboard supporting streaming telemetry with time-series database view, health monitoring, software upgrade, patching, traffic flow analytics, underlay & overlay topology view, congestion monitoring, resource utilization, configuration automation, and north-bound API support. CLI access to fabric devices should be available for direct troubleshooting and config changes.
13.	The solution should also support ansible library for day-0 provisioning, deployment and day-2 operations automation purposes and later integration with CI/CD pipeline.

Sr. No.	Specification Description
14.	The fabric shall support open-standard based overlay networking using EVPN-VXLAN for multi-tenant segmentation and scalable L2/L3 services, Should support 802.1x / equivalent for dynamic workload authentication, admission into the network and automation.
15.	The fabric shall support congestion control mechanisms, buffer utilization monitoring, jumbo frames of not less than 9,000 bytes end to end, PTP/NTP, on-board python for automation, advanced streaming telemetry for monitoring. The offered DC LAN switches shall support single-hop switch port-to-port forwarding latency of not more than 4 microseconds (µs), as per OEM-published specifications.
16.	Each endpoint shall connect at the access rate specified for it in the respective Item of this Section. The fabric shall support the required access rates concurrently, including through breakout cabling where a leaf port operates at a higher rate than the endpoint. The Bidder shall include all required optics, DAC/AOC cables, breakout cables and fibre as applicable, with 2% spares of each type.
17.	The fabric shall eliminate single points of failure at the leaf and spine layers and between them, with all inter-switch paths redundant and equal-cost multipath. All DC LAN switches shall be supplied with N+N redundant hot-swappable power supplies and redundant hot-swappable fans, the two power supplies of each switch being connected to independent power feeds.
18.	The Bidder shall submit a detailed fabric design covering port allocation, pod boundaries, rack elevations, per-rack power consumption and total power and cooling requirement. The rack elevations shall demonstrate compliance with the applicable DC LAN Fabric requirements specified in this RFP.
19.	The solution shall provide centralized management with GUI and CLI access, telemetry, health monitoring, automation and API support. The Bidder shall supply the dedicated hardware appliance and/or servers from the Cloud CPU compute node required to host the fabric management and telemetry platform. The supplied hardware shall be configured for high availability and shall include a minimum of 1 TB storage , along with all necessary software licences and associated components(OS,virtualization).
20.	All licences required for routing, EVPN, VXLAN, telemetry, congestion control and monitoring shall be included in the offer as per license term on day 1
21.	All Ethernet switches supplied under Track-II shall be SDN-capable, supporting REST API, NETCONF/YANG or similar data modelling framework and gRPC/gNMI APIs, VXLAN with EVPN,, vendor-supported networking plug-ins or mechanism drivers or APIs for cloud platform network services, should support the Kubernetes CNI, Ansible and Python automation, zero-touch provisioning and streaming telemetry. The Bidder shall supply all drivers, plug-ins and licences required for integration.
22.	Where a single storage platform (High throughput storage and Cloud storage) is offered, storage traffic shall be carried on the DC LAN Fabric. The leaf switches connected to the storage controllers shall have sufficient port capacity and bandwidth to support the **aggregate committed throughput of both Storage Items concurrently, in both directions.**

Sr. No.	Specification Description
23.	The scope of supply shall include two (2) high-performance 10/25 GbE optical fiber switches equipped with 100 GbE uplinks and supporting hardware-accelerated EVPN-VXLAN shall be provided to manage North–South traffic and interconnect firewalls, WAF, and upstream ISP equipment in a resilient mesh network. The 10/25 GbE switches shall provide enterprise Layer-3 routing capabilities, supporting dynamic BGP (eBGP/iBGP), OSPF (v2/v3), VRF for traffic segmentation, Equal-Cost Multipath (ECMP), and static routing. For system resilience, dual-homing, and appliance interconnection, the switches shall fully support Multi-Chassis Link Aggregation (MLAG / VLT VPC/ MCLAG), VRRP, IEEE 802.3ad LACP, dynamic ECMP load balancing, and loop prevention (RSTP/MSTP). Hardware reliability must include dual hot-swappable N+N redundant power supplies operating on independent power feeds and hot-swappable N+1 redundant cooling fan modules with front-to-back/back-to-front airflow matching data centre containment.

H. In & Out of Band N/W

Sr. No.	Description
1.	The solution shall provide a dedicated In-Band and Out-of-Band (OOB) management network architecture connecting In & Out Band management interface of all CPU nodes, accelerated compute (AI Accelerator) nodes, storage systems, network devices, security appliances and other Track-II devices.
2.	The management network shall be implemented as Ethernet leaf-spine architecture using enterprise-class Layer-2/Layer-3 1GbE leaf with VxLAN + EVPN for network segmentation and at least 10GbE or 100GbE spine to ensure full rack-level coverage across the data center, as per the proposed rack schedule. Leaf switches shall provide 1 GbE RJ45 access ports for the management interfaces of all Track-II equipment and 10 GbE or 100GbE uplink ports to the spine layer.
3.	Each access switch shall be rack-mountable (1RU) and with required RJ45 access switch supporting Gigabit Ethernet RJ45 access connectivity and 10GbE or 100GbE uplink connectivity, as required by the proposed network architecture and operational requirements.
4.	Each access switch shall be non-blocking and shall forward at wire rate on all ports simultaneously. The Bidder shall declare the switching capacity of the offered switch.
5.	All accelerated compute nodes, CPU nodes, and network devices must have OOB connectivity via a dedicated BMC port.
6.	The network shall support logical segmentation between In-Band management, Out-of-Band management, infrastructure services (IPMI/iDRAC/iLO/BMC), monitoring systems, and administrative traffic.
7.	The network shall support logical segmentation between In-Band management, out-of-band device management, service-processor traffic (IPMI, Redfish or equivalent), monitoring systems and administrative traffic. Each switch shall support IPv4 and IPv6 configuration from Day 1, and shall support a minimum of 32,000 MAC addresses, 4,000 VLAN IDs and 9,000-byte jumbo frames.

Sr. No.	Description
8.	The solution shall support high-availability features including MLAG/VPC/ MCLAG or equivalent, VRRP or equivalent, MST/RSTP and Link Aggregation (LACP).
9.	The switches shall support Layer-3 routing protocols including OSPF (v2/v3), BGP (where required), ECMP, VRF, and static routing.
10.	The switches shall support 802.1x authentication capability, access control lists at Layers 2 to 4, DHCP snooping, Dynamic ARP Inspection, storm control and Control Plane Policing. SNMPv3, syslog, and sFlow or IPFIX shall be supported, with integration to centralized monitoring and SIEM platforms, and centralized authentication through LDAP, Active Directory, TACACS+ and RADIUS.
11.	The switches shall support API-driven automation through NETCONF/YANG and REST API, zero-touch provisioning, and integration with automation tools including Python and Ansible.
12.	Each switch shall include a dedicated out-of-band management port, a console port, N+N hot-swappable redundant power supplies, redundant fans and a rail kit.
13.	All uplink transceivers, fibre or DAC cables, patch cords, rail kits and mounting hardware required for full operational connectivity shall be supplied.
14.	The spine layer and all access-switch uplinks shall be free of single points of failure, and the network shall permit the addition of further access switches without redesign of the spine layer.
15.	All licences required for routing, security, monitoring and automation shall be included and enabled from Day 1
16.	The In-Band and Out-of-Band network switches shall be configured with a minimum of 10% additional ports, over and above the total number of ports required for the specified In-Band and Out-of-Band network connections. The additional ports shall be provided as spare/unused ports and shall not be counted toward the required network connectivity.
17.	The Bidder shall supply dedicated hardware appliances and/or servers separate from the Cloud CPU compute nodes, to host the fabric management and telemetry platform. The supplied hardware shall be configured for high availability and shall include a minimum of 1 TB storage capacity, along with all necessary software licences and associated components(OS,virtualization,etc). Alternatively, the Bidder may utilize the dedicated management hardware provisioned under the DC LAN Fabric to manage and monitor both environments (DC Lan Fabric and In & Out Band N/W), provided the platform supports multi-fabric domain isolation and is sized to handle aggregate telemetry ingestion.
18.	The Bidder shall include all required optics, DAC/AOC cables, breakout cables, fibre cables, copper cables and associated accessories as applicable, with 2% spares of each type.

I. Data Protection and backup

Sr. No.	Description
1.	The Bidder shall supply a complete, enterprise-grade, end-to-end Data Protection, Backup and Archival Solution, delivered as a turnkey deployment, comprising the Tape Library, Backup and Archival Software, Data Movers, Media Agents, Backup Servers, SAN switches, and all cables, transceivers, accessories, hardware, software and licences required for a fully operational system from Day 1. .
2.	The solution shall integrate with the High Throughput Storage and the Cloud Storage platforms supplied under this tender and shall support as backup and archival sources all native functionalities, file systems, data structures, and object types supported by these underlying storage platforms.
3.	The entire solution shall be free of single points of failure, including servers, switches, robotics, power and cooling. All supplied systems shall have hot-swappable redundant power supplies and redundant cooling fans.
4.	The Tape Library shall provide a minimum of 10 PB native capacity with a minimum of 350 media slots and shall be presented and managed as a single logical library.
5.	The Tape Library shall include a minimum of eight (8) native Fibre Channel LTO-10 drives, with dual active-active and redundant Fibre Channel I/O interface per drive and shall provide failover robotics control. The Bidder shall state the native capacity of the LTO-10 media offered.
6.	Each tape drive shall be provided with a dedicated Fibre Channel interface sufficient to sustain that drive's rated native transfer rate continuously, with all drives streaming concurrently at native rate without tape repositioning. The end-to-end path from the source storage platforms to the drives — host bus adapters, SAN switches, inter-switch links and storage-side connectivity — shall contain no segment below the bandwidth required to sustain this. The Bidder shall submit a bandwidth budget for the complete path and shall demonstrate concurrent native rate streaming at acceptance.
7.	The library shall be supplied with not less than five hundred (500) new rewritable LTO-10 data cartridges and spare twenty (20) LTO-10 universal cleaning cartridges from the Tape Library OEM, with coloured barcode labels for all media and one additional set of 350 barcode labels.
8.	The Tape Library shall support media cartridges of multiple brands for read and write, with no vendor locking to the media of a specific OEM.
9.	The Tape Library and all supplied drives shall support WORM functionality and WORM media.
10.	The Tape Library shall support encryption of data written to media, with encryption licences and required S/W, H/W included for all drives supplied. Solution should support KMIP to integrate with external key manager.
11.	The Tape Library shall support logical partitioning of not less than eight (8) partitions and barcode reading.
12.	The Tape Library shall support LTFS (Linear Tape File System), and archived data shall be written in LTFS or TAR format such that it remains readable independently of the backup software.
13.	The Tape Library shall have a Mean Cycle Between Failures (MCBF)/Mean Swaps Between Failures (MSBF) of not less than 2,000,000 and a Mean Time to Repair of not more than thirty (30) minutes.

14.	The Tape Library shall provide GUI-based management and a dedicated Ethernet management port with remote monitoring, SMI-S or SNMP and SMTP compliance, automatic drive cleaning, automatic drive firmware upgrade and firmware auto-levelling, proactive monitoring and advanced diagnostics, system error and status logs, drive utilisation and media analysis reports, cartridge movement reporting, security reports and media removal notifications, and library configuration protection.
15.	The Tape Library shall be scalable to not less than 470 media slots and sixteen (16) drives, with aggregate throughput expandable in proportion, without architectural redesign or replacement of the supplied components.
16.	The Backup and Archival Software shall support high-performance, multi-threaded backup, archival and restore at petabyte scale, and shall support a catalogue of not less than five billion (5,000,000,000) files and folders.
17.	The software shall support automated backup, archival and long-term retention policies, policy-based data lifecycle management with automated movement from primary storage to archival tape, configurable data classification with a tailored backup policy per class, and scheduling and policy-driven archival on administrator-defined criteria including file age, last access date and file type.
18.	The software shall split any task into sub-tasks parallelized across all available Data Movers and shall begin data movement as soon as a defined number of files or a defined capacity has been scanned, without waiting for the scan to complete.
19.	Sub-tasks shall be load balanced automatically across Data Movers, and a failed sub-task shall be automatically relaunched on another Data Mover without failure of the parent task. The software shall support the addition of servers provided by C-DAC to increase transfer rate, and the Bidder shall make provision for the same.
20.	The software shall support incremental-forever backup with intelligent version management at the backup target, metadata indexing and search on file properties and custom metadata with results served from an indexed database and change tracking allowing a user to browse backups and archives between two dates.
21.	The software shall support automatic and manual archival, application of archive policy without end-user intervention, and archival of a given dataset to two or more archive repositories, each copy with its own retention.
22.	The software shall provide GUI-based end-user and administrator interfaces for job monitoring, archival requests and restore, including drag-and-drop archival, point-in-time restore of a whole set or of selected folders and files, and granular file and folder restore.
23.	The software shall preserve files with their access control lists from the source storage, converting them automatically to a suitable form on the target storage, and shall support LDAP/LDAPS or equivalent directory authentication with role-based access control restricting browsing, searching and retrieval per user.
24.	The software shall encrypt all network communication and data movement over LAN and WAN, shall encrypt data at rest, and shall perform automatic data integrity verification on every data movement.
25.	The software shall provide a centralised management and monitoring console with dashboards, job tracking, reporting, alerting and audit logging.
26.	Solution should be application-aware protection. shall provide application-consistent, log-aware backup with point-in-time and granular object-level recovery for relational and non-relational databases; image-level backup of virtual machines with granular file recovery from within a guest; protection of container persistent volumes through the container platform's snapshot interface; and backup

	of S3-compatible object storage. Should be compatible with k8s, container orchestrator, and cloud platforms
28.	The Bidder shall supply all licences, agents, plug-ins and connectors required to protect the entire committed usable capacity of both storage platforms supplied under this tender — 50 PB under the High Throughput Storage Item and 10 PB under the Cloud Storage Item, being 60 PB in aggregate — across every workload type listed, without further licence purchase. No licence shall restrict the number of protected hosts, virtual machines, database instances, containers, file systems, buckets, Data Movers or Media Agents.
29.	Not less than four (4) Data Movers or Media Agents shall be supplied, together with the Backup Servers required, as rack-mountable enterprise-class servers with the required processor, memory, Fibre Channel HBAs, rack kits and management tools, and with Ethernet interfaces matching the access rate specified for data protection and backup nodes in the DC LAN Fabric Item.
30.	All Media Agent licences and any capacity-based licenses shall be supplied without quantity or capacity limit. All software licenses and enterprise operating system licences should be supplied.
31.	Staging tier. The solution shall provide a staging tier sized to sustain the committed backup window and to stream every tape drive at its rated native transfer rate without interruption. The staging tier may be provided as a purpose-built disk backup appliance or as a dedicated, protected allocation on the storage supplied under this tender. The Bidder shall declare the usable capacity and the sustained ingest and restore throughput of the staging tier offered.
32.	Enterprise-grade SAN switches shall be supplied in redundant configuration **with the port count and inter-switch link capacity required to stream all supplied tape drives concurrently at their rated native transfer rate, with no segment of the path below that rate, demonstrated at acceptance.** All port licences **(refer section III Warranty,Support,License),** Fibre Channel transceivers, cables and accessories shall be included.
33.	All optics, transceivers, Fibre Channel, QSFP/SFP, uplink and patch cables, connectors, power cables, rail kits and accessories necessary for installation, configuration and full integration with the SAN and the DC LAN fabric shall be supplied.
34.	The Bidder shall submit the OEM compatibility statement confirming that the offered Tape Library, Backup and Archival Software, Data Movers and SAN switches are jointly supported as an integrated solution and shall remain solely responsible for the performance of the solution as a whole.

J. Training

1. The respective OEM shall provide 7 days of comprehensive training, either on-demand or spread over a period not exceeding six months, through OEM Professional Services to enable users to effectively utilize the AI IT infrastructure and Cloud services.
2. **The respective OEMs/ Bidder shall deliver comprehensive training programmes covering accelerated platform administration, fabric administration, storage administration, and facility operations as given in the table below.**

Training Type	Training provider

AI Compute Cluster Administration and Management	AI Accelerator OEM through OEM Professional Services
Container and Scheduler Platform Administration	Accelerator OEM, through OEM Professional Services
Storage and Network Administration	OEM of the fabric and switching
AI/ML Software Stack Management	AI Accelerator OEM
Storage and Data Service Administration	Storage and Backup solution OEM
Performance Monitoring and Optimization	Storage and Backup solution OEM
Troubleshooting and Incident Management	Data Centre Partner
Security hardening and compliance	Bidder

3. **Above training, including mandatory certification, shall be imparted to a minimum of 50 C-DAC personnel, with all associated certification costs to be borne entirely by the bidder.**
4. Training material shall be handed over in editable soft copy, updated to the as-built configuration.

K. Benchmark and Acceptance Testing

1. General

a) Final Acceptance of the solution is conditional on successful completion of every acceptance test group set out in this section. No payment milestone tied to Final Acceptance shall be released until the Acceptance Test Report has been signed by b.
b) All tests shall be conducted at the installation site on the delivered production configuration at full quoted scale, witnessed by the Purchaser or its nominated representative. Testing on a reference, remote or partial configuration shall not be accepted.
c) The bidder shall submit a detailed test plan, including tool versions, command lines, run parameters and the theoretical peak values used in each calculation, for the C-DAC's approval at least fifteen (15) days before testing begins.
d) Where a criterion is expressed as a percentage of theoretical peak, the theoretical peak shall be the OEM's published figure for the exact part supplied. The bidder shall declare these figures in the technical bid; declared values may not be revised downwards at the time of testing.
e) All test outputs, logs and raw result files shall be handed over to the C-DAC in unedited form, together with the Acceptance Test Report.
f) The Acceptance Test Matrix and the AI Model Training and Inference Benchmarks shall apply to both Track-I and Track-II, as follows:
    a. **Track-I:** The Acceptance Test Matrix shall apply only to the respective items supplied (AI Accelerator Node & Scaleup, Scale out Fabric). All AI Model Training and Inference Benchmarks shall apply in full.
    b. **Track-II:** All tests in the Acceptance Test Matrix and all AI Model Training and Inference Benchmarks shall apply in full.

2. Acceptance test matrix

Ref.	Domain	Benchmark / Tool	Scope & Workload Profile	Key Metric Measured	Pass / Fail Acceptance Criteria
AI Accelerator Node & Scaleup, Scale out Fabric					
1	**Hardware Health & Diagnostics**	AI Accelerator Diagnostic Suites, Hardware Validation Frameworks, or Node Health/Stress-Testing Tools	PCIe integrity (peqt/pebb), memory registers, and AI Accelerator status	Hardware health status & error register counters	**Pass:** 0 uncorrectable ECC errors, 0 row remap failures, 0 PCIe replay errors, exit code 0 across 100% of nodes.
2	**Thermal & Power Integrity**	AI Accelerator Burn-In Utility / Compute Stress Workload	Sustained 100% compute load per node (2–4 hrs)	AI Accelerator temperature, power draw (W), clock throttling	**Pass:** 0 thermal/frequency throttling events; power draw tracks TDP within specification; 0 driver resets.
3	**In-Node Interconnect**	Intra-Accelerator Communication Benchmarks / Collective Performance Suites	At domain level sweeping collective bandwidth across AI Accelerators within the same server	Out-of-place Bus Bandwidth (busbw)	At least or above 90% of theoretical bidirectional a high-speed interconnect fabric or memory-semantic cpu-accelerator interconnect
4	**Inter-Node AI Fabric**	all_reduce_perf, alltoall_perf	Multi-node all_reduce_perf / alltoall_perf over	Inter-node collective Bus Bandwidth (busbw)	At least or above 90% of theoretical network line rate across rail optimized NICs
5	**Inter-Node AI Fabric**	osu_latency, osu_allreduce (OSU Micro-Benchmarks), or equivalent	Multi-node point-to-point and 8 B all-reduce over the inter-node fabric, between the node pair separated by the maximum number of switch hops in the offered topology	Inter-node point-to-point latency (8 B) and 8 B all-reduce completion latency	Not more than 5 µs (99th percentile) point-to-point at 8 B between the worst-case node pair; 8 B all-reduce completion latency not more than ten (10) times the measured point-to-point latency

High Throughput Storage					
6	Storage Sequential I/O	IOR / mdtest	Distributed parallel clients writing/reading in both file per process and single shared file mode to the mounted filesystem	Aggregate read/write throughput (GB/s) & metadata IOPS	Not less than 100% of the sequential throughput committed in the High Throughput Storage Item, sustained for not less than thirty (30) minutes.
7	Storage Random IOPS	fio, or the ior-hard component of IO500	Random 4 KiB read and write against the all-flash tier, DIRECTIO with cache bypass, queue depth and client count declared by the Bidder before the test	Random 4 KiB read IOPS and write IOPS	Not less than 100% of the random 4 KiB read and write IOPS committed in the High Throughput Storage Item, sustained for not less than thirty (30) minutes.
8	Storage Metadata	mdtest, or the mdtest-hard component of IO500	File create, stat and delete operations across the parallel file system at the client count declared by the Bidder	Metadata operations per second	Not less than 100% of the metadata rate committed in the High Throughput Storage Item.
9	Capacity Tier Throughput	IOR	Applicable only where a multi-tier architecture is offered. Sequential read and write against the capacity tier, benchmarked separately, 1 MiB transfer size, DIRECTIO	Aggregate read and write throughput (GB/s)	Not less than 100% of the capacity-tier throughput committed in the High Throughput Storage Item. Not applicable where a single-tier all-flash architecture is offered.

Cloud Storage					
10	Unified / Cloud Storage Performance	IOR and fio, or equivalent	Sequential read and write at 1 MiB transfer size, and random 4 KiB read and write, against the Unified / Cloud Storage platform with cache bypass, dataset not less than twice the aggregate cache	Aggregate throughput (GB/s) and random 4 KiB IOPS	Not less than 100% of the throughput and IOPS committed in the Unified / Cloud Storage Item, sustained for not less than thirty (30) minutes.
11	Backup and restore	The offered backup and archival software, with tape drive and staging telemetry	Backup of the declared protected data volume from the primary storage platforms to the archival target, and restore of a declared subset, including a single-file restore and a full point-in-time restore	Backup throughput (TB/hour), restore throughput (TB/hour), single-file restore time, concurrent tape drive streaming rate	The backup window, restore throughput and recovery time objective; all supplied tape drives stream concurrently at their rated native rate without tape repositioning.

3. **AI Model Training & Inference Benchmark**
   a) Published (in ML Commons.org by the System OEM) and Acceptance - Bidder need to submit the proof (detailed reports) of meeting the benchmark along with the bid. Bidder can submit the published MLPerf benchmarks or can run the benchmarks and submit along with the technical bid.Technical bids without benchmarks results will be rejected and not considered for further evaluation.
   b) The bidder shall submit with the bid a declaration from the Accelerated Compute Node OEM undertaking to meet the MLPerf Training & Inferencing results tabulated below, and shall demonstrate the benchmark on the delivered solution after supply as an Acceptance Criterion.
   c) The bidder shall submit detailed reports as per Data preparation guidance to be followed as given in the MLPerf benchmarking website at https://mlperf.org/; proving the proposed compute nodes meet the required performance criteria.
   d) Bidders must submit their performance validation using the structured format below. If relying on OEM-published MLPerf results, Parts 1, 2, and a link to the official MLCommons ledger will suffice. If submitting custom-run benchmark results, all 5 parts are mandatory:

      Part 1: Performance Summary
      - Benchmark Version: (e.g., MLPerf Training v6.0, MLPerf Training v5.1 / Inference v5.0 ...etc)
      - Target Model & Task: (e.g., ResNet-50, BERT-Large, Llama 2 70B)
      - Achieved Metric: (e.g., Time-to-train in minutes, Latency in Samples/sec, Tokens/sec)

- Scale Used: Exact number of Compute Nodes and AI Accelerators utilized for the run

Part 2: Hardware & Software Description

- Compute Node Specs: CPU Model, Core Count, System RAM, and Storage layout.
- AI Accelerator Specs: AI Accelerator Model, VRAM capacity, and exact count per node.
- Fabric & Interconnect: Node-to-node networking (e.g., 100Gbps/400Gbps/800Gbps RoCEv2/InfiniBand) and internal AI Accelerator interconnect.
- Software Stack: OS release, Kernel version, Accelerator Driver version (e.g., CUDA/ROCm), and Framework versions (e.g., PyTorch, Ray).

Part 3: Official Log Output

- Complete, unmodified output logs generated by the benchmark framework (specifically mlperf_log_summary.txt and mlperf_log_detail.txt).
- Output logs proving the results successfully pass the official MLPerf submission_checker script.

Part 4: Reproducibility Artifacts

- The exact Docker files, container images, or environment setup scripts used.
- A README containing step-by-step commands required for the C-DAC technical team to identically reproduce the run during the Acceptance Testing (AT) phase.

Part 5: Telemetry & Thermal Logs

- Continuous AI Accelerator utilization and power draw logs (e.g., nvidia-smi / rocm-smi polling outputs) captured during the benchmark execution.
- Thermal logs proving the AI Accelerators and CPUs maintained safe operating temperatures without thermal throttling during sustained 100% computational load.

e) **Benchmark Inference 6.0 / 6.1**

Model Name	Area/Task	Number of AI Accelerators	Throughput in Tokens / second (Server Scenario)
Llama 2 70B-99	Language/LLM-QA	8	89,371
DeepSeek-R1	Language/Reasoning	8	41,027.90
Gpt-oss-120b	Language/QA/Math/Code Generation	8	71,588.00

f) **Training 6.0**

Benchmark	Model name	Dataset	Benchmark criteria	Number of AI Accelerators	ML Perf Latency in minutes
LLM	Llama3.1 8b	C4	3.3 log perplexity	64	18.9

LLM	GPT OSS 20B	C4	3.34 log perplexity	64	29.9

Note: For all the submitted performance measurements, the bidder shall comply with the established MLCommons acceptance criteria for Inference 6.0/6.1 and Training 6.0 strictly. remaining within a 10% deviation threshold relative to the above target values

4. Security Acceptance

Vulnerability Assessment and Penetration Testing. The bidder shall appoint a CERT-In empanelled agency, to conduct comprehensive VAPT covering all hardware, software, APIs, service endpoints, integration points all items including software provided in solution. The bidder shall remediate all non-compliances, observations, and security findings identified in the VAPT report. Without any additional cost.

Pass criteria: a clean VAPT report with zero non-compliances and zero open observations, submitted to the C-DAC prior to Final Acceptance.

Submittals

a) With the bid: an OEM-signed declaration undertaking to meet every acceptance criterion of this Item, covering all benchmarking and Acceptance Testing; and a schedule of declared values stating, for every criterion this Item expresses as a declared value, the figure the bidder commits to.
b) Before testing: the detailed test plan required under General above.
c) After testing: the Acceptance Test Report, with all raw logs and result files, signed by both parties.

5. Track-II (Data Centre)

5.1. Detailed Scope

5.1.1. The scope covers the Data Centre facility being designed, executed and Uptime Institute Tier-III certified for TCDD, TCCF, & TCOS on an Engineering, Procurement and Construction (EPC) (Turnkey) basis. The Engineering, Procurement and Construction (EPC) contract (also called 'Design & Build' Contracts/Turnkey Contracts) assigns the complete responsibility for site survey, investigation, detailed design, execution and final certification of the Data Centre facility to the bidder.

5.1.2. The entire Data Centre facility shall be designed in compliance with Uptime Tier-III standards and statutory guidelines. The Data Centre facility shall obtain Uptime Institute Tier-III certification at all stages, i.e., Tier Certification of Design Document (TCDD), Tier Certification for Constructed facility (TCCF), and Tier Certification for Operational Sustainability (TCOS) for the Data Centre works and services.

5.1.3. The requirements indicated here in RFP are minimum indicative quantities, capacity with minimum specification and shall in no way absolve the Contractor/Vendor of the responsibility to provide any additional equipment or any other associated items required for a complete, fully functional, reliable and maintainable Data Centre installation complying with the specified Uptime Institute Tier III requirements and other applicable statutory rules, codes and/or standards, and the best design practices in the AI Data Centre Domain.

5.1.4. The project being executed in EPC (Engineering, Procurement and Construction) mode, the Contractor/Vendor shall verify the adequacy of all quantities based on detailed engineering as per respective IT OEM requirements, design calculations, equipment loading, site conditions, capacity requirements, redundancy philosophy, maintainability, single points of failure and operational requirements.

5.1.5. The additional quantities or equipment are required to achieve the specified performance, capacity, operational requirements, Tier III compliance and/or best practices in State of the Art-AI Data Centre, the same shall be provided by the Contractor/Vendor without compromising the project requirements.

5.1.6. The quantities & specifications shall therefore be treated as minimum requirements and not as a limitation on the Contractor/Vendor's scope or responsibility. Any additional items necessary for achieving the specified performance, redundancy, reliability, maintainability, safety and Tier III requirements shall be deemed included in the Contractor/Vendor's scope and shall be provided without any additional cost to the C-DAC.

5.1.7. The bidder shall be responsible for the planning, design and engineering of a Tier-III or higher certified Data Centre to meet the requirements of the Track-II IT DC infrastructure at C-DAC, including the supply, installation and commissioning of power and cooling infrastructure and implementation of an integrated BMS solution for real-time monitoring and control of power, cooling and other parameters, including dynamic control, redundancy and associated management functions.

5.1.8. The Bidder shall be responsible for 24x7 operation, support, performance management and maintenance of the Data Centre for a period of three (3) years from Final Acceptance of Track-II. The Bidder shall establish and implement an industry-standard Service Management framework and deploy adequate and suitably skilled manpower for comprehensive Non-IT Data Centre Operations and Management, including critical facilities, HVAC, BMS, electrical systems.

5.1.9. All personnel engaged by the Bidder for the design, planning, installation, commissioning, operation & maintenance (O&M), and warranty support of the proposed system shall be Indian nationals residing in India.

5.1.10. The Bidder shall comply with and fulfil all Service Level Agreement (SLA) requirements specified in Annexure-L.

5.2. DC Technical Submittals along with bid

5.2.1. The Detailed Design Basis Report to be submitted.

5.2.2. Duly filled Technical Bid (Covering the details of solution, detailed bill of material, bill of quantities, technical specifications, makes and models of items with selection sheets as per Pune site conditions, diagrams, layouts, all drawings, Electrical SLD, Cooling P & ID, BMS architecture, First floor layout, GAD with section drawings, DC Room Layout along with sections drawings , IT Halls Rack Layout ,Outside Utility Area Design Drawings with plan, section and elevations along with design basis reports for utility area equipment's , steel structure, IT and NON-IT Load Calculations etc.

5.2.3. The details of electrical power consumption, footprint, ambient temperature, temperature range targeted in various cooling circuits i.e CDU Primary side, CDU Secondary side DCLC cooling circuit , Air-cooling circuits, Comfort Cooling, Container Cooling, Pipe Sizing etc with design basis report .

5.2.4. Cable schedule, BBT schedule along with voltage drop calculations, circuit breaker sizing, panel sizing along with fault calculations at various levels from source to load with detailed calculations etc., MV panel Sizing, LT panel Sizing, DG Sets Sizing, UPS & battery sizing and back-up calculations, Panel busbar sizing etc.

5.2.5. Details of Power Consumptions, diesel consumption & water consumption (if any) on various loading conditions.

5.2.6. Design Basis Report along with yearly & quarterly Design Power Usage Effectiveness (PUE) calculations at ASHRAE N-20 YR Extreme Dry Bulb temperature for Pune Site Condition for 25%, 50%, 75% and 100 % of IT load. Design PUE calculation at 100% load at the extreme outdoor dry-bulb temperature (ASHRAE N-20 yr) for Pune Site Condition shall be equal to or below 1.45. Annualized PUE calculation for Pune Site Condition shall be equal to or below 1.30. Calculation of PUE shall be calculated, measured and reported in accordance with the latest applicable edition of ISO/IEC 30134-2 (Category-2)

5.2.7. Design basis and analysis of cooling solution at full and partial load conditions including complete details, assumptions made, and the specific references/standards used for the same. Applicable de-ratings for Pune site conditions shall be considered while selecting all cooling units, and the bidder shall submit the product selection considering the site ambient conditions as per ASHRAE N=20 yr Data (Extreme Dry Bulb temperature). Selection sheets shall be submitted for all products.

5.2.8. The cooling systems should perform efficiently at variable load conditions. The overall cooling solution should be designed to achieve better cooling and low operating cost. The IT room air temperature should be maintained at 22 +/- 2 Deg. C and humidity as per ASHRAE TC 9.9 2017 guidelines. Heating and humidifier to maintain correct operating environment throughout the data centre needs to be considered.

5.2.9. CFD analysis report for all IT halls shall be provided.

5.3. Indicative IT Load

5.3.1. The AI Infrastructure shall be designed and commissioned to support a rated IT load not exceeding 7.0 MW, & in addition 1.0 MW IT spare Load capacity shall be provisioned along with associated non-IT infrastructure requirements. The overall facility shall be designed to meet an annualized Power Usage Effectiveness **(PUE) not exceeding 1.3** and design PUE at 100% load not exceeding 1.45. The Data Centre for the Track-II project is planned at first floor of the building. The building load of 1.5 MVA should also be considered additionally in design and the feeder for the same also be supplied , laid and connected to Building Power Distribution Panel incomer which will feed power to other floors (except the first floor where Data Center is proposed).

5.3.2. The Vendor shall accommodate all outdoor infrastructure within a single contiguous land parcel not exceeding 44,000 sq. ft. and shall submit a space-optimized Master Plan demonstrating compliance with the stipulated land area.

5.3.3. The AI Accelerator IT Infrastructure solution for Track-2 shall be accommodated within a maximum of 44 DCLC Racks, & the ancillary IT Infrastructure (Storage, CPU nodes, N/W etc.) should not occupy a maximum of 18 Air Cooled Racks. There should be a provision of Four (4) spare DCLC Racks with min. 150 kW power and cooling (Minimum 80:20 liquid to Air cooling ratio, higher liquid cooling proportion is acceptable) each; & 14 additional Air-Cooled Racks, each with min. 25kW (cooling & power)

5.4. Broad DC Requirements

Sr. No.	Item Description	Requirement Description	Qty	Unit	Minimum Redundancy Requirement
A	**UPTIME INSTITUTE CERTIFICATION**				
A.1	DC Design Certification	Tier III Tier Certification of Design Documents (TCDD) by Uptime Institute	1	No.	NA
A.2	DC Constructed Facility Certification	Tier III Tier Certification of Constructed Facility (TCCF) by Uptime Institute	1	No.	NA
A.3	DC Sustainable Operation Certification	Tier Certification for Operational Sustainability (TCOS) by Uptime Institute	1	No.	NA
B	**ELECTRICAL SYSTEM (MV SIDE — 22 kV)**				
B.1	Electrical Works (MV Side / 22 kV)	Two numbers of 22 kV express feeders (HT XLPE Armoured cables in N+1 configuration) from two nearest separate MSEDCL (utility) substations	NA	Set	N+N
B.2	MV Switchgear Panels	Two 22 kV, 20 kA electrical panels (MV panels) with summation metering facility or as approved by MSEDCL; battery charger with DCDB and batteries for MV panel control supply (Fault as per MSEDCL) (Two for MSEDCL Control & Two for CDAC Control)	NA	Set	N+N

Sr. No.	Item Description	Requirement Description	Qty	Unit	Minimum Redundancy Requirement
B.3	Compact Substation	22 kV, Compact substation with RMU panels and input–output Motorized VCB configuration, dry-type transformer DYn11, 22 kV/433 V and other accessories	NA	Set	N+1
B.4	HT Cabling	22 kV HT XLPE Al Armoured cables	NA	Set	N+1
B.5	HT Terminations & LS Works	22 kV Straight Through termination kits, HT section and LS works	NA	Set	NA
C	**ELECTRICAL SYSTEM (LV SIDE — 433 V)**				
C.1	Electrical Works (LV Side)	Electrical LT panels and ATS (IEC-61439)	NA	Set	NA
C.2	LV Distribution	Electrical DBs, electrical LT cables, battery charger with DCDB and batteries for LV panel control supply	NA	Set	NA
C.3	LT Cabling	Electrical LT cables (XLPE)	NA	Set	NA
C.4	Panel Control Supply	Battery charger with DCDB and batteries for panel control supply	NA	Set	NA
C.5	Miscellaneous LV Works	Miscellaneous / LS works / DBs / cable trays	NA	Lot	NA
C.6	Indoor Use-Bus Duct, IP54 or XLPE Cable	Sandwich bus duct with Copper busbars for indoor use OR XLPE Cables(copper) can also be used alternatively depending on site requirements & site difficulties	NA	Set	NA
C.7	Outdoor Use-Bus Duct, IP65 or XLPE Cable (Armoured)	Sandwich bus duct with aluminium/copper busbars for outdoor use, with support over MS overbridge structure and suitable canopy OR XLPE Cables (aluminium/copper) with support over MS overbridge structure and suitable canopy can also be used alternatively depending on site requirements & site difficulties	NA	Set	NA
D	**AC POWER SYSTEM (UPS, BATTERIES, DG & FLOOR PDUs)**				
D.1	UPS — IT Load	UPS for IT racks of AI Accelerator data halls and network/storage hall, with hot-swappable power modules(N+1), SNMP, paralleling cables, battery isolator and battery cables etc.	NA	Set	N+1
D.2	Battery — IT Load	Li-ion battery for IT racks of AI Accelerator data halls and network/storage hall; 10 min EOL backup at specified load with each UPS; UL 9540A compliant etc.	NA	Set	NA

Sr. No.	Item Description	Requirement Description	Qty	Unit	Minimum Redundancy Requirement
D.3	UPS — Mechanical & ELV Load	UPS for mechanical load (CDU, FWU, pumps, valves, controllers, PAHU, BMS), ELV load (fire safety, security and monitoring), emergency lighting and other emergency loads, with hot-swappable power modules, SNMP, battery isolator and battery cables etc.	NA	Set	N+1
D.4	Battery — Mechanical & ELV Load	Li-ion battery for the above mechanical and ELV loads; 10 min EOL backup with each UPS; UL 9540A compliant etc.	NA	Set	NA
D.5	Diesel Generator	Continuous Power Rated (COP) or Equivalent rated at full load power (IT + NON-IT), with buffer tanks & Day tanks for each DG etc.	NA	Set	N+1
D.6	Diesel Tanks (Bulk Fuel Storage)	Underground storage tanks for at least 12 hours of operation at full load power (IT + NON-IT). Fuel transfer system: automated pumps with feedback from level sensors of buffer tanks, and piping networks to supply fuel safely to the generators	NA	Set	N+1
D.7	Building Power Load	LT XLPE power feeder supply cable to building LT panel input breaker(ACB) at ground floor (approx. 1.5 MVA load)	NA	Set	NA
E	**THERMAL / COOLING SYSTEM**				
E.1	CDU for AI Accelerator Compute Racks	Technology supplier (server OEM) validated CDU with N+1 redundant pumps, SNMP for external communication and leak detection sensors, with dual power changeover provision (ATS) and low-side works etc.	NA	Set	N+1
E.2	Fan Wall Units — Data Halls	Fan wall units for AI Accelerator compute hall and network/storage room, with dual power changeover provision (ATS) and low-side works including necessary power cables, drain lines, etc.	NA	Set	N+1
E.3	PAHU/VRF— UPS & Battery, Panel Rooms(ISO/Non-ISO Sized Containers)	PAHU/VRF/VRV units with dual power changeover provision (ATS)	NA	Set	N+1
E.4	Comfort Cooling — Support Rooms	Air-cooled Chiller/ VRF /VRV with dual power changeover provision (ATS);	NA	Set	N+1

Sr. No.	Item Description	Requirement Description	Qty	Unit	Minimum Redundancy Requirement
E.5	Air-Cooled Chiller- for DCLC Loop and Air-Cooled Chiller- for Air Cooling Loop	Air-cooled chiller with VFD on compressors and pumps, ATS and AHF (Active Harmonic Filter) panel. All chillers shall be placed outside the building at first-floor level on an MS structural support designed for the applicable static and dynamic loads as per respective OEM. Variable primary pumps (N+2) for each Chiller Plant ring main (DCLC Loop& Air Cooling Loop)	NA	Set	N+2
E.6	Chiller FAT	Factory Acceptance Test at OEM works before dispatch, as per customer script	NA	Set	NA
E.7	Heater & Dehumidifier — All Data Halls	Heater & Dehumidifier for data halls	NA	Set	N+1
E.8	Chiller Plant Manager	Redundant PLC(N+1) with dual power supply arrangement; each chiller to have an individual RIO panel; necessary sensors and meters	NA	Set	NA
E.9	Thermal Storage Tank	Thermal storage tank(stratified) for at least 5 minutes of backup	NA	Set	N+1
E.10	Chilled Water Low-Side Works	Low-side piping work including necessary valves, sensors and expansion tanks, pressurisation unit, chemical dosing units etc.	NA	Lot	NA
E.11	Liquid Cooling Secondary Fluid Network	SFN SS 304L pipes with necessary valves, fittings, gauges , sensors and other accessories. Scope also includes the necessary factory testing of the SFN (cleaning up to 25 microns, ensuring pressure variation of not more than 50 Pa; report to be generated for a minimum of 1 hour).	NA	Lot	NA
E.12	Air Purifier Units	Air purifier units for data halls, as per the requirement	NA	Set	N+1
E.13	Hot Aisle Containment	Hot aisle containment for all IT PODs, as per the requirement	NA	Set	NA
E.14	Metal False Ceiling — Entire Floor	Metal false ceiling with structural grid	NA	Lot	NA
E.15	Raised Floor — Entire Floor	Raised flooring of suitable UDL capacity, as per the equipment load requirement (Minimum 3100kg/sqmt UDL for IT Halls)	NA	Lot	NA
F	**ELV SYSTEM — FIRE, SAFETY, SECURITY & MONITORING**				
F.1	Fire Alarm & PA System	Fire alarm system with PA voice evacuation system for the entire first floor	NA	Set	

Sr. No.	Item Description	Requirement Description	Qty	Unit	Minimum Redundancy Requirement
F.2	Access Control System	1. Face recognition & Biometric authentication entry for all IT halls 2. Face recognition & Biometric authentication entry for all NON-IT rooms	NA	Set	
F.3	IP CCTV System	IP closed-circuit television system	NA	Set	
F.4	Water Leak Detection (Water)	Water leak detection system for water circuits	NA	Set	
F.5	Water Leak Detection (CDU SECONDARY) (PG25/OTHER)	Water leak detection system for PG25/Other circuits	NA	Set	
F.6	VESDA / HSSD + Multi Detector system — IT Data Halls	High-sensitivity smoke detection system (HSSD/VESDA) and Smoke & Heat (Multi Detector) Detection system for all IT data halls	NA	Set	
F.7	Smoke & Heat (Multi Detector) Detection — NON-IT Halls	Smoke & Heat (Multi Detector) for all NON-IT halls	NA	Set	
F.8	Rodent Repellent System	Rodent repellent system for the entire floor area	NA	Set	
F.9	BOOM Barrier(2 No.s)	Physical security system for the facility	NA	Set	NA
F.10	X-Ray Baggage Scanner	X-ray baggage scanner at the entry point	NA	Set	NA
F.11	Door Frame Metal Detector	Door frame metal detector at the entry point	NA	Set	NA
F.12	BMS	PLC-based BMS	NA	Set	NA
F.13	Gas Suppression System	FK5-12 gas OR better fire suppression for the entire first-floor area	NA	Set	NA
G	**SITE READINESS & STATUTORY APPROVALS**				
G.1	Site Readiness	1. Land levelling of the DC utility area (outside the building) is the responsibility of the bidder. 2. Concrete Access Road (minimum 6 m width & at least 150 mm thick) all around the DC utility area, and internal sections covering the Container area, receiving substation area, DG yard and diesel tank yard area. 3. Chain link fencing all around the DC utility area, with four gates (minimum 6 m length) at four corner points of DC Utility Area.	NA	Lot	NA

Sr. No.	Item Description	Requirement Description	Qty	Unit	Minimum Redundancy Requirement
G.2	Statutory Approvals / Clearances	Building(if needed), fire, environmental, , DGCA (if applicable), DG commissioning and operation (CPCB, SPCB), parking concession, Department of Explosives (PESO),CCOE, MSEDCL, MSETCL (if needed), CEIG, CEA and all other applicable statutory permissions are the bidder's responsibility. All statutory fees (if any) shall be deposited upfront by the bidder on behalf of C-DAC. Only the necessary statutory fees paid by the bidder shall be reimbursed by C-DAC on production of documentary evidence.	NA	Lot	NA
H	**MISCELLANEOUS**				
H.1	ISAT / Testing & Commissioning Works	Integrated site acceptance testing, testing and commissioning of the complete facility	NA	Lot	NA
H.2	Freight	Freight, loading, unloading, transportation and insurance to site	NA	Lot	NA
H.3	CFD Analysis	Computational fluid dynamics analysis of the data halls	NA	Lot	NA
H.4	Warehouse Rental	Warehousing of materials during the project period	NA	Lot	NA
H.5	FAT of Key Items	Factory acceptance testing of respective key items such as Chiller, UPS, CDU, LT-HT panel , DG Set, Pumps , etc.	NA	Lot	NA
H.6	Design Engineering Services	Detailed design engineering services for the complete facility	NA	Lot	NA
H.7	Project Management	Project management services for the complete scope	NA	Lot	NA
H.8	Construction power and water	Part of scope of bidder.	NA	Lot	NA

5.5. ELECTRICAL WORK

5.5.1. ELECTRICAL WORK OUTSIDE PREMISES

5.5.1.1. The Bidder shall be responsible for the complete design, feasibility, coordination, approvals, execution, testing, commissioning and energisation of HT power supply works outside C-DAC premises for bringing approximately 19.8 MVA power through two independent HT sources from the two separate local electricity authority substations using suitable voltage class HT XLPE Aluminium Armoured Cables(N+1) configuration as approved by local electricity board. The minimum contract demand (Phase-1) is expected to be 12 MVA.

5.5.2. Note: C-DAC shall apprise the Sub-station(s) details through corrigenda

5.5.2.1. The scope shall include, but shall not be limited to:

5.5.2.2. Feasibility study, load sanction, power allocation, connectivity and load release coordination with local electricity board.

5.5.2.3. Survey and design of HT cable routes from the respective local electricity board substations up to the C-DAC receiving point.

5.5.2.4. All required local electricity board substation modification/augmentation works, HT cables, joints, terminations, protection, earthing and associated accessories.

5.5.2.5. Complete ROW, road-cutting, road-crossing, trenching and reinstatement works, including necessary permissions/NOCs and provision of Hume/RCC pipes or approved ducts for road crossings.

5.5.2.6. Coordination with Municipal Corporation, PWD, road-owning agencies and other concerned authorities, wherever applicable.

5.5.2.7. Anything required in Upstream MSEDCL Substations and HT metering kiosk with CT, PT/CVT, meter and associated wiring/accessories in receiving substation in CDAC Plot as per local electricity authority /local regulations and approved metering scheme.

5.5.2.8. Obtaining all necessary local electricity authority, CEIG, Electrical Inspector, local authority and other statutory approvals/NOCs required for energisation.

5.5.2.9. Complete testing and commissioning, including cable, CT/PT, metering, protection and earthing tests, statutory inspection and rectification of observations.

5.5.2.10. Coordination with local electricity authority for charging, energisation and release of the sanctioned load from both sources.

5.5.2.11. Submission of all approved drawings, test reports, statutory certificates and as-built documentation.

5.5.2.12. The Bidder shall include all labour, materials, equipment, transportation, excavation, cable laying, jointing, testing, approvals, coordination and incidental works necessary for successful completion and energisation of both HT sources. Any item or activity reasonably required for completion of the works, though not specifically mentioned herein, shall be deemed included in the Bidder's scope.

5.5.2.13. C-DAC shall bear only the official statutory/utility fees and charges payable to local electricity authority, CEIG, Electrical Inspector, Municipal/PWD or other Government authorities, against valid official demand notes/challans/receipts generated in the name of C-DAC. All other costs, including penalties or additional expenditure arising due to the Bidder's delay, negligence or non-compliance, shall be borne by the Bidder.

5.5.3. ELECTRICAL WORKS INSIDE PREMISES

5.5.3.1. The scope of work shall include, but not be limited to, the complete supply, installation, testing and commissioning (SITC) of all electrical equipment and associated systems required within the C-DAC premises.

5.5.3.2. The Bidder shall submit, along with the Bid, Single Line Diagrams (SLD), fault-level/short-circuit calculations, equipment layout drawings, earthing schematic and calculations, lighting layouts and other relevant electrical design drawings & calculations.

5.5.3.3. The Bidder shall include all necessary equipment, accessories, cabling, sandwich busduct/busbars, protection and control systems, earthing, supports, terminations, testing, commissioning and other incidental works required for a complete, safe and fully functional electrical installation, whether or not specifically mentioned herein.

5.5.3.4. Two sets of suitable HT panels for MSEDCL Control (Receiving Substation in plot)shall be provided for termination of the two independent HT power inputs received from the respective local electricity authority substations, complete with utility-approved metering kiosk, CTs, PTs, numerical protection relays , energy meters and all associated accessories. Two sets of suitable HT panels also be provided downstream of above for CDAC Control with CTs, PTs, numerical protection relays, multi-function meters and all associated accessories.

5.5.3.5. The HT panels shall be complete with suitable protection, control, indication, metering and interlocking arrangements. The minimum protection scheme shall, as applicable, include 50/51, 50N/51N, 64, 25 and other necessary functions based on the system fault level, protection coordination study and local electricity authority requirements.

5.5.3.6. The Bidder shall submit the protection coordination study, relay settings, short-circuit/fault-level calculations and detailed SLD for approval. All equipment and protection arrangements shall comply with the latest applicable local electricity authority requirements, IEC/IS standards and statutory regulations.

5.5.3.7. HT RMU, dry-type transformers and associated LT panels shall be provided in compact substations, as indicated in the indicative SLD. The motorised RMU shall be arranged as a ring-main system capable of receiving supply from either of the two independent HT sources, with suitable automatic source selection/changeover arrangement.

5.5.3.8. Dry-type transformers shall comply with IS 2026 (Part applicable) / IS 2026:2011 and shall be Cast Resin type, suitable for the specified site conditions. The Bidder shall submit temperature-rise/thermal calculations at the specified site ambient and rated loading conditions. All necessary electrical, mechanical, fire and personnel safety/protection provisions shall be included.

5.5.3.9. UPS and Battery System and associated Incoming and Outgoing panels :-IT & Non-IT-UPS systems and associated Incoming and Outgoing panels shall be installed in suitable ISO /NON-ISO sized containers, complete with Li-Ion battery systems sized to provide 10 minutes backup at the calculated load at end-of-life of 10 years.

5.5.3.10. The container shall have minimum IP55 protection (Suitable for Outside Use).

5.5.3.11. All UPS systems shall be modular, scalable, hot-swappable. The Bidder may select the appropriate Li-Ion battery chemistry, subject to compliance with the specified performance, safety and statutory requirements.

5.5.3.12. Complete DG power generation system for backup power shall be in the Bidder's scope, including DG sets, associated control/protection systems, fuel system, exhaust system, acoustic enclosure, cabling/sandwich busduct and all necessary auxiliaries for a complete operational installation.

5.5.3.13. LT Panels and Power Distribution Equipment: - All LT panels and associated power distribution equipment shall be IEC 61439 compliant and type-tested assemblies, including's panels; Main LT panels; PS input and output panels; Cooling panels; Pump panels; BMS panels' and PDU panels; RTPFC panels with suitable detuned reactors(minimum 7%); Active Harmonic Filter (AHF) panels; and all other electrical panels required for complete system operation.

5.5.3.14. Complete internal and external illumination system, including lighting fixtures, controls, cabling and associated accessories, shall be provided. Complete AC power wiring and associated distribution for all applicable areas shall also be included.

5.5.3.15. Earthing and Lightning Protection:-Complete equipment earthing, power/system earthing and equipotential bonding system, including earth pits, earth electrodes, conductors, test links and all accessories, shall be provided.

5.5.3.16. A suitable lightning protection system shall also be provided wherever required based on risk assessment, applicable standards and site conditions.

5.5.3.17. Cables, Busducts and Cable Management:-All Aluminium and Copper LT cables, HT cables, Cu/Al sandwich busducts, cable trays, SS cable trays, cable joints, heat-shrinkable jointing kits, cable termination kits, glands, lugs, supports and associated accessories required for the complete electrical installation shall be in the Bidder's scope.

5.5.3.18. DG Bulk Fuel Storage System:-The Bidder shall provide a complete DG bulk HSD storage system with minimum 12-hour fuel autonomy at the specified/rated IT load plus non-IT load OR as specified as the minimum quantity to be delivered in this tender, which ever is higher , including bulk storage tanks, transfer pumps, fuel polishing units, piping, valves, level monitoring, controls, safety systems and all associated accessories. The Bidder shall obtain all applicable PESO/CCOE and other statutory approvals/permissions for the fuel storage and distribution system and shall comply with all applicable statutory requirements.

5.5.3.19. Anything else required but not explicitly mentioned for delivery of a Tier-III Datacentre

5.5.4. HT Substation Work & Upstream Work

5.5.4.1. The project requires two separate express feeders of 22kv Voltage Class (HT XLPE AL Armoured Cabling suitable for 19.8 MVA load after all deratings with N+1 Configuration from each substation) from two different nearby MSEDCL upstream substations up to receiving substations in CDAC Plot in Chikhali, Pune. The vendor has to do close liasoning with MSEDCL (UTILITY) and other applicable statutory authorities for feasibility study, route survey, any issue related with ROW, digging ,laying of cables and refilling of soil etc. , approval for road digging work, Hume pipe for road crossing etc. as per MSEDCL Guidelines and supervision. Metering Kiosk along with CT, PT, and Summation Metering etc. will be as per local MSEDCL rules & regulations. The contract demand (Phase-1) will be approx. 12 MVA. The load sanctioning and contract demand approval is in bidder scope.

5.5.4.2. The scope of work shall include all works, services, materials, equipment, accessories, testing, commissioning, statutory approvals and other requirements, whether specifically mentioned herein or not, that are

necessary for the successful completion, energisation and charging of the receiving substations. The Contractor shall be responsible for identifying and executing all such incidental and associated works required to make the receiving substations fully complete, safe, functional and ready for successful charging and operation.

5.5.4.3. The scope shall be deemed to include, but shall not be limited to, all civil, electrical, mechanical, protection, control, metering, communication, earthing, lightning protection, cable works, termination, testing, commissioning, interlocking, synchronization, SCADA integration(if needed by MSEDCL), statutory inspection and approval requirements, as applicable by local statutory authorities, together with all associated accessories and auxiliary systems required for successful energisation and charging of the receiving substations.

5.5.4.4. No additional claim shall be entertained for any item, activity, accessory or service that is reasonably necessary for the safe, complete and successful charging, energisation and operation of the receiving substations, even if such item or activity is not expressly or individually specified in the tender documents.

5.5.5. 22KV HT Breaker Panel-1250 Amps(I/C)+1250 Amps(O/G) Motorized VCB Panels

5.5.5.1. 22 kV Motorised Vacuum Circuit Breaker Panel - The switchboard shall be sheet steel fabricated, free standing, dust and vermin proof, totally enclosed, fully compartmentalized, floor mounted type. The circuit breaker panels shall be draw out, multi-panel unit type unless otherwise specified. The unit shall be robust design to withstand the stresses encountered in the event of an electrical fault. Automatic safety shutters shall be provided to shroud bus side and cable side main disconnecting contacts of the circuit breaker when the circuit breaker is taken to test position. Bus bar shutter shall be Permalink / Hylams of minimum 4.75 mm and shall have red paint. The instrument / control chamber shall incorporate the indicating instruments, lamps and components of the control circuit. The instrument chamber shall be provided with a separate door, which can be opened when the circuit breaker is `ON'. The instrument chamber shall also be totally segregated from the rest of the panel. Wherever equipment's are mounted on the door, the wiring shall be with flexible wires. The wires shall be neatly bunched and clamped and shall be sufficiently long so that the door can be opened without causing unnecessary stress on the terminations at the instruments. All instrument and relays belonging to one panel shall be mounted on the same panel. One vertical panel shall include one feeder. Extension chambers at rear portion shall be considered for termination of large size / number cables, if required. Necessary dummy cubicles complete with horizontal bus bars, space heaters, power, control and annunciation, bus bars / cables shall be included to avoid interference of beams with cable openings wherever required. All bus bars and their main current carrying connections shall have the same sectional area throughout their length. Bus bars shall be sized to continuously carry the rated current without exceeding the final temperature of 85 Deg. o C. and the same shall be capable of withstanding the full fault level without any deformation. The rating of bus bars shall be same as that of incoming breaker rating. Bus bars shall be of aluminium (unless otherwise mentioned in specific

requirements) with proper plating at joints. The bus bars shall be provided with cast epoxy sleeving or nylon film of suitable insulation class throughout their lengths and vertical droppers and colour coded. Joints in bus bars shall be provided with shrouds. For long bus bars, suitable expansion joints may be provided. The bus bars shall be supported by insulators of non-carbonizing material resistant to acid and alkali and having non-hygroscopic characteristics and braced to withstand the fault level specified. The clearance between live parts and the earth shall be as per the Indian Standard. In case of copper to aluminium connections, proper treatment shall be given to minimize the bimetallic effect. Bus bars and connections shall be secured in such a manner that the insulators are not subjected to bending forces under short circuit conditions. Dynamic stresses shall be calculated on the basis of peak short circuit current. The vertical droppers shall be sized to carry continuously at least the rated current of the connected circuit breaker. It shall be possible to extend the bus bars at either end of the switchboard for addition of future units. Both ends of bus bars must be suitably drilled for this purpose. Where bus bars are taken through the partitions of adjacent cubicles, shrouding shall be provided to prevent spread of fire from one unit to the next. Thermal design of the bus bars shall be based on installation of the switchgear in poorly ventilated conditions. The cooling air volume shall take into account only the bus enclosure. For safety reasons, each panel (Vertical Section) shall be divided into compartments to keep main equipment segregated. Switchgear shall be provided with all necessary safety interlocks and features along with Mechanical safety interlock. All PT's shall be epoxy cast resin type All PT's shall be draw out type and connections between the bus bars and PT shall be completely shrouded. Automatic shutter shall be provided to shroud the bus bars when PT is taken out. For Incomer feeders PT may be mounted on circuit breaker truck and shall be of fixed type since the same are connected on the incoming cable side. It shall be possible to remove voltage transformer from the circuit breaker whenever required. HRC fuse protection shall be provided on primary as well as secondary side. The primary connection shall be disconnected before PT or its primary fuses become accessible. All current transformers shall be epoxy cast resin type. All current transformers shall be capable of withstanding dynamic and thermal stresses originated by short circuit fault current for one second. Terminals shall be provided with plastic covers to prevent inadvertent contact. HT switchgear will be connected to transformers or other equipment by HT XLPE cables. All power and control cables shall enter the switchgear from bottom. Sufficient space and support arrangement shall be provided in the cubicles to accommodate cables. The number of cables per circuit sizes and types shall be intimated to the supplier. If the required number of cable terminals cannot be accommodated in the circuit breaker chamber, additional dummy panel with bus extension suitable for the number of cables to be terminated shall be provided. External DC control supply shall be provided for tripping and closing circuits to one panel. Also external AC control supply shall be provided for auxiliary power and heater circuits to one panel. Supplier shall provide suitable control switch and fuse at the point of receiving control supply. Supplier shall be required to loop both these supply to all the panels in case of multi breaker panels forming

one unit. The cubicles shall be provided with space heaters to prevent moisture condensation and maintain cubicle temperature 5o C above the ambient. The space heaters shall be located at the bottom of the switchboards and shall be controlled through a thermostat with an adjustable setting, a manually operated switch. The thermostat shall preferably be located in the metering / relay chamber. Circuit breakers shall have completely sealed interrupting units for interruption of arc inside the vacuum. It shall be possible to isolate easily the vacuum interrupter unit from the breaker operating mechanism for mechanical testing of the interrupter to check loss of vacuum. The circuit breakers shall be complete with surge arrestors to provide protection to the equipment controlled by the breaker, against switching surges. Over voltage produced by the circuit breaker during switching off induction motor or switching on / off of transformer shall be limited to 2.5 times the peak value of rated phase to neutral voltage. Surge absorbers of either Z or Cr type with non-flammable, nontoxic liquid filled capacitors shall be used and located in switchgear cubicle if the over voltage limit exceeds. Surge diverters shall be provided for vacuum circuit breakers. Circuit breaker shall be power operated by a motor charged spring operated mechanism. It shall be strong, rigid, positive and fast in operation to ensure that the pole discrepancy does not exceed 10ms. Mechanism shall be such that failure of any auxiliary spring shall not prevent tripping and will not cause tripping or closing operation of the power operated closing devices. When the circuit breaker is already closed, failure of any auxiliary spring shall not cause damage to the circuit breaker or endanger the operator. The closing release and shunt trip shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker. Spring operated mechanism, shall be complete with motor of adequate rating, opening spring, closing spring with limit switch for automatic charging and all necessary accessories to make the mechanism a complete operating unit. After failure of power supply to the motor, at least one open-close-open operation of the circuit breaker shall be possible. Operating mechanism shall normally be operated locally, when the breaker is in “Service” position. Electrical tripping shall be performed by shunt trip coils. Provision also shall be made for local electrical control when the breaker is in “Test” position by a control switch on the switchgear cubicle door. Also, “Local / Remote” selector switch lockable in “Local” position shall be provided on the cubicle door. ‘Red’ and ‘Green’ indicating lamps shall be provided on cubicle door to indicate breaker close and open positions. Breaker “Service” and “Test” positions shall be indicated by separate indicating lamps on the cubicle door, in case mechanical indication of “Service” and ”Test” positions are not available on the cubicle door. For metering, main CTs and auxiliary CTs, if used, the accuracy class shall be normally 1.0. All metering CTs shall have an adequate burden. Instrument security factor shall be less than 5 unless otherwise specified. Protection CTs shall have class of accuracy of 5P10 and minimum burden 15VA. Core balance CTs shall be such that the earth fault relay should be able to operate over its entire range. CTs to be used for REF and Differential Protection will be PS Class.

Sr.No	Description

1	22 KV Motorized VACCUM CIRCUIT BREAKER-1250 Amps(I/C) + 1250 Amps(O/G) (Refer Drawing) electrically operated draw out type with fixed & moving contact, 4NO+4NC auxiliary contacts, safety shutter etc. Short circuit rating Minimum 20 KA for 1 Sec (As per MSEDCL) Shunt coil /Closing coil voltage 24 V DC motor voltage 230V AC
2	POTENTIAL TRANSFORMER 22KV/ 110V Fixed type Core 1 - CL 1.0 Burden - 50 VA
3	CURRENT TRANSFORMER 22 KV Ratio- Primary as per MSEDCL/5+5 Amps Burden- 10 VA No. of cores- Two Accuracy Class- core 1- 1.0 core 2- 5P 10
4	PROTECTION RELAYS, MASTER TRIP RELAY, AUX. RELAY
5	METERING: -I/C-Ammeter with SS Digital type Voltmeter Load Manager with RS485 port; Accuracy: Cl 1.0 , 8 Window Annunciator with Hooter, Load Manager with RS485 port for all outgoings(O/G)
6	CONTROL SECTION BREAKER CONTROL SWITCH BREAKER ON/OFF, TRIP, IND. LAMPS POWER PACK RYB PHASE INDICATING LAMPS SPACE HEATER WITH THERMOSTAT AL BUSBARS 1250 A SET BUSHINGS 1 SET 1 SET SAFETY SHUTTER 1 SET 22KV BUS BAR SUPPORT INSULATOR BUS BAR PVC SLEEVES & POWDER COATING OF CABINET

5.5.6. COMPACT SUBSTATION (CSS-2500 kVA)

5.5.6.1. In order to optimize the space, quality and speedy execution considering the timeline of project delivery , Compact Substation (CSS) have to be used in ring main architecture which gives chance for quick future augmentation. The Compact Substation (CSS) rated for minimum 2500 kVA shall be of outdoor duty construction and shall be suitable for continuous operation at an ambient temperature of 50°C. The CSS shall comprise an integrated 22 kV MV Motorized RMU, 22 kV/433 V dry-type cast-resin transformer and 433 V LV Switchboard, complete with all necessary protection, control, metering, interlocking, monitoring, communication, earthing, fire detection and other accessories required for safe, reliable and trouble-free operation. The CSS enclosure, MV Switchgear, Transformer, LV Switchgear shall preferably be of the same OEM to ensure compatibility, reliability and better life-cycle optimization.

5.5.6.2. The CSS enclosure shall be fabricated with a robust structural steel framework suitable for outdoor installation and the specified environmental conditions. The enclosure frame shall be fabricated using suitable CRCA pressed and shaped sheet steel of minimum 1.5 mm thickness, and the enclosure shall be mounted on a rigid base of minimum 4 mm thickness. The enclosure shall be provided with suitable lockable, hinged and gasketed doors on the HV/MV and LV termination sides and transformer access sides, as required, to facilitate inspection, operation and maintenance of the transformer and associated equipment. All access doors to energized MV equipment shall be provided with suitable electrical/mechanical interlocking with the associated MV circuit breaker. In the event that any such door is opened while the equipment is energized, the associated MV circuit breaker shall automatically trip and the arrangement shall prevent unsafe access to energized equipment. The

interlocking arrangement shall be fail-safe and shall prevent inadvertent operation under unsafe conditions.

5.5.6.3. The enclosure shall have a minimum degree of protection of IP54 for the MV/LV breaker/switchgear compartment and minimum IP34 for the transformer compartment, in accordance with IEC 60529 and the applicable requirements of IEC 62271-202. The enclosure shall be suitably designed to prevent ingress of dust, rainwater and foreign objects while ensuring adequate natural ventilation and heat dissipation of the transformer. Minimum two external earthing terminals shall be provided at the bottom of the enclosure, one on each side, and shall be suitably sized for connection to the external earthing system. All doors, removable covers and metallic components shall be effectively bonded to the main enclosure earthing system.

5.5.6.4. After thorough surface preparation and metal treatment, the enclosure shall be provided with a double coat of corrosion-resistant primer followed by minimum two coats of suitable outdoor-grade enamel paint or powder coating. The complete paint system shall be suitable for the site environmental and corrosion control. All metallic parts which are inaccessible for painting or otherwise susceptible to corrosion shall be manufactured from suitable corrosion-resistant material or provided with an equivalent permanent corrosion-protection system.

5.5.6.5. The complete CSS enclosure shall be designed to withstand Seismic Zone IV in accordance with IS 1893. The bidder shall consider all applicable wind pressure, seismic loading, equipment weight, transportation loads, lifting loads and anchoring forces in the structural design.

5.5.6.6. The CSS enclosure shall be equipped with a suitable fire detection and fire alarm system appropriate for the transformer and switchgear compartments. The fire detection and alarm arrangement shall comply with the latest applicable requirements of NFPA, FM, relevant Indian Standards and statutory fire-safety requirements, as applicable. Necessary fire alarm, fault and trip signals shall be made available for interface with the project fire alarm system /BMS.

5.5.6.7. The complete CSS shall be type-tested in accordance with IEC 62271-202:2022 for an equal or higher rated Compact Substation. The bidder shall submit relevant type-test reports/certificates from CPRI, ERDA or an appropriately accredited/reputed Short-Circuit Testing Laboratory (STL) in India for a minimum 2.5 MVA CSS, or an assembly having equal or higher electrical short-circuit, internal-arc and environmental ratings than those specified for this project, during the detailed engineering stage after award of contract. The required type-test evidence shall include, as applicable, short-circuit withstand test of 65 kA for 1 second, internal arc test of 21 kA for 1 second, temperature-rise test corresponding to the specified enclosure classification, ingress protection test of IP54 for the switchgear kiosk and IP34 for the transformer kiosk, mechanical impact test of IK10 and power-frequency dielectric withstand test, together with all other type tests required by IEC 62271-202. Any approximation, extrapolation or equivalence based on type-test reports of a lower-rated CSS shall not be accepted.

5.5.6.8. The maximum overall dimensions of the complete CSS, including all permanently mounted equipment and accessories, should be such to

achieve compact footprint. The bidder shall submit the actual operating weight and detailed general arrangement drawings during detailed engineering. The CSS shall be provided with a suitable lifting arrangement, and all lifting points/lugs shall be designed for the complete CSS weight. The 22 kV MV cable entry and exit shall be from the bottom/top, while the LV outgoing connection shall be suitable for busway/busduct connection and the LV busway outlet shall be provided from the side/top of the CSS. All necessary busduct flange arrangements, supports, termination provisions and interfaces shall be included in the supplier's scope.

5.5.6.9. The CSS shall be provided with a 22 kV, 630 A, 20 kA for 3 seconds, SF6-insulated, metal-enclosed, indoor, non-extensible Ring Main Unit (RMU) comprising three numbers of 630 A motorized vacuum circuit breakers(2 I/C +1 O/G), complete with suitable numerical protection relays and all accessories required for safe, reliable and trouble-free operation. The RMU and associated switchgear/control gear shall be suitable for continuous operation at an ambient temperature range to +45°C, relative humidity up to 95%, and installation altitude as per Pune Site. The RMU shall comply with the latest applicable requirements of the IEC 62271 series and relevant Indian Standards.

5.5.6.10. The RMU shall be complete with all components and accessories required for effective and trouble-free operation, including circuit breakers, earthing switches, operating mechanisms, protection relays, auxiliary contacts, interlocks, voltage indicators, control wiring, auxiliary supply, battery/charger system, communication interface and all other associated equipment. The RMU shall be of modular panel construction with front access and bottom cable access. Cable compartment covers shall be suitably interlocked with the associated earth switch to ensure complete safety of operating personnel, and the cable bushings shall be of bolted type construction suitable for the specified 22 kV cable termination system.

5.5.6.11. The RMU shall use SF6 as the insulating medium and vacuum interruption technology for the 22 kV circuit breakers. The vacuum circuit breakers shall be complete with suitable over-current and earth-fault protection relays for transformer protection. All protection relays shall support communication through IEC 61850 Edition 2. Integral earthing switches shall be provided on the incoming and outgoing feeders and shall have adequate short-circuit making and short-time withstand capacity. It shall be possible to directly earth the MV cables through the integral earthing switch without requiring any additional external switching device.

5.5.6.12. An integral DC battery and charger system shall be provided within the RMU panel with a minimum battery autonomy of 2 hours for the connected protection, control, indication and communication loads. The battery shall be suitably sized based on the actual connected load and the vendor shall submit the battery sizing calculation. The RMU shall have suitable manufacturer-approved provision for gas pressure monitoring and gas filling/maintenance in the event of leakage. The vacuum interrupters used in the RMU shall preferably be of the same make as the RMU manufacturer and shall have a minimum electrical endurance of 50 electrical operations at the specified rated short-circuit current.

5.5.6.13. Each 630 A vacuum circuit breaker shall be motorized and shall be provided with the required short-circuit making capacity, mechanical trip/fault indication, minimum 1NO + 1NC auxiliary contacts, anti-reflex operating mechanism, mechanical ON/OFF/EARTH indication and suitable "Live Cable" LED voltage indication through capacitive voltage dividers mounted on the bushings. Each panel shall be equipped with an integral earthing switch on the cable side, and it shall be possible to directly earth the connected MV cable through the earthing switch without the contribution of any other external device. Suitable mechanical and electrical interlocks shall be provided to prevent unsafe operation of the circuit breaker and earthing switch.

5.5.6.14. The RMU shall be of maintenance-free or minimum-maintenance construction and shall have a robust stainless-steel welded enclosure/tank with minimum IP67 protection for the high-voltage tank. The design shall ensure safety of personnel and equipment during operation and maintenance, reliability of service, mechanical protection and ease of maintenance. The RMU shall be internally arc tested for the specified fault level and duration. The main gas tank shall have an internal arc withstand capability of minimum 20 kA for 1 second, and the cable compartment shall have an internal arc withstand capability of minimum 20 kA for 1 second. Relevant type-test reports clearly identifying the tested RMU configuration, fault current, duration and internal-arc classification shall be submitted.

5.5.6.15. The RMU cubicle shall be provided with a suitable pressure-relief device. In the event of an internal arc, the pressure generated within the enclosure shall be safely relieved through a controlled pressure-relief path, and the hot gases shall be directed away from operating personnel and shall not be discharged towards accessible operating areas. The switchgear shall have a minimum degree of protection in accordance with IEC 60529 of IP67 for the tank containing high-voltage components, IP2X for the front covers of the operating mechanism and IP3X for the cable connection covers, or higher.

5.5.6.16. Each switchboard/RMU shall be provided with a dedicated wall-mounted remote-control HMI panel located outside the switch room/switching area to permit remote operation and monitoring of the associated breakers without requiring personnel to enter the switch room. The remote HMI shall provide touch-screen-based indication and operation of breaker status, ON/OFF/TRIP status, earthing-switch status, protection operation, alarms and other relevant operating information. The HMI shall be password protected and/or lockable to prevent unauthorized operation. The remote HMI shall be suitably interfaced with the project BMS system and capable of MSEDCL SCADA integration.

5.5.6.17. The CSS shall be provided with one 2500 kVA, 22 kV/433 V, Dyn11, three-phase, copper-wound, cast-resin dry-type transformer complete with off-circuit tap links, WTI scanner/temperature monitoring system and surge arresters. The transformer shall be suitable for continuous operation under the project ambient conditions. The transformer shall have a rated capacity of 2500 kVA, primary voltage of 22 kV, secondary voltage of 433 V, vector group Dyn11 and impedance of 6.75%. The transformer shall be

of cast-resin construction with copper windings and suitable resin insulation system for HV and LV windings.

5.5.6.18. The transformer shall be naturally air-cooled (AN) and shall be capable of delivering its full rated output of 2500 kVA under the specified project ambient condition. The transformer shall be designed, manufactured and tested in accordance with IS 2026 and IEC 60076-11, as applicable. The transformer shall be provided with off-circuit tap links having a range of +5% to -5% in 2.5% steps. The tap links shall be operable only when the transformer is completely de-energized and shall be clearly marked.

5.5.6.19. The transformer insulation system shall be Class F, and the guaranteed temperature rise shall comply with the applicable standard and approved manufacturer's design. The transformer shall comply with the relevant environmental classification as per Pune Site and fire classifications F1 under IEC 60076-11, and the vendor shall submit relevant type-test certificates demonstrating such compliance.

5.5.6.20. The transformer shall be provided with a suitable WTI/temperature monitoring and scanning system, including alarm and trip contacts. The temperature monitoring system shall provide local indication and suitable remote signals for integration with the project BMS system. The transformer shall be supplied with multi-directional rollers suitable for transportation and positioning within the CSS.

5.5.6.21. The transformer shall comply with the applicable energy-efficiency and loss requirements as per the applicable ECBC 2017 requirements and 2020 amendments, wherever applicable.

5.5.6.22. Suitable numbers (at least two) of 22 kV station-class surge arresters, with a minimum specified discharge current rating of 10 kA, shall be provided as part of the transformer installation. The surge arresters shall be suitably selected and coordinated with the 22 kV system voltage, insulation level and site lightning conditions and shall be complete with mounting and connection accessories.

5.5.6.23. The transformer shall be suitable for installation at an altitude of less than 1000 m above mean sea level (Pune). The transformer shall be designed for the project ambient temperature of 50°C and shall be capable of delivering the full rated 2500 kVA output at this ambient condition. The HV termination shall be provided with suitable insulators/bushings compatible with the specified 22 kV cable termination system, and the LV termination shall be suitable for direct connection to the specified LV busbar/busduct arrangement or cable termination if required as per Detailed Engineering.

5.5.6.24. A separate freestanding indoor-type LV switchboard shall be provided at the transformer secondary/output side for safe operation, isolation and maintenance convenience. The LV switchboard shall be designed and manufactured as a suitable low-voltage switchgear and control gear assembly in accordance with the applicable requirements of IEC 61439-1 and IEC 61439-2 and shall have provision for top busduct/busway connection.

5.5.6.25. The main LV incomer shall be rated 4000 A, 4-pole, LSIG, microprocessor-based ACB, fixed type/EDO, with a rated service voltage of 433 V. The LV switchboard shall be suitable for a prospective short-circuit current of minimum 65 kA. The main circuit breaker shall have Icu = Ics =Icw at the

specified fault level, and the circuit breaker and complete LV assembly shall have adequate short-time withstand capability. The specified Icw value shall be clearly declared for a minimum duration of 1 second, and the circuit breaker shall be of utilization category B.

5.5.6.26. The complete LV switchboard shall have adequate short-circuit withstand capability for the main busbars, neutral busbar, earth busbar, breaker compartments and outgoing connections. The vendor shall submit the guaranteed busbar short-time withstand current; peak withstand current, temperature-rise limits, IP rating and other relevant technical particulars during detailed engineering. The LV switchboard shall be complete with all necessary protection, metering, indication, control, auxiliary supply, communication, interlocking and monitoring facilities. The microprocessor-based ACB shall provide adjustable LSIG protection and suitable local and remote status indications.

5.5.6.27. The LV switchboard shall be suitably integrated with the project BMS system, and all relevant breaker status, trip/alarm indications, electrical measurements and energy parameters required by the project shall be made available through the specified communication protocol. The LV switchboard shall be fully coordinated with the 2500 kVA transformer and downstream LV busduct system, and the bidder shall submit the complete short-circuit coordination, protection discrimination/selectivity and equipment withstand calculations during detailed engineering.

5.5.6.28. The bidder shall submit complete technical data sheets, guaranteed technical particulars, general arrangement drawings, single-line diagrams, control schematics, protection coordination details, interlocking philosophy, communication architecture, thermal calculations, type-test certificates and routine-test certificates during detailed engineering. The complete CSS assembly, including the enclosure, MV switchgear/RMU, transformer, LV switchboard, protection, control, communication and associated systems, shall undergo all applicable factory routine tests in accordance with the latest applicable IEC and IS standards. The client shall have the right to witness the Factory Acceptance Tests (FAT) and inspection of the equipment.

5.5.6.29. The bidder shall be responsible for complete coordination between the MV switchgear, transformer, LV switchboard, protection system, fire alarm system, BMS interface and CSS enclosure. The complete CSS package shall be supplied as a coordinated assembly, fully tested and ready for site installation, testing and commissioning.

5.5.7. LT DISTRIBUTION PANELS

5.5.7.1. All LV Panels i.e. (PCCs, MCCs) UPS input/output panels, mechanical services panels and other critical LV distribution assemblies shall be Type-Tested/Design-Verified Assemblies complying with the latest applicable requirements of IEC 61439-1 and IEC 61439-2. The assemblies shall be designed, manufactured and tested by the original manufacturer or an authorized panel builder using a verified assembly system. The panels shall have documented design verification. The assembly shall be suitable for the specified system voltage, fault level, service conditions and ambient temperature without derating beyond the declared design conditions. The bidder shall submit the manufacturer's IEC 61439 design-verification/type-

test documentation along with the technical bid. Partial or component-level test certificates shall not be considered.

5.5.7.2. Main Distribution Panels, Sub-Distribution Panels and Final Distribution shall be covered under this section. Panels/Boards shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, 4 wire system with neutral grounded at transformer. All distribution panels shall be of totally type-tested design and shall be manufactured by the OEM or its authorised system integrator. All type-test certificate shall be made available.

5.5.7.3. Distribution panels shall be Totally Type Tested Assemblies (TTA) as per the latest edition of IS/IEC 61439-1 & 2. Panels for outdoor equipment shall be suitable for outdoor duty application. Switchgears and control gear shall be as per IS/IEC – 60947 and latest applicable sections of the IEC codes.

5.5.7.4. The general construction shall conform to IS/IEC 61439-1 & 2 for factory built assembled switchgear & control gear for voltage up to and including 1100 V AC. The Distribution panels shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors and folded covers, Neoprene gasket, padlocking arrangement and bolted back. All removable/ hinged doors and covers shall be grounded by flexible standard connectors. Steel sheets used in the construction of Distribution panels shall be minimum 2 mm thick for load bearing,1.6 mm for non-load bearing members, internal partition 1/1.6 mm & base frame of 3 mm and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded. The switchboards and the associated equipment including switchgear, control gear, busbar supports, busbar orientation, Busbar links etc. shall be supplied by OEM to the assembly manufacturers in construction to the assembly which has undergone the type test.

5.5.8. Diesel Generator & Associated Infrastructure:

5.5.8.1. Diesel Generating Set

Supplying, installing, testing and commissioning of minimum 2500kVA/2000 kW capacity at site condition for ASHRAE n=20 Yr Extreme Dry bulb temperature for Pune . The DG set shall be Continuous Power Rated /Equivalent Rated suitable for 24×7 continuous operation at the specified rated capacity for AI data-centre applications. The DG set shall be capable of delivering the specified rated output continuously for unlimited operating hours per year. The manufacturer shall submit the manufacturer's official rating certificate/datasheet clearly identifying the COP rating /Equivalent Rated as per OEM qualifying UPTIME INSTITUTE TIER-III certification requirements. Diesel Generating Set shall have 415 V, 50 Hz, AC Alternator with Control Module or equivalent along with acoustic enclosure, 990 litre - day oil fuel tank, residential silencer, exhaust piping from engine outlets to inlet of residential silencer, engine starting battery and charger, including all control & signal cables as required etc. Control cabinet for BMS interface, control cabinet for fuel call system, AVM pads including cable termination box with all associated equipment, including outdoor rated canopy, engine mounted radiator, sound attenuators to meet the pollution control board requirement, necessary structural support as per specifications. Engine shall not be derated up to 50 deg. C ambient temperature. Fuel connection

to engine and return, BMS communication compatibility devices (TCP IP), RS 485 port, RJ45 etc. as required for BMS. The system/ product shall be complete with all the required accessories required to make DG set complete and functional in all respect. DG set shall conform to the applicable requirements of ISO 8528 series, including ISO 8528-1, ISO 8528-2 and ISO 8528-5. The diesel engine shall conform to ISO 8528-2, and the complete generating set shall conform to the applicable performance requirements of ISO 8528-5. Diesel engine shall be fuel efficient, robust in construction, air/water/coolant cooled four stroke cylinder engine as per OEM design and shall be confirming to BS: 5514. Engine shall be electric start turbocharged and after cooled with capacity of 100% load after deducting all internal consumptions of power if any and to run continuously for unlimited period except maintenance schedule interruption. Engine shall have sufficient BHP to meet 2000 kW requirement of alternator. Noise level of engine shall be as per environmental rule.

5.5.8.1.1. The alternator shall comply with IEC 60034 / BS EN 60034, BS 5000 and NEMA MG 1, as applicable, and other relevant Local Codes. Internal Acoustic Limit as per Health and Safety Limits and External Acoustic Limit as per latest CPCB & SPCB requirements

5.5.8.1.2. The scope also includes DG controller, control kiosk, remote annunciator, internal wiring within canopy & fuel day tank & buffer tank, fuel control box with I/O points, controls wiring within canopy and DG fuel oil Day tank wiring.

5.5.8.1.3. Factory testing of each DG set with all consumables shall be in the bidder's scope.

5.5.8.2. DG EXHAUST SYSTEM (FLUE PIPES)

5.5.8.2.1. Design, supply & installation, Testing and commissioning of suitable OEM Recommended DG Exhaust system with B Class ERW MS pipe with flanges, fire fly gaskets, hardware, insulation shall be in the vendor's scope.

5.5.8.3. HSD STORAGE & SUPPLY SYSTEM

5.5.8.3.1. Supplying, installing, testing and commissioning of underground Double Wall Horizontal cylindrical HSD storage tank (6mm thick shell and 10 mm thick flat ends or as per CCOE/PESO Recommended) installation including the following:

5.5.8.3.2. Inlet and outlet connections each tank,

5.5.8.3.3. Vent pipe with flame arrester, Dip pipe assembly with calibration chart, complete with cap with locking arrangement with dip stick engraving in it.

5.5.8.3.4. 800 mm internal dia manhole with cover.

5.5.8.3.5. Underground H.S.D. tank anchorage by means of steel flats of round bars having adequate cross section to resist the uplift at a stress level of 140 Mpa.

5.5.8.3.6. HSD tank earthing as per clause/para 12.5.4 of IS: 10987-1992 and fuel pipe line earthing as per IPR-2002.

5.5.8.3.7. Each Tank shall be with overflow prevention valve, level transmitter with control panel, level switch (4 level),

5.5.8.3.8. Leak detection sensor in interstitial space, Breather Valve, Foot valve (3 Nos), Anti corrosive coating and wrapping & Stainless-steel ladder.

5.5.8.3.9. The level indicator shall be provided in electrical control panel. Cost of electrical/control cabling from level transmitter to level indicator to be included in this item.

5.5.8.3.10. The design, fabrication, pressure testing, corrosion protection, anchoring, earthing etc. will be done strictly as per IS:10987-1992 and duly approved by 'CCOE' suitable for underground installation.

5.5.8.3.11. Starts/stop, level indication shall be interfaced with BMS. necessary potential free contacts shall be provided in local control station, panels.

5.5.8.3.12. The individual storage tank shall be delivered in minimum minimum 30 KL capacity HSD tank

5.5.8.3.13. Overall storage requirement shall be maintained as per UPTIME TIER III Requirement or as asked as minimum capacity later in this tender , which ever is higher.

5.5.8.3.14. Statutory approval towards DG charging, panel placement, SD yard works, pollution control, as applicable from different authorities and co-ordination with building OC agency (if required) for requisite documents to be provided by DC Partner scope

5.5.8.4. Flame Proof Fuel Transfer Pumps

5.5.8.4.1. Supplying, installing, testing and commissioning of electrical driven Flame Proof rotary gear pumps suitable for pumping of HSD consisting of following: (Pumps shall be suitable for automatic/ manual operation) Self priming gear pump with minimum IP 55 protection. The pump motor shall be with IE3 efficiency.

5.5.8.4.2. Consider flame proof double helical rotary gear Pumps.

5.5.8.4.3. The pump shall be with internal safety relief bypass arrangements.

5.5.8.4.4. Pump shall be suitable for negative suction.

5.5.8.4.5. Pump shall be with 4 Pole motor.

5.5.8.4.6. Horizontally mounted single stage each capable of delivering minimum 6 M3/Hr. at calculated head (Minimum) while running at required RPM, complete with tail pieces for proper connection to suction and delivery line.

5.5.8.4.7. Vendor shall check and confirm on the pump head requirement based on final routing as per site conditions. Same to be submitted along with technical submittal.

5.5.8.4.8. Flame proof motor suitable for 415 ± 10% V, 3 phase, 50 Hz AC supply and of suitable HP for the above pumps, along with suitable pump starter panel.

5.5.8.4.9. Flame proof on-off push button station (Push to lock & turn to release) of required rating suitable for the above motor without no volt coil including connection, interconnection in switch board.

5.5.8.4.10. Suitable foundation and anti-vibration damping arrangement with cushy foot or similar mounting arrangement.

5.5.8.4.11. Coupling and coupling guard for direct coupling of pump and motor.

5.5.8.4.12. One (1) No. pressure gauge and pressure safety relief valve on the delivery side of each pump with isolation cock. Two (02) Pumps along with accessories shall be mounted on a common skid. (Total 2 No.s of Skids)

5.5.8.5. Fuel Delivery Pipe & Accessories

5.5.8.5.1. Providing, fixing, testing & commissioning of Double wall Pipe. Main pipe (inner pipe) shall be seamless steel tube schedule 40. The jacket pipe (outer pipe) shall be MS ERW class B as per IS 1239 including fittings like tees, elbows, junctions, unions, bends, plugs, flanges etc. clamps, structural supports as required/ directed at site including painting the pipes with desired shade of enamel paint over a coat of primer.

5.5.8.5.2. This includes following valves:

5.5.8.5.3. Flame proof Stainless Steel ball Valve of the suitable sizes tested to 15 kg/sqcm pressure flanged to class ASME 150.Flame proof Stainless Steel Pilot Operated Diaphragm Solenoid valve for the suitable sizes tested to 15 kg/sqcm pressure flanged to class ASME 150.Flame proof Stainless Steel Non-Return valves of the suitable sizes as per ASME class 150/screwed ends/flanges ends

5.5.8.5.4. Providing, fixing, testing & commissioning of Digital Oil Flow Meter on the pipes

5.5.8.5.5. (Supply & Inlet pipes) with flanged joints. Flow meter shall be suitable for BMS integration.Flow meter shall be of Aluminium Material.

5.5.8.5.6. Accuracy: ± 1% of Reading

5.5.8.5.7. Built in Filter: 75 Micron, Reusable type SS Mesh

5.5.8.5.8. Calibrated Flow Range: 5000LPH - 20000 LPH

5.5.8.5.9. IP 65 rating

5.5.8.5.10. Providing and fixing unloading point assembly consisting of 5-meter-long flexible hose with necessary suitable connection for all oil tanker outlet complete with pipes, flanges, elbow & reducer as required. The composite flexible hose shall be made of polypropylene fabrics and films with abrasion resistant PVC. Its shall be with GS inner wire and SS outer wire. electrical continuity shall be as per EN 13765:2010. Max temp 120 Deg C and Pressure of 10 bar.

5.5.8.5.11. Providing, fixing, testing & commissioning of stainless-steel Advance combination Angle type silent pressure safety valves.

5.5.8.5.12. Other Instruments as required in supply line: Flow switch, Y-Type strainer, Foot Valve, Float Valve, Pressure gauge, Compound gauge, Simplex Strainer (Basket Type)

5.5.8.6. HSD Buffer Tank 990 Ltrs. capacity with all accessories:

5.5.8.6.1. Supply, installation testing & commissioning 990 Ltr. Cap. Double Wall Buffer Tank for HSD to be installed in DG yard. The tank shall be fabricated from 5 mm thick MS plates. Tank shall be provided with all necessary nozzles for inlet, out let, vent, drain, overflow and 450 mm dia manhole for easy access for cleaning & maintenance. The tank shall be with Level Transmitter with low level, critical low level & high level, critical high level cut off and alarm indication including all fitting & accessories, Level Switch (4 level), Leak Detector sensor, float & Board type level Indicator, vent. Level controllers/sensors shall have provisions for integration with BMS. Tank shall be provided with structural steel platform for Buffer tank fabricated from beams,

Channels, angles, plates, chequered plates etc. of suitable heights to be erected.

5.5.8.7. Fuel Polishing Units:

5.5.8.7.1. Design, Manufacture & Supply, erection, testing and commissioning of 10 Cubic Meter/Hour Skid mounted Diesel Oil Polishing Unit complete as required. The system shall be with BMS interface.

5.5.8.8. FUEL MONITORING & CONTROL SYSTEM

5.5.8.8.1. Supply installation testing and commissioning of Fuel monitoring and control system inclusive of necessary sensors, transmitters, switches, overflow preventer, junction boxes, control cabling, PLC panels, RIO module etc for complete system described in this item. (Complete fuel monitoring system shall be with 1 No hot redundant PLC to avoid single point of failure). The system shall have provision to interface with BMS. DC power supply shall be provided as control supply. 230V UPS (Dual) & Raw power shall be available from respective NON-IT UPS system. PLC, switch, other indications shall be with 24V DC supply OR as per detailed design.

5.5.8.9. FUEL LEAK DETECTION SYSTEM

5.5.8.9.1. Design, engineering, completion of erection, installation of all components, cable laying including supply and installation of all cables, cable trays, cable glanding/ terminations, configuration of the supplied system, loop checking, testing, pre-commissioning, site acceptance test, handing over, warranty and Training for the complete Fuel Leak Detection System

5.5.8.9.2. Areas to be covered: Underground HSD Tanks Buffer Tanks, Supply/Distribution Pumps Polishing Units,Day Tank & DG set ,Low point & Flanged point

5.5.8.10. MAJOR REQUIREMENTS FUEL LEAK DETECTION SYSTEM

5.5.8.10.1. Main Fuel Leak Detection Panel

5.5.8.10.1.1. Main Fuel Leak Detection Panel (02 No.s) with min 10" Touch Screen Display networkable on RS 485 with Fuel Leak Detection Modules. Shall give pin point of leak distance in Meters and cable fault conditions of each networked modules. It shall have event log with date and time. Panel shall have Modbus/BACnet output for BMS monitoring. Main Panel to be enclosed in NEMA 4X enclosure.

5.5.8.10.2.Sensor interface module

5.5.8.10.2.1. Sensor interface module with relay/location display, 230 Vac. The Module should have Modbus connectivity and should have relay contacts for Alarm / Fault and service conditions. Module to be enclosed in NEMA 4X enclosures with transparent cover for easy viewing. To be installed at 1.2 m height for easy viewing from clear top cover

5.5.8.10.3.Modular Leader cable

5.5.8.10.3.1. Modular Leader cable shall be a minimum 4 mts connection cable with one end prepared for connection to terminals in control panel/ module, and with socket-type plastic connector at other end to connect to the sensor cable / jumper cable.

5.5.8.10.4.Fuel Leak Sensing Cable

5.5.8.10.4.1. Quick Dry Addressable Type / Reusable type Fuel Leak Sensing Cable (Modular Hydrocarbon Leak Sensing cable) with leader cable if required and end connections. Fuel sensing cable shall be able to detect the presence of liquid hydrocarbon fuels at any point along its length yet does not react to the presence of water. HC sensing cable should come in in modular lengths and should give of an alarm whenever fuel comes in contact with the cable.

5.5.8.10.5.Jumper Cable

5.5.8.10.5.1. Non- sensing cable between module and areas monitored to make connections between sensing cable and alarm module. Cable has four color-coded 18 AWG conductors. Cable shall be Armoured as per Outdoor environment. Jumper cables Connectors & End Caps as per detailed design.

5.5.8.10.6.Hold-down clips

5.5.8.10.6.1. Cable Securing Clips with Tie Fixing Base (Recommended to secure cable every 4 ft)

5.5.8.10.6.2. Hold-down clips to attach sensing cables to flat surfaces.

5.5.8.10.7.High-visibility Yellow Tag

5.5.8.10.7.1. High-visibility Yellow Tags to identify sensing cable and record mapped distance. Package contains a permanent marker. Tag attaches to sensing cable by sticking on itself. Use a tag on each length of cable and at mapping points. To be applied after every 5 metres

5.5.8.10.8.Communication Cable

5.5.8.10.8.1. FRLS 1 Twisted Pair x 1.5 mm2 Multistrand Copper conductor, Shielded individually with Al-Mylar Tape, with drain wire, Unarmoured, Black in colour. The communication cable shall be laid in Conduits / Cable trays. Scope shall be inclusive of GI Junction Box, lugs, cable compression glands, cable tags and Ferruling.

5.5.8.10.9.Sounder cum flasher with power Supply

5.5.8.10.10. **Underground leak detection**: -

PVC conduit & following accessories for underground leak detection
-Micro slotted tube for sensor installation, 1 - 1/2" dia x 3 meters
-90-degree PVC large radius sweep
-Components for cable tray and air lock used inside of pull box
-Pull Box (not traffic rated for use on pipeline right-of-way)
-Fabric Filter sock for slotted PVC conduit

5.5.9. UPS System (IT & NON-IT)

5.5.9.1. The UPS system shall be a transformer less, modular, hot-swappable and scalable three-phase UPS system employing IGBT-based rectifier and IGBT-based inverter technology, suitable for continuous operation in a mission-critical data-centre environment and suitable for dynamic AI workload (high dynamic transient demands). The UPS system shall be with modular three-phase power modules sizing for minimum 1000 kW load and shall have a minimum frame capacity of 1200 kW. Each UPS Frame shall be sized for kW =kVA load i.e. Unity Output power Factor. The UPS shall comprise modular three-phase power modules, each having a minimum rating of 100 kW, installed in a common UPS frame with a fully rated centralized static bypass switch. The configuration shall provide minimum N+1 power-module redundancy at the specified 1000 kW (N) load, with the UPS capable of maintaining the critical load upon failure or removal of any one power module without transfer to bypass.

5.5.9.2. The UPS shall support online insertion, removal and replacement of individual power modules while the UPS remains fully operational and supplying the critical load, without transfer to maintenance bypass or battery operation. The live-swapping capability shall be demonstrated and independently verified by a recognized third-party testing/certification laboratory such as TÜV, UL, ERTL or equivalent, including assessment of electrical safety and arc-flash incident energy during the complete module insertion/removal procedure. The bidder shall submit valid third-party test reports/certificates confirming compliance with the specified live-swap safety requirements along with the bid.

5.5.9.3. The UPS shall comply with IEC/EN 62040-3 and shall be classified VFI-SS-111 (Class 1). The UPS shall additionally provide a high-efficiency operating mode capable of achieving a minimum 99% AC-to-AC efficiency and double conversion mode efficiency more than 97% . The high-efficiency mode shall not compromise the specified output power quality or the required UPS protection and shall automatically transfer to double-conversion VFI operation whenever the configured operating conditions are outside the permissible high-efficiency operating envelope. Transfer between high-efficiency mode and double-conversion mode shall be fully automatic. The bidder shall clearly state the applicable efficiency, loading, input/output voltage and operating-temperature conditions in the technical datasheet and shall submit relevant type-test or independent test evidence.

5.5.9.4. The UPS system shall be capable of delivering 100% of its rated output power continuously. The UPS shall be suitable for direct integration with the data-centre LV electrical distribution system and shall have a minimum short-circuit withstand rating (Icw) of 100 kA RMS symmetrical for the UPS assembly, including the integrated static bypass arrangement, where applicable. The manufacturer shall submit type-test certificate during detailed engineering.

5.5.9.5. The UPS shall incorporate an intelligent Network Management Controller (NMC) with secure Ethernet-based communication and shall support integration with BMS through appropriate standard communication protocols. The NMC/embedded firmware shall be independently assessed and certified to IEC 62443-4-2. The UPS shall be provided with an integral

touchscreen HMI for local monitoring, configuration, alarm management, event logging, operating-status indication and diagnostic functions.

5.5.9.6. The charging system shall provide appropriate protection against overvoltage, overcurrent, excessive battery temperature and other abnormal battery operating conditions.

5.5.9.7. The UPS shall be provided with a lithium-ion battery energy-storage system sized to provide a minimum 10 minutes of backup at the specified 1000 kW critical load at battery end-of-life (EOL) & unity PF. Battery sizing shall be based on the manufacturer's discharge characteristics and shall account for UPS efficiency, minimum battery voltage, battery temperature, ageing, permissible depth of discharge and all other applicable derating factors. The bidder shall submit detailed battery sizing calculations demonstrating that the required 10-minute autonomy is achieved at EOL of 10 years at the specified 1000 kW load. The battery system shall incorporate a suitable Battery Management System (BMS) providing monitoring and protection of cell/module/string voltage, current, temperature, state of charge (SOC), state of health (SOH) and relevant alarms, with communication to the UPS monitoring system.

5.5.9.8. The lithium-ion battery system shall be tested in accordance with the applicable fire and thermal-runaway propagation requirements and shall have a valid UL 9540A test report from an accredited/recognized laboratory. The bidder shall submit the UL 9540A test documentation, battery manufacturer's technical datasheet, BMS details, battery sizing calculations and applicable safety certifications along with the bid. The complete UPS and battery system shall be suitable for installation in a mission-critical AI data-centre environment and shall support continuous monitoring and integration with the overall BMS platform.

5.5.9.9. Based on long calendar life, high safety and high power density, Bidder to choose either any one mentioned chemistry of Lithium.Selection of a particular chemistry should be made with safety in mind as well as the other system requirements, namely float service life, footprint or volume of the solution, power capability, temperature of operation and discharge time etc.. Bidder need to consider above aspects while selection chemistry of Lithium.

5.5.9.10. Battery protection shall be provided by thermal-magnetic molded-case circuit breakers in each battery rack. UPS battery should be Lithium Ion based(LFP or LMO) battery as per recommended makes with back up time of 10 Mins at Unity PF & EOL , with Built in DC Breaker , Battery Cabinet and Battery Monitoring system.

5.5.9.11. These Batteries are to be in the RACK. The battery system shall be designed with highest level of protection built into the battery system against potential safety risk – over voltage and short circuit. Vendor to submit the compatibility certificate with Offered Model of Battery and UPS. Vendor to submit Battery Sizing calculation for back up. The Complete battery system should be comprised of multiple such module in series/ parallel combination to arrive at the required backup and DC voltage requirement of UPS.

5.5.9.12. Batteries should be compliant to

Safety Cell	UL1642
Module	UL 1973

Transportation	UN38.3
Seismic	GR63
EMC	IEC61000-6-2, and 61000-6-4
Rack Level	UL 1998,991
Battery Module& Switchgear	UL 1973 with each component level

5.5.9.13. The Battery System should be equipped with Battery Management system to indicate the availability and health of entire battery system and cell balancing activity. Battery cabinet should be free standing housing Battery modules with Battery breaker, Battery management system, and Communication protocol for BMS etc.

5.5.9.14. Battery monitoring shall be provided at the module, rack, and system level. A switched-mode power supply shall be included and shall provide power for the battery monitoring system from UPS Input and Output

5.5.9.15. The battery system shall consist of a 3 level of protection namely, cell, module and rack level.

- 1st Level Protection – Battery Management System (BMS) & Switch Gear: Each battery rack shall be installed with main switch gear to isolate the affected battery rack in the event of a fault. BMS shall also be included in each rack to provide continuous monitoring of the voltage and temperature of each cell within the rack. BMS gathers and analyses the rack current. In the event of over voltage or short circuit, the BMS will trip the MCCB at rack level.
- 2nd Level Protection – Fuse: Fuses are built into the main switch gear at rack level. In the event of a fault current (caused by short circuit) which the MCCB cannot be activated in the shortest time, fuses will be activated to clear the fault current without damaging the cells.
- 3rd Level Protection – Cell: Several protection features shall be incorporated into the cell namely, safety function layer (SFL), Multi-layers Separator, Safety Vent, Safety Fuse and Overcharged Safety Device. These safety features are to protect the cell from overcharging and thermal runaway.

5.5.9.16. Minimum Recommended Loads on Non-IT UPS :

System	Minimum Recommended provision
BMS	BMS Servers, PLC controllers, gateways and network switches required for critical monitoring
Cooling controls	CW Primary Pumps, PAHU/Other Precision Cooling loads of UPS -Battery Containers, PLC controls, Motorised control valves, communication gateways and control power supplies
Liquid cooling	CDU, FWU, DCLC monitoring, leak detection, rack cooling Motorised control valves and associated control systems, Heaters and Humidifiers
Security	CCTV & VMS, access control, critical security network equipment
Network / communications	Critical non-IT network switches, monitoring gateways and operational communication equipment

Environmental monitoring	Temperature, humidity, differential pressure, water-leak and other critical sensors/controllers
Fire and life safety	Fire alarm and suppression control panels with their prescribed dedicated standby supplies
Emergency Lighting & critical loads	Emergency Lighting and other critical loads
Operator PCS	NOC, SOC,BMS ,

5.5.10. POWER DISTRIBUTION UNIT (K-20) FOR AI -IT LOADS:-

Floor Mounted Power Distribution Units (PDUs) will be considered for distribution of clean power to IT equipment in the AI Workload data centre application as they combine the functionality of several devices into one enclosure, which is often smaller, and more effective than the installation of several discrete panel boards and transformers.

PDUs will be provided complete with an isolation transformer, input and output breakers. A typical PDU will include all of the following:

Transformer:

This will be located as close to the load as possible to minimize common mode noise between ground and neutral and to minimize differences between the voltage source ground and signal ground. The closest possible location will be achieved when the transformer is located within the PDU enclosure. To withstand the heating effects of harmonic currents, K-20 rated Cu winding transformers will be used. To reduce harmonic currents and voltages, a zigzag harmonic cancelling transformer or transformer with an active harmonic filter will be used. Minimizing harmonics in the transformer improves the efficiency of the transformer and reduces the heat load produced by the transformer.

i. Efficiency of Isolation transformer Should be greater than 97% at full load.
ii. The neutral to earth voltage at racks shall be limited to maximum of 5V. K-Factor rated transformers shall have an impedance range of 3% to 4% and shall have a minimum reactance of 2% in order to help reduce neutral current when supplying loads with large amount of third harmonic current.
iii. Winding conductor: Copper, ASTM B49 - 99.95% purity electrolytic tough pitch grade copper as per IS 13730 Part-29-1996. Polyster amide enamel dual coated rectangular copper wire - class 200, Core lamination: Material - CRGO, Grade-M6 or better, Insulation-R Class.

5.5.10.1 Adequate arrangements for air circulation shall be made within each compartment of PDU & Transformer.

5.5.10.2 SOFT START MODULE: Manual Soft Start Module with Contactor Logic

5.5.10.3 Distribution panel boards: Panel boards will be mounted in the same cabinet as the transformer or in case where more panel boards are needed, a remote power panel will be used. Enclosure construction: CRCA enclosure with load bearing members 2/2.5mm thick, all doors 1.6 mm thick and all covers 1.2 mm thick, With powder coating, DEGREE OF PROTECTION: IP20

5.5.10.4 Interlayer insulation must be UL 220 Deg c as per the UL 746.

5.5.10.5 The PDU shall feed power to IT Racks through Bus way. The PDU shall have suitable provision for end termination of busway.

5.5.10.6 The PDU shall be provided with 3 pole incomer ACB/MCCB and 4 pole outgoing ACB/MCCB

5.5.10.7 The PDU shall have manual soft starter of suitable rating based on PDU rating.

5.5.10.8 A suitable indicating lamps ON/OFF/TRIP & R/Y/B shall be provided for both input and output MCCB/ACB.

5.5.10.9 Energy/Power-Meter (V,I,F, KWH,KVA,KW ,PF etc.) with Power Quality Monitoring -Minimum THD monitoring (current, voltage) Features for each outgoing feeder with Modbus/ Ethernet shall be provided with connection to BMS .

5.5.11. AC WIRING CIRCUIT

Main circuit Point wiring should be surface or concealed in MS/PVC conduit system. Conduit wiring shall be as per IS-732. Conduits and conduit accessories shall be galvanized and shall conform to IS-2667, 1988. Conduit ends shall be free from sharp edges or burrs. The ends of all conduits shall be reamed and neatly bushed with Bakelite bushings. In order to minimize condensation or sweating inside the conduit system, all outlets shall be properly drained and ventilated in such manner so as to prevent entry of insects. Conduit pipes shall be fixed by 22 gauge ribbed G.I. saddles on 25 x 3 mm G.I. (Galvanized Iron) saddle bars in an approved manner at intervals of not more than 50 cms. Saddle shall be fixed on either side of couplers, bends or similar fittings, at a distance of 30 mm from the center of such fittings. In Data Center, Panel Room, UPS and Battery Room all conduits will be MS and in Office area PVC conduits will be used.

5.5.12. LIGHTING FIXTURES & POLES

5.5.12.1. Lighting wiring between JB (Junction Box) and lighting fixtures shall be done by PVC insulated 3-core (phase neutral and earth) unarmored cable. All joints of conductors in Switch boards / JB's / Fittings shall be made only by means of approved Mechanical connectors (nylon / PVC connectors). Bare or twist joints are not permitted anywhere in the wiring system. Fixtures shall be firmly supported from the structures, support clamps etc. They may be bolted or welded to the steel work or metal inserts. In case of concrete structures, where metal inserts are not available, fixtures will be fixed to or supported from concrete surfaces with the help of anchor fastener, in such cases special care shall be taken to see that anchoring is firm. All LED fixtures shall be with high power factor, low harmonic (THD< 10%) (THD= Total Harmonics Distortion) and minimum 120 lumens/watt. All existing light fixture needs to be replaced. Lux level requirement will be as per UPTIME /TIA-942 or required as per Table 5.9 whichever is higher and other applicable standards in IT Halls & other areas .

5.5.12.2. LED Panel light 2 ft × 2 ft(36 watts):

Panel light 2 ft × 2 ft, of powder-coated die-cast / extruded aluminium body (Thickness greater than 1.20 mm) with heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C, as per IS: 10322, with driver as per the requirement having driver efficiency greater than 85%, operating voltage AC 140–270 Volt, frequency 50/60 Hz, operating

temperature range –5°C to 40°C, internal surge protection of 2.5 KV with short & open circuit protection, THD less than 10%, P.F. ≥0.95, IP20, CRI greater than 80, UGR (Unified Glare Rating) less than 19, flicker free (flicker shall be below 5%), system lumen efficacy ≥120 and less than 135 lm/Watt, lifetime (LED, Driver & electrical circuitry) of minimum 50,000 burning hours with 70% of initial lumen maintained till life ends, CCT 3000°K / 4000°K / 5700°K / 6500°K (as per ANSI Bin), SDCM (Standard Deviation Color Matching) less than 3. Maximum power consumption shall not be more than the specified rating and fixture shall be of relevant BIS standard. Manufacturer's Word Mark/Name shall be engraved/embossed/screen-printed on housing. Complete in all respect including external connections with 1.5 sq. mm FRLS/HFFR, PVC-insulated copper conductor single-core cable and earthing, etc., as required, with minimum 5-year OEM warranty. LM79 & LM80 test reports and all testing required for LED fixtures as per BIS shall be submitted. Shape, size and CCT shall be as approved by Engineer-in-Charge as per requirement.

5.5.12.3. LED STREET LIGHT FIXTURE:-

LED Street light fixture, powder coated pressure die cast aluminium body (System lumen efficacy ≥120 lm/Watt). Supplying, installation, Testing & Commissioning of Street light LED fixture powder coated pressure die cast aluminium body with driver as per the requirement with Driver efficiency >85%, Input voltage: 140-270 Volt AC, frequency 50/60 hz, Operating temp range -5 0C to 50 0C, internal surge protection of 5 KV L,N,E as per IEC 61000-4-5, Driver efficiency >85%, THD < 10% as per IEC 61000-3-2, P. F.≥0.95, IP-66, IK-10, CRI >70, under voltage and over voltage protection, EMI EMC As per CISPR 15, lenses for beam angle as per IESNA type I/II/III as per the width of the road and the project requirement, suitable to fit in up to 65mm dia pipe, life time (LED, Driver & electrical circuitry) of minimum 50000 Burning Hours with 70% of initial Lumen maintained till life ends as per LM80 extrapolation IES TM-21-11 report, CCT 3000°K / 4000°K / 5700°K / 6500°K (As per ANSI Bin), SDCM (Standard Deviation Colour Matching) <5, Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard complete in all respect i/c external connections with 1.5 sq mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy ≥120 lm/Watt output. LM79 & LM80 Test report for LED fixtures shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C).

5.5.12.4. LED FLOOD LIGHT FIXTURE:

LED Flood Light, powder coated pressure die cast aluminium (System lumen efficacy ≥120 lm/Watt). Supplying, Installation, Testing & Commissioning of Flood Light, powder coated pressure die cast aluminium body with built in or separate driver as per the requirement with Driver efficiency >85%, Input voltage: Input voltage: 140-270 Volt AC, frequency 50/60 hz, Operating temp range -5 0C to 50 0C, internal surge protection of 5 KV L,N,E as per IEC 61000-4-5, Driver efficiency >85%, THD < 10%. as per IEC 61000-3-2, P.

F.≥0.95, IP-66, IK-10, CRI >70, under voltage and over voltage protection, EMI-EMC as per CISPR-15, lenses for beam angle 30 deg-120deg as per the application and the project requirement, suitable tilt able fitting, life time (LED, Driver & electrical circuitry) of minimum 50000 Burning Hours with 70% of initial Lumen maintained till life ends as per LM80 extrapolation IES TM-21-11 report, CCT 3000°K / 4000°K / 5700°K /6500°K (As per ANSI Bin), SDCM (Standard Deviation Colour Matching) <5, Maximum power consumption should not more than the specified rating and Fixture shall be of relevant BIS standard complete in all respect i/c external connections with 1.5 sq.mm FRLS/HFFR, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 5 year OEM warranty. System lumen efficacy ≥120 lm/Watt output. LM79 & LM80 Test report for LED fixtures shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminium housing such that LED junction temperature shall not rise above 90°C).

5.5.12.5. STEET LIGHT POLES:-

This 6-meter straight tubular lighting pole is constructed from heavy-duty Mild Steel, minimum 4.5 mm wall thickness, conforming to the IS 1161 grade standard. Designed for robust outdoor performance, the pole features a tapered profile that transitions from a 114 mm bottom diameter to a 76 mm top diameter. It is equipped with a single arm for fixture mounting and utilizes a secure bottom plate mounting type for installation. To protect against weather elements and ensure long-term durability, the structure is finished with a protective paint coating, making it ideal for deployment in open environments such as campuses. The pole shall be embedded underground in a suitable RCC foundation of 1:2:4 or equivalent concrete with nominal reinforcement, including finishing of the foundation, complete in all respects.

5.5.13. EARTHING AND EARTHING PITS

All Electrical Equipment must be efficiently double earthed in accordance with the requirement of IS-3043/IEEE 80 and relevant regulations of Electrical. UPS power system earthing will be as per recommendations of IEEE-1100. Guidance will also be taken from IEEE 142:2007 where the combined path from the buildings earth bar to the final earth pits will be designed to fall within a range of 1Ω for general earthing and 1Ω for Generator earthing. All requirement for local regulatory bodies shall be considered & complied. The earth pits shall be as per IS with proper arrangement for testing. Maintenance free earth pits to be used. All Earthing conductors shall be hot dip galvanized / electrolytic grade base copper conductor. The main earthing rings shall be done as per practice laid in Indian Standard. All electrical equipment shall be connected to the earth bus at two points except the lighting fittings and junction boxes. All hardware for bolted joints shall be galvanized and the size of the bolt shall not be more than quarter of the size of earth conductor. Tinned copper lugs shall be provided where round earthing conductors are used. The 415V neutral shall be solidly earthed by means of two separate and distinct connections to earth. The earth pits shall be interconnected between themselves and the main earthing grid to form an earthing ring. All joints in the main earthing conductors shall be welded. Terminal joints on the equipment

shall be bolted. Removable test links shall be provided near the earth pits to facilitate testing of earth pits. Where the earthing terminal diameter provided on equipment is larger than quarter of the size of the earth conductor, connection shall be made using a wider flag welded to the conductor. The equipment to be earthed shall be connected to a common earth grid of power system. The number of earth pits will depend upon soil resistivity and the voltage of the system. The earth pit together with the electrode shall be constructed as per IS-3043-1987. The potential difference between neutral and earth should be less than 3 V. A bolted assembly link shall be provided in the connection between earth electrode and the main earth conductor. Existing Earth pits cannot be used all should be new one. Equipotential earthing inside the data center needs to be considered with grid below raised flooring of 2 X 2 meter of 25 X 3 mm Cu strip and all end corners after covering complete room needs to be grounded. Pedestal /stringers, Rack body to be grounded to this grid so that flooring and equipment's are at equal potential. The method of testing shall be as per Clause No. 10.1 and 10.2 of IS-3043. The contractor shall prepare the test report on standard Format. The effective earth resistance of the system shall be <1ohm.The 415V neutral shall be solidly earthed by means of two separate and distinct connections to earth. Each connection shall be connected to an independent earth pit near the transformer. The earth pits shall be interconnected between themselves and the main earthing grid to form an earthing ring. The neutral earthing leads shall be kept away from the transformer tank. If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions. Following also shall be earthed:-Metallic noncurrent carrying parts of all electrical equipment's such as transformer, switchgear, panels, power sockets, lighting fixtures., shall be earthed at one point for and up to 230V and at two points for working voltage of 415 Volts, Steel structures / columns, Cable trays, spheres, vessels and other process equipment, Fence and gate of electrical equipment (of transformer yard),Cable shields and Armour, Street light poles near to main earth grid shall be earthed by tapping from main earth grid. For remote located street light pole, individual earth electrodes shall be constructed, Earth strips from Lightning arrester shall be laid and connected to Earth stations directly. Strips shall be of specified size. These shall be connected with plant main grid, whenever specified only below ground, Equi-potential jumpers for any or all of the above equipment joints / sections intended for earthing. Also, all the earth pits dedicated for IT equipment's shall be interconnected in a common grid separate from the other general earthing grid. The earthing pits needs to be coved by earth chamber in brick work / readymade high grade material earthing chamber.

5.5.14. LIGHTNING PROTECTION

5.5.14.1. The Utility plant and structures shall be protected against lightning in accordance with requirements of IS/IEC 62305.

5.5.14.2. Lightning Protection System (LPS) for the external chiller yard, substation area, and DG area and overall DC Utility Area is under the scope of bidder.

5.5.14.3. Air terminal rods shall be provided at the top most points of structures. Each down comer shall be provided with one earthing pit. Each down conductor shall be provided with a test link for testing the installation. Portion at the conductor below ground shall be painted with bituminous paint. The down

conductor shall be cleated at intervals of 300 mm using G.I. clamps. All joints in the conductors shall be welded. Welding joints shall be painted with two coats of Bitumen. Each air terminal rod shall have 150 mm dia GI or 75 mm dia copper sphere with 5 nos. 150 mm long conical GI / Copper spikes. The spikes shall be screwed and welded / brazed to the sphere. The whole assembly shall be fixed to a GI rod of not less than 50 mm nominal bore by means of flanged connections. The down conductor shall be connected to the flange and welded / brazed. The top of the air terminal rod shall be two meters above top most point of structure.

5.5.15. CABLE TRAYS

5.5.15.1. Stainless Steel Cable trays for IT Halls to be considered above each row of the Rack & if required Cable tray Grid above the rack to be provided. The row needs to be inter connected to each other by same number of cable trays. Rack interconnecting cables mostly will be fiber, Bidder to take care utmost care as 90 Deg C bend will not be accepted. If required fiber runners can also be proposed in the solution for IT hall area.

5.5.15.2. For other areas , all cable Trays up to 300mm shall be perforated type & above 300mm ladder type trays shall be used. The Trays shall be pre-fabricated hot-dipped galvanized. Cold galvanizing at site is acceptable only for touch-ups. The Trays shall have suitable provision for clamping at an interval of 500 mm. The Earthing Strip for the earthing ring shall be run along the side of the Tray. The connection between individual equipment to the ring shall be by bracing or with lugs. The bending of trays shall be smooth and the curvature sufficient for each bending of cables in it. Pre-fabricated accessories such as Tees, bends, risers, couplers, reducers, etc. shall be used at all junction & branches. Cutting & welding of trays at site is not permissible. Similarly, the trays shall not be welded on the supports but bolted only. Electrical Cable Tray routing shall be coordinated by Electrical Contractor at site to check fouling with pipes, equipment, light fittings, HVAC, etc. before fixing the trays.

5.5.16. CABLES

All Low-tension cables should be of 1.1 KV grade, All power cables from 25 Sq.mm to 400 Sq.mm should be with stranded, compact aluminium conductor, with XLPE insulated, PVC inner sheathed, galvanized steel strip armoured and overall PVC sheathed conforming to IS:7098 /88. As stated in Electrical single line diagram for Cu flexible cables should be of Solid/Stranded Copper conductor, XLPE Insulated, cores laid up, PVC tape/PVC Extruded Inner sheathed for Multicore Cables, Unarmoured, extruded PVC Type ST2 Sheathed as per IS 7098 (Part 1) 1988. Cables shall comply with the latest editions of following standard, as applicable-BIS: 1554 Part 1 PVC insulated electric cables (Heavy duty), BIS: 7098 Part 2 Cross- Linked Polyethylene Insulated PVC sheathed cables, BIS: 8130 Conductors for insulated electric cables and flexible cables.1.1 KV grade cables: All LT power cables shall be 660/1100V grade, with aluminium conductor for size 10 Sq.MM and above. Power cables of sizes up to 6 Sq.mm. shall be with copper conductors, All Cables shall be externally marked at either end with the respective identification numbers by means of non-deteriorating material. Cable Markers shall be approved by Client. IS: 1554 - PVC insulated (heavy duty) electric (Part I) Cables - Part I for working voltages up to and including 1100V.IS: 1753 -Aluminium conductors for insulated

cables.IS: 3961 -Recommended current ratings for (Part II) cables: Part-II PVC insulated and VC sheathed heavy-duty cables.IS: 3975 -Mild steel wires, formed wires and tapes for armouring of cables.IS: 5831 - PVC insulation and sheath of electrical cables.IS: 7098 -Cross-linked Polyethylene insulated (Part-II) PVC sheathed cables: Part-II for working voltages from 3.3 KV up to & including 33 KV.IS: 8130 -Conductors for insulated electric cables and flexible cords.IS: 9968 - Elastomer - insulated cables, for (Part I) working voltage up to and including 1100V.

5.5.16.1. LT CABLES

5.5.16.1.1. Work Description

The design, manufacturing, testing and supply of FRLS inner and outer sheath both, PVC insulated 1.1 KV grade stranded twisted wires shall comply with following standards with update amendments under the specifications.

- IS-3961: Current rating for cables.
- IS-5831: PVC insulation and sheath of electric cables.
- IS-694: PVC insulated cables for working voltage up to and including 1100 volts.
- IEC-54 (I): PVC insulated cable.

5.5.16.1.2. Copper/ Aluminum stranded twisted conductor PVC insulated wires shall be used in conduit as per item of work. Aluminum wires for power cables and copper wires for control cables shall be used.

5.5.16.1.3. The wires shall be color coded - (red, yellow, blue) for Phases, black for Neutral and green for Earth.

5.5.16.1.4. Progressive automatic in line indelible, legible and sequential marking of grade, voltage, capacity and length in meters shall be embossed at every meter on the outer sheath of cable.

5.5.16.1.5. The design, manufacture, testing and supply of the cable under these specifications shall comply with following standards latest edition of:

- IS: 8130: Conductors for insulated electric cables and flexible cords.
- IS: 5831: HRPVC / HR PVC insulation and LSZH sheath of electric cables.
- IS: 3975: Mild steel wires, strips and tapes for armoring cables.
- IS: 3961: Current rating of cables.

5.5.16.1.6. The routing and minimum rated current carrying capacity of the LV power cables shall be indicated on the Drawing. The Contractor shall consider the manufacturer data and engineering for cable sizing and to ensure that it meets the conditions of grouping, ambient temperature etc.

5.5.16.1.7. All LT cables for normal power/control circuits within building shall be XLPE insulated and PVC sheathed Aluminum conductor and control cables shall be PVC insulated and PVC sheathed copper conductor respectively.

5.5.16.1.8. All LT cables, for emergency power circuits serving emergency light, Building Management System (BMS), Fire Protection System, Security Systems, emergency communication systems, etc. with back-up from

UPS systems or incoming and outgoing from the Emergency Switchboard, shall be fire resistant as required.

5.5.16.1.9. Cables in service duct, open trench, direct-laid underground in soil shall be by means of armoured cables. Non-armoured cables shall only be laid in conduits, trunkings or tray/ladder for mechanical protection.

5.5.16.1.10. Standards

(a) All cables shall be manufactured and constructed in accordance of the following standards with the latest revision:

1.	IS: 694	HRPVC/XLPE insulated (heavy duty) electric cables for working voltage up to and including 1100 volts.
2.	IS: 424-1475(F-3)	Power cable-flammability test.
3.	IS: 7098(I)	Specification for cross-linked polyethylene insulated LSZHPVC sheathed cable for working voltage up to 1.1 KV.
4.	IS: 1554	Specification for PVC insulated (heavy duty) electric cables for working voltages up to and including 1100 volts.
5.	ASTM-D: 2863	Standard method for measuring the minimum oxygen concentration to support candle-like combustion of plastics (Oxygen Index).
6.	ASTM-D: 2843	Standard test method for measuring the density of smoke from the burning or decomposition.
7.	IEEE: 383	Standard for type of tests Class-IE, Electric cables, field splices and connections for power generation station.
8.	ASTME: 662/ IEC: 754(x)	Standard test method for specific optical density of smoke generated by solid materials
9.	IS: 10418	Cable drums.
10	IS-10810	Testing method of cable.
11.	IS-6121	Cable glands.
12.	IS-9537	Rigid steel conduit.

(b) The manufacturing of the cable shall also conform to the requirements of all relevant local codes, as applicable, together with the additional requirements referred to in the approved Specification and Drawings of EPC contractor. Only more stringent specification shall be followed.

5.5.16.1.11. Sample submission

Shop Drawings of the cable route showing the coordinated routing of cables, arrangement on cable trays, methods of

fixing of cable trays and cables, etc. All conduits including concealed conduit routing drawings shall also be included

- Cable test reports and IS Certification
- Cable schedule:
- Cable code and type and installation method
- Cable feed from and serve to
- Cable route length and voltage drop
- Cable capacity and Upstream protection breaker rating
- The cable schedule shall be prepared in accordance to the cable manufacturer's data.

5.5.16.1.12. The cables shall be suitable for laying in racks, ducts, trenches conduits and under- ground buried installation with uncontrolled back fill and chances of flooding by water.

5.5.16.1.13. They shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operating condition.

5.5.16.1.14. The aluminium/ copper wires used for manufacturing the cables shall be true circular / sector in shape before stranding and shall be of uniformly good quality, free from defects. The conductor used in manufacture of the cable shall be of H2 grade.

5.5.16.1.15. The cable should withstand 2.5 kA for 1 Sec. with insulation armour insulated at one end. Bidder shall furnish calculation in support of capability to withstand the earth fault currents. The current carrying capacity of armour and screen (as applicable) shall not be less than the earth fault current values and duration.

5.5.16.1.16. The fillers and inner sheath shall be of non-hygroscopic fire retardant materials and shall be suitable for the operating temperature of the cable. Filler and inner sheath shall not stick to insulation and outer sheath.

5.5.16.1.17. Progressive automatic in line indelible, legible and sequential marking (grade, voltage, capacity, length - in meters) shall be embossed at every meter on the outer sheath of all cables and at every 5 meter 'LSZH marking in case of 'LSZH cables.

5.5.16.1.18. IS: 3975 method (b) for strip / wire armouring shall only be acceptable. For single core cable aluminium wire armouring shall be used.

5.5.16.1.19. Allowable tolerance on the overall diameter of the cables shall be + 2mm.

5.5.16.1.20. The normal current rating of all XLPE insulated cables shall be as per IS: 3961.

5.5.16.1.21. A distinct inner sheath shall be provided by pressure extrusion process for all multi cores armoured and unarmoured cables as per IS: 5831.

5.5.16.1.22. Outer sheath shall be provided by extrusion process as per IS: 5831.

5.5.16.1.23. The breaking load of armour joint shall not be less than 95% of that armour wire. Zinc rich paint shall be applied on armoured joint surface.

- In plant repairs to the cables shall not be accepted.

- All the cables shall be supplied in non-returnable drums as per IS: 10418.
- Fire Survival Cables

5.5.16.1.24. Multi core Al / Cu Conductor XLPE/ Cross linkable Low Smoke Halogen Free insulated with Fire rated Glass Mica Tape, LSZH inner and outer Sheathed, Armoured with GI Strip/ Wire Fire Survival Cable.

5.5.16.1.25. Basic design shall be as per BS:7846-2009,

5.5.16.1.26. Fire resistance of the cable shall be as per BS:8491-2008 & 8434-2:2003

5.5.16.1.27. Inspection

5.5.16.1.28. All cables shall be inspected on receipt of the same at site and checked for any damage during transit.

5.5.16.1.29. Joints in Cables

5.5.16.1.30. Cable drum length and sizes of cable lengths required may be checked carefully before cutting the cables from drum. The contractor shall take care that the cables received at site are distributed to various locations in single length as far as possible to ensure maximum utilization. Where the joints are unavoidable, the same is to be done with approval from the Engineer in Charge. The joints shall be done by qualified jointer strictly in accordance with manufacturer's instruction / drawings in presence of Engineer-in-charge.

5.5.16.1.31. Joint Boxes for Cables

5.5.16.1.32. The cable joint boxes shall be of appropriate size suitable for type of cable of particular voltage rating.

5.5.16.1.33. Cable Joints

5.5.16.1.34. All cable joints materials shall be of standard make and suitable to requirement. On jointing of cables in the joint box the cable compound shall be filled in accordance with manufacturer's instructions and in approved manner. All straight through joints shall be done in epoxy mould boxes with epoxy resins. Straight through joints shall not be permitted unless the length of run is in excess of cable drum.

5.5.16.1.35. End terminations of cables more than 1.1 KV grade shall be done with epoxy mould boxed and epoxy resin. Cable glands shall be 1.1KV grade double compression type and made to tin plated heavy-duty brass casting and machine finished. Glands shall be of robust construction capable of clamping cable and cable armour, firmly without injury of cable.

5.5.16.1.36. All washers and hardware shall be made of brass tinned. Rubber components used in the glands shall be made of neoprene of tested quality.

5.5.16.1.37. Cable lugs shall be tinned copper / aluminium solder less crimping type conforming to IS: 8309 suitable for aluminium or copper conductor.

5.5.16.1.38. Crimping of terminals shall be done by using Corrosion inhibitory compound, with crimping tool.

5.5.16.1.39. Fire resistant paint has to be applied 1 Meter on either side of cable joint.

5.5.16.1.40. The contractor shall liaise fully with all other contractors to achieve an efficient and properly coordinated installation where equipment has to be re-positioned due to lack of site liaison; no extra cost shall be incurred .

5.5.16.2. XLPE HT Cables (Upto 22 KV)

5.5.16.2.1. The cross linked polyethylene (XLPE) 22KV cable shall be aluminium conductor PVC outer sheath steel strip armoured over inner sheath construction. XLPE cable shall conform to testing in accordance with IS: 7098 (Part-I) 1977 and (Part-II) 1973. The screening shall be done on individual cover. The armouring applied over the common covering shall be flat steel wires. Each and every length of cable shall be subjected to routine test.

5.5.16.2.2. The termination and jointing techniques for XLPE cables shall be by using heat shrinkable or push on cable jointing kits.

5.5.16.2.3. While laying underground cables in ducts care should be taken so that any underground structures such as water pipes, sewerage lines etc. are not damaged. Any telephone or other cable coming in the way shall be properly protected as per instructions of the Engineer- in-charge. The HT cable shall be laid at least 1200mm for cable up to 22KV (E) below the ground level in a trench 450mm wide.

5.5.16.2.4. After laying and jointing work is completed High Pot test shall be performed in presence of Engineer in Charge and test results submitted for approval in order to ensure that they have not been damaged during or after the laying of cables. In case, the test results are unsatisfactory, the cost of all repairs and replacement and all extra work of removal and relaying will be made good by the contractor without any extra cost.

5.5.16.2.5. Note: All other procedure will be followed as per L.T. cables.

5.5.16.3. EXECUTION

5.5.16.3.1. Erection of Cables

The Contractor shall be entirely responsible for the supply of correct lengths of the cables to be installed and for all allowances for connecting and terminating the cables to the switchgears and transformers respectively

The Contractor shall submit proposed cable routes including details of supports for the cables for approval before installation. The cable shall not be run in places other than corridor, passageway, electrical riser or other designated areas subject to the Engineer's approval. The cost of support shall be deemed to have included in the Contract.

5.5.16.3.2. Cable Pulling

a) Winching of cables through ducts / pipes shall only be carried out with the approval of the Engineer in Charge in which event a pulley eye shall be attached to the conductors. Cable shall be run in neat and orderly manner to allow space for future cabling and

maintenance. Under any circumstances the cable shall not run diagonally across a room, cable basement, corridor, etc.

b) A cable sheath stocking may be employed or cables where no undue stress in the sheath is likely to occur.

c) Care shall be taken to ensure that the draw strain is applied to the armouring and protected during drawing against damage.

5.5.16.3.3. Cable Laying

a) The cable drum shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming links. At all changes in directions in horizontal & vertical places, the cable shall be bent with a radius of bend not less than 8 times the diameter of cable.

b) The cable of 1.1KV grade shall be laid not less than 750mm below ground level in a 375 mm wide trench (throughout). Where more than one cable is to be laid in the same trench, the width of the trench shall be increased such that the inter axial spacing between the cables except where otherwise specified is at least 150mm minimum or as per site requirements or as approved by the Engineer-in-charge. Where single core cables are used in multiphase systems, the cables shall be installed in trefoil where possible.

c) In case the cables are laid in vertical formation due to unavoidable circumstance the depth per tier shall be increased by 200 mm (minimum). Cable shall be laid in reasonably straight line, where a change in direction takes place a suitable curvature shall be i.e. either 20 times the dia meter of the cable or the radius of the bend shall not be less than twice the diameter of the cable drum or whichever less is. Minimum 3-meter-long loop shall be provided at both sides of every straight through joint & 3 meters at each end of cable or as directed at site.

d) Greater care shall be exercised in handling the cable in order to avoid forming 'Kinks'. The cable drum shall in-verbally convey on wheels and the cable unrolled in right direction as indicated on the drum by the manufacturer. The cable shall be pulled over rollers in the trench steadily and uniformly without jerks and strains.

e) Cables laid in trenches in single tier formation, 10 cms all-around sand cushioning is provided below and above the cable before a protective cover is laid. For every additional vertical tier. The 30 cm of sand cushion is provided over the initial tier. The cable shall be protected by 2nd class brick of size not less than 230 x 115 x 75mm, stone tiles/ RCC curved channel be placed on top of the sand breadth wise for the full length of the cable and where more than one cable is to be laid in the same

trench the brick shall cover all cables and project at least 8 cms over the outer sides of the end cables.

f) Filling of trenches shall be done after sand cushioning and tiles or bricks lying and inspection is carried out by the Engineer in Charge (Refer drawing). Back fill for trenches shall be filled in layer not exceeding 150 mm. Each layer shall be properly rammed & consolidated before laying the next layer.

g) PVC pipe shall be provided on all road crossing. The size of the pipe shall be above the size of the cable. Minimum 100mm dia. pipes are to be provided. The pipe shall be laid in groundwith special arrangement and shall be cement jointed and concreting of 1:5:10 shall be provided as per relevant IS with latest amendment. Nothing extra shall be paid on this account. Cable route markers at interval of 30 meters and at the point of direction change shall be provided to indicate cable path. Aluminum strip cable tag of 20mm wide with engraved tag no. shall be provided at both ends of cable.

h) Where the cables are laid in ducts (pucca trenches) inside the building, they will be laid on MS rack/ cable trays grouted on trenches walls. Cables passing through floors shall be protected from mechanical damage by steel channel to a height of one meter above the floor. Sleeve shall be provided in the wall for crossing of cables.

i) Where the cables are laid in open (in building) along walls, ceiling or above false-ceiling, cable rack (ladder type) or cable tray shall be provided. The size of the cable tray or rack shall depend on the number of cables to pass over that rack. Cable tray/rack shall be properly supported through wall/ceiling according to the site conditions. Cable laid on tray & riser shall be neatly dressed & clamped at an interval of 1000 mm & 750mm for horizontal & vertical cable run respectively either side at each bend of cable. All power cables shall be clamped individually & control cables shall be clamped in groups of three or four cables. Clamps for multi core cables shall be fabricated of 25x3 GI flats. Single core power cable shall be laid in trefoil formation & clamped with trefoil clamps made of PVC/fiber glass.

j) Cable openings in wall/floor shall be sealed by the contractor suitably by Hessian tape & Bitumen compound or by any other proven material to prevent ingress of water.

k) After the cables are laid, shall be tested as per IS and the results submitted to Architects/Engineer and in case the results found unsatisfactory, all the repairing/ replacing of cables will be done by the contractor free of charge.

5.5.16.3.4. Internal Wiring

a) All the wiring installation shall be as per IS: 732 with latest amendment. PVC insulated copper conductor cables as specified in bills of quantity shall be used for sub-circuit runs from the distribution boards to the points and pulled into conduits. They shall be twisted copper conductors with thermoplastic insulations of 1100 volts grade. Colour Code for wiring shall be followed.

b) Looping system of wiring shall be used, wires shall not be jointed. Where joints are unavoidable, they shall be made through approved mechanical connectors with prior permission of the Engineer in Charge. No reduction of strands is permitted at terminations. No wire smaller than 1.5 sq.mm shall be used. Wherever wiring is run through trunkings or raceways, the wires emerging from individual distributions shall be bunched together with cable straps at required regular intervals. Identification ferrules indicating the circuit and DB number shall be used for sub main sub-circuit wiring. The ferrules shall be provided at both end of each sub main and sub-circuit.

c) Where single phase circuits are supplied from a three phase and a neutral distribution board, no conduit shall contain the wiring fed from more than one phase. In any one room in the premises where all or part of the electrical load consists of lights, fans and/or other single phase current consuming devices, all shall be connected to the same phase of the supply. Circuits fed from distinct sources of supply or from different distribution boards or through switches or MCBs shall not be bunched in one conduit. In large areas and other situations where the load is divided between two or three phase, no two single phase switches connected to different phase shall be mounted within two meters of each other.

d) All splicing shall be done by means of terminal blocks or connectors and no twisting connection between conductors shall be allowed.

e) Industrial sockets shall be of polycarbonate and deeply recessed contact tubes. Visible scraping type earth terminal shall be provided. Socket shall have self adjustable spring loaded protective cap. Socket shall have MCB/ELCB/RCCB as specified in the schedule of work.

5.5.16.3.5. Fire Seal System

a) All the floor/wall opening provided for cable crossing shall be sealed by fire seal system.

b) The fire proof sealing system shall fully comply with the requirements of relevant IS/BS: 476 Part-B. The fire proof seal system shall have minimum one hour fire resistance rating.

c) The fire proof seal system shall be physically, chemically, thermally stable and shall be mechanically secured to the masonry concrete members. The system shall be completely gas and smoke tight, antirodent and anti-termite.
d) The material used in fire proof seal system shall be non-toxic and harmless to the working personnel.
e) Type of fire proof seal system shall be foaming type or flamemastic type compound or approved equivalent.
f) After laying and jointing work is completed, high voltage test should be applied to all cables to ensure that they have not been damaged during or after the laying operation and that there is not fault in the jointing.
g) Cables for use on low and medium voltage system (1.1KV grade cables) should withstand for 15 minutes a pressure of 3000V, DC applied between conductors and also between each conductor and sheaths. In the absence of pressure testing facilities it is sufficient to test for one minute with a 1000V insulation tester
h) In case the test results are unsatisfactory the cost of repairs and replacements and extra work of removal & laying will be made good by the contractor.
i) Cable shall be installed so that separations shown in the table below are observed.

5.5.16.3.6. Site Acceptance Test

a) The Contractor shall supply all necessary testing equipments for site testing. When required, these testing equipments shall be calibrated at the expense of the Contractor at a recognized national laboratory.
b) The Contractor shall engage an Authorised Medium Voltage Testing Engineer who is recognized by SEB to perform all site tests.
c) In addition to SEB's requirements and those recommended by the manufacturer, the following tests shall be carried out:
d) Continuity test
e) Earth test
f) Polarity test
g) Insulation resistance test
h) DC high voltage test. The test voltage shall be in accordance with SEB's requirements and Engineer's approval

5.5.17. BUS DUCT SANDWICH TYPE -

5.5.15.1. The Busbar Trunking System shall be of sandwich construction, type-tested in accordance with the latest applicable edition of IEC 61439-1 and IEC 61439-6, with the offered rating and configuration duly covered by valid test certificates issued by an independent testing/certification body.

5.5.15.2. The BBT system shall be suitable for 415 V, 50 Hz, three-phase, four-wire system with 100% rated neutral, and the neutral conductor shall have the same cross-sectional area as the phase conductor. The busbars shall be of high-conductivity electrolytic-grade aluminium, suitably insulated with a multilayer Class B or higher-rated insulation system, halogen-free and non-hygroscopic, and there shall be no bolts passing through the busbars. Epoxy insulation shall not be used where prohibited by the approved tested construction. The busbar ends and all joint and plug-in contact surfaces shall be suitably silver-plated or otherwise treated with an approved low-resistance contact system. The BBT shall incorporate a continuous integral aluminium protective earth/earth-return path, either through the enclosure or by a separate aluminium earth conductor, capable of withstanding the prospective earth-fault current at the installed location. The earth path shall be factory-fitted, factory-tested and its short-time withstand capability shall be declared in the manufacturer's type/design verification documentation. The BBT shall have a minimum rated insulation voltage of 1000 V and shall withstand the specified short-circuit level, which shall be minimum 40 kA rms for 1 second at 415 V, 50 Hz, or the higher value established by the short-circuit study, without electrical, mechanical or thermal damage. The system shall be self-cooled and shall be suitable for a design ambient temperature of 50°C, with the rated current duly established/verified for the specified ambient conditions in accordance with IEC 61439-6. Temperature-rise limits shall comply with the applicable requirements of IEC 61439-6.

5.5.15.3. The BBT enclosure shall be totally enclosed and non-ventilated, providing protection against mechanical damage, dust ingress and other environmental influences. The enclosure shall be manufactured by the BBT manufacturer and shall be constructed from corrosion-resistant electro-galvanized steel and/or aluminium of adequate thickness, with suitable high-performance protective coating/powder coating. The enclosure shall be designed to minimize eddy-current and hysteresis losses. The degree of protection shall be minimum IP54 for indoor installations and IP65 for outdoor/exposed installations, in accordance with IEC 60529, or higher where required by site conditions. Outdoor BBT shall be provided with a suitable weather-protective canopy of minimum 1.5 mm thickness, wherever required by the installation arrangement. No site modification, cutting, drilling, alteration or fabrication of the BBT system shall be permitted except where specifically approved in writing by the manufacturer and carried out in accordance with the manufacturer's approved procedure. The BBT system shall have an impact resistance of minimum energy.The busbar joints shall be of an independent, maintenance-friendly and foolproof design, suitable for correct and repeatable torque application. The joint assembly shall preferably incorporate a torque-indicating/two-headed bolt arrangement providing positive indication that the specified torque has been achieved, with visual confirmation possible before installation of the joint cover. All joint contacts shall be of low-resistance, suitably silver-plated copper or equivalent approved contact construction.

5.5.15.4. Plug-in/tap-off points shall be provided at locations required by the detailed engineering and shall have hinged, insulated, click-fit protective covers. Plug-in units shall be mechanically robust, self-locking and designed to prevent incorrect installation. The plug-in contact/jaw shall not directly bear on the aluminium busbar but shall connect through a suitable silver-plated/electro-fused copper contact arrangement specifically covered by the manufacturer's type/design verification. The earthing contact shall make before the live contacts during insertion and break after the live contacts during removal, and it shall not be possible to install or energize the plug-in unit without establishing the earth connection. Plug-in units shall be type-tested/design-verified along with the busbar trunking system in accordance with IEC 61439-6. Where required, tap-off boxes shall be provided with suitable MCCB/MCB or other protective devices; cable connection plug-in boxes without protective devices shall be provided only where specifically indicated. Live insertion/removal shall be permitted only where the complete plug-in unit and busbar system are specifically designed, tested and certified for such operation.

5.5.15.5. All BBT components and accessories, including straight lengths, elbows, tees, flanged ends, end covers, cable-end boxes, adaptor boxes, plug-in/tap-off boxes, flexible connections, expansion/flexible joints, and other fittings, shall comply with IEC 61439-6 and shall be of the same manufacturer as the BBT system. The BBT shall be installed with plug-in openings positioned for safe and practical access and maintenance. Hanger/support spacing shall not exceed the manufacturer's approved and type-tested recommendations. The support system shall be suitably designed for the BBT weight, short-circuit forces, seismic forces and site environmental conditions. BBT system shall be suitably seismically qualified for the applicable site seismic criteria, with valid test/qualification documentation submitted by the manufacturer.

5.5.15.6. Connections between BBT and transformers, generators, switchboards, panels and other equipment shall be made using suitably rated laminated/tinned copper flexible connections / insulated flexible connectors, adequately sized for the continuous current and short-circuit withstand requirements. The complete BBT system shall be supplied, installed, tested and commissioned by the manufacturer or its authorized installation agency, having demonstrated experience in installation of similar systems. The authorized installation agency shall strictly follow the manufacturer's approved installation, jointing, torqueing, testing and commissioning procedures.

5.6. HEATING, VENTILATION AND AIR CONDITIONING WORK

5.6.1. COOLING SYSTEM – DESIGN REQUIREMENTS

5.6.1.1. All cooling equipment and systems shall be selected and designed in accordance with the latest applicable ASHRAE standards/guidelines, including ASHRAE TC 9.9, considering the specified IT load & Non-IT Load, site ambient conditions and operating profile.

5.6.1.2. The cooling system shall be capable of efficient operation under variable load conditions, with suitable controls, variable-speed equipment and sequencing to optimise energy efficiency and minimise operating cost. The

overall cooling solution shall ensure reliable heat removal and maintain the required room air temperature and humidity conditions for the installed IT equipment. Suitable heating and humidification systems shall be provided wherever required to maintain the specified operating environment throughout the data centre.

5.6.2. COOLING WORKS – COMPLETE SCOPE

5.6.2.1. The Bidder shall be responsible for the complete design, engineering, supply, installation, testing and commissioning (SITC) of all cooling systems and associated equipment.

5.6.2.2. The Bidder shall submit, along with the Bid, the P&ID, equipment ratings and selection sheets, cooling-load calculations, equipment layouts, control philosophy and relevant design drawings& calculations for review.

5.6.3. COOLING EQUIPMENT AND ACCESSORIES

The scope shall include, but shall not be limited to

5.6.3.1. Variable-flow High-Temperature Chillers for DCLC cooling and Variable-flow Low-Temperature Chillers for Air-cooling;

5.6.3.2. Cooling Distribution Units (CDUs);

5.6.3.3. Cooling units for UPS -battery & Panel containers;

5.6.3.4. Complete SS piping for DCLC loops

5.6.3.5. Water piping for Chiller loops shall be heavy-duty Mild Steel (MS/Black Steel) Class-C with all necessary fittings, including bends, elbows, tees, reducers, flanges, flexible/vibration isolators, hangers, supports, unions, bellows and other accessories

5.6.3.6. Fan Wall Units & PAHU

5.6.3.7. Primary Variable-flow pumping units;

5.6.3.8. Expansion tanks;

5.6.3.9. Chemical dosing units;

5.6.3.10. Air separators;

5.6.3.11. Minimum 5-minute thermal storage tank(N+1);

5.6.3.12. Flanges, flange ends, unions, flexible connectors/bellows and joints;

5.6.3.13. Gate, ball, check, butterfly and automatic balancing valves;

5.6.3.14. Temperature, flow, pressure, differential-pressure and water-quality sensors; and

5.6.3.15. All controls, instrumentation, accessories and other equipment necessary for a complete and operational cooling system.

5.6.3.16. All DCLC loop piping, fittings and valves shall be suitable for the specified operating pressure, temperature and coolant. SS piping with SS grooved-end fittings and valves or Factory manufactured SS Piping Skids as per design shall be provided for the DCLC loop.

5.6.3.17. The Bidder shall, in coordination with the IT/Server OEM partner, establish the required DCLC coolant/water quality parameters, including filtration, treatment and monitoring requirements, and shall submit the proposed water-quality specification with solutions proposed along with the Bid for approval.

5.6.4. ANCILLARY ROOM AIR-CONDITIONING (Air-Cooled Chiller/ VRV/VRF)

5.6.4.1. Suitable room air-conditioning shall be provided for all non-IT areas requiring environmental control, including meeting rooms, passages,

BMS/control rooms, staging areas, UPS and battery containers/rooms and other equipment rooms, as required by the design and site conditions.

5.6.4.2. All such systems shall be complete with controls, drainage, electrical connections, piping/ducting, supports and accessories required for a complete and operational installation.

5.6.5. AIR-COOLED SCREW TYPE CHILLER WITH FREE COOLING (FOR DCLC):

5.6.5.1. Supply, installation, testing and commissioning of a factory-assembled, factory-charged and factory-tested High Temperature air-cooled screw chiller, complete with compressors, condenser coils, DX shell-and-tube evaporator, electronic expansion valves (EXV), dual independent refrigeration circuits, controls and all necessary accessories. The chiller shall have a minimum net sensible cooling capacity of 530 TR at the specified design & site conditions, use R134a or any environmentally friendly refrigerant, and be equipped with two (2) full-inverter compressors serving two independent refrigeration circuits. The design supply chilled-water temperatures shall be minimum 25°C leaving with delta T of 10°C, with the unit selected for the applicable ASHRAE N=20-year design ambient based on ‗Extreme Maximum Dry-Bulb (DB) Temperature conditions for Pune. The maximum sound pressure level shall be 70 dBA at 10 m, and the chiller shall have a quick-restart capability to achieve full-load operation within 180 seconds. A factory-fitted free-cooling coil and associated circulation pump shall also be provided as an integral part of the chiller package.

5.6.5.2. The compressor and refrigeration system shall consist of a minimum of two screw compressors, with each compressor operating on a completely independent refrigerant circuit to ensure a true 50% built-in cooling capacity redundancy in the event of a single-circuit failure. The system shall provide 50% cooling capacity in case of failure of one circuit. Each compressor must be direct-drive, semi-hermetic configuration utilizing a inverter/VFD arrangement complete with integrated electronic motor protection. Each circuit shall include isolation valves, EXV, high-pressure (HP) and low-pressure (LP) safety protections.

5.6.5.3. The enclosure shall be constructed from galvanized steel structures/panels with a corrosion-resistant epoxy/polyester coating, suitable for the specified outdoor environment. All external fasteners shall be stainless steel. The outdoor enclosure shall have a minimum IP55 ingress protection rating. Suitable anti-vibration mounts/rubber pads shall be provided.

5.6.5.4. The unit shall be provided with a direct-expansion (DX), shell-and-tube, single-pass evaporator designed for counter-flow operation and provided with suitable closed-cell insulation. The evaporator shall be equipped with chilled-water flow protection to safeguard against inadequate flow conditions. The maximum evaporator water-side pressure drop shall not exceed 4 meter head at design conditions.

5.6.5.5. The condenser shall comprise copper tubes with aluminum fins, suitable for reliable operation under high-ambient conditions. It shall be equipped with high-efficiency EC axial fans and variable-speed fan control based on condensing pressure for efficient operation. The unit shall also be provided with a factory-fitted free-cooling coil and associated circulation pump.

5.6.5.6. The unit shall be provided with an outdoor electrical panel of minimum IP55 rating. The system shall incorporate protection against phase sequence, phase loss, phase imbalance and over/under-voltage. A microprocessor-based controller with display shall monitor and display chilled-water temperatures, refrigerant pressures, compressor current, voltage, alarms and operating status. PID control shall maintain the leaving chilled-water temperature, with anti-freeze and loss-of-water-flow protection. The controls shall provide automatic chiller sequencing, lead/lag operation and load sharing. Provision shall also be there for remote ON/OFF control for integration with the BMS.

5.6.5.7. The system shall include facility for integration with Chiller Plant Manager for automatic sequencing, scheduling and load sharing of multiple chillers. The chiller shall support Modbus RTU over RS485, BACnet or other required communication protocols provided for BMS.

5.6.5.8. The chiller shall be provided with an integrated free-cooling system capable of automatically operating under suitable ambient conditions to pre-cool the entering chilled water, thereby reducing compressor loading and improving overall chiller efficiency.

5.6.5.9. Each chiller shall be provided with A/B dual power supplies and an automatic transfer switch (ATS), with Source A as the preferred supply and Source B as the emergency/alternate supply, ensuring continuity of chiller operation during failure of the preferred source.

5.6.5.10. Each chiller shall be factory run-tested and supplied complete with the required refrigerant charge and oil. The vendor shall submit certified/computer-generated selection data confirming the net sensible cooling capacity as per design conditions, power consumption, airflow, chilled-water flow rate, pressure drop, sound level and applicable other operating data. AHF panel shall be integrated with in the skid or externally connected to it

5.6.5.11. The chiller plant will be integrated with Variable(VFD Integrated) primary pumps (N+2) with each pump individually suitable for full GPM delivery as per Chiller Capacity and Delta T targeted. The Head will be as per detailed engineering. The pumping arrangement can also be separate to chiller skid or integral to chiller skid as per detailed design engineering.

5.6.6. AIR-COOLED SCREW TYPE CHILLER WITH FREE COOLING (FOR AIR COOLING):

5.6.6.1. Supply, installation, testing and commissioning of a factory-assembled, factory-charged and factory-tested air-cooled screw chiller, complete with compressors, condenser coils, DX shell-and-tube evaporator, electronic expansion valves (EXV), dual independent refrigeration circuits, controls and all necessary accessories. The chiller shall have a minimum net sensible cooling capacity of 530 TR at the specified design & site conditions, use R134a or any environmentally friendly refrigerant, and be equipped with two (2) full-inverter compressors serving two independent refrigeration circuits. The design supply chilled-water temperatures shall be minimum 18°C leaving with delta T of 7°C, with supply air temperature of 22 degree Centigrade +/- 2 degree Centigrade, with the unit selected for the applicable ASHRAE N=20-year design ambient based on Extreme Maximum Dry-Bulb (DB) Temperature conditions for Pune. The maximum sound pressure level shall be 70 dBA at 10 m, and the chiller shall have a quick-restart capability

to achieve full-load operation within 180 seconds. A factory-fitted free-cooling coil and associated circulation pump shall also be provided as an integral part of the chiller package.

5.6.6.2. The compressor and refrigeration system shall consist of a minimum of two screw compressors, with each compressor operating on a completely independent refrigerant circuit to ensure a true 50% built-in cooling capacity redundancy in the event of a single-circuit failure. The system shall provide 50% cooling capacity in case of failure of one circuit. Each compressor must be direct-drive, semi-hermetic configuration utilizing a inverter/VFD arrangement complete with integrated electronic motor protection. Each circuit shall include isolation valves, EXV, high-pressure (HP) and low-pressure (LP) safety protections.

5.6.6.3. The enclosure shall be constructed from galvanized steel structures/panels with a corrosion-resistant epoxy/polyester coating, suitable for the specified outdoor environment. All external fasteners shall be stainless steel. The outdoor enclosure shall have a minimum IP55 ingress protection rating. Suitable anti-vibration mounts/rubber pads shall be provided.

5.6.6.4. The unit shall be provided with a direct-expansion (DX), shell-and-tube, single-pass evaporator designed for counter-flow operation and provided with suitable closed-cell insulation. The evaporator shall be equipped with chilled-water flow protection to safeguard against inadequate flow conditions. The maximum evaporator water-side pressure drop shall not exceed 4 meter head at design conditions.

5.6.6.5. The condenser shall comprise copper tubes with aluminum fins, suitable for reliable operation under high-ambient conditions. It shall be equipped with high-efficiency EC axial fans and variable-speed fan control based on condensing pressure for efficient operation. The unit shall also be provided with a factory-fitted free-cooling coil and associated circulation pump.

5.6.6.6. The unit shall be provided with an outdoor electrical panel of minimum IP55 rating. The system shall incorporate protection against phase sequence, phase loss, phase imbalance and over/under-voltage. A microprocessor-based controller with display shall monitor and display chilled-water temperatures, refrigerant pressures, compressor current, voltage, alarms and operating status. PID control shall maintain the leaving chilled-water temperature, with anti-freeze and loss-of-water-flow protection. The controls shall provide automatic chiller sequencing, lead/lag operation and load sharing. Provision shall also be there for remote ON/OFF control for integration with the BMS.

5.6.6.7. The system shall include facility for integration with Chiller Plant Manager for automatic sequencing, scheduling and load sharing of multiple chillers. The chiller shall support Modbus RTU over RS485, BACnet or other required communication protocols provided for BMS.

5.6.6.8. The chiller shall be provided with an integrated free-cooling system capable of automatically operating under suitable ambient conditions to pre-cool the entering chilled water, thereby reducing compressor loading and improving overall chiller efficiency.

5.6.6.9. Each chiller shall be provided with A/B dual power supplies and an automatic transfer switch (ATS), with Source A as the preferred supply and Source B as the emergency/alternate supply, ensuring continuity of chiller operation during failure of the preferred source.

5.6.6.10. Each chiller shall be factory run-tested and supplied complete with the required refrigerant charge and oil. The vendor shall submit certified/computer-generated selection data confirming the net sensible cooling capacity, derated cooling capacity as per design conditions, power consumption, airflow, chilled-water flow rate, pressure drop, sound level and applicable other operating data. AHF panel shall be integrated with in the skid or externally connected to it.

5.6.6.11. The chiller plant will be integrated with Variable (VFD Integrated) primary pumps (N+2) with each pump individually suitable for full GPM delivery as per Chiller Capacity and Delta T targeted. The Head will be as per detailed engineering. The pumping arrangement can also be separate to chiller skid or integral to chiller skid as per detailed design engineering.

5.6.7. THERMAL STORAGE TANK - STRATIFIED TANK (Backup Cooling)

5.6.7.1. Supply, Installation, testing & commissioning of Stratified Thermal storage tank as per below minimum specifications. Thermal storage tank shall conform to ASME Pressure and Vessel Code, Section VIII and its necessary requirements. The System shall comprise of Carbon Steel (SA516 Grade 70) Pressurized Vertical, cylindrical all-welded steel type tank with upper & lower dish-heads, skirt support, tank duly epoxy coated, fittings, flanges, gaskets, temperature sensor etc. Diffusers shall be constructed of stainless-steel plates of grade SS-304. Diffusers to be supported in the Dish-ends at the center and at periphery with Stainless Steel SS-304 Pipes. Cost for supply of Mounting Accessories/ required structural supports, manhole, ladder, internal vales and accessories to be included. The tank shall be duly insulated with 100 mm thick class "O" Closed cell Nitrile rubber insulation covered with 22G Al sheet. The tank shall be provided with flanged connection suitable for Supply & Return connections, drain connection, Air purge, extended stem temperature & Pressure Gauges etc. Figure of Merit shall be minimum 80% to be considered for the selection of tank. Tank design pressure shall be 8 bar minimum. Hydrostatic Test Pressure shall be 1.3 times the design pressure. For Temperature monitoring temperature transmitters with thermowell on the tanks (equidistant at 300mm distance) to be provided.

5.6.7.2. OEM shall provide CFD analysis to validate chilled water storage duration including Discharging cycle analysis - thermocline thickness, discharging Reynolds number & temperature distribution (animation) and Charging cycle analysis – thermocline thickness, charging Reynolds number & temperature distribution (animation).

5.6.8. LIQUID TO LIQUID COOLANT DISTRIBUTION UNIT (L2L CDU)

5.6.8.1. Supply, installation, testing and commissioning of Liquid-to-Liquid Coolant Distribution Units (L2L CDU) for separation and heat transfer between the Technology Cooling System (TCS) and Facility Water System (FWS) serving liquid-cooled DCLC IT Racks. A maximum of four (4) CDUs per AI Accelerator -POD shall be in a 3W+1S or 2W+2S configuration, and each CDU shall be designed and certified for continuous 24×7 data-centre operation and capable of operating in group mode.

5.6.8.2. The CDU shall be designed for a maximum working pressure of 10 bar on both TCS and FWS sides. The TCS shall use PG25 water-glycol or coolant as

per IT OEM requirement, with an operating temperature range of up to 55°C. The FWS shall use water, with an operating temperature range up to 50°C and flow as per system design. The CDU shall be suitable for an ambient range of Pune Site with corrosion category C2. The TCS/secondary circuit shall be designed for a differential pressure of minimum 50 psi. (Actual Pressure drop on the basis of detailed engineering)

5.6.8.3. The CDU shall be of self-supporting construction with galvanized-steel panels finished with epoxy-polyester powder coating and shall be front-accessible for maintenance. Suitable forklift pockets, castors and levelling feet shall be provided, with hydraulic connections at the top/bottom.

5.6.8.4. The CDU shall incorporate a counter-flow AISI 316 stainless-steel brazed plate heat exchanger, rated PN16, with a high-efficiency design and low approach temperature to maximize heat-transfer performance.

5.6.8.5. The TCS/secondary circuit shall be constructed using AISI 304 stainless-steel piping and shall use PG25 fluid or other as per IT OEM recommendation. It shall incorporate inverter-driven pumps in N+1 redundancy, with IE3, IP55 motors and VFD control. Pump control shall be based on differential pressure (ΔP) for the TCS loop, with provision for ΔT/flow control where required. The circuit shall include 25-micron stainless-steel filtration, expansion vessel, automatic air vents, filling/drain provisions, pressure and temperature sensors, pressure relief/safety valve, automatic refill system and integral drain pan with water-leak detection.

5.6.8.6. The FWS/primary facility-water circuit shall use AISI 304 stainless-steel piping and shall be provided with temperature and pressure sensors, a PN16 modulating 2-way control valve, isolation, drain and air-vent provisions. The primary-side flow shall be controlled through the 2-way modulating valve based on TCS supply temperature. The circuit shall include 100-micron filtration and top/Bottom-mounted connections.

5.6.8.7. The CDU shall be suitable for 415 V, 3-phase, 50 Hz dual-source power supply, with independent A/B power feeds and automatic transfer switch (ATS). Separate power and control sections, suitably rated MCB/MCCB, overload and control protection shall be provided.

5.6.8.8. The CDU shall incorporate a microprocessor-based controller with touchscreen HMI for monitoring and control of TCS and FWS supply/return temperatures and pressures, flow, pump speed/status, valve position, alarms and operating parameters. Pump control shall support constant differential pressure, differential temperature or flow modes, with the primary operating mode based on TCS-loop differential pressure. All sensors used for control shall have suitable redundancy to ensure reliable operation. Dew-point monitoring shall be provided using temperature & RH sensors, with alarm and appropriate protective action when TCS temperature approaches the room dew point.

5.6.8.9. The CDU shall support BACnet MS/TP, Modbus RTU over RS485, Modbus TCP/IP and SNMP communication. The BMS interface shall provide monitoring of TCS/FWS temperatures and pressures, flow, pump status and speed, valve position, alarms, operating status and other relevant parameters. Multiple CDUs shall be capable of group operation, coordinated control and load sharing.

5.6.8.10. All wetted TCS components shall be suitable for liquid-cooling applications and shall predominantly comprise AISI 304/316 stainless steel, with compatible EPDM/FKM seals and other corrosion-resistant materials suitable for PG25 /Other coolant service.

5.6.8.11. The CDU shall incorporate high/low-pressure protection, pump-failure protection, flow monitoring, filter,differential-pressure monitoring, water-leak detection, pressure relief and dew-point/condensation protection. Automatic standby-pump operation shall be initiated upon failure of the duty pump. Critical control sensors shall be suitably redundant, and the control system shall generate alarms and protective actions for sensor failure, abnormal pressure, temperature, flow and leakage conditions.

5.6.8.12. Each CDU shall be factory-tested prior to shipment, including pressure, leak testing, other testing and alarms, internal flushing/cleaning, and suitable nitrogen pre-charging and isolation for shipment. The vendor shall submit GA drawings, technical datasheets, certified performance data, hydraulic schematic, electrical drawings, BMS point list, installation/operation and maintenance manuals, control philosophy and factory test reports.

5.6.8.13. **RACK-LEVEL PRESSURE-INDEPENDENT INTEGRATED CONTROL VALVE ASSEMBLY:**

Supply, installation, testing and commissioning of factory-assembled electronic pressure-independent control valve (PICV) suitable for direct-to-chip liquid cooling (DCLC) of AI data-centre racks, complete with modulating actuator with fail safe protection, integrated flow meter, supply & return temperature sensors and controller. The valve shall be suitable for DCLC Kw load of rack and minimum design flow at design ΔT. Final valve sizing shall be based on actual design flow, available differential pressure and manufacturer's (IT OEM) pressure-drop data. Valve shall provide pressure-independent flow control, flow accuracy ≤±5% and measurement accuracy ≤±2% or better, with adjustable minimum/maximum flow and power limits. It shall provide real-time flow, supply & return temperature, delta T, instantaneous cooling power (kW) and ΔT Management. Valve shall be suitable for PG25 water-glycol or other coolant as per IT OEM, with minimum 10 bar working pressure and project operating temperature range, with compatible wetted materials and seals. Electronic actuator shall support modulating 0–10 V/digital control, position feedback and manual override. The valve shall provide direct BACnet/IP, BACnet MS/TP and/or Modbus TCP/RTU communication for BMS integration, with full telemetry including flow, temperature, power, energy, setpoint, status and alarm points. Each DCLC rack shall have an independent Integrated Valve Assembly for rack-level DCLC cooling control based on Differential Pressure set point, metering and optimisation.

5.6.9. FLOOR-MOUNTED CHILLED-WATER PAHU (PDU ROOMS & OTHER EQUIPMENT AREAS):

5.6.9.1. Supply, installation, testing and commissioning of floor-mounted chilled-water Precision Air Handling Units (PAHU) suitable for continuous 24×7 operation in data-centre/critical applications. The unit shall be designed for high sensible cooling capacity, high sensible heat ratio (SHR), reliable operation and low energy consumption, with a maximum sound pressure

level of 65 dBA at 1 m. The PAHU shall have a minimum net sensible cooling capacity which is 10% higher than calculated heat load. The chilled-water entering/leaving temperature of 18/25°C, supply-air temperature of 22+/-2°C.

5.6.9.2. The PAHU shall be of double-skin CRCA/GI construction with epoxy-polyester powder coating and suitable fire-rated thermal/acoustic insulation, with front-access arrangement for installation and maintenance. It shall be equipped with direct-drive EC backward-curved centrifugal fans with variable-speed control, based on cooling demand and cold-aisle/floor pressure. The cooling coil shall be a chilled-water coil comprising copper tubes and aluminium fins with hydrophilic coating, minimum six rows, high SHR and low air-side pressure drop. A stainless-steel condensate drain pan with trap and drain connection shall be provided. Chilled-water flow shall be controlled through a 2-way pressure-independent motorized control valve (PIBCV) for supply-air temperature regulation, with a minimum of two supply-air temperature sensors and real-time valve position and feedback available on the display and BMS. Replaceable F4/EU4 or equivalent filters with clogged-filter and airflow-loss monitoring, a factory-fitted motorized return-air damper, and electric reheat and electrode humidifier shall be provided.

5.6.9.3. For cold-aisle pressure control, each PAHU shall be provided with a minimum of two differential-pressure sensors, with automatic EC fan-speed modulation to maintain positive cold-aisle pressure and a minimum adjustable pressure setpoint. All PAHUs shall support group control with automatic capacity modulation.

5.6.9.4. The PAHU shall incorporate a microprocessor based PID controller with local display for monitoring room/supply temperature, RH, setpoints, fan speed/status, valve position, cooling status, running hours and alarms. The controller shall store historical alarms with password-protected settings and shall provide BACnet/IP, BACnet MS/TP or Modbus RTU/IP communication for BMS integration. Automatic lead/lag sequencing with equalized running hours and automatic standby-unit start upon duty-unit failure shall be provided.

5.6.9.5. The PAHU shall be provided with a main isolator, MCB/MCCB and necessary electrical protections, including phase failure, phase reversal, phase imbalance, overload and electrical fault protection. A/B dual power supply with ATS shall be provided. Heater and humidifier operation shall be interlocked with fan operation, and water-leak detection with alarm and shutdown provision shall be provided.

5.6.9.6. The bidder shall submit certified/computer-generated selection data confirming net sensible and total cooling capacity, airflow. The complete PAHU shall be factory assembled and tested and suitable for continuous 24×7 data-centre operation under the specified design conditions.

5.6.10. CHILLED WATER FAN WALL COOLING UNIT (IT HALLS):

5.6.10.1. Supply, installation, testing and commissioning of a floor-mounted Chilled Water Fan Wall Precision Cooling Unit, blow-through type, suitable for white-space/data-centre applications with rear/top return air and front/horizontal discharge, designed for continuous 24×7 operation. The unit shall operate on 415 V, 3-phase, 50 Hz power supply and shall provide

net sensible cooling capacity of minimum 350kw/unit (AI Accelerator Room-2W+2S) and minimum 400 kW/unit(Network Room-2W+1S), in single- or double-module configuration as applicable, using high-efficiency EC fans.

5.6.10.2. The unit shall comprise a CRCA/GI sheet-steel frame and panels finished with epoxy-polyester powder coating,, with minimum 15 mm thermal/acoustic insulation. It shall be floor-mounted with front/service access and fitted with easily replaceable F4/EU4 or equivalent filters accessible from the front. Provision shall be made for automatic motorized return-air dampers to isolate standby units and prevent air short-circuiting.

5.6.10.3. The cooling coil shall comprise copper tubes with aluminium fins and hydrophilic coating, with a minimum 6-row configuration, designed for high SHR and low-pressure drop. A stainless-steel condensate drain pan with trap/siphon and air-vent/bleed valves at high points shall be provided. The chilled-water circuit shall be fully insulated and rated PN10, with a 2-way pressure-independent control valve (PIBCV) for precise cooling control. Chilled-water connections shall be at the top /bottom connections.

5.6.10.4. The unit shall be provided with EC backward-curved centrifugal fans suitable for 380–480 V, 3-phase, 50 Hz, with variable-speed control. Fans shall have minimum IP54 and Class-F motor protection, low-vibration mounting and automatic airflow modulation. The equipment shall comply with applicable CE/UL safety certification requirements.

5.6.10.5. A microprocessor-based PID controller shall provide automatic control of EC fan speed and chilled-water valve position. A minimum 7-inch display shall indicate room/supply-air temperature, RH, CHW inlet/outlet temperature, fan speed, valve position, operating status and alarms. The unit shall support BACnet MS/TP, BACnet/IP, Modbus RTU/IP or equivalent communication for BMS, including monitoring and control of temperature, RH, fan operation, valve position, alarms and unit status.

5.6.10.6. The unit shall be provided with A/B dual power supplies with ATS and protection against phase loss, phase sequence, over/under-voltage and overload. Minimum instrumentation shall include two supply-air temperature sensors, one return-air temperature sensor, one RH sensor and CHW inlet/outlet temperature sensors. Water-leak detection with alarm and shutdown provision shall be provided, together with manual override for fan and valve operation where required.

5.6.10.7. The manufacturer shall submit selection sheet confirming net sensible cooling capacity minimum 350 kW/unit & minimum 400 kw/unit respectively, airflow, external static pressure. The complete unit shall be factory tested and suitable for continuous 24×7 data-centre operation under the specified design conditions.

5.6.11. UNDER FLOOR PIPING FOR SECONDARY FLUID NETWORK:-

5.6.11.1. This specification covers grooved-end pipes, joint couplings and fittings for the underfloor secondary fluid network (SFN).

5.6.11.2. References and Standards – American Society for Testing and Materials (ASTM)

- ASTM A193 - Alloy-Steel and Stainless-Steel Bolting Materials for High Temperature or High-Pressure Service and Other Special Purpose Applications

- ASTM A312 – Seamless and Welded Austenitic Stainless-Steel Pipe
- ASTM A351 – Castings, Austenitic, Austenitic-Ferritic (Duplex), for pressure Containing Parts
- ASTM A743 – Iron-Chromium Nickel, Corrosion Resistant, for General Applications

5.6.11.3. Pipe: Pipe shall be stainless steel conforming to ASTM A312, Type 304/304L or 316/316L, Schedule 10S, roll or cut grooved as appropriate to the pipe material, wall thickness, pressure, size and method of joining. Elbows shall also be Schedule 10S. All valves shall be rated minimum PN16. Piping shall be provided with Class 0 nitrile thermal insulation (Armaflex/K-Flex or equivalent) with a protective coating and minimum 26 SWG aluminium cladding.

5.6.11.4. Mechanical Couplings for Joining Stainless Steel Pipe

5.6.11.5. Stainless Steel Mechanical Couplings: Couplings shall be manufactured in two or more segments of cast stainless steel conforming to ASTM A351, A743 and A744. Gaskets shall be pressure-responsive synthetic rubber, of a grade to suit the intended service, conforming to ASTM D2000. Coupling bolts shall be Type 316 stainless steel meeting the physical properties of ASTM A193, Grade B8M, Class 2.

5.6.11.6. Rigid Type: Couplings shall be cast with a key designed to clamp the bottom of the groove to provide an essentially rigid joint.

5.6.11.7. Flexible Type: Flexible couplings shall be used where vibration attenuation and stress relief are required, typically at CDU connection points.

5.6.11.8. Mechanical couplings shall be manufactured in two segments conforming to ASTM A536. Gaskets shall be pressure-responsive synthetic rubber, of a grade to suit the intended service, conforming to ASTM D2000. Bolts shall be heat-treated carbon steel track-head bolts conforming to ASTM A449 and A183, with a minimum tensile strength of 758 MPa (110,000 psi). Sizes DN50 to DN100 (2" to 4") may be installation-ready for direct stab installation without field disassembly, with a Grade EHP gasket rated to +120 °C (+250 °F).

5.6.11.9. Flange Adapters: Flange adapters shall be used with grooved-end pipe and fittings for mating to ANSI Class 125 flanged components.

5.6.11.10. Grooved End Fittings: Fittings shall be manufactured from stainless steel conforming to ASTM A403 (WPW, WPW/S9 or CR/S9), or fabricated from stainless steel pipe conforming to ASTM A312, with factory-grooved ends. Fittings shall be Type 304/304L or 316/316L stainless steel and shall comply with the following:

5.6.11.11. Elbows, Tees, Reducing Tees, Laterals, True Wyes, Crosses, Adapter Nipples and Eccentric Reducers: Schedule 10S, Type 304L or 316L stainless steel, roll grooved from material conforming to ASTM A403/A403M, pipe

conforming to ASTM A312/A312M, or sheet conforming to ASTM A240/A240M.

5.6.11.12. Concentric Reducers: DN40 × DN20 to DN65 × DN50 (1½" × ¾" to 2½" × 2"), including 76.1 × 60.3 mm, Schedule 10S, Grade CF8M (Type 316 stainless steel) conforming to ASTM A351/A351M, A743/A743M and A744/A744M.

5.6.11.13. Caps: For use with Schedule 10S pipe; Schedule 10S, Grade CF8M (Type 316 stainless steel) conforming to ASTM A351/A351M, A743/A743M and A744/A744M.

5.6.11.14. Grooved fittings shall be selected for cooling applications only. Fittings intended for fire hydrant line applications shall not be used.

5.6.11.15. Grooved End Valves:

5.6.11.15.1. Butterfly Valves: Butterfly valves shall have a Grade CF8M stainless steel body and disc, 316 stainless steel stem, PTFE-impregnated glass fabric bearings with 316 stainless steel backing, and a synthetic rubber seal. The valve stem shall be offset from the disc centreline to provide full 360-degree circumferential seating. Valves shall be bubble-tight for dead-end or bi-directional service up to 2,068 kPa (300 psi).

5.6.11.15.2. Ball Valves: Ball valves shall be two-piece, standard-port valves with a Grade CF8M stainless steel body, 316 stainless steel ball and stem, TFE seats and fluor elastomer seals.

5.6.11.16. Braided Hoses: Hoses shall be convoluted Type 304 stainless steel with hygienic coupling to the CDU and DN65 PN16 fittings to suit the facility/secondary circuit. Maximum working pressure shall be 10 bar, test pressure 30 bar, and working temperature range −20 °C to 85 °C.

5.6.11.17. The SFN must have been undergone for Mechanical Integrity Test for 600Kpa pressure test ,Pre-Passivation, Passivation and Flushing.

5.6.11.18. Based on the IT OEM details, layout and technical information provided in this tender, the bidder shall submit SFN Design documents to meet all technical requirements of the tender.

Parameter Cluster	Engineering Metric	Specified Threshold	Verification Method	Pass/Fail Condition
Material Base	Piping Alloy Composition	SS 304L (UNS S30403)	EN 10204 3.1 Material Test Report	Carbon content must be ≤ 0.03% to prevent sensitization.
Cleanliness	Particulate Pass-Through	≤ 25 Microns	Downstream optical particle counting / patch analysis	Detection of any individual particle > 25µm

				causes test failure.
Pressure Hold	Micro-Pressure Fluctuation (Δ P)	≤ 50 Pa (± 0.5 mbar)	Digital differential transducer data logging	Pressure baseline drift exceeding 50 Pa within 1 hour triggers a fail.
Data Logging	Continuous Validation Window	≥ 60 Minutes	Automated PLC / DAQ timestamp logging	Any logging drop or system communication break invalidates the test.
Gas Quality	Medium Purity Envelope	UHP Nitrogen (N_2)	Trace moisture/particle analysis of supply line	Supply dewpoint must remain ≤ -40°C to avoid inner condensation.

5.6.12. CHILLED WATER PIPING , VALVES & OTHER EQUIPMENTS:

5.6.12.1. INSULATED MS PIPING

5.6.12.1.1. Supply, Installation, Testing and Commissioning of insulated MS heavy class (Class "C') pipes cut to required lengths and installed with all welded joints. The scope shall be inclusive of supply and fixing in position the necessary fittings like flanges, elbows, tees, bends, reducers, sockets etc., including hanging arrangement and floor supports as required, HDG angles/channels, GI fully threaded rods, rigid PUF saddles, U clamps, washers and check nuts. All pipe supports shall be of Galvanized Steel. The supports shall be recoated with cold galvanizing spray/paint wherever the base coat is damaged to avoid corrosion. Pipe material shall be conforming to IS 1239 (Part 1): 2004 Class C (up to 150mm) & IS 3589 :2001 MS for above 150mm.

5.6.12.1.2. For Pipe sizes of 125mm dia & above complete channel support shall be provided. For floor supports, supports shall be complete with pipes of adequate size with base plate & vibration isolation pads and "C" channel. All pipe supports channels, fastener etc. to be selected as per support depth & loading. All piping shall be tested to hydrostatic test pressure of at least two times the maximum operating pressure but not less than 10 Kg/ Sq.cm for a period of not less than 24 hours prior to commencement of application of insulation.

5.6.12.1.3. All sleeves in Fire wall/slab shall be sealed using acrylic/foam-based fire sealant of minimum 2 hours fire rating as per BS 476-20 at inlet/outlet openings of Pipes etc. within the building at critical crossings and at building entry. Fire sealant shall be suitable for metal, masonry, concrete base material. Thickness at cut-outs shall be as per vendor

recommendation and shall be cleared as per engineer-in-charge observations.

5.6.12.1.4. The pipe insulation shall be nitrile rubber (thickness given below) with Class 'O' fire retardant properties as per specifications. Pipe insulation shall be covered with 22G aluminium cladding as per specifications. Joints shall be sealed with adhesive forming proper bonding. Adhesive shall be fire retardant type.

5.6.12.2. VALVES:

5.6.12.2.1. Supply, installation, testing and commissioning of valves, strainers, gauges in the chilled water circuit. The valves & strainer shall be installed at appropriate location for easy access for operation, cleaning & maintenance and gauges shall be visible for taking readings as per site conditions. All necessary arrangement for fixing shall be included, duly insulated similar to the connected piping and adequately supported as per specifications. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.3. BUTTERFLY VALVES

5.6.12.3.1. Supply, installation, testing and commissioning of the following of Butterfly Valve lugged Type of PN-16 rating Cast Iron body conforming to IS 210 Gr. FG 260 with EPDM Integrally Molded Body liner (seal) and SS disc (CF8 AISI 304), SS-431 stem & EPDM 'O' Ring. Valve shall be suitable for insertion between ANSI B16.5 / CL150 BS 10 Table D/E Flanges. Handle of valve up to 150mm shall be lever type & valve 200mm Dia & above shall be gear operated. Valve shall be provided with complete accessories nut, bolts, gaskets and companion flanges etc. Valve shall be selected in such a way that it can be converted to motorized butterfly valve with actuator installation. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.4. MOTORIZED BUTTERFLY VALVES

5.6.12.4.1. Supply, installation, testing and commissioning of the following hand lever operated as well as motorized Butterfly Valve lugged Type of PN-16 rating Cast Iron body conforming to IS 210 Gr. FG 260 with EPDM Integrally Molded Body liner (seal) and SS disc (CF8 AISI 304), SS-431 stem & EPDM 'O' Ring. Valve shall be suitable for insertion between ANSI B16.5 / CL150 BS 10 Table D/E Flanges. Valve shall be provided with complete accessories nut, bolts, gaskets and companion flanges etc. Valve shall be selected in such a way that it can be converted to motorized butterfly valve with actuator installation.

5.6.12.4.2. Actuating motor shall be Non-spring return rotary type ON/OFF actuator of suitable torque, motor working on 220 V AC supply for indoor and outdoor application respectively complete with control wiring in copper construction. It should have minimum two auxiliary switches. Motor shall be able to produce minimum torque and working time. Actuator shall be BMS compatible, to be completely integrated, hardwired with Plant manager. It shall be able to receiver command ON/OFF & also provide the status. Valves shall have provision for failsafe mode

operation. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.5. BALANCING VALVES:

5.6.12.5.1. Supply, installation, testing and commissioning of following nominal sizes of Manual Balancing PN-16 Valve; Cast Iron body conforming to IS210 Gr FG. 260 and SS 410 stem & disc and EPDM seat. Valve shall be suitable for insertion between ANSI B16.5 / CL150 BS 10 Table D/E Flanges. Sizes from 25mm to 50mm shall be Gun metal body. Sizes from 65mm to 400 mm shall be cast Iron Body. Valve shall be provided with complete accessories nut, bolts, gaskets and companion flanges etc. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.6. CHECK VALVES

5.6.12.6.1. Supply, installation, testing and commissioning of following nominal sizes of Dual Plate Check Valve of PN16 rating of Cast Iron body conforming to IS210 Gr FG. 260, SS plates (CF8 AISI 304) & SS Hinge/Stop Pin (AISI-410). Valve shall be suitable for Insertion Between ANSI B16.5 CL150 BS 10 Table D/E/F Flanges. Valve shall be provided with complete accessories nut, bolts, gaskets and companion flanges etc. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.7. BALL VALVES

5.6.12.7.1. Supply, Installation, Testing and Commissioning of following sizes of PN16 Ball Valves, Forged Brass of Cu-Alloy Ball (Nickel Plated) with Teflon Seat & Seals. Valve shall be lever operated & Stem with Gland Packing of Teflon (PTFE). Valve shall be suitable for insertion with Screwed Female BSP Parallel Threads conforming to BS:21. Valve shall be insulated with nitrile rubber **insulation with Class 'O' fire retardant properties.**

5.6.12.8. Y -STRAINERS

5.6.12.8.1. Supply, Installation, Testing and Commissioning of following sizes of PN-16 'Y' Type Strainer of MS body, SS 304 Screen (Renewable) and a permanent magnet. Valve shall be suitable for insertion between Flanges as per ANSI B16.5 / CL-150/BS 10 Table E (Undrilled)and also conforming to DIN 3202 F1 for Face-to-Face connection. Valve shall be provided with complete accessories nut, bolts, gaskets and companion flanges etc.

5.6.12.8.2. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.9. FLOW METERS

5.6.12.9.1. Supply, Installation, Testing and Commissioning of electromagnetic type flow meter PN16 rating, suitable for outdoor/Indoor application. Flow meter shall be BMS compatible with Modbus RS485/ Chiller Plant Manager. Quoted price shall be inclusive of current transformers, control cabling & power cabling etc. as required. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.10. BTU METERS

5.6.12.10.1. Supply, installation, testing & commissioning of PN-16 Ultrasonic BTU meters, IP based, BMS/ Chiller Plant Manager compatible with suitable flanges and fittings with Flowmeter, gaskets, control cabling, Thermowell temperature sensors & display. Pressure drop across BTU meter shall not exceed 1mWG.

5.6.12.10.2. The units shall be capable of measuring the energy consumed with very high accuracy, it should calculate and store maximum values, display flow rates and temperature difference across supply and return. It shall be suitable for hooking on to M - bus. The display panel shall be mounted at readable height and it shall include interconnecting wiring between the flow meter and the display panel. The unit shall be housed in a totally tamper-proof box. Quoted price shall be inclusive of current transformers, control cabling & power cabling etc. as required. Valve shall be insulated with nitrile rubber insulation with Class 'O' fire retardant properties.

5.6.12.11. THERMOMETERS:

5.6.12.11.1. Supply, Installation, Testing and Commissioning of 150mm dia dial type thermometers complete in stainless stainless steel (SS) construction, SS thermowell measuring range from 0°C to 50°C

5.6.12.12. PRESSURE GAUGES:

5.6.12.12.1. Dial type pressure gauges complete in stainless stainless steel (SS) construction with 150mm dia dial and complete with nipple, SS syphon, & shut off gauge cocks etc. with measuring range from 0 to 16 kg/cm2. U tube of pressure gauges shall be insulated.

5.6.12.13. Automatic Chemical Dosing & RO Plant:

5.6.12.13.1. Supplying, dosing and commissioning of automatic chemical dosing system with pumps, tanks with calibration markings & required pH sensor, TDS sensor & other sensors as required for below ASHRAE 5.1.2.4 table requirements, Valves & controls, Electrical Panel with Voltage stabilizer, necessary chemicals etc. required for maintaining minimum water quality parameters as per chiller OEM requirement. No. of tanks shall be as per No. of chemicals. Scope shall be inclusive of all accessories and fillers, power & control cabling etc. required for complete installation.

5.6.12.13.2. Chemicals shall be as per IS 188 (1999) standards required for corrosion inhibition, de-scaling, microbes and pH control of chilled water as per water test report to be arranged by contractor to achieve the water quality as per chiller OEM requirement & CDU OEM. Dosing shall be done as per instructions by chemical dosing vendor. Chemical Dosing system shall be able to auto detect the water quality & capable of dosing chemicals accordingly. Corrosion Inhibitor Nitrite blend Non-oxidizing Micro-biocide Chemical cleaner for de-scaling Citric Acid or equivalent for lowering pH.

5.6.12.13.3. Automatic RO Plant has to be supplied and integrated with makeup water connection to loop.

5.6.12.13.4. Chilled Water Characteristics to be maintained is as below - This will be as per ASHRAE

5.6.12.14. Water quality parameters:-

5.6.12.14.1. FWS :- Table 5.3,ASHRAE2014

5.6.12.14.2. TCS:- Table 6.2,ASHRAE2014

5.6.12.14.3. However , bidder shall validate the water quality requirements with CDU OEM and DCLC IT OEM. Requirements of the CDU OEM and DCLC IT OEM shall prevail. Necessary all sensors(as per OEM) shall be in place to monitor for both FWS and TCS side Water quality parameters and the data shall be integrated to BMS also for centralized monitoring

5.6.12.15. Reverse Osmosis (RO) Water Treatment Plant:-

5.6.12.15.1. The bidder shall design, engineer, supply, install, test and commission a fully automatic Reverse Osmosis (RO) Water Treatment Plant suitable for providing make-up water to the Data Centre cooling system.

5.6.12.15.2. The RO plant shall be designed based on the actual raw-water analysis, Chiller, CDU and IT OEM water-quality requirements and overall cooling-system water balance.

5.6.12.15.3. The complete system shall include raw-water/feed pumps, pressure sand filter, activated carbon filter and/or suitable pretreatment, softener wherever required, micron cartridge filtration, antiscalant/chemical dosing system, high-pressure pump, TFC RO membranes, membrane pressure vessels, automatic flushing arrangement, treated-water storage, instrumentation and a PLC-based control system.

5.6.12.15.4. The RO plant shall be designed for a minimum recovery of 75% or better, subject to raw-water chemistry and membrane design. The vendor shall submit detailed RO projection and water-balance calculations establishing the proposed recovery, membrane flux, salt rejection and reject-water quantity.

5.6.12.15.5. The treated RO water shall meet the cooling equipment manufacturer's recommended water-quality limits, with particular consideration to conductivity/TDS, total hardness, alkalinity, chlorides, silica, pH and scaling/corrosion potential.

5.6.12.15.6. The system shall be sized with 15% design margin. Required redundancy (N+1) shall be considered to ensure uninterrupted cooling-system operation under Data Centre design conditions.

5.6.12.15.7. All critical pumps and treatment components shall be provided in Duty/Standby configuration. The RO system shall interface with the BMS

for remote monitoring of operational status, alarms, tank levels and critical water-quality parameters.

5.6.12.15.8. The vendor shall provide complete P&ID, water balance, equipment sizing calculations, RO membrane projection, electrical load details, GA drawings, control philosophy, instrumentation list, consumable requirements and treated-water quality guarantee as part of the technical submission.

5.6.12.15.9. The key parameters to specify are as per IT OEM , CDU OEM and ASHRAE 2014(Latest) requirements :

- RO plant capacity in **m^3/hr**
- Feed-water analysis
- Minimum design recovery
- RO membrane salt rejection
- Product-water conductivity/TDS
- Total hardness
- Silica
- Alkalinity
- Chlorides
- pH
- Maximum membrane flux
- Cooling-tower cycles of concentration
- Make-up/blowdown water balance
- Duty/standby philosophy
- Treated-water storage capacity
- Online conductivity/TDS monitoring
- PLC/BMS integration
- Automatic flushing/CIP provision
- Reject-water utilization/disposal philosophy
- RO plant in **N+1 configuration**

5.6.12.16. **PIBCV (Pressure Independent Balancing and Control Valve) in branch pipe to each Cooling Delivery unit**: -These valves shall be factory calibrated. Each valve shall limit flow rates within ±5% accuracy, regardless of system pressure fluctuations. Sufficient number of flanges and unions shall be provided as required to facilities maintenance work once the piping is installed. Piping shall be properly supported on or suspended from stands, clamps, roller hangers, etc. as required. The contractor shall adequately design all brackets, saddles, clamps and hangers and shall be responsible for their structural integrity. Each support shall be isolated from the support by means of anti-vibration springs or durable liner of neoprene rubber. Pipe supports shall be of steel and shall be painted with rust preventive paint and finish coated with synthetic enamel paint of approved colour. Only factory made supports with Galvanized fully threaded rods with bands are acceptable. The chilled water pipes shall be isolated from the bands by a rubber sheet.

5.6.12.17. Expansion Tank: Closed Expansion & Pressurization Unit:-

5.6.12.17.1. Tank with Expansion Vessel and pressurizing Pumps with one working and one standby. Expansion tank to be of MS with Armaflex/ K-Flex Insulation minimum 32 mm thick & minimum 26 Gage Aluminium Cladding with diamond finish with related piping, isolating valves, safety valves, drains, overflow. Tank Shall have Anticorrosive Coating. Close expansion tank should be provided with water capacity to suffice the capacity of volume of water contraction & expansion during operation & rest state of the system while maintaining proper system pressurization under varying operating conditions. Tank should be a closed vessel with rubber bladder/diaphragm to maintain the operating pressure inside the pipelines. System should include PRV and Air Vent also. Pressurization unit consisting of inline vertical multistage, centrifugal water pump with SS 304 casing, SS304 impeller and SS316 shaft, CI base TEFC motor, with mechanical seal, control panel and with duty cycling and dry run protection pressurization unit is provided for chilled water system to makeup water is lost through blowdowns or minor leakages. Standby and working booster pump should be provided with selector switch for pump starting, pressure differential transmitter, pressure gauge & non-return valve at discharge outlet of the pump, suction and discharge manifold. The system consists of an air vented tank into which treated water is supplied through the domestic water system and a pump unit that pressurized and feeds the water into the chilled water loop. The system should be skid mounted along with vacuum degasser to remove any dissolved gasses.

5.6.12.18. Cooling Schedule: -

	Cooling Provision: -	Details	Target Chillers	Duty Cycle
1	IT Halls (POD-1 & POD-2)	CDU and Precision Chilled Water Cooling (FWU) (N+1) with ATS for A/B UPS power input (Cold aisle	Air cooled Chiller(DCLC) + Air cooled	24/7

		Temperature Target: -22+/-2 degree Celsius at rack input)	Chiller(for Air Cooling)	
2	IT Halls (POD-3)	Precision Chilled Water Cooling (FWU) (N+1) with ATS for A/B UPS power input (Cold aisle Temperature Target: -22+/-2 degree Celsius at rack input)	Air cooled Chiller(for Air Cooling)	24/7
3	Container for UPS & Container for Battery along with Incoming & Outgoing panels	DX Precision Cooling with water cooled condenser (N+1) with automatic power changeover switch for A/B UPS power input (Room Temperature Target: -24+/-2 degree Celsius)	Air cooled Chiller(for Air Cooling)	24/7
4	Container for Other Electrical panels /Equipment's	DX Cooling with water cooled condenser/Air cooled Condenser (N+1) with automatic power changeover switch for A/B raw power input (Room Temperature Target: -24+/-2 degree Celsius)	Air cooled Chiller(for Air Cooling)	24/7
5	PDU Room in the DC floor	PAHU Cooling (N+1) with automatic power changeover switch for A/B UPS power input (Room Temperature Target: -24+/-2 degree Celsius)	Air cooled Chiller(for Air Cooling)	24/7
6	BMS Room, SOC room, Staging Room, NOC room, Corridor and other support areas in the DC floor	VRV/VRF comfort cooling with adjustable thermostat control (N+1) and with automatic power changeover switch for A/B Raw power input (Room Temperature Target: -24+/-2 degree Celsius).VRV/VRF Outdoor unit to be placed on terrace of the building on suitable MS structure.	VRV/VRF	24/7

5.7. ELV WORKS

The Bidder shall be responsible for the complete design, engineering, supply, installation, testing and commissioning (SITC) of all ELV systems required for the Data Centre, including all equipment, cabling, accessories, software, licenses, integration and associated works necessary for a complete and operational system. The scope shall include, but not be limited to, the following:

5.7.1. FIRE DETECTION AND ALARM SYSTEM

The Bidder shall provide a complete addressable fire detection and alarm system, including FACP, repeater panels, smoke/heat detectors, MCPs, hooters/strobes, I/O modules, ASD/VESDA for critical IT areas, power supply and batteries, complete cabling and containment, with suitable interfaces to HVAC, UPS, DG, BMS and other relevant systems. The system shall include all necessary accessories,

programming, testing, commissioning and integration and shall comply with applicable IS, NFPA and statutory requirements.

5.7.2. CCTV SURVEILLANCE SYSTEM

The Bidder shall provide a complete IP-based CCTV surveillance system covering all critical areas, entrances/exits, IT and equipment rooms, electrical rooms, DG areas, perimeter and other designated locations, including IP cameras, VMS, required storage, monitors, PoE switches and all associated accessories. The system shall provide continuous recording, central monitoring and video retrieval with adequate storage for the specified retention period.

5.7.3. ACCESS CONTROL SYSTEM

The Bidder shall provide a complete network-based access control system for all designated controlled areas, including access control panels, FR-Biometric-Card readers, door controllers, electromagnetic locks, door position sensors and all associated accessories. The system shall be integrated with the fire alarm system and shall include central monitoring, event logging and reporting wherever required.

5.7.4. STRUCTURED CABLING AND NETWORKING FOR STAFF/OPERATORS

The Bidder shall provide a complete structured cabling and networking system for staff/operator areas, including Cat-6A/Cat-7 and fibre-optic cabling, patch panels, LIUs, racks, patch cords, fibre accessories, network switches and all associated components. The scope shall include complete cable trays/conduits, labelling, identification, termination, testing and certification of all copper and fibre links.

5.7.5. PUBLIC ADDRESS / VOICE EVACUATION SYSTEM

The Bidder shall provide a complete Public Address and Voice Evacuation System for all designated areas, including amplifiers, speakers, microphones, control panels, emergency interfaces, cabling and accessories. The system shall be suitably integrated with the Fire Alarm System for automatic emergency announcements and voice evacuation.

5.7.6. BMS INTEGRATION

All ELV systems shall be capable of integration with the BMS, wherever applicable, for monitoring, alarm and status indication. Necessary gateways, interfaces, communication modules, licences and integration works shall be included.

5.7.7. OTHER ELV SYSTEMS

The scope shall also include, wherever applicable, intercom/telephone system, perimeter security and other ELV systems required for the complete operation and security of the facility.

5.7.8. GENERAL REQUIREMENTS

5.7.8.1. All ELV systems shall be based on open, scalable and proven technology and shall comply with applicable IS/IEC/NFPA/local statutory requirements and relevant standards.

5.7.8.2. The Bidder shall submit detailed design and engineering calculation, drawings for the system architecture, block diagrams, equipment specifications, coverage/layout drawings, cable schedules, rack layouts,

storage calculations, network architecture, integration philosophy and other relevant technical documents.

5.7.8.3. The Bidder shall include all cables, power supplies, UPS-backed power, earthing, termination, labelling, testing, commissioning, software, licences, training, documentation and as-built drawings required for a complete and fully functional ELV installation.

5.7.9. Minimum Requirements: -

5.7.9.1. Fire Alarm System for all areas in first floor.

5.7.9.2. Fire Suppression System (Fluro Ketone FK-5-1-12) or equivalent or better in first floor, UPS -Battery & Panels container Area, Other Critical Electrical Rooms.

5.7.9.3. HSSD/VESDA System in Server area.

5.7.9.4. Water Leak Detector System for Server area and PDU Room, UPS -Battery & Panels in container Area, Other Critical Electrical Rooms

5.7.9.5. Rodent Repellent System for whole first floor and other critical NON-IT Areas

5.7.9.6. Video Surveillance System (CCTV) of all internal as well as outside area with 90 days back up period.

5.7.9.7. Access Control System

5.7.9.8. Boom Barrier system (at least two numbers)

5.7.9.9. X ray baggage scanning system(at least one number)

5.7.9.10. BMS Monitors (10 Numbers) and LED 4K TVS(65 INCH)- (12 Numbers)

5.7.9.11. BMS software to monitor all equipment , instrumentation, power consumption, Real time PUE , average PUE- Monthly, Quarterly, Annually, Equipment Power consumption, Equipment change over, Temp and RH values, water quality parameters- Primary as well as DCLC loop ,all reports, History, Trends etc.

5.7.10. WATER LEAKAGE DETECTION SYSTEM (WLD)

5.7.10.1. The water leak detector shall be installed to detect any seepage of water into the critical area and provide alerts for the same.

5.7.10.2. It should consist of water leak detection cable and an alarm module. The cable shall be installed in the floor areas around the periphery.

5.7.10.3. Water Leak Detection system shall be for the IT Rooms (AI Accelerator +NETOWRK/STORAGE ROOMS) & other critical Non-IT Area (UPS, Battery, Electrical Panel room/Containers etc.). Water Leak Detection System shall be wire-based solution with alarm. It is preferred to typically divide a visible area into several zones and monitor each zone using a multi-zone control panel.

5.7.10.4. All materials, equipment's, fittings, etc. used in the installation should conform to the latest relevant IS. In case of materials for which standards specifications do not exist, the material shall be approved by the Client before start of work.

5.7.10.5. The work covered under this contract will require best quality workmanship and construction management.

5.7.10.6. The panel shall be microprocessor based one and shall be modular in design. The system should have different zones and detectors shall be connected to the panel through the zone module. Each area shall be divided into specific zones such that the user if required should isolate any zone.

5.7.10.7. The Panel should provide volt free contacts and Modbus RS485 output to connect to BMS System.

5.7.11. RODENT REPELLENT SYSTEM

5.7.11.1. Ultrasonic pest repellents shall be provided for whole first floor and other critical areas. This includes IT Rooms (AI Accelerator+NETOWRK/STORAGE ROOMS- in the above false ceiling, DC floor & below raised floor) ,Support Rooms(in the above false ceiling, floor & below raised floor) in First floor, & other critical Non-IT Area (UPS, Battery, Electrical Panel rooms /Containers etc.). as applicable to repel the pests without killing them. The rodent control system should comprise of an Ultrasonic Pest Repelled of a VFHO Model or Equivalent & monitoring software. The facility to be integrated with BMS.

5.7.11.2. Configuration: Master console with necessary transducer and Cabling

5.7.11.3. Operating Frequency : Above 20 KHz (Variable)

5.7.11.4. Sound Output : 50 dB to 110 dB (Not audible to humans)

5.7.11.5. Power output : 800 mW per transducer

5.7.11.6. Power consumption : 15 W approximately

5.7.11.7. Power Supply : 230 V AC 50 Hz

5.7.12. HSSD/VERY EARLY HIGH SMOKE DETECTION APPARATUS:

5.7.12.1. The HSSD/VESDA system should provide an early warning of fire in its incipient stage, analyses the risk, and provide alarm and actions appropriate to the risk the system should include, but not be limited to, a Display Control Panel, Detector Assembly, and the properly designed sampling pipe network. The system equipment shall be supplied by the manufacturer or by its authorized distributor.

5.7.12.2. The HSSD system should provide an early warning of a fire in its incipient stage. HSSD Detector shall be installed to sample the air from a protected area. In operation the air from the protected area shall be drawn through a piping network in the detector unit by an aspirating fan unit to the detector assembly. The air shall be illuminated by a laser light source. The area to be covered is IT Rooms (AI Accelerator ROOMS+NETOWRK/STORAGE ROOMS)

5.7.12.3. Independently programmable alarm points should provide additional visual indications on the display control cards and activate associated relays for additional annunciation and alarm.

5.7.12.4. Engineering Sampling Pipe Network

5.7.12.5. Piping networks shall be laid out to provide detection points with spacing.

5.7.12.6. Provide all sampling point pipe caps with predrilled holes per manufacturer's

5.7.12.7. shop drawings.

5.7.12.8. The design program for the air sampling pipe network shall be listed or

5.7.12.9. approved by Underwriters Laboratories or Factory Mutual [FM].

5.7.12.10. The design program for the air sampling pipe network should provide

5.7.12.11. a balanced engineered system and ensure equal sensitivity at each sampling point.

5.7.12.12. The air sampling smoke detection system shall consist of highly sensitive smoke detectors with aspirating fans, air sampling pipe network, filters, networked controllers and a high-level interface to the building Fire Alarm System, as required.

5.7.12.13. The air sampling detectors shall provide a nominal obscuration level range from .0015 to 6% /ft., adjustable through the system operator control interface.
5.7.12.14. Smoke Detector Assembly: The smoke detector, filter, and aspirating fan shall be housed in a Detector Control Assembly Enclosure and arranged in such a way that air is drawn from the protected area through the filter and detector by the aspirating fan.
5.7.12.15. The Detector Control Assembly shall house the programmable intelligent controller, which will support air flow/detector supervision, automatic and manual sensitivity adjustment, time delay and remote reset functions. Laser Compact detector shall communicate with the fire alarm control panel.
5.7.12.16. The system shall provide 3 field-selectable levels of alarm status: Alert Level 1 (.04% obscuration/ft.), pre-Alarm Level 2 (1.06 % obscuration/ft.) and Alarm Level 3 (2.6% obscuration/ft.). Actual sensitivity levels will be determined in the field and programmed during system commissioning. Alarm Levels 1 and 2 will initiate a Supervisory Condition on the Fire Alarm System, and Alarm Level 3 will initiate the building-wide evacuation sequence.
5.7.12.17. Approval – UL & FM
5.7.12.18. 18000 Event logs required.
5.7.12.19. Output signal – 5 Relay contact for Fault / Alarm & one analogue output for smoke density
5.7.12.20. Large flow rate fan (Max. shutoff pressure: at least 350Pa and max. flow rate: at least 170L.min

5.7.13. GAS BASED FIRE SUPPRESSION SYSTEM

5.7.13.1. The Clean Agent system considered for Total flooding application shall be in compliance with the provisions of Kyoto Protocol.
5.7.13.2. While installing new systems and/or replacing old systems the environmental impact of the new fire suppression system in accordance with Kyoto Protocol shall be given due consideration.
5.7.13.3. The minimum criterion for the selection of the Clean Agent will be on the following parameters
5.7.13.4. -Zero Ozone Depleting Potential.
5.7.13.5. -Global Warming Potential not exceeding one.
5.7.13.6. -Atmospheric Lifetime not exceeding one week.
5.7.13.7. The minimum design standards shall be as per NFPA 2001, 2004 edition or latest revisions & NFPA 72
5.7.13.8. For safety reasons the clean agent fire suppression system cylinder, valve, discharge hose, nozzles, fire detection detectors and panels etc. to be with UL/FM approvals.
5.7.13.9. The system shall be complete in all ways. It should include all mechanical and electrical installation, all detection and control equipment, agent storage containers , discharge nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, advisory signs, functional checkout and testing, training and any other operations necessary for a functional UL/FM listed Clean Agent suppression system. etc. The bidder shall submit

the manufacturer's agent datasheet, system design documentation and relevant certification/test reports with the technical bid.

5.7.13.10. The system (s) shall be actuated by detection of at least two Multi Criteria Detectors. Area to be protected are entire first floor and other critical NON-IT Areas such as UPS,BATTERY ,Electrical Panel Areas/Container etc.).

5.7.13.11. The system design can be modular, central storage, or a combination of both design criteria.

5.7.13.12. As per NFPA guidelines & OEM spec, room integrity may be ensured.

5.7.13.13. Systems shall be designed in accordance with the manufacturer's guidelines.

5.7.13.14. Tanks shall be actuated by either a resettable electric actuator or by manual actuator. Each tank should have a pressure gauge and pressure switch to provide visual and electrical supervision of the container pressure. Manual Release (Electric) shall be located at each exit from the protected hazard, Abort Station Next to Manual release, Audible and Visual Alarms (Strobe) shall be placed outside and above each exit door from the protected space. Provide an advisory sign at each light location, Caution and Advisory Signs & System and Control Wiring(All wiring shall be Copper twisted pair FRLS Armoured Cable)

5.7.13.15. The fire suppression system shall include and not be limited to gas release control panel, CCOE approved seamless cylinders, suitable discharge valve & actuator) as the case may be, discharge pipe, check valve and all other accessories required to make a complete operation system meeting applicable requirements of NFPA 2011 standards and installed in compliance with all applicable requirements of the local codes and standards.

5.7.13.16. Portable fire extinguishers shall also be distributed all areas such as passage, staff office rooms, substation area , Dg yard, chiller yard, Transformer areas etc. as per NFPA-10 and BIS: 2190. Additional extinguishers shall be provided as per requirements of Local Fire Authorities.

5.7.14. Fire Protection Schedule: -

Sr No.	Area	Sensing Points	Protection Methods
1	IT Halls	Multi-Criteria's Detectors (Smoke & Heat) +VESDA	Clean-agent gaseous suppression product (FK-5-1-12)+ BIS-certified portable CO_2 fire extinguishers (at least 4.5 kg) conforming to applicable IS 2878 / IS 15683 requirements
2	PDU Room and Other Electrical Critical Areas in first floor (DC)	Multi-Criteria's Detectors (Smoke & Heat) +VESDA	Clean-agent gaseous suppression product (FK-5-1-12)+ BIS-certified portable CO_2 fire extinguishers (at least 4.5 kg) conforming to applicable IS 2878 / IS 15683 requirements

3	Staging Room in in first floor (DC)	Multi-Criteria's Detectors (Smoke & Heat) +VESDA	Clean-agent gaseous suppression product (FK-5-1-12)+ + BIS-certified portable CO_2 fire extinguishers (at least 4.5 kg) conforming to applicable IS 2878 / IS 15683 requirements
4	UPS-Containers in Utility Area	Multi-Criteria's Detectors (Smoke & Heat) +VESDA	Clean-agent gaseous suppression product (FK-5-1-12)+ BIS-certified portable CO_2 fire extinguishers (at least 4.5 kg) conforming to applicable IS 2878 / IS 15683 requirements
5	BATTERY (LIB)-Containers in Utility Area	Multi-Criteria's Detectors (Smoke & Heat) +VESDA	Clean-agent gaseous suppression product (FK-5-1-12)+ BIS-certified portable CO_2 fire extinguishers (at least 4.5 kg) conforming to applicable IS 2878 / IS 15683 requirements
6	Other Containers housing Electrical Panels (HT &LT) in Utility Area	Multi-Criteria's Detectors (Smoke & Heat)	BIS-certified portable CO_2 fire extinguishers (at least 4.5 kg) conforming to applicable IS 2878 / IS 15683 requirements and any other Methods if required by local byelaws (PMRDA), Local Fire Authority & NBC--2016(Latest)
7	Other Support Rooms in first floor DC (BMS, SOC, NOC, MEETING, DC Corridors & OTHER ROOMs/AREAS)	Multi-Criteria's Detectors (Smoke & Heat)	Pre-Action Sprinklers and BIS-certified portable ABC fire extinguishers (At least 4 KG) conforming to applicable IS 2878 / IS 15683 requirements and Any Other Methods if required by local byelaws (PMRDA), Local Fire Authority & NBC-2016(Latest)
8	Washroom /Toilet Area in first floor(DC)	Multi-Criteria's Detectors (Smoke & Heat)	Pre-Action Sprinklers and BIS-certified portable ABC fire extinguishers (At least 4 KG) conforming to applicable IS 2878 / IS 15683 requirements + Any Other Methods if required by local byelaws (PMRDA), Local Fire Authority & NBC-2016(Latest)
9	Other Areas in DC & Utility Area	NA	Methods required by local byelaws (PMRDA), Local Fire Authority & NBC--2016(Latest)

5.7.15. BUILDING MANAGEMENT SYSTEM:

BMS System: - The proposed software shall be independent software platform for monitoring the parameters of Mechanical systems, Electrical systems, Chiller Plants, CDU, FWU, PAHU,DG Sets Fuel Yard, Motorized Valves, and other critical

systems etc. as applicable. The BMS shall monitor the parameters of the data centre mechanical equipment to maintain environmental conditions, such as temperature, pressure, and humidity, within acceptable limits and at optimal energy efficiency. A graphical user interface (GUI) or Human Machine Interface (HMI) needs to provide as a visual representation of local conditions, equipment overrides, set point adjustments, historical trends, and alarms conditions at the equipment level. The BMS also functions to notify the proper recipients, onsite or offsite, in the event of abnormal operation, and archive historical data for use in troubleshooting and analyzing system operation. BMS software must have web client and should be able to access from any standard Web browser (Chrome, Firefox, Edge, Internet Explorer etc.) without any plugins and shall be supplied with minimum inbuilt 10 licenses. BMS Software patches update and Version updates to be considered as part of scope during Warranty and AMC Period. BMS should have minimum 3-year historical data storage capacity. BMS software should have activity/auditing functionality so that each user action can be tracked based on login. The total BMS Architecture has to be PLC based redundant (N+1) architecture. Two servers are employed, with one being active and the other acting as a hot standby. The standby server continuously synchronizes data with the primary server in real time, ensuring both servers have identical information. If the primary server fails, the system automatically switches to the standby server. The essential source transfer, pump, FWU , PAHU & CDU protection and local cooling control etc . must continue autonomously when the supervisory BMS or a communication segment is unavailable.

5.7.15.1. Architecture of BMS system shall be of:

5.7.15.1.1. Management Level (BMS Servers/Software)

5.7.15.1.2. Control Level (PLC Controllers)

5.7.15.1.3. Field Level (Field Sensors)

5.7.15.1.4. BMS should have capability to show real time PUE, trends and record historical data of PUE.

5.7.15.1.5. BMS should generate event notifications over emails and sms, data for events based on which uptime and downtime will be calculated.

5.7.15.1.6. BMS should generate alarm signal and tripping signal at abnormal situations.

5.7.15.1.7. Allow easy access to documentation such as images, manuals and allows user to locate equipment on floor plans and maps instantly.

5.7.15.1.8. 3D Graphics to be considered. Operator customizable Report/Trend module to be considered. The BMS software shall provide for Extensive Graphics Functionality for HVAC / Electrical / Auxiliary Systems, with online display of parameter values.

5.7.15.1.9. There should be real-time reporting of Component wise and aggregate power consumption - Energy meters are provided to monitor the usage of the Electrical Energy at various stages.

5.7.15.1.10. Temperature and relative humidity in the data centre and UPS,battery room etc..

5.7.15.1.11. Instantaneous PUE, hourly PUE, daily PUE, monthly PUE and annual PUE.

5.7.15.1.12. Alarm indicators for component failures.

5.7.15.1.13. GUI with Electrical SLD ,P &ID, Equipment's visuals etc.

5.7.15.1.14. BTU Meters are provisioned in the P & ID Design to ensure a Real-time measurement of the BTU being consumed, and this information needs to be available to the BMS System.

5.7.15.1.15. The BMS system should allow for the monitoring, control, interrogation, alarm handling and routing for the following equipment's but not limited to:

- HVAC equipment – Chillers/Pumps/Valves /Actuators /CDU/FWU/PAHU
- Generators & Fuel Yards equipment's
- UPS and Battery system
- HV/LV metering and equipment.
- Fire Alarm Systems.
- Water Leak detection System.
- Rodent Repellent System

5.7.15.1.16. There should be real-time monitoring and logging of all parameters of the data center as per ASHRAE/TGG 2009 Real time energy consumption measurements in data centers guidelines (best practical). There should be facilities for periodic reports (including uptime reports) of all aspects of the data Centre. All the required hardware and software eco-system which store at least three years of historical data (High end PC, Key Board, Mouse etc.) has to be supplied by the bidder.

5.7.15.1.17. The Integrated Control Platform shall support encrypted password authentication for all web services whether serving or consuming.

5.7.15.1.18. Supply, Installation, Testing and Commissioning of BMS System which includes Automation Graphic Software, BMS Machine, PLC Controllers with necessary Panels, Field Sensors, Third Party Integrations, Integration with fire alarm panel, Monitoring and control of cooling units , monitoring and controlling of pump and valve operations etc,

5.7.15.1.19. The BMS IO summary bidder has to prepare and submit. This summary shall define the actual Digital/Analogue Input/output points and soft points to be considered for the functioning of the BMS. The Actual soft points shall be considered during the detail design stage based on the actual parameters selected and the mapping points. Bidder shall work out the Servers configuration and storage calculation based on the requirements as stipulated in this document considering inputs and the exact count of IO, Soft points.

5.7.15.1.20. BMS should control the operation of oxygen pumping equipment's under fire situation.

5.7.15.1.21. The scope shall be deemed to include for all labour, materials, equipment, transportation, insurance, tools and all connected works for the completion of work. The work shall be completed in all respects including safety measures to the entire satisfaction of Client and in accordance with all local laws, regulations, covering these types of installations.

5.7.15.1.22. Integrated Building Management System is proposed for the following:

- Monitoring and data logging from various services
- Controls for various services

Monitoring, control and data logging is proposed for following services

All high side HVAC equipment shall be monitored and controlled by a dedicated chiller plant manager. This chiller plant manager shall be remotely connected to BMS for data logging. Access control system to be linked with Fire alarm system through IBMS so that in case of fire, access control shall be bypassed.

All other services as per the table given for monitoring and control.

E&M SERVICE DESCRIPTION	MONITORING	CONTROL
Chillers i/c Chiller Plant Manager, primary variable pumps, Thermal storage tanks, CDU , all motorized valves etc.	Yes	Yes
FWU, PAHU	Yes	Yes
Ventilation fans, pressurization, exhaust fans, etc (if any)	Yes	Yes
Any other HVAC related equipment	As required by Tier-III and Best Industry Practice for AI Data Centre	
All HT panels, LT Panels, DG sets, fuel tank, AMF panel/COP, energy meters of substations & all major panels etc.	As per Design scheme	
UPS	Yes	-
Battery	Yes	-
LV systems like Data center, ASD/VESDA, CCTV, Water leakage detection system, Rodent Repellent System, etc.	Yes	-
Lighting(Internal &External)	Yes	Yes
Access control system	Yes	-
Fire Alarm system	Yes	-
Gas based fire suppression system	Yes	-
Very early smoke detection & analysis system (VESDA)	Yes	-
Pumps	Yes	-

E&M SERVICE DESCRIPTION	MONITORING	CONTROL
Tank level indicator - (Low, High, Mid) for all tanks (HSD Diesel Tanks, Thermal storage Tanks etc.)	Yes	-
Flow switch, flow meter, etc. in all major supply and delivery lines	Yes	-
Spare I/Os - 20%	Yes	Yes
All balancing valves	Yes	Yes
Any other critical E&M service as required within the EPC contract, UPTIME Tier III Requirements & Best Industry Practice for Data Centers	As required	

5.7.15.1.23. The BMS system must offer forward and backward compatibility. Also, the BMS vendor should offer obsolescence support for 5 years from the date of acceptance.

5.7.15.1.24. The control system shall consist of a high-speed, peer-to-peer network of PLC controllers I.P. network controller (as desired) and a web-based operator interface. Depict each mechanical system and electrical system by a point-and-click graphic. A web server with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface subject to all network security applications in place.

5.7.15.1.25. The system must be able to handle natively different disciplines in a building: Automation, Fire, Access Control, Video. The disciplines must allow distribution across independent servers if required. Scope of access for controlling and monitoring discipline data must allow customization per user in every owner station. Each owner station must be able to be assigned one or more disciplines, allowing customizable single or multiple discipline access mode. The exchange of data (values, events, and trend data) between other DC systems, or other supplemental services, must be supported via web services.

5.7.15.2. Hardware requirements

5.7.15.2.1. Central Control Server System

Supplying Installation Testing Commissioning of Central Control Server System comprising of Intel® Xeon® CPU E5-2640 x64 or better (latest series) compatible with dual and quad core processors, Latest Windows version, Windows Server 2013 R2 (Standard, Enterprise, 64 bit) 32 GB or more RAM , Video card and monitor capable of displaying at 1024 x 768 resolution or better, 2x 1TB HRADDISK(SSD), Latest Microsoft Licence Version Operating System Loaded with MS OFFICE Professional (latest), Word, EXCEL, Power Point, Outlook Express, Microsoft Team official

version lifetime licenses suitable for running BMS software complete etc. as required.

5.7.15.3. BMS PC :-

Supplying Installation Testing Commissioning of Client PC System(10 Numbers) comprising of PC Hardware with minimum11th Gen Intel® I7 processor CPU E5-2640 x64 (or better), compatible with dual and quad core processors minimum 3.1 Ghz and 16 GB or higher RAM, Hard Drive Space of 1 TB SSD or better, Video card and 24 inch LEDmonitor capable of 1920 x 1080 pixel resolution or better with Ethernet adapter (10/100/1000 Mbps with RJ-45 connector) with 2 GB or higher Graphics card suitable for BMS System complete etc. as required.

5.7.16. Fire Alarm System

5.7.16.1. *Scope of Work* :-Supply, Installation, Testing and Commissioning of Intelligent Addressable Fire Alarm System (FM Approved/ UL Listed) which includes Intelligent Addressable Fire Alarm Panel, FM approved Analogue Addressable Multi Criteria Type Detector with Inuit Isolator Base, Addressable Manual Call Point, Sounder (85 Db), Response Indicator (For False Floor Areas), Addressable Control module for activating sounder , Gas release Panel , Access Control De-Activation, Short Circuit Isolator Module, Addressable Monitor Modules, 2 core x 1.5 sq.mm twisted pair shielded multi strand Armored FRLS cable etc.

5.7.16.2. The system and its components shall be Underwriters Laboratories, Inc. listed, and FM APPROVED under the appropriate testing standard, for fire alarm systems and the installation shall be in compliance with the UL 10th Edition listing. The fire alarm system shall comply with requirements of NFPA 72 (National Fire Alarm and Signaling Code). The system shall be electrically supervised and monitor the integrity of all conductors. When a fire alarm condition is detected and reported by one of the system indicating the affected devices, the following functions shall immediately occur:

- The System Alarm LED to be flashed.
- Built in Agent release circuit with release / Abort module of same make.
- System output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm should be executed, and the associated system outputs (notification appliances and/or relays) to be activated.

5.7.16.3. The audio portion of the system should sound the proper audio signal (consisting of tone, voice, or tone and voice) to the appropriate zones.

5.7.16.4. Zone identification should be available on BMS system.

5.7.17. ACCESS CONTROL SYSTEMS

5.7.17.1. Access control system (ACS) is to be deployed to allow entry for the authorized personnel only and restrict unauthorized people from entering nominated areas of Data Centre. Access privileges to be configured as per the access data stored in Access Door Controllers (ADC). Face Recognition, Biometric and Card Authentication based authentication is required for both ingress and egress of doors.

5.7.17.2. It shall support distributed architecture with central monitoring and control. If communication to the central control fails, the ACS shall continue providing access based on the predefined security configuration. Until communication is restored, all event logs and alarms shall be stored locally for minimum six months (based on ADC capacity). These events shall be sent to the central control when the communication is regained.

5.7.17.3. It shall have multiple supervised inputs. The dynamic status of each input shall be continuously monitored and each change should be reported immediately.

5.7.17.4. It shall provide programmable inputs, i.e. the ability to apply a variety of conditions to the way in which these inputs are monitored. These conditions shall be expressed in definite terms. It shall be able to produce and communicate various types of outputs (Audible sirens, relay switching etc.) based on the above definition. These outputs shall be standard in terms and shall be interfaced as inputs to Building Management System. ACS communications should support RS232/ RS485/ TCP/IP. All data over the network between the ADC and the Server end shall be encrypted. All ACS software/firmware upgrades shall be downloadable through the network to the ADC.

5.7.17.5. Face Recognition, Biometric and Card Authentication required for user access to all IT halls both for ingress and egress.

5.7.17.6. Face Recognition, Biometric and Card Authentication for user access to rest all rooms in first floor area

5.7.17.7. Past Door Access Records should be stored and readily available for audit at least for last six months

5.7.17.8. <u>Access Control System with Face and Fingerprint Recognition Reader</u>

Supplying, Installation, Testing and Commissioning of Access Control System comprising of Face and fingerprint Recognition, Smart Card, QR Code, NFC & PIN Code based Reader, Minimum 5" IPS TFT Touch Screens, 1GB RAM, 8 GB ROM, Live Face Detection with anti-spoofing against 2D photograph, mobile selfie & video, Fake Fingerprint and face Detection Technology, 30,000 Face storage (1:N) /, 3,000 fingerprint (1:N), QR code 30,000, 30,000 card storage (1:N), 2 lakh transaction storage, 20,000 image logs, onboard dual camera (colour & IR) Primary camera min 2MP, Support authentication & verification from up to 1 meters, Communication protocols WiFi, TCP/IP, Wiegand Out, Wiegand IN, USB, MQTT protocol, Blacklist Employee Management, User wise authentication modes; Built in Lock Control, Mask Detection & Alert (configurable), 40 to 30,000 lux illumination, IP65 for Ingress Protection, Certification: CE, FCC, BIS, ROHS, etc. Metal Enclosure with battery backup, suitable for mounting on metal surface/metal frames/ wooden frames/wall/flap barriers including all mounting bracket & accessories complete etc. as required.

5.7.17.9. <u>Software for Web based Access Control System</u>

Supplying, Installation, Testing and Commissioning of Web based Access Control Enrolment and Device Configuration Software, Should be independent of OS (Windows), Unified Management of Biometric, Card, and Controllers, Import Functionality for bulk user details, Biometric Template Retrieval for Data Recovery, User Management, Logs and Terminal

Management, Support for IP-based and USB Biometric Devices, User-specific Access Policies, Different User Policies on the Same Terminal, Assignment of Specific Access Schedules, Pushing Users to Terminals or Groups, Admin Authority Management to define rights of each user to perform, Blacklist User Management, Access Schedule Creation, Real-Time Log Retrieval, Real- Time User Identification, Secure Storage of Biometric/Users Data, Capable to integrate with 3rd party applications over Web API's, MQTT protocol support

5.7.18. Video Surveillance Systems:

5.7.18.1. The surveillance system shall be designed and developed to the following standards: NFPA-70 (National Electric Code), National Electrical Safety Code (NESC), CE Compliant, UL ISO/IEC 27001 etc.- Supply, Installation, Testing and Commissioning of CCTV system along with indoor, outdoor cameras to cover entire DC area as well as outside equipment's area. All security alarm activations shall be brought to the attention of the BMS room and, where specified, live, and recorded images of the event are to be presented to the BMS control room automatically. The objective will be to provide High degree of electronic surveillance system to the first-floor area and outside utility. The purpose is to monitor & servile the entire area for unwanted incidents. The objective is also to restrict unauthorized personnel entry & exit through critical areas and facilitate effective people management. Strategically placed video surveillance cameras help to enhance security by providing motion based/continuous monitoring of all parts of DC Facility. The CCTV system shall comprise of various types of Indoor and Outdoor cameras with *at least 90 days storage capacity* with high end recording resolution. The storage disk architecture also should be in N+1 functionality with parallel storage to avoid any data loss due to failure of one storage unit. In case of network or power failure, camera can automatically switch to auxiliary (local) power source & start recording on the memory card inside the camera & can push the recording back to network once the network is up in the same time frame without any loss of recording. Camera should be with true day and night IR lens and suitable IP rated for indoor and outdoor applications.

5.7.18.2. Below minimum Locations of CCTV camera to be considered -

5.7.18.3. IT halls and all other rooms entrance & exit, Passage Area, Reception area (First Floor)

5.7.18.4. Substation area, DG Yard, Transformer Yard, Fuel Storage Yard, Chiller Plant etc

5.7.18.5. UPS and Battery, & Panel Room/Containers

5.7.18.6. LT and HT panel Area

5.7.18.7. Thermal Storage Tank Areas

5.7.18.8. And Other Critical areas

5.7.18.9. <u>4 MP IP IR Dome Camera:-</u>

SITC of 4 MP IP IR Dome Camera, 4 MP resolution (2560 × 1440) @ 25/30 fps, with 2.7–4 mm to 12–13.5 mm or better motorized varifocal lens, suitable for indoor surveillance applications, complete with all accessories and fittings. The camera shall support PAL/NTSC, Signal-to-Noise Ratio >50 dB, and shall display camera title, date and time in live and recorded video.

It shall have 1/2.8-inch or better progressive-scan CMOS image sensor, capable of producing colour images under low-light/night conditions, with minimum illumination of 0.006 lux @ F1.4, AGC ON and 0 lux with IR or better, True Day/Night operation with high-performance mechanical IR-cut filter with automatic switching, integrated IR source with Auto/Manual selection and built-in IR LEDs having effective IR distance of minimum 50 m or better, with minimum 30 m colour view at night. Imaging features shall include electronic shutter 1/3 s to 1/30,000 s, Auto Gain Control, Auto White Balance, Back Light Compensation, multi-zone privacy masking, HLC and digital watermarking. Video compression shall be minimum H.265 or better, with audio compression supporting G.711U/A, G.711Mu, G.726, AAC and G.723 or equivalent. The camera shall provide WDR of 120 dB or better and 3D Digital Noise Reduction (DNR) with ON/OFF facility. It shall support triple video streaming, with configurable main stream of 4 MP (2560 × 1440) @ 25/30 fps and minimum sub-stream of 720p @ 25/30 fps. Image settings including rotate mode, saturation, brightness, contrast and sharpness shall be adjustable through client software/web browser. Edge analytics shall include Tripwire, Intrusion Detection and Motion Detection. Cybersecurity features shall include AES-256-bit encryption, configuration encryption, Trusted Execution, Digest authentication, security logs, account lockout, video encryption, IP/MAC filtering, HTTPS and trusted/secure firmware upgrade. The camera shall have an onboard Micro SD/SDHC/SDXC card slot supporting up to 512 GB and shall be supplied with minimum 128 GB memory card, with facilities for SD formatting, overwrite, storage management and recording to NAS. Alarm/event functions shall include motion/tampering detection, network-disconnection detection, IP-conflict detection, memory-card status detection and memory-space detection. Network protocols shall include SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS and unicast. The camera shall support ONVIF and compatibility with open-source/third-party VMS. Ethernet interface shall be 1 × RJ45 10/100 Ethernet port. Audio shall include 1 × built-in microphone and 1/1 alarm input/output for external microphone/speaker connection as required. Power input shall support simultaneous dual power supply through 12 VDC power adapter and PoE IEEE 802.3af, ensuring continued operation in case of failure of one power source, with support for 12 VDC/24 VDC/PoE (802.3af)/ePoE, as applicable. Housing shall be IP67 weatherproof, IK10 impact resistant and metallic body construction. The camera shall be suitable for ambient temperature of -5°C to +50°C and relative humidity up to 95% maximum, non-condensing. IR LED life shall be 40,000 hours or higher and video bitrate shall be 32 Kbps to 8 Mbps or better. The camera shall comply with applicable BIS with ER, CE, FCC and RoHS requirements. The complete system shall include camera, motorized varifocal lens, IR illumination, 128 GB memory card, mounting brackets/junction box, power supply/PoE injector or switch interface, network and power cables, connectors, accessories, software/licences, installation, configuration, testing and commissioning, complete in all respects.

5.7.18.10. 8 MP IP IR Outdoor Bullet Camera

Supplying, Installation, Testing and Commissioning of 8 MP IP IR Outdoor

Bullet Camera, having 8 MP (3840 × 2160) resolution or better, with 2.7–4 mm to 12–13.5 mm or better motorized varifocal lens, suitable for outdoor surveillance applications, complete with all accessories, mounting hardware, cabling, connectors, power supply/PoE accessories, software/licences and necessary fittings. The camera shall have an outdoor bullet type construction with 1/2.8-inch or better progressive-scan CMOS image sensor, capable of producing colour images under low-light/night conditions, supporting PAL/NTSC, with Signal-to-Noise Ratio >50 dB and minimum illumination of 0.006 lux @ F1.4, AGC ON and 0 lux with IR or better. Imaging functions shall include electronic shutter 1/3 s to 1/30,000 s, Auto Gain Control, Auto White Balance, Back Light Compensation, multi-zone privacy masking, HLC and digital watermarking. The camera shall display camera title, date and time on both live and recorded video. It shall provide True Day/Night operation using a high-performance mechanical IR-cut filter with automatic switching and integrated Smart IR LEDs having an effective IR illumination distance of minimum 50 m, with minimum 30 m colour view at night. Video compression shall support H.265 or better, and audio compression shall support G.711U/A, G.711Mu, G.726, AAC and G.723 or equivalent. The camera shall provide WDR of 120 dB or better and 2D/3D Digital Noise Reduction (DNR) with ON/OFF facility.

5.7.18.11. The camera shall support triple configurable video streaming, with minimum main stream resolution of 8 MP (3840 × 2160) @ 20 fps, sub-stream of 4 MP @ 25/30 fps and D1 @ 25/30 fps. Image parameters including rotate mode, saturation, brightness, contrast and sharpness shall be adjustable through client software/web browser, with facilities for user configuration import/export. The camera shall support digital watermarking, user authentication and minimum 8 simultaneous users. It shall have an onboard Micro SD/SDHC/SDXC card slot supporting up to 512 GB and shall be supplied with a minimum 128 GB memory card, with facilities for SD formatting, overwrite, storage management and recording to NAS.

5.7.18.12. Edge analytics shall include Tripwire, Intrusion Detection and Motion Detection. Alarm/event functions shall include motion/tampering detection, network-disconnection detection, IP-conflict detection, memory-card status detection and memory-space detection, with minimum 1/1 alarm input/output ports. Audio shall include 1 × built-in microphone and 1/1 audio input/output ports for connection of external microphone and speaker, as required at site, with the specified audio compression formats.

5.7.18.13. The camera shall support network protocols including SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS and Unicast. It shall support ONVIF Profile S, Profile G and Profile T and shall be compatible with open-source/third-party VMS. The camera OEM shall be a full-time member of ONVIF and the quoted camera model shall be listed on the official ONVIF website; all relevant certifications and credentials shall be valid on the date of technical evaluation. Cybersecurity features shall include Trusted Boot, AES-256-bit

encryption, configuration encryption, Trusted Execution, Digest authentication, security logs, account lockout, video encryption, IP/MAC filtering, HTTPS and trusted/secure firmware upgrade.

5.7.18.14. The camera shall have 1 × RJ45 10/100 Ethernet port and shall support simultaneous dual power input through 12 VDC power adapter and PoE, ensuring continued operation in the event of failure of one power source. Power requirements shall support 12 VDC / 24 VDC / PoE (IEEE 802.3af) / ePoE, as applicable. The enclosure shall be IP67 weatherproof and IK10 impact resistant, suitable for outdoor installation. The camera shall operate at ambient temperature of -5°C to +50°C and relative humidity up to 95% maximum, non-condensing. IR LED life shall be 40,000 hours or higher, and video bit rate shall be 32 Kbps to 8 Mbps or better. The equipment shall comply with applicable BIS with ER, CE, FCC and RoHS requirements.

5.7.18.15. The complete system shall include 8 MP IP IR outdoor bullet camera, motorized varifocal lens, integrated IR illumination, minimum 128 GB memory card, mounting brackets/junction box, power adapter/PoE interface, network and power cables, connectors, accessories, software/licences and all necessary hardware, including installation, configuration, testing, commissioning and integration with the CCTV/VMS system, complete in all respects

5.7.18.16. <u>8 MP IP IR Motorized PTZ Camera:</u>

5.7.18.16.1. Supply, installation, testing and commissioning of an 8 MP IP-based IR motorized PTZ camera with minimum resolution of 3840 × 2160 pixels, capable of recording at 25/30 fps or better at the specified resolution, triple-stream video transmission and configurable video resolution. The camera shall incorporate a progressive-scan CMOS image sensor of 1/1.8 inch or better, PAL/NTSC signal compatibility, and minimum illumination of 0.008 lux at F1.6 with AGC ON and 0 lux with IR illumination. The camera shall provide automatic gain control, automatic/manual white balance, backlight compensation, highlight compensation, image rotation, electronic image stabilization (EIS), defog, ROI, adjustable saturation, brightness, contrast and sharpness, 2D/3D digital noise reduction and multi-zone privacy masking for a minimum of 24 areas. Shutter speed shall be configurable from approximately 1 second to 1/30,000 second or better.

5.7.18.16.2. The camera shall be equipped with a motorized varifocal lens having a focal length of approximately 3.95 mm to 177.75 mm or better, with automatic and manual focus adjustment, minimum 32× optical zoom and 12× digital zoom or better. The horizontal, vertical and diagonal fields of view shall be approximately 65.7°–1.9°, 39.4°–1.1° and 73.1°–2.1° respectively, or better. The camera shall provide 360° endless pan movement, with minimum manual pan speed of 260°/s and preset pan speed of 300°/s or better. Tilt range shall be at least -20° to +90°, with auto-flip function, manual tilt speed of at least 120°/s and preset tilt speed of at least 200°/s.

5.7.18.16.3. The camera shall incorporate a high-performance mechanical IR cut

filter for true day/night operation and integrated IR LEDs providing an effective IR illumination distance of at least 150 m, with automatic IR intensity control. The camera shall provide true WDR of 120 dB or better, HLC and BLC. The signal-to-noise ratio shall be greater than 50 dB. The camera shall support camera title, date and time display on live and recorded video.

5.7.18.16.4. The camera shall support deep-learning-based automatic object tracking using simultaneous pan, tilt and zoom operations. On detection of movement within a defined monitoring area, the camera shall automatically track the detected object and maintain it within the field of view. The camera shall support at least 300 presets, programmable patrol/tour functions and a minimum of 5 seconds pre-event and 5 seconds post-event buffering.

5.7.18.16.5. Video compression shall support H.265 and H.264 as a minimum, with triple-stream capability and configurable bit rate. Audio compression shall support G.711U/A, G.711MU, G.726 and AAC or better. The camera shall support an audio input and audio output interface for connection of an external microphone and speaker. Alarm interface shall provide minimum 7 alarm inputs and 2 alarm outputs, or better. Event notification shall be possible through relay output, e-mail and FTP/SFTP.

5.7.18.16.6. The camera shall support edge-based video analytics including motion detection, video tampering detection, network disconnection detection, IP conflict detection, SD-card status/health monitoring, storage-space monitoring, tripwire, intrusion detection, object abandoned/missing detection, smart motion detection (SMD) and face detection. The camera shall support ROI and configurable detection/monitoring regions.

5.7.18.16.7. The camera shall support IPv4/IPv6, TCP/IP, UDP/IP, HTTP, HTTPS, DNS, DHCP, NTP, SMTP, SNMP, ICMP, FTP/SFTP, NFS, PPPoE, RTSP/RTSPS and other standard network protocols as applicable. The camera shall comply with ONVIF Profile S, Profile G and Profile T. The camera OEM shall be a current full member of ONVIF and the quoted camera model shall be listed on the official ONVIF website on the date of technical evaluation. The camera shall support integration with open-standard/open-platform VMS through ONVIF and standard APIs.

5.7.18.16.8. The camera shall have minimum one RJ-45 Ethernet interface supporting 10/100/1000 Base-T Ethernet. The camera shall support local recording through a MicroSD/SDHC/SDXC card slot with support for a minimum 512 GB card. A minimum 128 GB industrial-grade MicroSD card shall be supplied with each camera. The camera shall support SD-card formatting, cyclic/overwrite recording, storage management, NAS recording and remote archival/access through FTP/SFTP.

5.7.18.16.9. Cybersecurity features shall include, as applicable to the quoted

model, encrypted configuration, AES-256 or stronger encryption, secure authentication/digest authentication, account lockout, video encryption, IP/MAC filtering, secure boot/trusted boot, secure firmware/trusted upgrade and secure execution mechanisms. The quoted model shall support the latest firmware available from the OEM at the time of supply.

5.7.18.16.10. The camera shall support simultaneous power input through IEEE 802.3at PoE+ and auxiliary DC power input, with automatic/failover operation so that loss of one power source does not interrupt camera operation, subject to the OEM's certified power architecture. Power input shall be 24 VDC or as recommended by the OEM, with PoE+ complying with IEEE 802.3at. The camera shall be housed in a rugged outdoor enclosure with minimum IP67 ingress protection and IK10 impact protection.

5.7.18.16.11. The camera shall operate over an ambient temperature range of at least -5°C to +50°C and relative humidity up to 95%, non-condensing. The IR LED service life shall be minimum 40,000 hours or as declared by the OEM, whichever is higher. The camera shall support video bit rates from approximately 32 kbps up to at least 8 Mbps or higher. The camera shall be suitable for continuous 24×7 operation and shall be supplied complete with all necessary mounting accessories, power accessories, connectors, licenses and accessories required for a fully operational installation.

5.7.18.17. VMS:-

VMS shall support at least 256 IP cameras without replacement of the core VMS platform. The system shall support 8 MP and higher resolution cameras, PTZ cameras,bullet and dome cameras, ONVIF Profile S/G/T, edge-based analytics, recording, playback, event management, alarm management, user/role-based access control, audit trail, health monitoring and centralized camera configuration along with 1G CCTV Network , 2 No.s × VMS Management/Recording Servers & Redundant SAN/NAS Storage (Minimum 90 days storage)

5.7.19. Sensors

5.7.19.1. Environmental Humidity & Temperature Senso(IT Halls & Other Critical Equipment Areas): The humidity sensor shall be in an independent housing or be combined with the room /duct type temperature sensor in the common housing as per application requirement. The sensor should be electronic type with capacitive sensing element. Relative Humidity (RH) sensors shall be of standard 0-10 VDC or 4-20 mA type, well protected against solid and liquid contaminants with a permeable coating. Range of 0-100% RH. Accuracy: +/- 3%Operating temperature range of 0 to 50 °C. Stainless steel sheath construction complete with integral shroud to enable specified operation in air streams of up to 10 m/sec. Maintenance of Sensor to be by a simple field method such as solvent or mild detergent solution washing, to remove anticipated airborne contaminants. Maximum sensor non-linearity of ±3% RH with defined curve.

5.7.19.2. Water Flow Meters –

5.7.19.3. Electromagnetic Water flow meter should work on Faraday's law of induction. As soon as the electrically charged particles of a fluid cross the artificial magnetic field generated by two field coils, an electric voltage is induced. This voltage, tapped by two measuring electrodes, is directly proportional to the velocity of flow and thus to the flow volume. The magnetic field is generated by a pulsed direct current with alternating polarity. This ensures a stable zero point and makes the flow measurement insensitive to multiphase or inhomogeneous liquids, as well as low conductivity. The measuring principle is virtually independent of pressure, density, temperature and viscosity. Flow meter should be communicable type and integrated with preset flow alarm. Accuracy shall be + 2% of actual reading from 0.4 to 20 feet per second flow velocities.

5.7.19.4. Water Quality Monitoring Sensors –

5.7.19.5. This is used for real-time measurement of water quality. This is used to optimize treatment processes, detect water contamination incidents etc. The main sensors include but not limited to pH Sensor, Turbidity sensor and other Sensors required for Water Quality Monitoring as recommended by CDU OEM & Chiller OEM.

5.7.19.6. Sensors & Meters for HVAC :-

5.7.19.7. The following are the main sensor types are proposed for the control and monitoring of HVAC System

Sr.No.	Sensor Type	Purpose
1	BTU Meters	Calculate chilled water energy usage at main header level (At least Two)
2	Flow Meter	To measure flow on each header & sub header and up to equipment level (supply) -P&ID
3	DP Sensors	To modulate Pump speeds (External or In built to Pumps)
4	Temperature Sensors and RH Sensor	To monitor temperature and RH levels in IT Hall areas ,PDU Room, UPS and Battery Areas(ISO /Non-ISO sized Containers), BMS Room , All Hot Aisles
5	Weather Stations	To check ambient temperature, humidity and air quality levels (At least Two)
6	Pressure Gauge	To measure pressure on each header & sub header and up to equipment level (supply/return) for Chiller Loop & Secondary loop
7	Temperature Gauge	To measure Temperature on each header & sub header and up to equipment level (supply/return) for Chiller Loop & Secondary loop

5.7.20. DIGITAL PUBLIC ADDRESS CUM EMERGENCY VOICE EVACUATION SYSTEM

5.7.20.1. Supply, Installation, Testing and Commissioning (SITC) of EN 54-compliant Digital Public Address cum Emergency Voice Evacuation System, suitable for indoor operation and compliant with applicable emergency voice alarm requirements including EN 54-16, EN 54-24 and IEC 60849, comprising one working and one hot-standby/redundant network controller with

automatic changeover on failure. The system shall support emergency/all-call operation during network-controller failure, minimum 30 pre-recorded voice messages, interface with Fire Alarm System (FAS), CCTV, BMS and other required systems, fibre-optic digital network connectivity, minimum 2 GB internal message storage for approximately 3 hours of audio, PC/web-based programming, external alarm inputs and programmable relay outputs for automatic activation of pre-recorded messages/tones, centralized fault diagnostics and reporting from call station/microphone capsule through amplifiers, minimum 20 simultaneous audio channels, minimum 4 analogue audio line outputs, sampling frequency ≥40 kHz, and call-stacker facility for recording/storing minimum 16 high-quality calls of up to 3 minutes each, including chimes and pre-recorded messages. The system shall include all required controllers, software, call stations/microphones, fibre/network interfaces, loop/power cabling and terminations, OFC splicing kits and patch cords, equipment racks suitable for minimum 2 controllers/amplifiers, DSP/high-pass/low-pass filters, timers, volume controls, monitoring and fault-reporting facilities, rack-mounted workstation with minimum Core i7 processor, 3 GB RAM and 1 TB HDD, USB programming interface and all associated hardware/software. Complete with installation, rack assembly, interconnections, earthing, testing, commissioning, programming, integration, documentation, training, including all labour, materials and accessories, complete.

5.7.20.2. Supply, Installation, Testing and Commissioning (SITC) of minimum 2 Numbers of 480 W EN 54-compliant Digital Power Amplifier, configured as 2 × 240 W channel output or equivalent, suitable for emergency voice evacuation/public address applications and compliant with EN 54 and IEC 60849, comprising automatic volume control/noise sensing facility, front LCD status display, amplifier and short-circuit monitoring, loudspeaker-line/output supervision, digital signal processing with minimum 3-section parametric equalisation, automatic changeover to hot-standby amplifier on failure through internal relays, selectable output voltage of 100/70/50 V, minimum two auxiliary microphone/line-level inputs, one or more programmable control outputs for fault/call functions and necessary monitoring/control interfaces. The amplifier shall be suitable for 230/240 V AC, 50 Hz and 24 V DC operation, rack-mountable, with required network, power and loop-cable terminations. Complete with mounting, cabling, accessories, interconnections, earthing, testing and commissioning.

5.7.20.3. SITC of EN 54-24 approved 6 W ceiling-mounted fire alarm/emergency voice evacuation speaker with fire dome throughout first floor, having complete metal construction with metal grille, 100/70 V line-matching transformer and selectable wattage taps of 6/3/1.5/0.75/0.25 W, effective frequency response 100–17,500 Hz as per BS 6840, sensitivity 87 dB SPL @ 1 m/1 W, 180° dispersion, snap-on spring mounting and peak SPL 95 dB, complete with fire dome, mounting hardware, cables/terminations and all necessary accessories, installation, testing and commissioning, complete.

5.7.21. SERVER / NETWORK /STORAGE RACK: As per Detailed Design of respective IT OEM (minimum 48 OU Rack)

5.8. MISCELLANEOUS WORKS–

5.8.1. OUTSIDE AREA STEEL STRUCTURAL WORK & EQUIPMENT FOUNDATION WORK–

Bidder to consider the suitable structural work in outside area (towards North of Existing Building in Plot) for positioning of equipment's.

5.8.1.1. At Ground level Indicative Equipment Placement:-

- Receiving Substation
- Suitable ISO /NON-ISO sized Container for housing LT Panels , UPS and Batteries,
- Compact Substations including Transformer, RMU & LT Panel etc.
- HT Panels & Other Panels
- Diesel Yard
- DG Sets
- Any Other Necessary Equipment's.

5.8.1.2. At First level Indicative Equipment Placement:-

- Chillers for DCLC & Chillers for Air Cooling
- Associated Pumps, Piping and other associated Equipment
- Thermal storage Tank (Can be at Ground level also if area permits)
- DG sets
- Panels
- Any Other Necessary Equipments.

5.8.1.3. Bidders need to consider area optimization of allotted land area. During detailed designing and engineering of steel structure, bidder need to consider operating load, vibration load and any other applicable loads of equipment's as per recommendations of OEM. All equipment for which civil foundation are required, also needs to be considered. Steel Structural drawing, equipment foundation drawings and access roads drawings along with design calculations needs to be vetted in writing from a structural consultant and also a third party structural vetting in writing from COEP-Pune /IIT/NIT or any other reputed body as approved by C-DAC. The documents need to be submitted to CDAC prior to execution. Bidder needs to plan all equipment's in the allocated area only as provided in the indicative drawing. Gutter line needs to be considered and same to be connected to the site gutter line. Chain link fencing along with MS gate with lock and access control is required for this area along with area of underground fuel storage tank.

5.8.2. BIM (Building Information Modelling):-

5.8.2.1. The contractor must use Building Information Modelling (BIM) for integration and co-ordination of multiple services such as HVAC, Fire Safety Works, Electrical, Plumbing etc and other DC services for construction of the project. Level of Detail/Development (LOD) for BIM shall be 300 (min).

5.8.2.2. The Agency is required to do BIM modelling, clash detection, screen shots, incorporating all disciplines of Architectural, Civil & MEP services etc. broadly the points given below are to be followed: -

5.8.2.2.1. Development of 3D models engineering drawings showing all elements of works

5.8.2.2.2. Views/ screenshots (jpeg) or any other appropriate format for the conflict points to be generated for review by the decision taking parties.

5.8.2.2.3. All the Elements shall be modelled as specific assemblies accurate in terms of quantity, size, shape, location and orientation.

5.8.2.2.4. - 3D BIM model for entire Data Centre and Utility Area shall be developed from advanced detailed drawings on Revit software and Co-ordinated construction drawing shall be issued from 3D BIM model for all the internal and external services in the DC and Utility Area drawings (Good for Construction) shall be prepared duly coordinated with 3D BIM drawings. The same model of completed work shall also be prepared and submitted to CDAC.

5.8.2.3. The contractor shall compulsorily use BIM for designing and finalization of layout of various services and will submit shop drawings of various E&M services mentioned in the tender as per requirement of sites before execution of work for approval.

5.8.3. METAL GRID CEILING:

5.8.3.1.1. The drop ceiling shall be provided with Armstrong or equivalent Lay in (Hot dipped galvanized steel) metal ceiling system 600 x 600 x 5 mm with standard 2.5 mm dia (16% open space) and fleece with NRC (Non-Directional Visual) of 70 & CAC 36 (CAC is a measure for rating the performance of a ceiling system as a barrier to airborne sound transmission through a common plenum between adjacent closed spaces) to be laid on Armstrong or equivalent grid system. The modular ceiling sheets with necessary fittings should be done up aesthetically to integrate with the lighting. False Ceiling needs to be considered in all areas in first floor along with Server hall, meeting room , staging area, passage , BMS room etc.

5.8.4. RAISED FLOORING:

5.8.4.1. Providing and fixing removable raised/false access flooring with system and its components of approved make for different plenum height with possible height adjustment up to 50 mm, comprising of modular load bearing floor panels supported on G.I. rectangular stinger frame work and G.I. Pedestal etc. all complete.

5.8.4.2. Providing and fixing Access Floor panel of 600x600x34.5 mm medium grade Filled Steel anti-static high-pressure Lamination. Access Floor panel shall be steel welded construction with an enclosed bottom pan with uniform pattern of hemispherical cones. The panel shall be corrosion-resistant epoxy coated for lifetime rust protection and cavity formed by the top and bottom plate is filled with Pyro grip non-combustible Portland

cementitious core mixed with lightweight foaming compound. The access floor shall be factory finished with Anti-static High-Pressure laminate with Non-Warp technology up to 1mm thickness for superior adhesion and Surface flatness within 0.75mm. The panel is to withstand a Concentrated Load of minimum 680 kg/sqm in IT Hall area applied on area 25mm x 25mm without collapse in the centre of the panel which is placed on four steel blocks. The panel will withstand Uniformly Distributed Load (UDL) of minimum 3100 kg/sqm in IT Hall area or as per server rack loading data which ever is higher. The panel in other areas shall withstand Uniformly Distributed Load (UDL) as per equipment load and detailed design.

5.8.4.3. Providing at required spacing to form modular framework, pedestals made out of GI tube of thickness minimum 2 mm and 32 mm outer diameter, fully welded on to the G.I. Base plate of size 150mm x 150mm x 4mm at the bottom of the pedestal tube, G.I. pedestal head of size 90mmx90mmx4 mm welded with GI fully threaded stud 16mm outer diameter with two GI Check nuts screwed on the stud for level adjustment up to 50 mm, locking and stabilizing the pedestal head in position at the required level.

5.8.4.4. Stringers system in all steel construction hot dipped galvanized of rectangular size 570x20x30x0.80mm thick having holes at both ends for securing the stringers on to the pedestal head using fully threaded screws ensuring maximum lateral stability in all directions, the grid formed by the pedestal and stringer assembly shall receive the floor panel, this system shall provide adequate solid, rigid support for access floor panel.

5.8.4.5. The fire protection should be Class 0 as per BS 476 PART 6 for Fire propagation index and Class 1 as per BS 476 Part 7. Fire Ratings tested as per CIRC 91/61 or BS 476 Part 6 & 7 fire resistance up to minimum 60 min as per NFPA. Raised floor needs to be considered in all area along with Server hall , meeting room , staging area, passage , BMS room, NOC and SOC area etc.

5.8.4.6. Raised flooring has be designed and provided to suit the requirements of IT OEM & Tier-III Uptime Standards for Data Centre, but not less than the specifications referred above.

5.8.5. FIRE RATED STEEL DOOR-TWO HOURS RATED -

All Fire Doors have to be two hours fire rated double skin steel door constructed from 1.25mm thick galvanized steel sheet formed to provide a 46mm thick fully flush door shell with lock seam joints at stile edges and the internal construction of the door should be specially designed Honey Comb structure with reinforcements at top, bottom and stile surround. The door frames and door shutters should be primed with Zinc-Phosphate Staving Primer and finished with Polyurethane Aliphatic grade or epoxy paint as per approved manufacturer specifications. Door if used for Emergency purpose is required to be with Panic bar. The Fire Doors are to be fully insulated and shall be tested as per IS: 3809-1979, ISO: 834-1975, IS: 3614 (PART-II)- 1992 and BS 476 (PART- 20 & 22)- 1987 under live fire conditions, The wired glass is to comply with both BS 476: PART 22 and BS 6206 relating to fire resistant and impact performance.

5.8.6. FIRE RATED PARTITION/ WALLS:

Partition walls within the data centers should have 2-hour fire rated. Suitable smoke seals should be used. Fire line boards should conform to IS:2095 – 1996-

Part-I. Providing and fixing minimum 132MM thick FIRE RATED gypsum board partitions with 2 Nos. x 15mm thick fire line board on both sides of 72mm GI floor channel and 70mm Square MS Pipe stud as per specifications, including scope of chasing for electrical conduits.

5.8.7. FIRE RATED GLASS PARTITION (BETWEEN CORRIDOR AND SERVER HALLS)

Providing and fixing of fire rating tested for 120 minutes, integrity and radiation control and partial insulation (EW120) - fully glazed non-load bearing fixed glass partition system with symmetrical (Bi-Directional) fire protection. The glass should be 14 mm clear 120 min fire rated and partially insulated. The glass should be manufactured in UL & TUV audited Facility and including UL Certification. The glass partition has to be full height between raised floor and false ceiling, and this has to be installed as partition wall between outside corridor/passage area and inside server halls to provide clear vision of server halls from corridor.

5.8.8. ACCESS ROAD WORK

5.8.8.1. Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas including getting out and disposal of excavated earth lead, as directed by authority(for all kind of soils).

5.8.8.2. Preparation and consolidation of sub grade with power road roller of 8 to 12 tonne capacity after excavating earth to an average of 22.5 cm. depth, dressing to camber and consolidating with road roller including making good the undulations etc. with embarkment and re-rolling the sub grade and disposal of surplus earth lead as per authority.

5.8.8.3. Construction of granular sub-base by providing close graded Material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete with material conforming to Grade-II (size range 53 mm to 0.075 mm) having CBR Value-25

5.8.8.4. Construction of dry lean cement concrete sub base of 150 mm over a prepared sub-grade with coarse and fine aggregate conforming to IS:383, the size of coarse aggregate not exceeding 25 mm, aggregate cement ratio not to exceed 15:1, aggregate gradation after blending to be as per specifications, cement content not to be less than 150 Kg/cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, for all leads & lifts, laid with a mechanical paver, compacting with 8-10 tonne vibratory roller, finishing and curing etc. complete as per direction of Engineer-incharge.

5.8.8.5. Providing and laying design mix cement concrete of M-30 grade minimum 150 mm thick, in roads/ taxi tracks/ runways, using cement content as per design mix, using coarse sand and graded stone aggregate of 40 mm nominal size in appropriate proportions as per approved & specified design criteria, providing dowel bars with sleeve/ tie bars wherever required, laying at site, spreading and compacting mechanically by using needle and surface vibrators, levelling to required slope/ camber, finishing with required texture, including steel form work with sturdy M.S. channel sections, curing, making provision for contraction/ expansion, construction & longitudinal

joints (10 mm wide x 50 mm deep) by groove cutting machine, providing and filling joints with approved joint filler and sealants, complete (Item of joint fillers, sealants, dowel bars with sleeve/ tie bars are included in scope).

5.8.8.6. Scope also includes all Cantering and shuttering including strutting, propping etc. and removal of form. Scope also includes all Reinforcement ,Thermo-Mechanically Treated bars, for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete

5.8.9. CHAIN-LINK SECURITY FENCE IN UTILITY AREA:-

5.8.9.1. Providing and fixing 2.4 m high G.I. chain-link fencing consisting of G.I. chain-link fabric having 50 × 50 mm mesh, manufactured from 4 mm dia G.I. wire, including stretching and fixing to properly aligned supporting posts with 2 mm dia G.I. strengthening wire, necessary clamps, nuts, bolts, washers and other fixing accessories, complete. The chain-link fabric shall be fixed to MS/GI angle/SHS posts of approved size and spacing(not more than 3 meter), securely anchored in minimum M20 grade concrete foundations of suitable size and depth .Intermediate posts, corner/end posts, struts/stays and tensioning arrangements shall be provided as required to maintain adequate rigidity and alignment.

5.8.9.2. The complete steelwork shall be suitably hot-dip galvanized or provided with an approved corrosion-protection system suitable for external exposure. The fencing shall be plumb, taut, rigid and free from sagging. The top of fencing shall be provided with G.I. Concertina razor wire on suitable galvanized/MS angle brackets, including all clamps, fasteners and accessories. GI Concertina razor wire(core wire of 2.5 mm thick) of coil diameter 450 mm shall be provided above the chain-link fence height of 2.4 meter.All excavation, PCC/M20 foundations, backfilling, disposal of surplus earth, posts, struts, fixing accessories and associated works shall be included in scope. The complete fencing shall be erected true to line, level and plumb, as per directions of the Engineer-in-Charge.

5.8.10. WORKSTATION UPS POWER WIRING:-

5.8.10.1. Supply & Installation of concealed / recessed Modular UPS point wiring using 600V 3R (P+N+E) x 1.5 Sq.mm copper conductor FRLS PVC insulated wires (with proper R,Y,B colour code) pulled through already laid PVC conduit/raceway on walls and through table partition including 3R (P+N+E) x 2.5 Sq.mm circuit wires from the relevant DB and also including 2.5 sqmm green colour copper earth wire and approved make modular type switch plate, switches, MS concealed back box, etc. as required & as approved by the CDAC/PMC. (The item shall include UPS Power Circuit wiring from relevant DB to the switch board with 3Rx2.5 Sq.mm wires & from switch board to next switch board OR to the first primary point / full point)

5.8.10.2. NOTE :- 1. Only FRLS PVC insulated wire shall be used; 2. Conduit carrying circuit wiring should not carry point wiring and Conduit carrying point wiring should not carry submain/circuit wiring; 3. Flexible conduits & Elbows are not allowed; 4. The wires from junction to points shall be drawn in flexible PVC conduit with adaptor & cover for junction box & crimp type lugs at both the ends along with necessary hardware & accessories, etc. as required; 5.

Proper ferrules, lugs, must be used in all cabling and wiring on both load / source end; 6. Each switch board must be provided with respective ferrules representing the respective DB, Phase & Circuit numbers; 7. Looping of Neutral / Earth wire between two separate Primary / Full Points is strictly not allowed; 8. Looping of Neutral / Earth wire between two separate circuits on similar or other phase is strictly not allowed; 9. Feruling / numbering / tagging to wires with circuit number & db name for all ups power shall be strictly followed at both DB & switch board / switch socket boards ends.

5.8.10.3. Supply & Installation of primary UPS point wiring for UPS power plug points on workstations / table using 3C X 2.5 Samm copper conductor FRLS PVC sheathed white color flexible cable pulled through already laid Surface PVC Box raceway and table/workstation partition raceways and taken upto table top using PVC rigid or flexible conduits run within wooden/metal partitions. Each point consisting of 2 nos of 5A , 3 pin Modular sockets above table top/bottom & 2 No., 5A Controlling Switch above table top, wired together forming one point. The earth wire of 3 core flexible cable to be of yellow green color only. (Maximum 4 no.s desks served by one circuit from DB)

5.8.11. WORKSTATION RAW POWER WIRING:-

5.8.11.1. Supply & Installation of concealed / recessed Modular UPS point wiring using 600V 3R (P+N+E) x 1.5 Sq.mm copper conductor FRLS PVC insulated wires (with proper R,Y,B colour code) pulled through already laid PVC conduit/raceway on walls and through table partition including 3R (P+N+E) x 2.5 Sq.mm circuit wires from the relevant DB and also including 2.5 sqmm green colour copper earth wire and approved make modular type switch plate, switches, MS concealed back box, etc. as required & as approved by the CDAC/PMC. (The item shall include UPS Power Circuit wiring from relevant DB to the switch board with 3Rx2.5 Sq.mm wires & from switch board to next switch board OR to the first primary point / full point)

5.8.11.2. NOTE :- 1. Only FRLS PVC insulated wire shall be used; 2. Conduit carrying circuit wiring should not carry point wiring and Conduit carrying point wiring should not carry submain/circuit wiring; 3. Flexible conduits & Elbows are not allowed; 4. The wires from junction to points shall be drawn in flexible PVC conduit with adaptor & cover for junction box & crimp type lugs at both the ends along with necessary hardware & accessories, etc. as required; 5. Proper ferrules, lugs, must be used in all cabling and wiring on both load / source end; 6. Each switch board must be provided with respective ferrules representing the respective DB, Phase & Circuit numbers; 7. Looping of Neutral / Earth wire between two separate Primary / Full Points is strictly not allowed; 8. Looping of Neutral / Earth wire between two separate circuits on similar or other phase is strictly not allowed; 9. Feruling / numbering / tagging to wires with circuit number & db name for all ups power shall be strictly followed at both DB & switch board / switch socket boards ends.

5.8.11.3. Supply & Installation of primary RAW point wiring for RAW power plug points on workstations / table using 3C X 2.5 Samm copper conductor FRLS PVC sheathed white color flexible cable pulled through already laid Surface PVC Box raceway and table/workstation partition raceways and taken upto

table top using PVC rigid or flexible conduits run within wooden/metal partitions. Each point consisting of 1 nos of 5A , 3 pin Modular sockets above table top/bottom & 1 No., 5A Controlling Switch above table top, wired together forming one point. The earth wire of 3 core flexible cable to be of yellow-green color only. (Maximum 4 no.s desks served by one circuit from DB)

5.8.12. WORK STATION NETWORKING POINT:-

Supply & Installation of Modular Data point including approved make Cat – 6A UTP cable through new trenches, and new flexible conduit in table partition, RJ45 information outlet face plate, etc. with Termination, Testing and Documentation of UTP Points complete as required. This includes supply & installation of backbone 1 Gbps(Minimum) Managed switch including crimping complete in all respect etc. with Fibre Unlinking, complete with Jack panel, patch cords at both rack level and workstation level and Network Rack required etc.

5.8.13. WORK STATION VOICE/TELEPHONE POINT :-

5.8.13.1. Supply & Installation of Telephone /Voice point including approved make Cat – 6A UTP cable through new trenches / conduits, RJ45 information outlet, in single face plate, in workstation partion wall etc. with Termination, Testing and Documentation of UTP Points complete as required.

5.8.13.2. The scope includes supply, installation, testing and commissioning of indoor type telephone suitable number of pair Main Distribution Frame (MDF) / Box with Krone modules with suitable S.S. frame for mounting tag module, cable, wires and incorporated in 16 SWG MS box with proper lockable cover. The box should be fixed on wall with suitable fasteners including painting & earthing. This also includes fixing the cable, distribution chart sufficient space for the cables, wires etc.to be provided in the box.

5.8.13.3. The scope includes supply & laying of suitable number of pair telephone cable through heavy gauge pvc conduit including all necessary hardware & accessories, etc.

5.8.14. LIGHTING POINTS:-

Supply & Installation of concealed / recessed light point wiring using 600V FRLS grade 3R (P+N+E) x 1.5 Sq.mm copper conductor PVC insulated wires (with proper R,Y,B color code) pulled through heavy gauge PVC conduits laid concealed over false ceiling or in wall chases or on the ceiling in case of an open ceiling including 3R (P+N+E) x 2.5 Sq.mm FRLS PVC circuit wires from the relevant DB and also including 2.5 sqmm green color copper earth wire and approved make modular type switch plate, switches, MS concealed back box, etc. as required & as approved by the consultant. (Each circuit shall not feed more than 8 points or 800 watts) (The item shall include Lighting Power Circuit wiring from relevant DB to the switch board with 3Rx2.5 Sq.mm FRLS wires & from switch board to next switch board OR to the first light point / primary point / full point)

5.8.14.1. Primary light points including 5A switch

5.8.14.2. Secondary light points looped from the above point

5.8.14.3. (maximum 3 points looped from one primary)

5.8.15. FURNITURE:-

5.8.15.1. Staff WorkStation:- Size:1200(W) X 600(D) X 750/1050(HT)

Supply, installation and placement of 1200(L) × 600(D) × 750(H) mm modular staff table, comprising 25 mm ± 2 mm thick three-layer pre-laminated particle board (wood-based panel) conforming to IS 12823 (latest edition), Grade II, Type II, with factory-finished surface and matching edge banding on all exposed edges; the table shall be of free-standing construction with gable-end side panels and modesty panel forming the under structure, without separate exposed legs, and shall be rigid, stable and suitable for continuous office use. The table shall have overall dimensions of 1200 ± 10 mm length, 600 ± 10 mm depth and 750 ± 10 mm height up to table top with minimum 30mm thick Coloured Screen board of 300ht above table top., complete with all necessary hardware, fittings, fasteners, levelling provisions, cable-management grommets/provisions wherever required and accessories for proper installation. Wire Management - wire manager hole on worktop with two metal cable tray below the table top for Electrical & networking points and wire riser for carrying wires. 30mm thick Screen board of 300ht above table top. The manufacturer shall provide a minimum 3-year warranty and product should be Green guard & BIFMA certified.

5.8.15.2. Pedestal Storage Unit:-

Supply and fixing of Pedestal Unit of 646x390x440 mm. Construction & Material- 1) Welded Assembled 2)1mm thk CRCA for Body Shell, Drawer Front & tray, Front Side Stiffener, Rear Side Stiffener & Bottom 3)1.2 thk CRCA Top Stiffener & Bottom stiffener Drawer Fronts- 1)Metal Front Straight Edge . Locking- 10 lever Cam Lock & Central RH locking with actuator & lock channel mechanism for 'Box-Box-File' & '4 Box' Pedestals • Swivelling non-lockable Castors mounted below the body shell

5.8.15.3. Midback Chair:-

Supplying and placing ergonomically designed, comfortable & aesthetically appealing Medium back chair. The seat shall be made of 15mm thick hot pressed commercial plywood upholstered with high resilience moulded polyurethane foam having density 48kg/m³ with foam net tapestry. The seat shall be upholstered with fabric tapestry 0.8mm thick and 300 GSM and the back shall be made of polypropylene net cover upholstered with breathable mesh tapestry. The backrest shall be made with contoured lumbar support and maintain the natural curvature of the spine. The chair shall be supplied with PU adjustable arm. The chair shall have synchro tilt 360-degree revolving mechanism with upright position locking. The Pedestal should have five legged injection moulded black nylon having pitch circle dia. 650 mm fitted with 5 nos. twin wheel castors which shall be made of injection moulded in 30% glass filled nylon having self-lubricating property for friction free movement, confirming to ANSI/BIFMA standards. The manufacturer shall provide a minimum 3-year warranty and product should be green guard & BIFMA certified.

5.8.15.4. High back Chair:-

Supplying and placing ergonomically designed, comfortable & aesthetically appealing High back chair. The seat shall be made of 15mm thick hot pressed commercial plywood upholstered with high resilience moulded polyurethane foam having density 48kg/m³. The seat shall be upholstered with fabric tapestry 0.8mm thick and 300 GSM and the back shall be made of polypropylene net cover upholstered with breathable mesh tapestry. The backrest shall be made with contoured lumbar support and maintain the natural curvature of the spine. The chair shall be supplied with PU adjustable arm. The chair shall have Synchro tilt with multi locking 360-degree revolving mechanism with upright position locking with tilt adjustment. The Pedestal should have five legged injection moulded black nylon having pitch circle dia. 650 mm fitted with 5 nos. twin wheel castors which shall be made of injection moulded in 30% glass filled nylon filled having self-lubricating property for friction free movement, confirming to ANSI/BIFMA . The manufacturer shall provide a minimum 3-year warranty and product should be Green guard & BIFMA certified.

5.8.15.5. **THREE-SEATER SOFA**

Supplying and placing THREE SEATER sofa of SIZE- 1950X 750X 750HT(-+10). The Sofa shall be constructed from natural hard wood and commercial plywood having inner frame. The thickness of the wood should allow for the heavy tension webbing. The sofa shall have spring attached and also be padded separately. The frame shall be padded with high resilience polyurethane foam having density 48Kg/m³ in seat and having density 32Kg/m³ in back. There shall be cushion arm provided padded with high resilience polyurethane foam having density 32Kg/m³. The complete structure shall be fully upholstered with Leathrite / Fabric tapestry. The understructure shall have metal. There shall be shoe provided at the bottom to avoid scratches on the floor.

5.8.15.6. **GLASS CENTRE TABLE:**

Providing & Supplying in position Centre Table top made out of glass of Size:-1200(L) x 600(D) x 400(ht) . Table under structure shall be made SS brushed frame. Table have a small buffer to avoiding the scracing on the floor.

5.8.15.7. **MEETING TABLE:-**

Providing & fixing table Size: 7200W x 1500D x 750Ht mm (20 Pax Seaters) . Table Top shall be made out of 36 mm thick Pre laminated particle Board of approved shade, design and colour. All exposed edges are sealed with the 2mm thick pvc edge banding tape and all unexposed edges sealed with 0.6mm edge banding tape pressed at 200 C with hot melt glue on special machines. The Metal Flipper is fixed on worktop of size 400 x 120mm, with switch & socket with metal cable tray below Table top for Electrical points with metal wire riser for carrying wires. The gable end shall be made of 25mm thick prelaminated particle board. The Modesty shall be made of 18mm thick prelaminated particle board. All exposed edges are sealed with the 2mm thick pvc edge banding tape and all unexposed edges sealed with 0.6mm edge banding tape pressed at 200 C with hot melt glue on special machines.

5.8.15.8. **4K SMART LED TELEVISION (65-INCH)**

5.8.15.8.1. The offered television shall be a minimum 65-inch LED-backlit Smart TV with In-Plane Switching (IPS) panel technology, supporting Wi-Fi screen sharing, screen mirroring and wireless connectivity. The display shall have a minimum Ultra HD 4K resolution of 3840 × 2160 pixels, with an aspect ratio of 16:9, minimum native contrast ratio of 1200:1 or better, typical brightness of 350 nits or better, horizontal and vertical viewing angle of approximately 178°, response time of 8 ms or better, and slim bezel design with bezel width preferably not exceeding 12 mm.

5.8.15.8.2. Picture and Processing: The TV shall incorporate a 4K picture processor or equivalent, with a minimum refresh rate of 60 Hz, HDR support including HDR10/HDR10 Pro and HLG, dynamic tone mapping, advanced colour enhancement, noise reduction, true colour accuracy, FILMMAKER MODE or equivalent, and a minimum 4K resolution upscaler. The TV shall provide suitable picture modes for general viewing and professional presentation/display applications.

5.8.15.8.3. AI and Smart Features: The TV shall support AI-enabled smart functions, including AI-based user interface, home dashboard, content recommendation and intelligent voice recognition. Built-in support for voice assistants such as Google Assistant and/or Amazon Alexa, or equivalent, shall be provided.

5.8.15.8.4. Smart TV Platform: The TV shall operate on a current Smart TV operating system such as webOS or equivalent, with access to an integrated content/application store and a full-featured web browser. The operating system shall support regular software/firmware updates.

5.8.15.8.5. Audio: The TV shall have an integrated 2.0-channel speaker system with a minimum audio output of 20 W RMS, comprising a minimum of two built-in speakers. It shall support AI Sound or equivalent audio enhancement, clear voice enhancement and automatic/acoustic sound tuning or equivalent functionality. Bluetooth audio playback shall be supported. The TV shall also provide an audio output interface for connection to an external audio system where required.

5.8.15.8.6. Connectivity: The TV shall support Wi-Fi IEEE 802.11ac or better, Bluetooth Version 5.0 or better, Wi-Fi Direct, screen mirroring, wireless screen sharing/casting and device control functionality. USB cloning or equivalent configuration-copying functionality shall be supported. The TV shall support wireless screen-sharing/hotspot functionality as applicable.

5.8.15.8.7. Inputs and Outputs: The TV shall have a minimum of 2 HDMI inputs, 1 USB port, 1 RJ-45 LAN/Ethernet port, and 1 digital optical audio output. HDMI shall be HDMI 2.0 or better and shall support the specified 4K display requirements.

5.8.15.8.8. Power: The TV shall operate on AC 100–240 V, 50/60 Hz or an equivalent universal power supply. Standby power consumption

shall not exceed 0.5 W, and typical operating power consumption shall preferably not exceed 130 W. The TV shall be suitable for continuous/extended commercial operation with a minimum duty cycle of 16 hours per day, 7 days per week (16×7). The operating temperature range shall be 0°C to 40°C, with operating relative humidity of approximately 10% to 80% RH, non-condensing.

5.8.15.8.9. Accessories and Installation: The supply shall include a conventional remote control, remote-control batteries, user/e-manual, power cable, quick installation guide, wall-mounting provision and complete wall-mounting kit suitable for the offered TV. Required data/connection cables shall also be supplied.

5.8.15.8.10. Warranty and Support: All items supplied under this specification shall carry a minimum 3-year comprehensive on-site warranty from the date of supply/installation, as applicable. The warranty shall cover all hardware, software/firmware-related defects, parts, labour, service visits, transportation and replacement of defective components without any additional cost to the purchaser. The successful bidder/OEM shall provide necessary technical support and attend warranty complaints within the stipulated response time.

5.8.16. INTERIOR/CIVIL WORKS :-

5.8.16.1. Dismantling brick masonry in lime or cement mortar or concrete wherever required with prior approval of client and disposing the materials as directed with all leads, lifts etc

5.8.16.2. Existing windows and opening in the first floor outer walls needs to be sealed by AAC BLOCKS . Providing Autoclaved Aerated Concrete Block masonry of conforming to IS:2185 (Part 3) - 1984 in extra fine jointing mortar of fix block of UltraTech or equivalent in superstructure including striking joints, raking out joints and scaffolding etc. Complete.

5.8.16.3. Providing internal cement plaster 12mm thick in single coat in cement mortar 1:3 without Neeru finish to concrete or brick surfaces where ever required , in all position including scaffolding and curing etc. complete.

5.8.16.4. Opening for the Cables or other utility services which are coming inside the building needs to be sealed by Fire resistance board system, water soluble fire retardant solutions, fire expanding foam etc. having minimum of 2 hours' fire rating when tested in accordance with BS 476 part 20 and UL 1479 for horizontal and vertical openings in RCC slabs, Beams, walls, Brick masonry or Gypsum partitions for passing service shafts. The service lines could be of various types like electrical cables, BBT, cable trays or metal pipes etc. Fire soluble cable coating should be suitable for protecting against spread of flame on timber panels and tested as per IEC 332 part 3 standard for reduced spread of flame & tested as per FM Class 3971. It should have no derating effect on cables, free from fiber, asbestos, odorless and solvent free, flexible when dry after application.

5.8.16.5. Room Signage and Fire Evacuation Map.

5.8.16.6. INSULATION ON ROOF AND FLOOR SLAB:

Thermal insulation class-"0" closed cell elastomeric nitrile rubber insulation with adhesives . Minimum 13 mm thick for floor and ceiling insulation is required.

5.8.16.7. Bidder to consider civil related work for underground fuel storage tank as per drawing approval received from PESO and CCOE

5.8.16.8. Construction of Tranches, underground Hume pipe etc. is also in the scope of Bidder. Pipe Rack required to bring the Cables/BBT or Pipes is part of scope of Bidder.

5.8.16.9. Power Cable entry in each rack will be from Top. Bidder need to consider boxing arrangement or cable manager or cable trunking system so that entire data center installation should look aesthetically good.

5.8.16.10. Earthing chamber work, Cutout opening, cleaning, painting with fire rated paint , painting in other area , structural work painting, drain line , gutter line and connecting to main gutter line , tapping from existing piping etc are part of scope of work .

5.8.17. PCC (Plain Cement Concrete):-

M20 Concrete for Bed : Providing and laying Ready Mix cement concrete in M20 of trap/ granite/quartzite/gneiss metal above RCC slabs (At least 75 mm thick on first floor slab-Higher Thick ness and grade as per Raised Floor OEM Requirement is in contactor scope) including centering, formwork, laying/pumping, compacting, roughening them if special finish is to be provided, finishing uneven and honeycombed surface and curing etc. complete. The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface, only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed.), with fully automatic microprocessor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade)

5.8.18. FIRE RETARDANT PAINTS:-

Provide and apply Fire Retardant Paint of approved make and shade to give an even shade over a primer coat as per manufacturers' recommendations after applying painting putty to level and plumb. Final finishing shall be with 2 coats of fire-retardant paint. Walls of all Data Hall and other critical areas like power rooms, equipment rooms etc must also be coated with fire retardant paint. Paint must withstand minimum 1000 degrees temperature. Paint should be water based and confirming to greenseal-11 VOC requirements.

5.8.19. Server Lift Requirement

Sr. No.	Parameter	Requirement
1	**Quantity, purpose and type**	Three (3) purpose-built, self-supporting data-centre server lifts shall be supplied. Each lift shall be designed and marketed by its manufacturer specifically for installation and removal of rack-mounted IT equipment in a live data centre. General-purpose material-handling equipment, warehouse stackers, scissor lifts, pallet trucks or fabricated assemblies shall not be accepted.

Sr. No.	Parameter	Requirement
2	**Rated lifting capacity**	Not less than 500 lb rated safe working load through the full lift height, certified by the manufacturer and marked on a permanently fixed load-rating plate. The Bidder shall declare the rated capacity and shall confirm that it exceeds the heaviest single item of supplied equipment — including a fully populated accelerated compute node, a liquid-cooled compute tray and a fully populated storage enclosure — by a margin of not less than 25%. The Bidder shall list those three weights in the technical bid.
3	**Lift height and lowered height**	The lift shall be capable of placing equipment at the topmost usable U position, and of receiving equipment at the lowest usable U position, of every rack supplied under this tender, measured from finished floor level, as established by the approved data centre design and rack elevations. No manual lifting of equipment on or off the platform shall be required at any U position. The Bidder shall declare the maximum and minimum platform heights of the offered lift and shall confirm in writing, against the approved rack elevations, that the topmost and lowest usable U positions of every rack type supplied are served. Compliance shall be demonstrated at acceptance.
4	**Lifting mechanism**	The lifting mechanism shall be electro-mechanical — winch, screw, belt or chain driven. The mechanism shall provide powered raise and lower with variable-speed control, and shall include a load-holding brake that prevents free-fall on loss of power or loss of drive, and an independent mechanical safety stop.
5	**Platform and load engagement**	The platform or fork assembly shall be rigid and shall remain level under full rated load at full height. It shall provide: (a) depth adjustment sufficient to support the full range of chassis depths of the equipment supplied under this tender, as established by the approved data centre design and equipment schedule, with no part of the load unsupported or overhanging; (b) lateral side-shift of not less than ±100 mm to align with rack rails without repositioning the lift; and (c) fine levelling or micro-tilt adjustment to align the chassis with the rack rails. The Bidder shall declare the platform dimensions and the adjustment range of each axis.
6	**Access to every rack position**	Every lift supplied shall be capable of installing and removing equipment at every rack position in the approved layout, including positions at which access is available from one side of the rack face only — as arises within hot-aisle containment, at end-of-row positions and where a rack abuts a wall or an adjacent enclosure. The three lifts shall be of identical make, model and configuration, so that any one of them can service any position and a single set of spares, accessories and operator training applies to the whole fleet. The Bidder shall declare the loading configuration offered and

Sr. No.	Parameter	Requirement
		shall demonstrate at acceptance, using each supplied lift, the installation and removal of a representative node at a DCLC rack within containment.
7	**Battery, charging and duty**	On-board rechargeable battery of a sealed, non-spillable type (AGM, gel or lithium). Vented flooded lead-acid batteries shall not be accepted. The battery shall support not less than one full working shift of normal use on a single charge, and the Bidder shall declare the number of full-load lift cycles per charge. Charging shall be from a standard 230 V AC, 50 Hz single-phase supply through a multi-stage charger with over-charge and deep-discharge protection, and an on-board state-of-charge indicator shall be provided. Charging points shall be provided by the Bidder at multiple pod locations within the data hall as agreed with C-DAC during detailed engineering. Where a lithium battery is offered, the Bidder shall submit the applicable safety certification and shall confirm compliance with the fire-safety provisions of the Track-II Data Centre scope.
8	**Mobility, wheels and floor loading**	The lift shall be mounted on heavy-duty castors that are non-marking, non-conductive and rated for use on raised-access flooring and anti-static data-centre floors, with lockable brakes on not less than two castors and swivel action permitting movement in a confined aisle. The Bidder shall declare the unladen weight of the lift, the maximum wheel point load under full rated load, and the contact area of each castor, and shall confirm in writing that these are within the rolling-load and point-load ratings of the raised access floor supplied under the Track-II Data Centre scope.
9	**Footprint, aisle and doorway clearance**	The lift shall pass through all doorways, lobbies, goods lifts and access routes between the goods entry point and every data hall, and shall operate within the narrowest hot and cold aisle of the rack layout with the load at full height and the stabilisers deployed, as established by the approved data centre design and layout drawings. The Bidder shall declare the overall dimensions in both transport and operating configuration, the turning footprint, and the maximum ramp gradient the lift can traverse under full load, and shall confirm these against the approved layout. Compliance shall be demonstrated over the complete route at acceptance.
10	**Stability and safety**	The lift shall be stable in all positions with the rated load at full height, without requiring counterweights to be added or removed by the operator. It shall be provided with a stabiliser or outrigger arrangement interlocked such that the load cannot be raised beyond a safe height until the stabilisers are deployed. An overhead proximity or anti-collision device shall be fitted to prevent contact between the raised load and ceiling-mounted services, containment, cable trays and

Sr. No.	Parameter	Requirement
		pipework. Emergency stop and controlled emergency lowering shall be provided.
11	**Standards and certification**	The lift shall comply with the applicable requirements for powered lifting equipment and shall carry recognised third-party certification — UL, CE, or an equivalent accepted international mark — for the complete machine, not merely for its components. Electrical safety and electromagnetic compatibility certification shall be submitted. Copies of all certificates, the manufacturer's declaration of conformity and the load test certificate for each supplied unit shall be provided at delivery.
12	**Accessories, documentation and training**	Each lift shall be supplied with the manufacturer's operating and maintenance manual, load-rating plate, spare battery charger lead, and any shelf, fork extension or adaptor required to handle the full range of equipment supplied under this tender. The Bidder shall provide on-site operator training for not less than ten (10) C-DAC personnel per lift, covering safe operation, load engagement, battery care and routine inspection, and shall issue training records.
13	**Warranty and support**	Comprehensive on-site warranty, covering the lift, the lifting mechanism, the battery and the charger, with defined response and resolution times and an annual preventive maintenance and load-test visit. Batteries shall be replaced free of charge if capacity falls below 70% of rated capacity within the warranty period. The Bidder shall confirm the availability of spares and service support in India.
14	**Requirements referenced to the data centre design**	Where this specification refers to the approved data centre design, rack elevations, equipment schedule or layout drawings, those documents are those approved by C-DAC during detailed engineering under the Track-II Data Centre scope. The Bidder shall satisfy the requirement against the design as finally approved. Any modification, attachment, accessory or replacement of the offered lift necessary to achieve compliance shall be provided by the Bidder at no additional cost to C-DAC. The Bidder shall state, with the technical bid, the design assumptions on which the offered lift has been selected.

5.8.20. PHYSICAL SECURITY: -

5.8.20.1. Baggage Scanner

Computer based multi energy X-Ray baggage inspection system mounted on castor wheels capable of passing through bags of nominal dimensions 940mm(W) x 640mm(H) with belt height 750mm to 850mm, 22"/24" LCD monitor, Input/output rollers with frames etc. as required.

5.8.20.2. X Ray baggage scanner, suitable for operation on 230 V single phase supply, 50 Hz (170 V to 260 V), complete with X-Ray source/ generator, sensors, video display, features of multi energy X Ray image facility, compliant to

Radiation safety standards, Lead impregnated safety screen, Threat Image Protection (TIP) system software, required computer with CPU, hard disk, mouse, keyboard, CD -RW Drive:: DVD Drive etc compete as required. The X Ray Baggage Inspection System shall be suitable for indoor use and the radiation level should not exceed accepted health standard (0.1 R/Hr at a distance of 5 cm from external housing). (Relevant certificate from AERB) It shall be as per QR/specification for ' X-RAY BAGGAGE INSPECTION SYSTEM', approved by MHA vide letter No. F/No. CISF/Tech/2008/MHA - Prov-I-1422 Dated 08th September, 2016 OR Latest.

5.8.20.3. Door Frame Metal Detector

20 zone or above door frame metal detector nominal size: 760mm (W) x 2050mm(H) x 700mm(D) along with necessary software, power and control cabling etc. suitable for operation on 230 volts single phase supply +- 10% AC, complete as required. The metal detector set should be intelligent, microprocessor controlled & PC compatible. It should have the following features and controls: Latest technology like continuous wave; It should consist of minimum required number of zones, each zones should have facility of auto calibration; The unit should be active continuously; It should be simple to operate; It should have keypad provision for all program settings; Detector should have self-test program and system fault indicators; Sensitivity, threshold & volume of each zone should be digitally controlled in steps from 0-99; There must be independent sensitivity setting of each zone; The detector should have battery backup for memory protection; The detector should have zone display on side panel of the frame along the length; The detector should have multi-mode counter i.e. IN, OUT, total IN & OUT; The detector should display the time, counter, program setting and sensitivity during setting; It should have IR occupancy sensor for traffic counter. Alarm should be active only when occupancy is there; It should be able to detect the objects as small as 15 mm ferrous or non-ferrous metal cubes; The walk-through door frame should be of FRP material and built in control unit to display different alarms, and location of the metal; It should meet the test requirement as per relevant ASTM standards (ASTM C1309-97, ASTM C1270-97 etc) or equivalent Indian standards.

5.8.20.4. Handheld Metal Detector:

The handheld metal scanner is a high sensitivity device designed to detect magnetic and non magnetic metal masses. The Unit can be used to detect weapons, detonators and other small pieces of metal concealed in baggage or correspondence. Optimum efficiency on a range of applications is achieved through user adjustable sensitivity. Handheld metal detector sensitivity allows a search to be non-intrusive and hands off by minimizing physical contact with the subject. The highly reliable advanced detection circuitry is housed in a rugged high impact ABS plastic case and detects all metals and alloys. Sensitivity adjustment is made accessible only on removing the battery cover thus reducing potential tampering or inadvertent adjustment. Detailed technical specification: Sensitivity: Detect 0.1 gm metal of 6 Ø; Search coil diameter: 90mm; Supply (Dual): 9VDC

(Rechargeable/Dry); Weight: 325 gms. (Approx.); Operating Temp: -10°C to +70°C.

5.8.20.5. Electromechanical boom barrier with all accessories upto 6 metre length

Electromechanical boom barrier with all accessories upto 6 meter length; consisting of a fixed housing and a movable arm; in two pieces without central support, electrically operated from security/guard- room through push buttons; Barrier Housing Unit: Powder Coated; Boom: Powder Coated mite RAL 9010m or approved color with Red reflective strips having IP 44 (Barrier Body) & IP 67 (Control Card Box); All Aluminium Housing with Base frame in SS-304 for high protection against corrosion; Operator console, necessary hardware, software, Power and control cabling etc as required It should have anti-crush safety mechanism to suspend the motion of barrier when met with any obstruction; Quick opening and closing of barrier with soft landing; Speed of barrier should be programmable while installing as per frequency of traffic; Provision to integrate with other peripheral devices like Access Control System, Beam sensors; It should be activated by a single push button and with an option to operate wirelessly through remote. In addition it must have provision to operate on electronic signals from Access Control System, Safety device like beam sensor should be provided with the barrier; Barrier should have clamping mechanism in open and closed positions; Control system (gear unit, crank drive and control unit etc) should be housed inside a stainless steel pole stand casing; It should have distinct visible marking/ paint work. The barrier body should be treated with 100 micro epoxy zinc plating anti corrosion paint.

5.8.21. ISO/Non-ISO Sized Containers: -

5.8.21.1. **General Description: -**

S.No.	Parameter	Specification
1	Function	Factory-built, pre-wired and pre-tested outdoor power module container housing critical power equipment (MV & LV switchboards/panels, UPS, Lithium-ion battery, 110 V DC charger and battery, cooling, fire detection and control systems).
2	Container type	Whether the container is ISO or NON-ISO Sized, they have to match all the specification as below .ISO /Non-ISO sized-custom-fabricated steel container. Structure, corner fittings, marking and lifting design are based on ISO 1496-1, ISO 1161, ISO 6346 and ISO 10855-1.
3	H & W (Internal Dimension)	Minimum 3 Meter (Note :-Length -as per detailed engineering as per equipment placement planning)
4	Installation	Outdoor
5	Site design conditions	Site: Pune, Maharashtra. Altitude, outdoor design ambient temperature, relative humidity, rainfall, basic wind speed, seismic zone and corrosivity category: as per Pune Chikhali Industrial Area (MIDC) area conditions.

6	Enclosure protection	E-house protection class: designed for IP 55 and tested for IPX5 as per IEC 60529; weatherproof, dust-proof and rodent-proof.
7	Fire rating of envelope	2 hours as per BS 476 Part 20 & 22 (walls, roof, doors, cable transits).
8	Design life	25 Years with the specified painting system and scheduled maintenance.
9	Template note	As per Pune condition

5.8.21.2. **Applicable Codes & Standards:**

S.No.	Standard	Applicability
1	ISO 668	Series 1 freight containers: classification, dimensions and ratings (reference basis for a non-ISO size container).
2	ISO 1496-1	Specification, testing, design and manufacture of the container structure.
3	ISO 1161	Corner and intermediate fittings, provided at the four corners.
4	ISO 6346	Coding, identification and marking of containers.
5	ISO 10855-1	Design, manufacture and marking of containers and lifting sets (lifting arrangement).
6	ISO 12944, ISO 9223, ISO 19840	Corrosion protection by paint systems, classification of environments, and measurement and acceptance of dry film thickness.
7	BS 476 Part 20 & 22	Fire resistance of walls, roof, doors and penetrations (2 hours).
8	IS 800, IS 875 (Parts 1-5), IS 1893 (Part 1), IS 2062	Structural design, loads, wind and seismic criteria, and structural steel grade.
9	ISO 3834 / AWS D1.1	Welding quality requirements, welding procedure and welder qualification.
10	IEC 61439-1/-2, IEC 62040 series, IEC 60529	LV switchgear assemblies, UPS systems and degrees of protection of the equipment housed.
11	IS 3043 / IEC 60364, IEC 62305	Earthing, equipotential bonding and lightning protection.
12	CEA Safety Regulations, NBC 2016 (Part 4), NFPA 2001 / ISO 14520	Electrical safety, escape routes and fire safety, and clean agent suppression (where specified).

5.8.21.3. **Door Schedule:**

Door Tag	Description	Location	Clear size W × H (mm)	Qty per container	Fire rating	Opening / hardware

D1	Personnel access / exit door (main)	One end wall of container	1600 × 2800 (typ.)	1	2 hrs	Double leaf door, outward opening, three point panic push-bar from inside, lockable from outside, door closer and hold-open stopper, door handles
D2	Personnel exit door (secondary)	Opposite end wall of container	1000 × 2500 (typ.)	1	2 hrs	Single leaf door, outward opening, single point panic push-bar from inside, lockable from outside, door closer and hold-open stopper, door handle. (Provides a second escape route.)

5.8.21.4. **Painting Specification:**

S.No.	Parameter	Specification
1	Governing standard	ISO 12944 (corrosion protection of steel structures by protective paint systems). Corrosivity category as per ISO 12944-2 and ISO 9223 for Pune: C4 (high), covering the urban / industrial atmosphere, monsoon humidity and long periods of wetness. Durability: High (more than 15 years to first major maintenance).
2	Surface preparation	CRCA sheet and MS plain plate: degreasing, then abrasive blast cleaning to Sa 2½ (ISO 8501-1) with a suitable surface profile. GI sheet (enclosure internal): etch primer. All weld spatter, sharp edges and weld seams ground smooth before painting. Fabricator to submit the surface preparation and painting procedure for approval before start of painting.
3	Enclosure external	Base material: CRCA sheet. Surface preparation: Sa 2.5. Coat 1: epoxy primer, 75 µm. Coat 2: epoxy intermediate, 200 µm. Coat 3: polyurethane finish, 50 µm. Total DFT: 325 µm.
4	Enclosure internal	Base material: GI sheet. Surface preparation: etch primer. Coat 1: epoxy primer, 100 µm. Coat 2: polyurethane finish, 50 µm. Total DFT: 150 µm.
5	Cladding sheet	NA
6	Floor internal	Base material: MS plain plate. Surface preparation: Sa 2.5. Coat 1: epoxy primer, 50 µm. Coat 2: polyurethane finish, 50 µm. Coat 3: epoxy barrier

		coat, 100 µm. Total DFT: 100 µm (as per the source paint specification table).
7	Floor external	Base material: MS plain plate. Surface preparation: Sa 2.5. Coat 1: epoxy primer, 75 µm. Coat 2: epoxy intermediate, 200 µm. Coat 3: polyurethane finish, 50 µm. Total DFT: 325 µm.
8	Roof	As per Enclosure External & Internal paint specification.
9	Colour / shade	Enclosure external, enclosure internal and floor external: RAL 9003. Floor internal: RAL 7046. Roof: as per Enclosure External & Internal paint specification.
10	Inspection and acceptance	DFT measured per coat and total as per ISO 19840 (acceptance criteria as per the standard). Adhesion (pull-off) test per ISO 4624 on a sample / test panel. Visual inspection for runs, sags, pinholes and holidays. Touch-up and repair procedure to be approved.
11	Paint make	Akzonobel/Equivalent

5.8.21.5. **Insulation Details:**

Insulation material		Rockwool	
Fire Rating		2hrs Fire rating as per BS 476 Part 20 & 22	
S.No.	Area	Thickness	Density
1	Wall insulation	100 mm	80kg/m3
2	Roof insulation	100 mm	80kg/m3
3	Floor Insulation	Not Applicable	

5.8.21.6. **Material of construction:**

S.No.	Component	Material / specification
1	Base frame (main and cross members)	Main structure material: structural steel to IS 2062 E250 (Gr. A / B or better) and IS 4923 (hollow sections), rolled sections (channels / I-beams). Sizes as per the structural analysis. All exterior welds continuous, full penetration, without undercutting or porosity, to give watertight properties.
2	Corner posts / roof frame	Structural steel to IS 2062 E250 / IS 4923 (hollow sections or rolled sections). Sizes as per the structural analysis.
3	Corner fittings	Cast steel ISO corner fittings at the four corners as per ISO 1161.
4	Floor	MS plain plate, 4 mm minimum (typ.; final thickness per structural analysis), supported on cross members. No floor insulation (see Insulation Details). Bottom sheet: not applicable. Raised floor: not applicable. Anti-skid finish. Insulating

		rubber mat (IS 15652, rated for the system voltage) in front of and behind switchboards.
5	Wall panels (sandwich)	Sandwich wall of welded construction, 100 mm thick. External skin: 2.0 mm CRCA sheet (typ.). Insulation: 100 mm Rockwool, 80 kg/m³. Internal cladding: 1.2-1.6 mm GI sheet (typ.); inner sheet shall be riveted. See Wall Section.
6	Roof	Sloped / cambered roof to shed rainwater, 2.0-3.0 mm CRCA sheet (typ.), with 100 mm Rockwool insulation and internal lining. Designed for the load of roof-mounted equipment (e.g. condensing units) and a maintenance walkway, if specified.
7	Doors and frames	See Door Specification.
8	Fasteners, hinges, hardware	Hot-dip galvanised or stainless steel (SS 304). Bolted joints considered snug-tight unless noted otherwise.
9	Gaskets and sealants	EPDM / neoprene gaskets and weather-resistant sealant at all door, panel and cut-out joints.
10	Welding	Welding procedure and welder qualification as per ISO 3834 / AWS D1.1. NDT (DPT / MPI / UT) on lifting points and primary structural welds as per the approved QAP.
11	Material certificates	Mill test certificates for all structural steel, insulation, door hardware and paint materials.
12	All external components	CRCA sheet.

5.8.21.7. **Door Specification:**

S.No.	Parameter	Specification
1	Door construction	Hollow-metal, double-skin leaf (1.6 mm CRCA / GI skins, typ.), filled with Rockwool, 2-hour fire rated as per BS 476 Part 20 & 22. Fire test certificate to be submitted.
2	Door frame	Formed steel frame, 2.0 mm minimum (typ.), welded to the container structure, with EPDM weather seal all round.
3	Opening direction	Outward opening, minimum 120° swing, with door stoppers / hold-open devices. Doors on escape routes must open from inside without a key at all times.
4	Hardware	Minimum 3 heavy-duty ball-bearing hinges per leaf; panic push-bar exit device from inside; lockable mortise lock / handle from outside; hydraulic door closer; flexible earth braid between door and frame.
5	Ingress protection	Weatherproof and dust-proof, IP 55 minimum (as per the enclosure protection class) with rain hood /

		canopy over each external door and a raised sill to prevent water ingress.
6	Security and monitoring	Door-open limit switch on each door, wired to the BMS / alarm panel. Provision for access control lock
7	Signage	Photoluminescent "EXIT" sign above each exit door; "DANGER - Authorized personnel only" sign on external face; door tag as per the Door Schedule.

5.8.21.8. **Gland Specification:**

S.No.	Parameter	Specification
1	Cable entry method	Cable entry location: bottom and sidewards (as per drawing), through removable gland plates / multi-cable transit (MCT) frames in the base frame and side walls, over a cable pit or trench.
2	Gland plates	Removable and bolted, 3 mm minimum thickness (typ.). Single-core AC cables must pass through non-magnetic plates (aluminium / brass / SS) to avoid eddy-current heating. Gaskets on all plates.
3	Multi-cable transits (MCT)	Gland type: Roxtec. Modular, fire-rated (2 hrs, same as container envelope), watertight and dust-tight (IP 66 typ.), rodent-proof. Gland tightening torque: 8-12 N·m based on frame size. MCT layout and cable arrangement to be coordinated with the electrical equipment layout and approved.
4	Cable glands (control / small power)	Double compression, nickel-plated brass, with IP 66 sealing, conforming to IEC 62444. Glands for armoured cables with armour clamping and earth continuity.
5	Spare capacity	20 % spare entries in each gland plate / MCT frame, fitted with blanking plugs or spare modules.
6	Sealing	All unused openings sealed against water, dust, rodents and fire. Seal type to be tested to the same fire rating as the wall.

5.8.21.9. **Structural Analysis**

S.No.	Parameter	Requirement
1	Design codes	IS 800 (limit state method), IS 875 Parts 1-5 (loads), IS 1893 Part 1 (seismic), ISO 1496-1 and ISO 10855-1 (container and lifting design).
2	Dead load	Self-weight of the structure, insulation and lining, plus the weight of all installed equipment (UPS, batteries, panels, cooling units, cables, trays) as per the approved equipment layout and weights.
3	Live load	Floor: 5.0 kN/m² minimum uniformly distributed load (typ.), or the actual equipment concentrated /

		point loads (UPS, battery racks, panels etc.), whichever governs. Roof: 1.5 kN/m² (roof with maintenance access, IS 875 Part 2), plus roof-mounted equipment loads (condensing units, cable trays) as applicable.
4	Wind and seismic	Wind (IS 875 Part 3): basic wind speed Vb = 39 m/s for Pune, terrain category 2 (typ.), with k1, k2, k3 and k4 factors as per the code for the container height and site. Seismic (IS 1893 Part 1): zone III, Z = 0.16, importance factor I = 1.5 (critical facility, typ.), response reduction factor and damping as per the code for the structural system, with equipment anchorage checked for seismic forces. Overturning and sliding checked at the foundation interface.
5	Analysis conditions	(a) In-place condition: container supported on plinth / piers as per the foundation layout. (b) Lifting condition: lifting by crane using the ISO corner fittings or lifting lugs with spreader beam, including a dynamic amplification factor as per ISO 10855-1. (c) Transport condition: road transport loads as per the transport plan.
6	Method	3D finite element model (STAAD / ANSYS or equivalent) of the complete container with equipment loads. Separate calculation report for each container variant.
7	Acceptance criteria	Stress utilization ratio ≤ 1.0 for all members and connections. Deflection of floor and roof beams ≤ span/300 (typ.). Maximum permissible dimensional deviation ± 15 mm (see Container Dimensions).
8	Weights and CG	Gross weight and centre of gravity of each container declared on the GA and lifting drawings and displayed on the container.
9	Deliverables	Structural calculation report (in-place and lifting conditions), lifting arrangement drawing, foundation load / reaction details, all for approval before fabrication.

5.8.21.10. **Wall Section:**

Layer	Component	Material	Thickness / density
1	External skin (outside)	CRCA sheet, painted as per Painting Specification	2.0 mm (typ.)
2	Structural frame / studs	Steel sections, IS 2062 E250 / IS 4923	As per structural analysis
3	Insulation	Rockwool, non-combustible, 2 hrs fire rating (BS 476 Part 20 & 22)	100 mm, 80 kg/m³ (walls and roof)

4	Internal lining (inside)	GI sheet, inner sheet riveted	1.2-1.6 mm (typ.)
5	Floor	MS plain plate, no insulation; no bottom sheet; no raised floor	4 mm minimum (typ.)
6	Typical wall section drawing	[Insert typical wall section / roof section drawing here, showing all layers, joints, door frame and gland plate details.]	

5.8.21.11. **Electrical System:**

S.No.	Parameter	Specification
1	Container Supply system	415 V AC, 3-phase, 4-wire, 50 Hz. Source arrangement and redundancy (N+1 / 2N). Fault rating as per short-circuit calculation.
2	Equipment housed (per variant)	➢ MV Module Block:-MV Panels(22KV)+Kiosks etc. ➢ IT Module Block:- LV panels, modular IT-UPS etc ➢ Mech Module Block: LV panels and control panels for Mechanical loads and modular NON-IT UPS etc ➢ LIB Module Block: lithium-ion battery racks
3	LV switchboard	Type-tested assembly to IEC 61439-1/-2, form of separation 4B, Al busbars, IP 4X minimum (indoor within the container).
4	UPS backup (Emergency /Critical loads)	Non-IT UPS Online double conversion, to IEC 62040-1 / -2. Battery: lithium-ion. Monitoring over Modbus TCP / SNMP.
5	DC system	110 V DC battery and charger for switchgear control and protection: SMPS-based float / float-cum-boost charger with integral DCDB. Battery and charger installed and wired inside the container.
6	Internal cabling	Copper conductor, XLPE insulated, armoured, FRLS (low smoke zero halogen where specified) power cables; 1.1 kV FRLS control cables. Cable sizing for 20 % future growth and a voltage drop within limits. Cable identification at both ends.
7	Cable trays	Hot-dip galvanised perforated trays, 2 mm thick (±0.1 mm), 65 micron average coating, width 150 / 300 mm, side height 50 / 75 mm, length 2500 mm. Tolerance as per IS 1852. All joints bonded for earth continuity.
8	Layout and clearances	Equipment clearances as per the OEM manuals and CEA regulations. A clear, unobstructed escape path from every working location to an exit door at all times. Layout approved by the customer and the electrical inspector before fabrication.

9	Protection and safety	Surge protection device at the incomer; emergency power off (EPO) push-button with safety guard near each exit door; single-line diagram and danger / warning labels displayed inside;
10	Monitoring and control	Multifunction meters on incomer and critical outgoers (Minimum as per drawing). Interface to BMS over Modbus TCP / BACnet / SNMP. Potential-free contacts for alarm, fire and door status.

5.8.21.12. **Earthing system:**

S.No.	Parameter	Specification
1	Standards	IS 3043 / IEC 60364-5-54 for earthing and bonding; IEC 62305 for lightning protection interface.
2	System earthing	(e.g. TN-S) as per the approved project earthing schematic.
3	Container connection to site earth	Body earthing (container): earth cleat at the 4 corners of the container base frame, with SS bolt and lug. Body earthing (system): 50 × 6 mm GI earth flat connecting to the site earth grid.
4	Internal earth bars	Main earth bar of tinned copper, rated for the declared fault current. Separate PE and, if specified, electronic / UPS earth bars, bonded to the main earth bar at a single point. Earth bars wall-mounted on insulators at a visible, accessible location.
5	Equipotential bonding	All exposed metal parts bonded to the main earth bar: panels, UPS, battery racks, cable trays (bonded at every joint), gland plates, doors (flexible braid), HVAC units, steel frame. Earth conductors colour-coded green / green-yellow.
6	Continuity	Resistance between any exposed metal part and the main earth bar ≤ 0.1 Ω (typ.), tested at factory and at site.
7	Site earth electrode resistance	As per the project design basis
8	Neutral earthing	MCT gland for the neutral strip, terminating to the earth bus.

5.8.21.13. **Air Conditioning & Ventilation:**

S.No.	Parameter	Specification
1	Cooling system	Refer Cooling Schedule
2	Redundancy	N+1 per container: working & standby units, with automatic duty rotation and changeover on failure.
3	Design basis	Heat load = equipment losses + envelope gain (including solar gain) + lighting. Outdoor design ambient (extreme maximum dry-bulb

		temperature) as per ASHRAE N=20 yr Pune conditions. Condensing units and cooling units to deliver full rated capacity at the outdoor design ambient without derating and to remain in operation at higher ambient temperatures (allowance for recirculation and roof radiation). Room set point and relative humidity (non-condensing) for the UPS / LV containers and lithium-ion battery containers as per the equipment OEM requirements and the project design basis. Monsoon humidity as per Pune conditions to be considered for coil, drain and condensate design.
4	Refrigerant	R410A or R32 (typ.), low-GWP refrigerant preferred, as per the customer approval).
5	Ventilation / fresh air	Louvres with filters and fire dampers (closing automatically on fire alarm), maintaining the 2-hour fire rating of the envelope. Provision for battery room ventilation as required by the battery OEM.
6	Controls	Temperature and humidity sensors inside each container. High-temperature, unit-fail and standby-start alarms wired to the BMS (Modbus TCP / BACnet).

5.8.21.14. **Fire Detection, Alarm & Safety:**

S.No.	Parameter	Specification
1	Detection	Addressable Multi (smoke & heat) detectors inside the container and under the floor / cable zone as applicable, connected to a fire alarm panel inside the container.
2	Alarm	Hooter / strobe inside and outside the container, and a manual call point at each exit door. Potential-free contacts for integration with the site fire alarm system and BMS.
3	Suppression	Clean agent system (FK-5-1-12, NFPA 2001 / ISO 14520) with abort switch + portable fire extinguishers (CO_2) at each exit.
4	Lithium-ion battery module	Battery management system with alarm and trip interface, plus early detection and suppression arrangement as required by the battery OEM and the RFP
5	Fire stopping	All cable and pipe penetrations sealed with 2-hour fire-rated MCT frames or sealant, tested to BS 476 or equivalent.
6	Escape and signage	Clear escape route to at least two exits (see Door Schedule), photoluminescent exit signs, safety signage and a single-line diagram displayed inside.

5.8.21.15. **Lighting, Small Power & Emergency Lighting:**

S.No.	Parameter	Specification
1	Internal lighting	Normal lights: 40 W LED, IP 54 minimum, mounted clear of equipment access and escape routes. Average illuminance 300 lux at working plane. Switches at each door .
2	Emergency lighting	Emergency light: 40 W LED with 60 minutes in-built battery backup, along the escape route and at each exit, auto-switching on supply failure.
3	External lighting	No external lights.
4	Small power	6/16 A switch and socket, 2 nos. per container (not applicable in LIB modules), fed from the lighting DB. 20 % spare ways.
5	Lighting DB	1 no. lighting DB per container.
6	Exit light	1 no. above each door.
7	Others	FRLS PVC wire and casing capping.

5.8.21.16. **Lifting, Transport, Testing & Documents:**

S.No.	Parameter	Specification
1	Lifting	Lifted, moved and supported only as per the installation manual and the approved lifting arrangement drawing, using the four ISO corner fittings or designed lifting lugs and a spreader beam. The same applies to lifting and moving inside the factory.
2	Transport	Shipped fully assembled with equipment secured and transport restraints fitted. Transport plan covering route, trailer type, permits and maximum gross weight / dimensions to be approved. Loose items packed and listed inside the container.
3	Site installation	Placed on a levelled foundation within the tolerance given in the installation manual, bolted or welded to the foundation inserts as per the foundation drawing.
4	Factory tests	Dimensional check (± 15 mm), weld NDT, DFT and adhesion tests, water-tightness (water spray) test, insulation resistance, earth continuity, functional tests of lighting, HVAC, fire alarm, door switches and BMS signals, and equipment functional tests as per the approved FAT procedure.
5	Inspection	Hold and witness points at fabrication, painting and final stages for the customer / third-party inspector, with an inspection call as per requirement.
6	Documents for approval	GA and layout drawings, wall and roof sections, structural calculation, lifting drawing, painting procedure, QAP, welding procedure, electrical equipment datasheets, SLD, earthing schematic, cable tray layout
7	Final documents	As-built drawings, test reports, material and fire test certificates, O&M manuals

5.8.22. Variable Frequency Drive(VFD):

The variable frequency drive(s) shall be pulse width modulation (PWM) type, microprocessor controlled design. VFD, including all factory installed options, is tested to conform to UL standard 508. VFD shall also meet UL and be CE marked and built to ISO 9001:2000 standards. VFD shall comply EMC directives as per IEC 61800-3:2004, category C1 with 50-meter motor cable (for power less than or equal to 90 Kw) & category C2 with 50 meter motor cable (for power more than 90 Kw). VFD shall be housed in enclosures for indoor applications. Wall mounted/VFDs with plastic enclosures shall not be acceptable. For outdoor applications, VFDs shall be housed in IP 54 enclosure or if inbuilt pump with frequency inverter the enclosure shall be IP55. VFD shall employ an advanced sine wave approximation and voltage vector control to allow operation at rated motor shaft output speed with no deration. This voltage vector control shall minimize harmonics to the motor to increase motor efficiency and life. Power factor shall be near unity regardless of speed or load. VFD shall have balanced DC link chokes to minimize power line harmonics. VFDs without a DC link choke shall provide a 3% impedance line reactor. VFD shall be compatible for ModBUS/any open standard protocol.

5.9. MINIMUM INDICATIVE REQUIREMENT OF MAJOR COMPONENTS

5.9.1. The quantities indicated here in are minimum indicative quantities with minimum specification and shall in no way absolve the Contractor/Vendor of the responsibility to provide any additional equipment or any other associated items required for a complete, fully functional, reliable and maintainable Data Centre installation complying with the specified Uptime Institute Tier III requirements and other applicable statutory rules, codes and/or standards, and the best design practices in the AI Data Centre Domain.

5.9.2. The project being executed in EPC (Engineering, Procurement and Construction) mode, the Contractor/Vendor shall verify the adequacy of all quantities based on detailed engineering as per respective IT OEM requirements , design calculations, equipment loading, site conditions, capacity requirements, redundancy philosophy, maintainability, single points of failure and operational requirements. Where additional quantities or equipment are required to achieve the specified performance, capacity, operational requirements , Tier III compliance and/or best practices in State of the Art-AI Data Centre , the same shall be provided by the Contractor/Vendor without compromising the project requirements.

5.9.3. The quantities shall therefore be treated as minimum requirements and not as a limitation on the Contractor/Vendor's scope or responsibility. Any additional items necessary for achieving the specified performance, redundancy, reliability, maintainability, safety and Tier III requirements shall be deemed included in the Contractor/Vendor's scope and shall be provided without any additional cost to the Employer.

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
Tier Certification				
DC Design Certification	Tier III Certification of Design Documents (TCDD) by Uptime Institute			

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
DC Constructed Facility Certification	Tier III Certification of Constructed Facility (TCCF) by Uptime Institute			
DC Sustainable Operation Certification	Tier-III Certification for Operational Sustainability (TCOS) by Uptime Institute			
Electrical Solution				
Supply, laying, testing and commissioning of two separate 22 kV express HT feeders, each comprising 3 Runs × 3C × 300 sq.mm XLPE insulated, armoured Aluminium HT cable, routed from two independent MSEDCL upstream substations as identified/approved by MSEDCL, with N+1 redundancy. Scope shall include all required HT cable accessories, straight-through and termination kits, glands, lugs, cable identification, earthing, route works, testing and commissioning, complete in all respects as per MSEDCL requirements	22kv*3 R*3C*300 Sq mm XLPE Armored AL HT Cable	Sq mm	2	N+N
SITC of complete Summation Metering/other metering scheme as per the requirements and approval of MSEDCL, including metering CTs/PTs, energy meters, wiring, interconnections and all associated accessories. The scope shall also include preparation and submission of applications, drawings and documents and obtaining approval for Connected Load and Contract Demand/Load, along with all required statutory and regulatory approvals from MSEDCL and other concerned authorities, including inspection, testing, compliance and coordination, complete in all respects.	1	LOT	1	
HT Panel (Reference Drawing)-Utility/MSEDCL Control	1250 (I/C)	AMP	2	N+N
HT Panel (Reference Drawing)-CDAC Control	1250 (I/C)	AMP	2	N+N
SITC of 2500 kVA Compact Substation comprising HT RMU	2500	KVA	10	N+1

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
with motorized VCB arrangement (2-Incomer + 1-Outgoing), 22 kV, complete with protection, metering and necessary interlocking, 2500 kVA, 22/0.433 kV dry-type transformer, and suitably rated LT ACB panel, including all necessary HT/LT cables, terminations, glands, lugs, earthing, control and protection accessories, interconnections, testing and commissioning, complete in all respects				
SITC of automatic EB–DG Changeover Panel, comprising electrically & mechanically interlocked incomer switching devices for EB and DG sources, source monitoring, protection, indication, metering and necessary control accessories, including busbars, wiring, terminals, interconnections, cable termination facilities, earthing, testing and commissioning, complete in all respects	2500	KVA	10	
SITC of RTPFC Panel (Minimum 7% Detuned Reactor)	750	KVAR	10	As Per Detailed Engineering
SITC of all TTA LT Panels conforming to IEC 61439-1 & IEC 61439-2, including suitable incomers, busbars, ACB/MCCB/MCB etc., outgoing feeders, protection, metering, indication and control accessories, along with Distribution Boards (DBs), isolators and associated power distribution equipment for electrical and mechanical equipment/services. Scope shall include all necessary interconnections, internal wiring, cable termination facilities, earthing, supports, identification, testing and commissioning, complete in all respects	1	LOT	1	As Per Detailed Engineering

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
IT UPS:-SITC of modular online double-conversion UPS system for IT load, rated for 1000 kW continuous base load(N), with minimum frame capacity of 1200 kW and configured in N+1 redundant module arrangement. The system shall be complete with Lithium-Ion Battery (LIB) system providing minimum 10 minutes backup at 1000 kW load at 10-year End-of-Life (EOL), including BMS, DC protection/isolation and battery cabinets/racks. Scope shall include all required power, control cables, terminations, interconnections, earthing, accessories, testing and commissioning, complete in all respects.	1000	KW/ KVA	12	N+1
NON-IT UPS: -SITC of modular online double-conversion UPS system for NON-IT load, rated for 1000 kW continuous base load(N), with minimum frame capacity of 1200 kW and configured in N+1 redundant module arrangement. The system shall be complete with Lithium-Ion Battery (LIB) system providing minimum 10 minutes backup at 1000 kW load at 10-year End-of-Life (EOL), including BMS, DC protection/isolation and battery cabinets/racks. Scope shall include all required power, control cables, terminations, interconnections, earthing, accessories, testing and commissioning, complete in all respects.	1000	KW/ KVA	02	N+1
SITC of Foor Standing PDU with Isolation Transformer for IT loads, comprising dry-type, K-20 rated isolation transformer with 100% copper windings, suitable for nonlinear AI IT loads and data-centre applications,	1	LOT	1	As Per Detailed Engineering
SITC of IT Sandwich-Type Busbar Trunking (Copper) above each IT rack row within the Server Hall,	1	LOT	1	As Per IT OEM require

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
complete with suitably rated tap-off boxes, straight lengths, bends, end-feed units, jointing assemblies, supports/hangers and all necessary accessories for power distribution to IT racks				ments & Detailed Engineering
SITC of complete external electrical power distribution system using suitably rated Sandwich-Type Busbar Trunking (Aluminum/CU) and/or XLPE insulated power cables (HT/LT), as applicable, for power distribution to electrical loads located outside the IT Halls and for external utility/services loads, including all necessary straight lengths, bends, tees, tap-off units, end-feed units, jointing kits, cable glands and lugs, supports, hangers, MS Overbridge/cable trays/trenches, terminations, earthing, identification, testing and commissioning, complete in all respects.	1	LOT	1	As Per Detailed Engineering
SITC of one electrical feeder from the Non-IT Raw Power Panel to the incomer ACB of the Main Distribution Panel (MDP) located at the Ground Floor, for distribution of power to the electrical loads of other floors of the building, including suitably rated power cables/busbar trunking, cable termination and glands, lugs, supports, routing, identification, earthing, testing and commissioning, complete in all respects	1500	KVA	1	As Per Detailed Engineering
Diesel Generators Solution				
Diesel Generators--High side and low side	2500 KVA /2000kwe , as per technical specification provided ,for Data Centre Application with compliance to Tier-III Certification (UPTIME INSTITUTE) Requirements	KVA	10	N+1
DG EXHAUST SYSTEM (FLUE PIPES)- -High side and low side	1	LOT	1	
UG HSD Tanks--High side and low side- along with approval from PECO/CCOE , piping etc.	30	KL	4	

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
First Fill of HSD in tanks (After successful DC IST report by UPTIME)	One(1) Lakh	Litres		
Flame Proof Fuel Delivery Pump--High side and low side	6	M3/hr	4	
Fuel Delivery Pipe & Accessories	1	LOT	1	As Per Detailed Engineering
Fuel unloading point assembly--High side and low side	1	LOT	2	
DG HSD Day Tank--High side and low side	990	Ltrs	10	
Fuel Polishing Units--High side and low side	10	Cubic Meter/Hour	2	
Fuel Monitoring & Control System--High side and low side	1	LOT	1	
Fuel Leak Detection System--High side and low side	1	LOT	1	
Cooling Solution				
Air Cooled Screw High Temperature Chiller for DCLC (With Free cooling) High side and low side	530 (Derated capacity /Net Sensible Capacity)	TR	6	N+2
Variable (VFD) primary pumps for DCLC Chillers -High side and low side	As Per Detailed Engineering	HP	6	N+2
Air Cooled Screw Chiller for air cooling (With Free cooling) & other support areas cooling- High side and low side	530 (Derated capacity /Net Sensible Capacity)	TR	4	N+2
Variable (VFD) primary pumps for Air Cooling Chillers -High side and low side	As Per Detailed Engineering	HP	4	N+2
CDU -High side and low side-DCLC AI Accelerator POD 1	1200 (Derated capacity) Each: 3W + 1S or 1800 kW (derated capacity) Each: 2W + 2S (FWS Supply ≥25°C, FWS ΔT ≥10°C, TCS Supply ≥30°C, TCS ΔT ≥10°C).	KW	4	N+1
CDU -High side and low side-DCLC AI Accelerator POD 2	1200 (Derated capacity) Each: 3W + 1S or 1800 kW (derated capacity) Each: 2W + 2S (FWS Supply	KW	4	N+1

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
	≥25°C, FWS ΔT ≥10°C, TCS Supply ≥30°C, TCS ΔT ≥10°C).			
DCLC Rack-Level Integrated pressure independent flow Control Valve Assembly: - (One per each AI Accelerator DCLC Rack): - 1. Measurement: - Flow rate, supply & return temperature, Delta T, Delta P, cooling energy (KW) etc. 2. Control: -Differential-pressure control and Differential Temperature control 3. With Fail safe Mode Protection etc.	As per DCLC design of IT OEM	Lot	48	As Per Detailed Engineering
Fan Wall Unit-High side and low side-AI Accelerator POD 1	350 (Derated capacity/Net Sensible Capacity) (S: >= 18°C, R: 25°C)	kw	4	N+2
Fan Wall Unit-High side and low side-AI Accelerator POD 2	350 (Derated capacity/Net Sensible Capacity) (S: >= 18°C, R: 25°C)	kw	4	N+2
Fan Wall Unit-High side and low side-NETWORK -STORAGE POD 3	400(Derated capacity /Net Sensible Capacity) (S: >= 18°C, R: 25°C)	kw	3	N+1
PAHU –PDU ROOM and other Cooling outlets (CW based/VRF/VRV) for other support areas	As Per Detailed Engineering (S: >= 18°C, R: 25°C)	LOT	1	N+1
THERMAL STORAGE TANK - STRATIFIED TANK FOR DCLC CHILLER COOLING LOOP -High Side and low side	60	KL	2	N+1
THERMAL STORAGE TANK - Stratified Tank For Air Cooling Chiller Loop -High side and low side	40	KL	2	N+1
Expansion Tanks & Pressurization Unit (2 pumps) (2 no. for DCLC Cooling Circuit & 2 no. for Air Cooling Circuit)	1	LOT	4	N+1
Automatic Chemical dosing plant (2 no. for DCLC Cooling Circuit & 2 no. for Air Cooling Circuit)	1	LOT	4	N+1
SITC of MS C-Class pipes for chiller loops, complete with all required fittings, isolation & control valves, strainers, flanges, gaskets, supports/hangers, flexible connections, drain and vent arrangements, pipe insulation, identification, testing, flushing and commissioning, complete in all respects	1	LOT	1	NA

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
SITC of SFN stainless-steel (SS) piping for DCLC loop (CDU secondary side),as per technical specification provided , complete with all required SS fittings, isolation & control valves, strainers, flanges, gaskets, flexible connections, supports/hangers, drain and vent arrangements, pipe insulation, passivation, flushing, pressure testing, identification and commissioning, complete in all respects	1	LOT	1	NA
SITC of RO Plant for make up water (as per CDU OEM Validation)	1	LOT	2	NA
ELV				
SITC of complete Building Management System (BMS) comprising PLC based control system, BMS software, server & workstations, communication network, gateways and necessary hardware, including Soft I/O, Hard I/O Digital and Analog points for monitoring, control and integration of electrical, HVAC, mechanical and other DC services. The system shall be provided with a minimum 20% spare I/O capacity over the base project requirement, including spare physical I/O modules, terminals and software/database capacity, with all necessary programming, graphics, alarms, trends, reports, testing, commissioning and integration with relevant equipment/control systems, complete in all respects.	1	LOT	1	NA

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
BMS Operator Work Station: SITC of BMS Operator Workstation, comprising PC with minimum Core i7 processor, 16 GB RAM, 1 TB SSD, 24-inch LED monitor, keyboard, mouse, network interface and required operating system/software, complete with BMS workstation/client software and licences ETC,		NO.S	10	
SITC of Water Leak Detection (WLD) System for server areas, including leak detection sensing cable along the entire periphery of server halls, around all chilled-water cooling units such as FWU, PAHU ,CDUs , all along SS Piping etc. complete with leak detection control panels, zone controllers, sensing modules, alarm annunciation, location identification, monitoring interface and BMS integration. The system shall provide alarm and event indication with suitable zoning and fault monitoring, including all cables, accessories, supports, testing and commissioning, complete in all respects.	1	LOT	1	NA
SITC of Aspirating Smoke Detection (ASD/VESDA) System for areas(Fire Protection Schedule), comprising high-sensitivity aspirating smoke detectors, sampling pipe network, sampling points, filters, control/indication panel and all necessary accessories. The system shall provide early warning smoke detection with multi-level alarm thresholds and shall be integrated with the Fire Alarm System (FAS) & BMS, including all piping, cabling, supports, programming, testing and commissioning, complete in	1	LOT	1	NA

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
all respects as per approved design and applicable standards.				
SITC of Rodent Repellent System throughout the First Floor of the building, comprising suitable ultrasonic rodent-repellent units, controllers, power supply, cabling, mounting accessories and necessary controls, complete with zoning, testing and commissioning. The system shall provide continuous rodent deterrence and complete in all respects	1	LOT	1	NA
SITC of IP-based CCTV Surveillance System with minimum 4 MP IP Verifocal Dome Cameras throughout the First Floor of the building, designed to ensure complete coverage without blind spots in Server Rooms, all support/service rooms/ISO or Non-ISO Sized Containers, corridors, server-room entrances& exits, floor entrances & exits and both fire-exit doors. The system shall include cameras, VMS, storage, PoE switches, network cabling, monitoring workstation, UPS-backed power supply, mounting accessories, software/licences, recording, including all necessary accessories, testing and commissioning, complete in all respects	1	LOT	1	NA
SITC of IP-based outdoor PTZ CCTV Surveillance System comprising minimum 8 MP PTZ motorized cameras with minimum 32× optical zoom or higher, 360° continuous pan,IP66, suitable tilt range and minimum 100 m IR illumination, for comprehensive surveillance of the external building periphery. Minimum 8 Nos. cameras shall be provided at suitable locations on dedicated poles, including poles/foundations, PoE/network	1	LOT	1	NA

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
switches, power supply, UPS-backed power, network/fibre-optic and power cabling, VMS, storage, mounting hardware, earthing, software/licences and all necessary accessories, testing and commissioning, complete in all respects				
SITC of IP-based outdoor CCTV Surveillance System comprising minimum 8 MP IP Bullet Cameras with minimum 50 m IR illumination, IP 66, minimum 24 Nos., for comprehensive surveillance of the external building periphery and utility areas across both floors of steel structural support , with camera locations finalized to ensure complete coverage without blind spots. The scope shall include suitable poles/mounting structures, PoE/network switches, power supply, UPS-backed power, network/fibre-optic and power cabling, mounting accessories, earthing, software/licences and all necessary accessories, testing and commissioning, complete in all respects	1	LOT	1	NA
SITC of ACCESS CONTROL SYSTEM (Door Access Control:-1. Face Recognition &/or Biometric -In Server Areas, 2. Face Recognition &/or Biometric In Other Areas in first floor and UPS-BATTERY-Panel Rooms/Containers etc.	1	LOT	1	NA
Fire Doors:-Two Hours Fire Rated (Minimum Height of 2400 mm)	1	LOT	1	NA
Fire Monitoring & Alarm System	1	LOT	1	NA
SITC of Luminaires LED Lights (Minimum 36 Watts, 120 lumen/watt) IP 4X 2x2 Grid Pattern with power, cables, accessories etc. to maintain minimum average 500 lux - Server Area	1	LOT	1	NA
SITC of Luminaires LED Lights (Minimum 36 Watts, 120 lumen/watt) IP 4X 2x2 Grid	1	LOT	1	NA

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
Pattern with power, cables, accessories etc. to maintain minimum average 350 lux – Rest All Support Areas including corridor in First Floor				
SITC of Luminaires LED Lights (Minimum 150 Watts, 120 lumen/watt) IP 6X with flood and/or street light with poles , power, cables, accessories etc. to maintain minimum average 50 lux - External/Outdoor Area & Utility Area	1	LOT	1	NA
SITC of Fire Protection System Including Gas Suppression System and fire extinguishers (CO2/ABC) for DC first floor (Server Halls, PDU room, Staging Room) and all Critical support Electrical Containers/ Rooms/in utility section (Refer Fire Protection Schedule)	1	LOT	1	NA
SITC of Fire Protection System including Pre-Action Water Sprinklers with pre-action valve (double lock) and fire extinguishers for rest of the areas in first floor of the building(Refer Fire Protection Schedule)	1	LOT	1	NA
SITC of Digital Public Address cum Emergency Voice Evacuation System with 2x 480-watt amplifiers and 6-watt ceiling speakers throughout first floor along with power ,control cabling, mounting accessories, and all other necessary accessories, testing and commissioning, complete in all respects	1	LOT	1	NA
Miscellaneous				
Raised floor in throughout First Floor Area in building as per respective UDL calculation (Except Toilet Area) (In IT halls minimum 3100 kg/sqmt UDL)	1	LOT	1	NA
Metal false ceiling throughout First Floor	1	LOT	1	NA
Fire rated (2 hour) glass partition between corridor and IT Halls + between corridor and NOC area (as per Drawing)	1	LOT	1	NA

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
Land filling, compacting & Levelling in outside equipment area as per site survey and contour drawings to achieve the level above natural water drainage level	1	LOT	1	NA
Design, supply, fabrication, erection and execution of 1. Supporting steel structures for installation of outdoor equipment, 2. foundations and 3. access roads etc., including structural design, drawings and calculations, duly vetted by a Structural Consultant and third-party structural vetting by COEP Pune/IIT/NIT or any other agency approved by C-DAC Pune.	1	LOT	1	NA
Access Concrete Roads(Minimum 150 mm) in Utility Area	1	LOT	1	
Chain Link Security Fence for Utility Area	1	LOT	1	
Staff Furniture				
BMS ROOM				
1200(L)x600(W)x750 /1050(H)mm Modular Tables		NOs.	10	
Metal Pedestal Storage Units(4 Drawers)		NOs.	10	
Mid back chair		NOs.	10	
NOC ROOM				
1200(L)x600(W)x750 /1050(H)mm Modular Tables		NOs.	16	
Metal Pedestal Storage Units(4 Drawers)		NOs.	16	
Mid back chair		NOs.	16	
SOC ROOM				
1200(L)x600(W)x750 /1050(H)mm Modular Tables		NOs.	12	
Metal Pedestal Storage Units(4 Drawers)		NOs.	12	
Mid back chair		NOs.	12	
STAGING ROOM				
1200(L)x600(W)x750 /1050(H)mm Modular Tables		NOs.	20	
Metal Pedestal Storage Units(4 Drawers)		NOs.	20	
Mid back chair		NOs.	20	

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
Meeting Room				
Meeting Room Table (20 Pax Seaters)		NOs	1	
High back chair		NOs	21	
Other Areas				
Three Seater Sofa		NOs	2	
Centre Table(Glass)		NOs	2	
LED TV Units				
SITC of 65-inch 4K LED TV, complete with all allied cables, power points, HDMI cables, wall/ceiling mounting bracket, connectors and necessary accessories, including power and signal connectivity, installation, testing and commissioning, complete in all respects		NOs	12	
Physical Security				
SITC of Electromechanical Boom Barrier System with minimum 6.0 m boom arm, with all accessories upto 6 meter length suitable for vehicle entry/exit control, with control panel, UPS power supply, networking provisions cabling, earthing and all associated accessories etc., complete in all respects		NOs	2	
Hand held Metal Detector		NOs	2	
SITC of X-Ray Baggage Scanner Machine :-Computer based multi energy X-Ray baggage inspection system mounted on castor wheels capable of passing through bags of nominal dimensions 940mm(W) x 640mm(H) with belt height 750mm to 850mm, 22"/24" LCD monitor, Input/output rollers with frames etc. as required for security screening of baggage, parcels and hand-carried items, complete with conveyor, control panel, UPS power supply, networking provisions, earthing and all associated accessories etc., complete in all respects		NOs	1	

Minimum Equipment Description (SITC)	Minimum Capacity	Unit	Minimum Indicative Quantity with Redundancy	Minimum Redundancy
Walk through Multi Zone Metal Detector: 20 zone or above door frame metal detector nominal size: 760mm (W) x 2050mm(H) x 700mm(D) along with necessary software, power and control cabling etc. suitable for operation on 230 volts single phase supply +- 10% AC, complete as required	760mm (W) x 2050mm(H) x 700mm(D)	NO.s	1	

5.9.4. STAFF SEATING MINIMUM POINTS REQUIREMENT: -

Area	Staff seats	Raw Point (5/6 amp)	UPS point(2*5/6 amp)	Raw point(15/16 A)	Network /Data Point	Telephone Point
STAGING AREA	20	20	20	20	20	20
NOC AREA	16	16	16	4	16	16
SOC AREA	12	12	12	4	12	12
BMS ROOM	10	10	20	4	20	10
MEETING ROOM	21	8	8	4	8	2
CORRIDOR & ENTRANCE	NA	10	10	10	10	4
IT HALL-1	NA	4	4	4	4	0
IT HALL-2	NA	4	4	4	4	0
IT HALL-3	NA	4	4	4	4	0

5.9.5. NOTE:-

(a) During Project Execution Phase till the successful IST report and TCCF Final Closure Report of UPTIME, all the consumables including Diesel (HSD) , Power , Water etc is in vendor scope.

(b) During O&M phase, Statutory bills such as Electricity Bills and Water bills will be paid by CDAC directly. Diesel (HSD) procurement for DG Sets will be initiated by vendor as per requirements but after due information and consent of CDAC concerned officials. The bill will be settled by CDAC to the HSD supplier with in 15 days period of HSD delivery date subject to production of bill with necessary documentary evidence.

5.10. TIER-III CERTFICATION SCOPE: -

5.10.1. The scope involves Data Centre project to be Certified at THREE (3) level by Uptime Institute, Global Authority for Data Centre Certification process. Bidder to incorporate below scope of work.

5.10.2. Below description is the minimum services to be delivered for the project. Other than what is described in below scope of work, it will be responsibility of the bidder to consider anything else required to complete Tier III certifications.

5.10.3. STAGE-1:- TIER III CERTIFICATION OF DESIGN DOCUMENTS: -

5.10.3.1. Uptime Institute will conduct design review of bidder at concept/preliminary level during RFP evaluation process to ensure overall integrity and technical sufficiency of the solution. The designs created by bidder will be reviewed at concept/preliminary level to identify gaps if any for timely correction and improvements in design. Bidder has to incorporate those corrections suggested by UPTIME in their design and resubmit the designs. Submitting a preliminary design vetting report by UPTIME during technical evaluation stage of the bid will be part of the scope of bidder. (There is no design certification required at bidding or bid evaluation stage).

5.10.3.2. After the successful bidder is awarded the order, 100% (Detailed) TCDD review process will be initiated by UPTIME. The overall design is to be vetted against Tier standard to achieve an overall performance meeting Tier III level. After each review Uptime Institute to provide gap report to contractor and CDAC, Pune. Once all the points are cleared, Tier III certification of Design Document is to be provided by Uptime Institute.

5.10.4. STAGE-2:- TIER III CERTIFICATION OF CONSTRUCTED FACILITY: -

5.10.4.1. Uptime Institute will review the commissioning plans and commissioning scripts prepared by the bidder or their commissioning agent (for Level 4 & Level 5 commissioning). Uptime Institute will provide report with corrections and improvement in these documents. These improvements must be included by contractor and their commissioning agent while commissioning the data centre.

5.10.4.2. Uptime Institute will check readiness of the site for TCCF visit. They will submit the review with observations and suggestions for site's readiness to both bidder and CDAC, Pune. Uptime Institute also has to assess the on-site topology of Data Center site infrastructures for the purposes of awarding Tier III Certification of Constructed Facility.

5.10.5. Prepare a list of supplemental demonstrations of the site's functionality and distribute to the project team prior to the site visit.

5.10.6. Perform an on-site visit to identify discrepancies between the previously reviewed design drawings and the installed site infrastructure equipment ,Observe (on site) the selected demonstrations—prepared beforehand—of the site's -Concurrently Maintainable capability of the Electrical, UPS, Central Cooling Plant, Computer Room Cooling, and Engine-Generator Systems etc.

5.10.7. Uptime Institute Professional Services consultants will observe the appropriate testing procedures, as performed by others.

5.10.8. Award Tier Certification of Constructed Facility on closure of all points.

5.10.9. Note:-The Data Centre shall be tested for site performance before acceptance using external load banks supplied by bidder. Nothing extra shall be payable to bidder in this regard.

5.10.10. STAGE-3:- TIER CERTIFICATION OF OPERATIONAL SUSTAINABILITY

5.10.10.1. Uptime Institute needs to assess the site management program of the CDAC DC for the purposes of awarding Certification of Operational Sustainability.

5.10.10.2. Uptime Institute Professional Services to evaluate the effectiveness of each component of Management & Operations, DC Operations Human risk & Performance Management
5.10.10.3. CDAC is targeting for GOLD certification for Operational Sustainability.
5.10.10.4. This assessment needs to be done within 6-7 months of DC operations or after TCCF award whichever is earlier.
5.10.10.5. Contractor on board needs to keep valid certification throughout the tenure of DC operations
5.10.10.6. DC Operations Human risk & Performance Management
5.10.10.7. Bidder on board needs to have visibility about the on site staff. Bidder on board needs to include Competency and Confidence Assessment Modelling for all the people on the site through the operations contract period

5.11. DC ACCEPTANCE CRITERIA:

5.11.1. Based on demonstration of following parameters, the DC implemented solution will be accepted.
5.11.2. Getting Successful Integrated System Test Reports (IST Report) of DC solution and TCCF Final Closure Report by UPTIME Institute
5.11.3. Submission of As-Built Drawings (3 Sets hard copy along with Soft Copy)
5.11.4. Submission of HOTO (Handing Over & Taking Over) Documents including but not limited to warranty cards and manuals

5.12. MINIMUM INDICATIVE KEY EXECUTION PERSONNEL TO BE DEPLOYED

5.12.1. (IMPLEMENTATION PHASE)

SL.NO.	CATEGORY	Nos
1	PROJECT MANAGER -ATD	1
2	LEAD DISCIPLINE ENGINEERS(B.E/B.TECH)	Electrical – 1 per shift Mechanical &/HVAC –– 1 per shift IBMS –1 per shift CIVIL-– 1 per shift
3	SITE WORK SUPERVISOR (DIPLOMA/ B.E/B.TECH)	Electrical – 2 per shift Mechanical &/HVAC –– 2 per shift IBMS – 2 per shift CIVIL-– 2 per shift
4	SAFETY OFFICER	1 per shift
5	STORE IN CHARGE	1 per shift
6	QA/QC SUPERVISOR	1 per shift

5.12.2. NOTES:

5.12.2.1. The details of minimum manpower required to be mobilized by the contractor during the Implementation to complete the work is MINIMUM Requirement only. Contractor is required to augment the above list with additional numbers/categories of personnel as required and/or as directed by CDAC to carry out the works in working hours including night shifts, and complete the work within the completion time schedule.

5.12.2.2. The Key Construction Personnel identified above shall be well qualified & having adequate relevant experience. The other manpower shall also be qualified and experienced with their assigned work.

5.13. Safety Regulations

5.13.1. The contractor shall at his own expense, arrange for the safety provisions as per the codes of Indian Standard Institution, Indian Electricity Act / Rule and such other Rules, Regulations and Laws as may be applicable in respect of all labour, directly or indirectly employed in the work for performance of the Contractor's part of this agreement.While the Indian Electricity Rules 1956, as amended up to date, are to be followed in entirety, any installation or portion of the installation that does not comply with these Rules, should be rectified immediately.

5.13.2. The contractor shall be responsible for and indemnify the buyer against all injury to persons – both his own workmen and others and for all damage to structural and / or decorative part of the buyer's property during erection and commissioning of the equipment. The contractor shall repair / reinstate all such damage at his own cost.

5.13.3. It shall be ensured that the control switches and distribution boards are duly marked, the distribution diagrams of substations are prominently displayed, and the substation premises, main switch rooms and D.B. enclosures are kept clean. Particular care should be taken to prevent the substation being used as store for inflammable materials, broken furniture, waste materials etc.

5.13.4. No inflammable materials shall be stored in places other than the rooms specially constructed for this purpose in accordance with the provisions of the Indian Explosives Act. If such storage is unavoidable, it should be allowed only for short period and in addition, special precautions such as cutting off supply such places at normal times, storing materials away from wiring and switch boards, giving electric supply for a temporary period with due permission of engineer- in charge shall be taken.

5.13.5. Protective and safety equipment such as rubber gloves, earthing rods, line men's belt, portable respiration apparatus, necessary number of caution boards such as " Man on Line", "Don't switch on" etc. should be provided in easily identifiable locations. Where electric welding or such other nature of work is undertaken, goggles shall be provided.

5.13.6. Rubber or insulating mats should be available in front of the main switchboards or any other control equipment of medium voltage or above.

5.13.7. Standard first Aid boxes containing materials as prescribed by Indian red cross should be provided in easily identifiable locations and should be easily available.

5.13.8. Periodical examination of the first aid facilities and protective and safety equipment provided should be undertaken and proper records shall be maintained for their adequacy and effectiveness.

5.13.9. Charts (one in English and one in regional language) displaying methods of giving artificial respiration to a recipient of electrical shock shall be prominently displayed at appropriate places.

5.13.10. A chart containing the names, addresses and telephone numbers of nearest authorized medical practitioners, hospitals, fire brigade and also officers in charge shall be displayed prominently along with the first Aid box.

5.13.11. Steps to train supervisory staff and authorized persons of the engineering staff in the first Aid practices, including various methods of artificial respiration with the help of local authorities such as fire brigade, St. John's Ambulance Brigade, Indian Red Cross or other recognized institutions equipped to impart such training shall be taken, as prompt rendering of artificial respiration can save life at the time of electric shock.

5.13.12. Electrical wiring and control switches should be periodically inspected and any defective wiring switches which will expose live parts should be replaced immediately to make installation safe.

5.13.13. No work on live L.T. bus bars or pedestal switch boards should handle by a person below the rank of a wire man and such a work should preferably be done in the presence of the Engineer in charge of the work.

5.13.14. When working on or near live installation, suitable insulated tools should be used, and special care should be taken to see that these tools accidentally do not drop on live terminals causing shock or dead short.

5.13.15. The electrical switchgear and distribution boards should be clearly marked to indicate the area being controlled by them.

5.13.16. Before starting any work the existing installation, it should be ensured that the electric supply to that portion in which the work is undertaken is preferably cut off. Precautions like displaying "Men at Work" caution boards on the controlling switches, removing fuse carrier from these switches and these fuse carriers being kept with the person working on the installation, etc., should be taken against accidental energization. "Permit to Work" should be obtained from the Engineer-in-charge. No work on H.T. main should be undertaken unless it is made dead and discharged to earth with an earthing lead of appropriate size. The discharge operation shall be repeated several times and the installation connected to earth positively before any work is taken up.

5.13.17. Before energizing any installation after the work is completed, it should be ensured that all the tools have been removed and accounted and no person is present inside any enclosure of the switchboard. Any earthing connection made for carrying out the work should be removed. "Permit to work" should be received back duly signed by the person to whom it was issued in token of having completed the work and the installation being ready for energization and "Men at Work" caution Boards removed.

5.13.18. In case of electrical accidents and shock, the electrical installation on which the accident occurred should be switched off immediately and the affected person should be immediately removed from live installation by pulling him with the help of coat, shirt, and wooden material or with any other dry cloth. He should be removed from the place of accident to a nearby safe place and artificial respiration continuously given as contained in BIS code and standard prescribed by St John Ambulance Brigade or Fire Brigade.

5.13.19. While artificial respiration on the affected person is started immediately, help of Fire Brigade and Medical Practitioner should be called for an artificial respiration should be continued uninterrupted until such help arrived.

5.13.20. These instructions should be explained in Hindi / local language to those staff who does not understand English.

5.13.21. The contractor shall ensure that all portable power tools used by the workman are rated 230 volts, double insulated and have to be taken through 100 mA Earth Leakage Circuit Breaker (ELCB). Also all temporary lighting shall be supplied through 30 mA ELCB. Inserting wire into the sockets without the plug

tops is not allowed. The length of the extension cord for portable tools should not be more than 5 feet. Temporary cables and flexible wires of short length should be bunched up and supported at inaccessible height. Temporary lamps should be mounted at inaccessible height. If lamps are incandescent, they should be protected by wire-mesh.

5.13.22. All power supply / Distribution Boards shall have canopy for protection against weather if located outdoors.

5.13.23. While carrying out work in Vessels / AC ducts or any other confined place, hand lamps with metallic guard suitable for 24 Volts AC supply shall be used All non-current carrying metallic parts of electrical system and equipment shall be earthed with two separate earthing wires of adequate capacity.

5.14. GENERAL RESPONSIBILITY

5.14.1. The contractor shall obtain a "Work Permit" from the Site Engineer / Client before starting any work at site. The work permits are issued to prevent anyone working in unauthorized areas and they are valid for specific period.

5.14.2. The contractor shall produce test certificates from Government approved certifying authorities for all the lifting gear & hoists (slings, chains, hooks, chain pulley blocks, winches, cranes etc.) before starting the work. The contractor's supervisor for subsequent spot checks shall retain the certificates.

5.14.3. The gas cylinders should be used in safe manner. They should not be dropped from heights. Acetylene cylinder should be kept upright position. Oxygen cylinders should not be kept near inflammable materials like oil etc.

5.14.4. The contractor is to remove all waste materials from and around the work site and leave the work spot spick and span.

5.14.5. Works like Gas cutting, welding etc.

5.14.5.1. Before carrying out any work like gas cutting, welding etc. the contractor shall contact the site-in -charge to ascertain about the safety of the area for welding work.

5.14.5.2. The contractor shall produce certificates for his welding sets checked by the site in charge before starting the work. The certificates shall have to be renewed every two months. A copy of the current certificate shall be displayed on the welding sets.

5.14.5.3. Only cables in good condition and insulated holders are to be used. The length of the supply cable shall not exceed 25 feet and the welding set body shall be properly earthed. Under no circumstance building structure pipeline should be used as a return path of the current.

5.14.5.4. A charged fire extinguisher of CO2 type is to be carried with each welding set.

5.14.5.5. The welder is to wear good quality insulated welding gloves, shoes & goggles while at work.

5.14.5.6. Tarpaulins are not used in the vicinity of welding / gas cutting jobs.

5.14.6. EXCAVATION

In the event of an excavation being made, it is the responsibility of the contractor to see that any opening, sump or pit caused by them is securely fenced as required by the Factory Act.

5.14.7. WORKING AT HEIGHT

5.14.7.1. For carrying out work at heights exceeding 6 feet or over and near the opening in floors, roofs, etc the following precaution to be taken.

5.14.7.2. The written permission of the Departmental Manager is to be taken before carrying out any work. Adequate safety precautions like use of safety belts, crawling ladders etc are to be taken.

5.14.7.3. All personnel engaged on overhead work shall be men experienced in such work.

5.14.7.4. Whenever possible timber staging or platform shall be erected with planks of minimum thickness 2 inches and minimum width 12 inches when the nature of work demands staging of a greater width than plank provided then additional planks shall be added and lashed securely.

5.14.7.5. Staging shall be provided with simple safety rails or ropes throughout its length, at waist height and on each open side.

5.14.7.6. Staging supports shall be of standard steel scaffolding safely secured and supported on firm level footings or slung from overhead beams. The supports shall be situated at a maximum distance of 8 feet apart and staging shall be secured to each support.

5.14.7.7. In case the site or nature of work is unsuitable for erection of proper staging all workers shall wear safety belts around their waists and secure their lifelines to strong scaffolding or structural members.

5.14.7.8. Wherever it is not possible to put up staging and / or use safety belts, safety nets or sheets shall be slung beneath the place of work.

5.14.7.9. When working in open process vessels or tanks, safety belts or safety nets shall always be used whether or not staging and scaffolding is provided.

5.14.7.10. Safe access to all points of work should be provided in the form of suitable ladders, stairways etc.

5.14.7.11. Contractor's employee of at least status of a foreman shall examine all arrangements before starting such work is commenced and shall satisfy himself that all reasonable safety precautions have been taken.

5.14.8. FIRE INSTRUCTIONS

5.14.8.1. Before carrying out any gas cutting, welding etc, the contractor shall contact the site-in -charge to ascertain about the safety of the area for welding work.

5.14.8.2. Smoking is strictly prohibited in premises. Severe action will be taken if any of the contractor's workmen is found smoking at the work site area.

5.14.8.3. In case fire is discovered, dispatch additional force & site Engineer. Wherever possible switch off any electrical and gas apparatus near the fire.

5.14.8.4. Check the nature of fire, pick up appropriate fire extinguisher and try to put out fire. For Electrical fire use carbon dioxide fire extinguisher.

5.14.9. PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment should be worn wherever necessary.

5.14.10. REVIEW MEETINGS

5.14.10.1. Periodic safety review meeting shall be conducted to review safety and for better coordination with other agencies.

5.14.10.2. Periodically safety review will be held with Site Engineer and issues will be discussed and action points shall be monitored and recorded in a separate safety Register / File.

5.14.11. WORK AFTER NORMAL WORKING HOURS

Extra care need to be taken for jobs being carried out after normal working hours with due revalidated work permit.

5.14.12. ACCIDENTS

5.14.12.1. In case of injury or serious illness, the department should be informed immediately. All injuries are to be reported by filling in the "injury report" form, which will be available with the respective department / site engineer.

5.14.12.2. These safety conditions should not be regarded as exhaustive. These have been issued for the guidance of the contractor and will not in any way absolve the contractor from any obligations or liabilities that might incur or transfer such obligations on liabilities to the company.

5.14.13. Environment, Health &Safety (EH&S) Guidelines

5.14.13.1. To outline EH&S rules and responsibilities of contractors while performing work in facility of Client/end user.

5.14.13.2. Project Manager Responsibilities

5.14.13.3. Project Manager is responsible for the safe execution of the contractual job as documented in this procedure.

5.14.13.4. Project Manager shall discuss the EH&S requirements with other sub-contractors as well as oversee as the principal contractor compliance with all legal and regulatory issues in Client Premises.

5.14.13.5. Project Manager may suspend or terminate the sub-contractor should he/she find gross negligence in the part of them to observe EH&S rules outlined in this procedure.

5.14.13.6. The rules indicated here under shall be binding for the sub-contractors as well. Principal Contractor's Responsibilities

5.14.13.7. Contractor shall carry out the work with safety and health of all personnel and properties in mind. Contractors shall therefore notify conditions that constitute hazards to those potentially affected.

5.14.13.8. Contractor shall control the manner and methods of its operations and is directly responsible for the actions of its employees.

5.14.13.9. Contractor shall comply with applicable national, local EH&S legislation & regulations and ensure that it employees receive proper training on the work to be done.

5.14.13.10. Contractor shall provide proper personal protective equipment, tools and equipment and ensure that such equipment can accomplish the work safely.

5.14.13.11. Contractor shall demonstrate good work ethics and shall not circumvent engineered safety devices and control.

5.14.13.12. Contractor Safety Representative shall visit the site (once in a week) to oversee EH&S on site. And Communication related to EH&S will be between the Project Manager and Contractor Safety Representative.

5.14.13.13. Project manager shall prepare and submit a weekly work progress report on each weekend, including number of employees working on site and the man hour worked, any activities that has positively or negatively affect EH&S at the work site. This weekly report shall be submitted to the client/ Consultant.

5.14.13.14. Project manager shall immediately inform the client / Consultant when an accident happened to its employee or Client personnel and properties. A brief accident report shall be submitted within 24 hours and a detailed report within 72 hours.

5.14.13.15. Environment, Health and Safety Rules for the Principal Contractor/ Sub-vendors Passageway

5.14.13.16. Do not enter other work areas without proper authorization.

5.14.13.17. Use established aisles and walkways, do not take short cuts between desks and equipment.

5.14.13.18. Passageway and emergency exit doors must be kept clear at all time.

5.14.13.19. Material temporarily left at site must be stacked properly with a sign placed to warn others.

5.14.13.20. Good housekeeping shall be maintained at all work areas. Clean up at the end of the day and completely before handing over of job. Food & drink are not generally allowed in Client/Consultant's Offices.

5.14.14. Smoking

Smoking is not allowed at site.

5.14.15. Chemicals

5.14.15.1. Chemicals brought to Client site must be labelled for its contents, its hazards and the Material Safety Data Sheet (MSDS) are provided to Project Manager. Common household chemicals are exempted from this requirement.

5.14.15.2. Large container of chemicals is not allowed to be brought into Client Site. Use small container holding only the enough quantity for the day work. Store flammable chemicals properly and ensure it is capped when not in use.

5.14.16. Electrical Safety

5.14.16.1. Do not tap electricity directly from the distribution boxes without first informing the Project Manager and/or Client's representatives.

5.14.16.2. To avoid electrical hazards, be alert for conditions that allows electricity to cause harm: loose or broken insulation on wires, improper connection between devices, broken or defective plugs, improper ground at the plug, and loose or broken switches should not be used.

5.14.16.3. Do not place liquid chemicals near electrical equipment. Liquids spillage onto electrical equipment could create a fire or electrical hazard.

5.14.17. Fire Safety

5.14.17.1. Contractor shall study the emergency exit floor plan located at the office or work site.

5.14.17.2. Contractor is not allowed to shut down essential firefighting systems, e.g., sprinkler systems, fire alarm at any time. If there is a need, coordinate with Client

5.14.17.3. /Consultant.

5.14.17.4. When detecting a fire, immediately activate the nearest fire alarm by pulling the lever or break the glass. Only when it is safe to do so, use fire extinguishers to fight the fire.

5.14.17.5. When fire alarm is activated, leave your work area immediately, walk to the nearest emergency exit and report to Client designated assembly area.

5.14.17.6. All alarms must be regarded as true alarms.

5.14.17.7. Only when the 'all clear' signal is given by Client, can one re-enter the building.

5.14.18. Equipment & Operational Safety

5.14.18.1. Contractor shall provide suitable personal protective equipment when the job requires. This includes but is not limited to safety helmets, safety glasses, face shields, earplugs, respirators, hand gloves & safety shoes.

5.14.18.2. Loaning of tools or equipment from Client is not allowed.

5.14.18.3. When working on machines that are provided with safety covers or safety guards, operate these machines only when the guards are in place.

5.14.18.4. When license or permit to work are issued by the government agencies, a copy must be displayed at the work site.

5.14.18.5. Contractor performs hot work where sparks or heat is produced (e.g. using welding equipment, open flame cutting and incendiary devices) shall implement safety measures to prevent accident. Project Manager shall be informed of the location & duration via a written request from sub-Contractor at least 1 day before the hot work is done.

5.14.18.6. Ladders used in Client office shall have slip-resistant bases and defect free. Inspection of all ladders must be carried out.

A ladder is considered damaged if it has broken rungs, missing steps or other construction defects.

5.14.18.7. Do not stand on the top two steps of a ladder as it can become unstable. Use ladder of the correct height. Ask for help when in doubt.

5.14.19. Asbestos

Contractor, if suspect of doing work that involves the removal, encapsulation, maintenance, clean up, transportation, disposal of structures that contain asbestos, must stop work immediately and inform Project Manager (such work shall not be undertaken by Client or Consultant).

5.14.20. When Accident Happens

5.14.20.1. When accident, incident or injury happens, all work shall be stopped immediately. Attend to the injured first and seek help immediately.

5.14.20.2. First aid treatment should be provided even for the slightest injury.

5.14.20.3. Work related accidents and injury should be reported immediately to Project Manager.

5.14.20.4. Investigation shall be carried out for injury that resulted in lost working days. Investigation must be forwarded to the Project Manager.

5.14.21. Wastes

Contractor on a daily basis must remove all wastes generated as a result of the contract. Inform Project Manager when there are hazardous or contaminated wastes to be removed.

5.15. Applicable Standards but Not Limited to :

5.15.1. Installation and materials shall also confirm to latest amendments of

5.15.1.1. Indian Electricity Rules

5.15.1.2. Indian Factories Act

5.15.1.3. National Electric Code

5.15.1.4. Petroleum rules

5.15.1.5. Quality and Safety Standards

Sr. No.	Code Number	Description
1	IS 2309	Protection of buildings and allied structures against lightning.
2	IS 3043 /IEEE 80	Code of practice for earthing.
3	IS 5216	Safety procedure and practices in Electrical work.
4	IS 3106	Code of practice for selection, installation and maintenance of fuses (Voltage not
5	IS 1646	Code of practice for fire safety of buildings (general) Electrical installation.
6	IS 9921	Alternating Current Dis connectors above 1000 V.
7	IS 2551	Danger notice plates.
8	IS 1248	Electrical indicating instruments.

Sr. No.	Code Number	Description
9	IS 722	AC Electric meters.
10	IS 3156	Voltage transformers.
11	IS 10118	Installation and maintenance of switchgear.
12	IS 398 /IEC 1089-1991	ACSR conductors
13	IS 7098	Cross linked polyethylene insulated PVC sheathed cables up to 33 kV
14	IS 12943	Brass glands for PVC cables
15	IEC 99-4	Gapless Surge Arrestors
16	IS-900	Code of practice for Installation and Maintenance of Induction Motors
17	IS-1255 -1983	Codes of practice for Installation and Maintenance of Power Cables up to and including 33 kV Rating.
18	IS-732 1989	Code of practice for Electrical Wiring Installation. (System Voltage not exceeding660 Volt).
19	IS-1913	General and Safety Requirements for Luminaries.
20	IS-1646	Code of Practice for Fire Safety of Building (General) Electrical Installation.
21	IS 8130	Conductors for insulated electrical cables and flexible cords.
22	IS 3975	Specification for mild steel wires, strips and tapes for armouring of cables
23	IS-2667	Specification for Fittings for Rigid Steel Conduits for Electrical Wiring.
24	IS 3615	Glossary of terms used in Refrigeration and Air-conditioning.
25	IS 325	Three phase induction motor.
26	IS 1239	Mild steel tubes, tubular and other wrought steel fittings.
27	IS 639	Steel pipe flanges.
28	IS 277	Galvanized sheet steel.
29	IS 5831	Specification for PVC insulation sheath for electric cables.
30	IS 655	Metal air ducts.
31	IS 732	Code of practice for electrical wiring and fittings for buildings.
32	IS 900	Code of practice for installation and maintenance of induction motors.
33	IS 1248	Direct acting electrical indicating instruments.
34	IS 6392	Steel pipe flanges.
35	IS 1367	Technical supply conditions for threaded steel fasteners.
36	IS:10462	Thickness of the PVC outer sheath
37	IS 4894	Centrifugal fan.
38		
39		
40	IS 1554	PVC insulated (heavy duty) electrical cables for working voltages up to and including 1100 V.
41	IS 659	Air-conditioning safety code.
42	IS 616	Mechanical refrigeration safety code.

Sr. No.	Code Number	Description
43	IS: 1554 -	PVC insulated (heavy duty) electric (Part I) Cables - Part I for working voltages up to and including 1100V.
44	IS: 1753 -	Aluminum conductors for insulated cables.
45	IS: 3961 -	Recommended current ratings for (Part II) cables: Part-II PVC insulated and PVC sheathed heavy-duty cables.
46	IS: 3975 -	Mild steel wires, formed wires and tapes for armouring of cables
47	IS: 5831 -	PVC insulation and sheath of electrical cables.
48	IEEE 519:1992	Harmonics
49	IS 277	Galvanized Steel Sheet (Plain and corrugated).
50	IS 655	Metal Air Ducts.
51	IS 737	Wrought Aluminum and Aluminum Alloy sheet and strip for general engineering purposes.
52	UL 181	Factory – Made Air ducts and connectors.
53	UL 555	Fire Dampers.
54	ASHRAE 70	Method of testing for rating the performance of Air Outlets and inlets.
55	BS 649	Diesel Engines for general purpose.
56	BS 2613	Rotating Electrical Machinery.
57	IS 4722	Electrical performance of rotating electrical machinery.
58	IS 4728	Terminal markings for rotating electrical machines.
59	IS 4729	Measurement of vibrations of rotating electrical machines.
60	IEC60034	Rotating Electrical Machines
61	IEC60034.1	Rotating Electrical Machines Part1: Rating and Performance
62	IEC60947	Low Voltage Switchgear and Control Gear
63	ISO 8528 Part 1 to 10:	Reciprocating Internal Combustion engine Driven Alternating current Generating Sets
64	IS-375	Marking and arrangement for switchgear bus bars, main connection and auxiliary wiring.
65	IS-722 Part – I	AC Electricity Meters
66		Part - I General requirements and tests
67	IS-1248	Direct acting indicating analogue electrical measuring instruments and their accessories.
68	IS-1822	AC Motor starters, of voltage not exceeding 1000 volts.
69	IS-2147 IS-2208	Degrees of protection provided by enclosures for low voltage switchgear and control gear.
70		HRC cartridge fuse links for voltage above 650V.
71	IS-2419	Dimensions for panel mounting indicating and recording electrical instruments.
72	IS-2516	Circuit Breakers - Requirements and Test voltages not exceeding 1000V AC or 1200V DC.
73	IS-2607	Air break isolators for voltages not exceeding 1000 volts.
74	IS-2959	Contactors for voltages not exceeding 1000V AC or 1200V DC
75	IS-3072	Code of practice for installation and maintenance of switchgear.

Sr. No.	Code Number	Description
76	IS-3106	Code of practice for selection, installation, maintenance of fuses (voltage not exceeding 650V).
77	IS-3156, Part - I	Voltage Transformer - General Requirements.
78	Part – II	Voltage Transformer - Measuring Voltage Transformers.
79	Part – III	Voltage Transformer - Protective Voltage Transformers.
80	IS-3231	Electrical Relays for Power System Protection.
81	IS-3914	Code of practice for selection of AC Induction Motor Starters (Voltage not exceeding 1000V)
82	IS-4047	Heavy-duty air-break switches and composite units of air-break switches and fuses for voltages not exceeding 1000 V.
83	IS-4064	Air break switches, air break disconnections, air break switch disconnections and fuse combination units for voltages not exceeding 1000V AC or 1200V DC.
84	Part – I	Part I - General Requirements.
85	IS-4146	Application guide for Voltage Transformers.
86	IS-4201	Application guide for Current Transformers.
87	IS-4237	General Requirements for Switchgear and Control Gear for Voltages not exceeding 1000V AC or 1200V DC.
88	IS-4483	Preferred panel cut-out dimensions for electrical relays - flush mounting IDMTL relays.
89	IS-4794, Part- I	Push Button Switches - General Requirement and Tests.
90	IS-5082	Wrought aluminium & aluminium alloy bars, rode, tubes and sections for electrical purposes.
91	IS-5987	Code of practice for selection of switches (Voltage not exceeding 1000V).
92	IS-6236	Direct recording electrical measuring instruments.
93	IS-6875	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages up to and including 1000V AC and 1200V DC.
94	IS-8623	Factory built assemblies of switchgear and control gear for voltages up to and including 1000V AC and 1200V DC.
95	IEC 62040-3	(International Electro technical Commission) – Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements.
96	IEEE 587 (ANSI C62.41)	Category A & B (International Electrical and Electronics Engineers) – Recommended practices on surge voltages in low voltage power circuits.
97	ANSI B 31.5	Code for Refrigeration Piping
98	ASHRAE 30	Methods of Testing Liquid Chilling Packages
99	ASHRAE 15	Safety Code for Mechanical Refrigeration
100		

5.16. LIST OF PREFERRED MAKES FOR DATA CENTRE WORK:-

THE BIDDER SHALL COMPLY WITH MINIMUM TECHNICAL SPECIFICATIONS MENTIONED IN THIS TENDER UNDER VARIOUS SECTIONS FOR VARIOUS PRODUCT/MATERIAL.

S. No.	Materials	Approved make
1.	**Electrical Sub-station**	
(i)	HT Panel	ABB/ Schneider/Siemens/ Eaton or OEM Authorized Panel Manufacturer
(ii)	CSS	ABB/ Schneider/Siemens/ Eaton
(iii)	HT Breakers (VCB, SF6)	ABB/ Schneider/Siemens/ Eaton
(iv)	Transformer (dry type)	ABB/ Schneider/Siemens/Telawne / Voltamp/ Raychem RPG /Kirloskar Electric
(v)	Engine for DG Set	Cummins/MTU/Caterpillar/Kohler/Mitsubishi/ Sterling-Baudouin
(vi)	Alternators	Stamford/AVK/MTU/Leroy-Somer
(vii)	UPS	Vertiv / Eaton/ Schneider/ ABB/DELTA Electronics /FUJI
(viii)	LIB	SAMSUNG/LG/ Exide Energy/ Amara Raja
(ix)	Instrument Transformer	Kappa, Pragati, Instrans, Gilbert & Maxwell
(x)	Lightning protection System	JMV, APS, Dehn, ARECA, Signify
(xi)	Auto source Transfer Switch	Siemens/Schneider /ABB
(xii)	PDU(K-20 Isolation Transformers)	Siemens/Datson/Schneider/ABB/Eaton/ Delta
2.	**Electrical Internal**	
(i)	ACB	ABB/ Siemens/ Schneider/ Eaton
(ii)	MCCB	ABB/ Siemens/ Schneider/ Eaton
(iii)	Contractor, Release	Siemens/ABB/Schneider/Socomec/ Eaton
(iv)	TVSS	Schneider/ABB/Siemens/Emerson/Eaton
(v)	Changeover switch on load	Siemens/ABB/Schneider/Socomec
(vi)	Digital Meters	Siemens/Schneider/Socomec/ Legrand/ABB
(vii)	KWH, DLM, MDC Meters	Siemens/Schneider/ Socomec/ Legrand/ABB
(viii)	Capacitor	Siemens/Schneider/Epcos//ABB

S. No.	Materials	Approved make
(ix)	Dual Source KWH Meter	Siemens/Schneider/Socomec/ Legrand/ ABB
(x)	MCB, ELMCB, ELCB	ABB/Siemens/Schneider/Legrand/Eaton
(xi)	Protection Relays (Numerical)	ABB/ Schneider/ Siemens
(xii)	HRC Fuses and fuse fittings	Siemens/ L&T/ Schneider/ABB/Legrand/Eaton
(xiii)	CT's PT's (low side)	Automatic Electric/ Kappa/Reco
(xiv)	Capacitor Control Relay	ABB/Schneider/Epcos/Siemens/ABB
(xv)	DG Synchronizing and AMF relay	OEM of DG set
(xvi)	PLC	Siemens / Schneider / GE/ABB
(xviii)	LT Panel (TTA) panels	Siemens/ Schneider / ABB or OEM Authorized Panel Manufacturer
(xix)	Sandwich Type Bus duct/Busbar Trunking	Siemens/ Schneider/ABB/ Legrand/Starline
(xx)	Residual Current Circuit Breaker (RCBO's)	ABB/Siemens/Schneider/Legrand
(xxi)	Power, Aux. Contactor	ABB/Siemens/Schneider
(xxii)	Current Transformer	Automatic Electric/ Kappa/Reco
(xxiii)	Indicating Lamps LED type and Push Button	Altos/Mimic /Technik / Schneider/Siemens
(xxiv)	SPD (Surge protection device)	Mersen, Eaton, Weidmuller, MEG, Magnaflux/L&T
(xxv)	Automatic Transfer Switch	Siemens/Schneider /ABB
(xxvi)	Lugs	Dowell's/Comet/Barco/Jainsons
(xxvii)	E.L.C.B., RCCB	ABB/Siemens/Schneider/Legrand/Eaton
(xxviii)	Addressable Smoke Detection System and all its components (UL Listed)	Kidde/Notifier/Bosch/Simplex/Cooper/Eaton/ Schneider / Siemens / Morley
(xxix)	Operator Work Station (Computer)	HP/ IBM/ Dell

S. No.	Materials	Approved make
(xxx)	Laser jet Printer	EPSON, HP, CANON
(xxxi)	Software	Kidde/Notifier/Bosch/Simplex/Cooper/Eaton/ Schneider /Siemens / Morley
(xxxii)	PA and Music System	Bosch/Honeywell /Siemens
(xxxiii)	Cable Glands	Comet, Cosmos, Dowell, HMI
(xxxiv)	Rubber Mats (ISI mark)	Jyoti, Maruti
(xxxv)	Communication Cable, Signal Cable	Polycab/Havells/Finolex/KEI
(xxxix)	STS	Schneider, Emerson, ABB, Eaton, Socomec
(xL)	Track Busway & tap offs (For server/rack area)	Starline/PDI/E+I Engineering Group
3.	**Low Voltage Work, AV system, Security System, etc**	
(i)	LAN & Telephone: Passive Networking (Cat6A & Fiber Optics)	Panduit/ Belden/ Commscope (systimax)/ Siemon/AFL
(ii)	Active Switching, Router/Firewall/Industrial switches	Juniper/Cisco/Arista / Extreme/ Nexus/Belden /Paloalto
(iv)	CCTV System (Camera, VMS)	Pelco/Honeywell/Bosch/Tyco/Siemens/Axis
(v)	4k LED TV	Samsung/LG/Sony
(vi)	Digital Wireless Boundary layer microphone	Sennheiser/AKG/Shure/Bosch/ JBL/ Honeywell
(vii)	Digital Central Unit	Sennheiser/AKG/Shure/Bosch/ JBL/ Honeywell
(viii)	Wireless digital Handheld Microphone	Sennheiser/AKG/Shure/Bosch/ Beyerdynamic/ JBL/ Honeywell
(ix)	Wireless digital Lavalier Microphone	Sennheiser/AKG/Shure/Bosch/ Beyerdynamic/ JBL/ Honeywell
(x)	Wireless digital Head worn Microphone	Sennheiser/AKG/Shure/Bosch/ Beyerdynamic/ JBL/ Honeywell
(xi)	Ceiling Microphone	Sennheiser/AKG/Shure/Bosch/ JBL/ Honeywell
(xii)	DSP	Sennheiser, Symmatrix, BSS, AKG, QSC, JBL, Crown, Honeywell
(xiii)	Touch Control Panel	Sennheiser, Symmatrix, Xylica, QSC, JBL, BSS, Crown, Honeywell

S. No.	Materials	Approved make
(xiv)	speaker	BOSCH,/Audac/ Labgruppen/JBL/Bose/ Honeywell
(xv)	Hypex Class-D amplifier	Audac, Labgruppen, Cloud, QSC, JBL
(xvi)	Digital Signal Processor	Extron/Crestron/Kramer
(xvii)	Video Conference System	Cisco/Sony/Polycom
(xviii)	Cable Manager	AMX, Satellier, Crestron, ATEN, KRAMER
(xix)	8x8 HDMI to HDBT Matrix switcher	AMX/Crestron/Extron/Kramer
(xx)	Cable & Patch cord	AMX/Crestron/Extron/Kramer
(xxi)	PA SYSTEM	Honeywell/Siemens/Bosch/Tyco/UTC
(xxii)	Network, Server Rack	Vertiv/Valrack/Schneider (President)/ Eaton/ NETRACK/nVent
(xxiii)	Access Control System	Honeywell/TYCO/ Siemens/ Bosch
(xxv)	Fire Alarm System	Notifier/Siemens/Bosch/Tyco/UTC/Eaton / Honeywell
(xxvi)	Fire Survival Cable	Rallison/Bonton/ Ramcro/ Batrahenley/ Polycab/ Havells/ASES/Grandlay
(xxviii)	Boom Barrier	FAAS/CAME/Dormakaba/TISO/Housys/Speedgatz
(xxix)	Video Wall	Delta/NEC/LG
(xxx)	Hand held Metal Detector	Smiths Detection/ Astrophysics/ Rapiscan
(xxxi)	X Ray Baggage Machine	Smiths Detection/ Astrophysics/ Rapiscan
(xxxii)	Walk through Multi Zone Metal Detector	Smiths Detection / Astrophysics/ Rapiscan
4.	**CABLE & ACCESSORIES**	
(i)	HT Cable	Finolex/Polycab/KEI /RR
(ii)	LT Cable	Finolex/Polycab/ KEI /RR
(iii)	Cable Tray	Indiana, Profab, Slotco, Steelways, Legrand, Areca, BEC,
(iv)	Raceways	Legrand/ OBO Betterman/ MK
(v)	Wire Mesh Cable tray	Legrand- Cablofil, OBO, Slotco, Areca, Indiana, BEC,

S. No.	Materials	Approved make
(vi)	Fiber ducts	Panduit, Legrand, Belden, Commscope, AFL
5.	**WIRING ACCESSORIES**	
(i)	MSConduitand Accessories	BEC/AKG/SteelKraft/Precision/ RR Kabel
(ii)	PVCConduitand Accessories	BEC/AKG/Indiana/Rallison/Precision/ RR Kabel
(iii)	PVC FRLS Insulated Cu wires	Finolex/Polycab/ KEI /RR
(iv)	FRLS Cu Flexible cables	Finolex/Polycab/ KEI /RR
(v)	Switches & Socket outlets	Legrand-Arteur / MK-Elements/ABB-IVIE/ Schneider-Clipsal X
(vi)	Distribution Boards	Siemens, Schneider, ABB, Legrand,
(ix)	Metalcladindustrial sockets	Siemens, Schneider, ABB, Legrand,
(x)	Industrial Sockets & Plugs	Siemens, Schneider, ABB, Legrand,
(xi)	Telephone Tag Blocks	Krone/Kothari/ ITL
(xiv)	Blower fan	Crompton / Bajaj / Khaitan
6.	**LIGHTING**	
(i)	Lighting Fixture (LED)	Philips/Wipro/Havells/Osram/ Trilux
(ii)	External Lighting, Lighting Fixture	Philips/Wipro/Havells/Osram/ Trilux
(iii)	External lighting Pole	Philips/Havells/Valmont/Transrail/Global Power Industries/Insta power/ Shaffer/ Bajaj
7.	**IBMS**	
(i)	Gas suppression system	Honeywell/Siemens/UTC/Kidde/3M/Fire Trex/Tyco/Cryptzo
(ii)	Access control	Siemens/Bosch/Tyco/Honeywell
(iii)	CCTV & VMS	Bosch/Siemens/Honeywell /Pelco/Tyco/ Axis
(iv)	WLD	C System, Sontay, Maser
(v)	Rodent repellent system	C system, Maser, Sontay
(vi)	Fire alarm system	Notifier (Honeywell)/ FPA-1000 (Bosch)/ XLS Fire Finder (Siemens)/Simplex (Tyco)/ Eaton

S. No.	Materials	Approved make
(vii)	VESDA	Xtralis/Honeywell/Siemens/Bosch/Tyco/Securiton
(viii)	Handheld extinguishers	Minimex/Kanex/Life-Guard/Superex
(ix)	Flap Barriers	COM INFO/BOON EDAM/ BGI/ FAAC/Neptune/Housys/ Magnetic / Gunnebo/ Vantage
(x)	BMS SYSTEMS	Honeywell/Schneider/ Siemens/JCI
7.1	**Controller, Software**	
(i)	Central Control BMS Server	JCI, HP, DELL, Phillips, LG, Samsung, DELTA, SIEMENS, Honeywell, Azbil
(ii)	132 Column 240 CPS Printer	HP, CANON, EPSON
(iii)	Building Management System	Siemens/Honeywell / JCI/ Schneider
(iv)	BuildingManagement Web Based Server Software	Siemens/ Honeywell / JCI/ Schneider
(v)	Programmable & Application Specifier Controller (DDC)/PLC	Siemens, Honeywell, JCI, Schneider
(vi)	System Intergration	Siemens, Honeywell, JCI, Schneider
	Units for 3RD Party software Integration	
7.2.	**Sensor & Field Devices**	
(i)	Immersiontype temperature sensors	Siemens/Honeywell / JCI/ Schneider
(ii)	Ultrasonic/Electrcomag neticBTU Meter, Flow Meter	Siemens/Honeywell / JCI/ Schneider
(iii)	Outside T+RH Sensor	Siemens/Honeywell / JCI/ Schneider
(iv)	Differential pressure Switch Air	Siemens/Honeywell / JCI/ Schneider
(v)	Differential pressure Switch Water	Siemens/Honeywell / JCI/ Schneider
(vi)	Differential Pressure Sensor- Air, Water	Siemens/Honeywell / JCI/ Schneider
(vii)	Room, Duct Type Temp Sensor	Siemens/Honeywell / JCI/ Schneider

S. No.	Materials	Approved make
(viii)	Room, Duct Type Temp + RH Sensor	Siemens/Honeywell / JCI/ Schneider
(ix)	Pressure Sensor Water	Siemens/Honeywell / JCI/ Schneider
(x)	CO2 Sensor, VOC Sensor	Siemens/Honeywell / JCI/ Schneider
(xi)	Water Level Switches	Veksler, Flipro, ABB, DELTA, JCI, Azbil
(xii)	Flame Proof Level Transmitter	Veksler, Flipro, ABB, DELTA, JCI, Azbil
(xiii)	DC Voltage, Current, Power Factor Transducer	L&T, ABB, MECO, DELT, JCI, Azbil
(xiv)	Current Relay	L&T, ABB, MECO
(xv)	IAQ Monitor for PM Levels	Thermofischer, Elktron, Aeroqual
(xvi)	PH Anayser, TDS Analyser	Hach, forbes Marshall, ABB
(xvii)	Valves & Actuators	Siemens/ Sant / Audco / Castie/Belimo / Honeywell/JCI
(xviii)	Thermostat	Siemens, Daikin, Danfoss
8.	**HVAC**	
(i)	Chillers	Trane/ Schneider/ Vertiv/ Daikin /York/Climavaneta
(ii)	CDU	Vertiv/ Schneider/Cool-IT/Chilldyne/nVent/Boyd/Motivair/Delta
(Iii)	Hot Aisle Containment	Intersol, Schneider, AET, WQ
(iv)	Nitrile Insulation	Armaflex, K – Flex, U - Flex
(v)	Fan Wall Unit & Precision Air Handling unit (PAHU)	Trane/ Schneider/ Vertiv/ Daikin /York
(vii)	Online scale preventer	Scale Guard, Crystallo, Supremo, Elgrerry
(viii)	Electronic Air Filtration System, UVGI, Air Purification System	Honeywell, Intelligreen, Air Quality, Magneto, Zeco, Aeropure, Trion, Ruks
(ix)	VRV, VRF system	Daikin/Mitsubishi/O-General /Hitachi/ LG/ Carrier/Toshiba
(x)	Variable Refrigerant Flow unit (VRF)	Daikin/Mitsubishi/O-General /Hitachi/ LG/ Carrier/Toshiba
(xi)	Pumps	Grundfos/Armstrong/Xylem/Wilo

S. No.	Materials	Approved make
(xix)	Axial Flow fan	Nicotra, Kruger, Airflow, Wolter, Greenheck, Systemair, LTI
(xx)	Inline Fan	Carryaire, Kanalflakt, Kruger, Flaktwood, Cynor, Eflow, Humidin, Greenheck, Wolter, Airflow, LTI
(xxi)	Pipes	
a)	G.I.	Sail/Tata/Jindal
b)	M.S up to 150mm	Sail/Tata/Jindal
c)	M.S. above 150mm	Sail/Tata/Jindal
d)	PVC Pipe	Finolex/Supreme/Prince/AKG
e)	Copper pipe	Rajco Metals/ Mandev/Mexflow / Nippon/ Hindustan Copper /Mettube
(xxii)	Valves	
a)	Butterfly valve	Zoloto, Honeywell, Danfoss, Siemens, Belimo, Advance, Castle
b)	Ball Valves	Zoloto, Honeywell, Danfoss, Siemens, Belimo, Advance, Castle
c)	Balancing valve	Zoloto, Honeywell, Danfoss, Siemens, Belimo, Advance, Castle
d)	Non Return Valve	Zoloto, Honeywell, Danfoss, Siemens, Belimo, Advance, Castle
e)	Y- Strainer	Zoloto, Honeywell, Danfoss, Siemens, Belimo, Advance, Castle
f)	Control valve (2- way,3 way) valve , thermostat, sensor & controller, PICV	Zoloto, Honeywell, Danfoss, Siemens, Belimo, Advance, Castle
g)	Actuators & modulating motors	Danfoss, Honeywell, Johnson Control, Flowcon, Belimo
h)	Pressure Gauge /Thermometer	H. Guru, Emerald, Anergy, Axin,
i)	Flow switch	Emerald, Anergy, Honeywell, Siemens, Axin
j)	Air Vent Valve	SKS, Flamco, Zoloto, Honeywell, Danfoss, Freese, Siemens, Belimo
k)	Flexible Connection	Resistoflex, Emerald, Kanwal, Axin
l)	Expansion Tank	Anergy, Emerald, Rapidcool, Flamco

S. No.	Materials	Approved make
m)	Air Separator & Dirt Separator	Anergy, Emerald, Rapidcool, Flamco
n)	Pressurization Unit & Side stream filtration	Anergy, Emerald, Rapidcool, Flamco, Lakos
o)	VFD	Danfoss, Siemens, ABB, Fuji, Belimo, Delta
p)	BTU Meter	Kamstrup, Shenitech, Sontay, Rossweiner
(xxiii)	Air Distribution	
a)	G.I. sheets, MS Sheet	TATA, Nippon, SAIL
b)	Factory fabricated Ducts	Zeco, Ductofab, Dustech, MEI, Waves
c)	Grilles, Diffusers, VCD,	Dynamic, Mapro, Servex Fabricators, Trox, Conair, MEI
	Louvers	
d)	Fire Dampers, Back draught dampers	Dynamic, Mapro, Servex Fabricators, Trox, Conair, MEI
e)	Actuators for Fire dampers	Belimo, Siemens, Honeywell
g)	Thermostats	Danfoss, Belimo, Siemens, Honeywell, Emerald
k)	Grooved Coupling & fitting	Victaulic /Tyco/Viking / NVR
(xxiv)	Insulation	
a)	Expanded Polystyrene	Styrene Packaging, Beardsell, Lloyd
b)	PUF Pipe supports	Malanpur, Lloyd
c)	Nitrile Rubber	Armacell, ALP, Supreme, Armaflex
d)	PUF slabs	Malanpur, Lloyd
e)	Glass wool	Twiga, Owens Corning
F)	XLPE Insulation	Paramount, Aerolam, Supreme
(xxv)	Electric Motors	
a)	All pumps	Grundfos/ Armstrong/ ABB/ Siemens
b)	Fan	ABB, Siemens, Kirloskar,
(xxvi)	Electrical Items	
a)	Switchgear	ABB, Siemens, Schneider Electric
b)	Control Cables (Copper & Aluminium)	Finolex/Polycab/Havells/KEI
c)	Push Buttons	Siemens, Cutler Hammer, ABB

S. No.	Materials	Approved make
d)	Auxiliary Relays, Contactors	Siemens, BCH, GE, ABB
e)	Line Type Fuse	GE, L&T, Siemens
f)	Timer	Siemens, L&T, Cutler Hammer, GE
g)	Indicating Lamps	Siemens, L&T, ABB
h)	Selector Switches	Siemens, L&T, Kaycee, Neptune
i)	Cable Glands	Comet, Gripwel, Dowell
j)	Starter	GE/ Larsen & Toubro/Northwest
k)	Cable Trays	Indiana, OBO, Aditya Steel, Global Power Industries (GPI), MEM,
l)	Multi-Functional Meter	ABB, Siemens, Schneider
m)	TES tanks	NES India Engineers/Sevcon/Triozone/Fitzer Incorporation
9.	**FIRE-FIGHTING**	
(i)	M.S. Pipes	Tata Steel, Jindal Hisar, Surya, Prakash
(ii)	G.I. Pipes	Tata Steel, Jindal Hisar, Surya, Prakash
(iii)	Gun Metal Valves (Gate, Globe), Sluice, Butterfly and Non-Return Valves, Y Strainer, wafer type NRV, Ball Valve	Kirloskar, Leader, Audco, Zoloto, AIP, DRP, Cim, Advance, C&R, Emerald, Axin, Castle
(iv)	GI Fitting	DRP-M, Unik, Zoloto
(v)	Suction Strainer	Leader, Sant
(vi)	Sprinkler (UL Listed)	Spray Safe, HD, Impact
(vii)	Fire Hydrant Landing Valves, Fire brigade Connection (ISI marked)	Minimax, Newage, Superex
(viii)	Installation Valve (ISI Marked)	Spray Safe, Guards, HD Fire, Tyco
(ix)	Fire hose pipes, First Aid Hose Reel (ISI Marked)	Minimax, Newage, Chhatariya, Superex
(x)	Branch Pipe, Nozzle and couplings	Minimax, Newage, Superex
(xi)	Fire Extinguishers	Ceasefire/Minimax/Safex/Lifeguard/Superex/Kanex
(xiii)	Starters, switches, T.P.N switch	Siemens, Cutler Hammer, Schneider, ABB

S. No.	Materials	Approved make
(xiv)	Single phasing preventer /over load protection unit	Siemens, Minilec Schneider
(xv)	Pressure Switch	Danfoss, Swizer, Indfoss
(xvi)	Pressure Gauge	H. Guru, Fiebig, Emerald
(xviii)	Contractors	Siemens/ABB/Schneider
(xix)	Control Cable	Finolex/Polycab/Havells/KEI/ Grandlay
(xxii)	FuseDisconnector switch, switch fuse units	L&T/ MDS/ Siemens/ GE Power/ ABB, /Schneider
(xxiv)	Ammeter, Voltmeter	Universal, Schneider, Conzerv, Trinity, L&T, Secure, Socomec
(xxvii)	Fire Alarm Panel	Notifier/Siemens/Bosch/Tyco/UTC/Eaton/ASES
(xxviii)	Fire Signage's	Glo-lite/ Advik/Prolite
(xxxii)	Motor	ABB, Havells, Siemens, Kirloskar
(xxxiii)	RRL Hose	Guard, Supremax, Superex, G Tech, Safefire, Exflame, Omex, Kalpex
(xxxiv)	Thermoplatic hose reel	Guard, Superex, Lifeguard, G Tech, Safefire, Exflame, Omex, Kalpex, Maitras
(xxxv)	Rubber Gaskets	CIC, Varuna
(xxxvi)	Hose Drum	Guard, Superex, Lifeguard, G Tech, Safefire, Exflame, Omex, Kalpex,
(xxxvii)	Mechanical Seal	Duramettalic, Burgmann
(xxxviii)	Strainer	Emerald, Kirloskar
(xxxix)	Pipe Supports (Band Hanger)	Zip Clip, Tagra, Hilti, Gripple
(xl)	Flow Switch	System Senasor, Potter, Honeywell
(xli)	Pipe Fittings	Unik, VS, Zoloto M, DRPM
(xlii)	Deluge Valve	HD Fire, Victaulic, Tyco, Anvil
(xliii)	Braided flexible for sprinkler	Victaulic, Tyco, Anvil
(xlv)	Multifunctional meters	ABB/Siemens/Schneider
10	Interior & Civil	
(i)	Raised floor	Unitile/ Schneider /Uniflair/Kingspan

S. No.	Materials	Approved make
(ii)	Calcium Silicate / Mineral Fiber False Ceiling	Armstrong, Saint Gobain, Aerolite, Ramco Hilux, USG Borals
(iii)	Metal false ceiling	Armstrong, Hunter Douglas, Lindner AG, Anakon, Dexune
(iv)	Fire Rated Metal/Wooden Doors (Glazed/Unglazed)	Tata Pravesh, Shakti-met, Pacific, Navair, Shakti-Hormann, Saint Gobain
(v)	Structural Steel Sections / Tubular Sections	SAIL, Tata Steel, JSW ,RINL, JSPL
(vi)	Dash / Anchor Fasteners, Rawl Plug	HILTI, Fischer, Bosch, Wurth, Canon
(vii)	Metal deck profile sheet	SAIL, Tata, JSW ,RINL, JSPL
(viii)	Fire Resistant Paint	Asian paints, Akzo Nobel Coatings India Ltd., Viper.
(ix)	Hot Aisle Containment -	Intersol/Schneider/ nVent/ AET/WQ

5.17. DRAWINGS & OTHER DOCUMENTS

The Drawings and other necessary documents, as mentioned below, related to site will be shared with the bidder upon receipt of formal request to C-DAC and signing of an NDA. Considering the strategic nature of the project, these documents are not being shared publicly with this RFP. The request for accessing these drawings/ documents/ information etc. should be made formally through an email at mmg@cdac.in. Accordingly, an NDA shall be shared with the bidder and upon submission of the same, the information shall be shared with the bidder.

I. THE FLOOR DRAWING OF THE DATA CENTER BUILDING.
II. HSD YARD, RECEIVING SUBSTATION & SITE LAYOUT
III. UTILITY EQUIPMENT GAD
IV. ELECTRICAL SCHEME
V. COOLING P&ID
VI. CONTOUR MAP OF SITE
VII. GEO TECHNICAL REPORTS OF SITE

(END OF SECTION IV)

SECTION V - BOQ / BOM Details

(To be submitted with Technical Bid)

(1) Bill of Quantities along with Bill of Material to be submitted as per the following table for the offered product by the bidder.
(2) These exact details to be filled in the MII declaration as well as provided under ANNEXURE F
(3) The below table given is a representative format, however bidder has to list out the details of the items under the scope of the supply as required for the completion of the solution. The items thus added shall be incorporated within the indicative category of the IT Infrastructure sub-systems. New IT Infrastructure categories can be added if so required.
(4) ***Bidder may please note that this exact sheet needs to be submitted along with financial quote on the GeM portal duly signed and stamped on bidder's letterhead mentioning each line item's title, quantity, unit rate (all inclusive), total rate for the line item (all inclusive) and the grand total of all the line items. This grand total (all inclusive) should be submitted on the GeM portal.***
(5) ***VALUE4 is the total price (all inclusive) for 3 years (12 quarters) of Operations and Maintenance of the Track-II DC, and shall be quoted as a single value under "Item Sr. No. 4 – Any other services, allied works etc." on the GeM portal.***
(6) ***VALUE4 shall not be less than 3.5% of VALUE2, both all-inclusive of GST.***
(7) ***VALUE4 shall be paid in 12 equal quarterly instalments (all inclusive), each after completion of the quarter and submission of a valid invoice.***
(8) ***A financial bid that does not comply with Notes 5 and 6 shall be summarily rejected.***
(9) ***C-DAC reserves the right to continue O&M for the 4th and 5th year. The price for each year shall not exceed 110% of the preceding year's price, the 3rd year's price being one-third of VALUE4.***

Track-I				
Item No.	**Item Title**	**Item Qty**	**Offered Make**	**Offered Model**
Accelerated Compute Solution				
1.	Accelerated compute nodes	Mention Item Qty		
2.	Transceivers	Mention Item Qty		
3.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
4.	Network Interface cards	Mention Item Qty		
5.	Disk Type1	Mention Item Qty		
6.	Disk Type2	Mention Item Qty		
7.	Software licenses	Mention Item Qty		
8.	Additional Item as required	Mention Item Qty		
High Speed Compute Fabric				

Track-I				
Item No.	Item Title	Item Qty	Offered Make	Offered Model
1.	Spine Switches	Mention Item Qty		
2.	Leaf switches	Mention Item Qty		
3.	Fabric manager / subnet manager servers — High Availability configuration	Mention Item Qty		
4.	Spine switches to Leaf switches Cables	Mention Item Qty		
5.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
6.	Leaf switches to Host cables	Mention Item Qty		
7.	Leaf switches to Host Breakout/Splitter Cables	Mention Item Qty		
8.	Transceivers	Mention Item Qty		
9.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
10.	Software licenses	Mention Item Qty		
11.	Additional Item as required	Mention Item Qty		

Track-II (IT)				
Item No.	Item Title	Item Qty	Offered Make	Offered Model
Accelerated Compute Solution				
1.	Accelerated compute nodes	Mention Item Qty		
2.	Transceivers	Mention Item Qty		
3.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
4.	Disk Type1	Mention Item Qty		
5.	Disk Type2	Mention Item Qty		
6.	Network Interface cards	Mention Item Qty		

Track-II (IT)				
Item No.	**Item Title**	**Item Qty**	**Offered Make**	**Offered Model**
7.	Software licenses	Mention Item Qty		
8.	Additional Item as required	Mention Item Qty		
DC LAN Fabric				
1.	Spine Switches	Mention Item Qty		
2.	Leaf switches	Mention Item Qty		
3.	Border Leaf switches	Mention Item Qty		
4.	Service Leaf switches	Mention Item Qty		
5.	Spine switches to Leaf switches Cables	Mention Item Qty		
6.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
7.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
8.	Leaf switches to Host cables	Mention Item Qty		
9.	Leaf switches to Host Breakout/Splitter Cables	Mention Item Qty		
10.	Transceivers	Mention Item Qty		
11.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
12.	Additional Item as required	Mention Item Qty		
High Speed Compute Fabric				
1.	Spine Switches	Mention Item Qty		
2.	Leaf switches	Mention Item Qty		
3.	Fabric management and telemetry servers / appliances — High Availability	Mention Item Qty		
4.	Spine switches to Leaf switches Cables	Mention Item Qty		
5.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
6.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
7.	Leaf switches to Host cables	Mention Item Qty		
8.	Leaf to Host Breakout/Splitter Cables	Mention Item Qty		
9.	Transceivers	Mention Item Qty		

Track-II (IT)				
Item No.	**Item Title**	**Item Qty**	**Offered Make**	**Offered Model**
10.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
11.	Software Licenses	Mention Item Qty		
12.	Additional Item as required	Mention Item Qty		
Cloud CPU Compute Solution				
1.	Compute nodes	Mention Item Qty		
2.	Transceivers	Mention Item Qty		
3.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
4.	Disk Type1	Mention Item Qty		
5.	Disk Type2	Mention Item Qty		
6.	Network Interface cards	Mention Item Qty		
7.	Additional Item as required	Mention Item Qty		
High Throughput Storage				
1.	Storage controllers / storage server nodes	Mention Item Qty		
2.	Metadata servers / metadata targets	Mention Item Qty		
3.	Disk Type1	Mention Item Qty		
4.	Disk Type2	Mention Item Qty		
5.	Drive enclosures / JBODs / JBOFs	Mention Item Qty		
6.	Management / monitoring nodes	Mention Item Qty		
7.	Rack mounting kits and rails	Mention Item Qty		
8.	Software Licenses	Mention Item Qty		
9.	Additional Item as required	Mention Item Qty		
Storage Delivery Network Fabric				
1.	Spine switches	Mention Item Qty		
2.	Leaf switches	Mention Item Qty		
3.	Spine switches to Leaf switches Cables	Mention Item Qty		
4.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		

Track-II (IT)				
Item No.	**Item Title**	**Item Qty**	**Offered Make**	**Offered Model**
5.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
6.	Leaf switches to Host cables	Mention Item Qty		
7.	Leaf switches to Host Breakout/Splitter Cables	Mention Item Qty		
8.	Transceivers	Mention Item Qty		
9.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
10.	Software Licenses	Mention Item Qty		
11.	Additional Item as required	Mention Item Qty		
Cloud Storage				
1.	Storage controllers / storage server nodes	Mention Item Qty		
2.	Metadata servers / metadata targets	Mention Item Qty		
3.	Disk Type1	Mention Item Qty		
4.	Disk Type2	Mention Item Qty		
5.	Drive enclosures / JBODs / JBOFs	Mention Item Qty		
6.	Gateway nodes	Mention Item Qty		
7.	Management / monitoring nodes	Mention Item Qty		
8.	Rack mounting kits and rails	Mention Item Qty		
9.	Software Licenses	Mention Item Qty		
10.	Additional Item as required	Mention Item Qty		
In & Out of Band N/W				
1.	Spine Switches	Mention Item Qty		
2.	Leaf switches	Mention Item Qty		
3.	Spine switches to Leaf switches Cables	Mention Item Qty		
4.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
5.	Spine switches to Leaf switches Breakout/Splitter Cables	Mention Item Qty		
6.	Leaf switches to Host cables	Mention Item Qty		

Track-II (IT)				
Item No.	**Item Title**	**Item Qty**	**Offered Make**	**Offered Model**
7.	Leaf switches to Host Breakout/Splitter Cables	Mention Item Qty		
8.	Transceivers	Mention Item Qty		
9.	Rack mounting kits, rails, blanking panels	Mention Item Qty		
10.	Software Licenses	Mention Item Qty		
11.	Additional Item as required	Mention Item Qty		
Data Protection & Backup				
1.	Tape Library	Mention Item Qty		
2.	Tape drives	Mention Item Qty		
3.	Data cartridges	Mention Item Qty		
4.	Universal cleaning cartridges	Mention Item Qty		
5.	Barcode labels	Mention Item Qty		
6.	Software License	Mention Item Qty		
7.	SAN Switches	Mention Item Qty		
8.	Ethernet Switches	Mention Item Qty		
9.	Media agents/ Data Movers	Mention Item Qty		
10.	Backup Servers	Mention Item Qty		
11.	Fibre Channel host bus adapters	Mention Item Qty		
12.	Fibre Channel transceivers	Mention Item Qty		
13.	Ethernet Network Cables	Mention Item Qty		
14.	SAN Network breakout/splitter Cables	Mention Item Qty		
15.	Ethernet Network Cables	Mention Item Qty		
16.	Transceivers	Mention Item Qty		
17.	Software Licenses	Mention Item Qty		
18.	Additional Item as required	Mention Item Qty		

Track-II (DC)			
Item No.	**Item Title**	**Item Qty**	**Compliance (Yes/No)**

1.	Supply, Installation, Testing and Commissioning of DC infrastructure (NON-IT) on EPC basis with O&M Charges for 3 years post implementation.	1	Bidder to provide details (viz. Make, Model, Quantity etc.) of major components /items /machinery etc. being supplied against this requirement.

(END OF SECTION V)

SECTION VI - FINANCIAL BID DOCUMENT

(To be submitted along with financial quote on the GeM portal duly signed and stamped on bidder's letterhead)

Item Number	Item Title	Item Description	Item Quantity	Unit of Measure	Consignee ID	Delivery Period (In days)
1	Track-I - ICT and Operationalization of the AI Cloud	Track-I -Supply , Installation, Testing , Commissioning, benchmarking, and operationalization of the AI Cloud IT infrastructure - Accelerated Compute Solution, High Speed Compute Fabric.	1	pieces	gem-con3-pun@cdac.in	90
2	Track-II – Supply, Installation, Testing and Commissioning of DC infrastructure (NON-IT) on EPC basis	Track-II - Supply, Installation, Testing and Commissioning of DC infrastructure (NON-IT) on EPC basis with Tier-III (TCDD, TCCF and TCOS) Certification	1	pieces	gem-con3-pun@cdac.in	240
3	Track-II – Supply, Installation, commissioning, benchmarking, and operationalization of the AI Cloud IT infrastructure	Track-II – Supply, Installation, Testing, commissioning, benchmarking, and operationalization of the AI Cloud IT infrastructure - Accelerated Compute Solution, High Speed Compute Fabric, DC LAN Fabric, In and Out Band Network, Cloud CPU Compute Solution, High Throughput Storage, Storage Delivery Network Fabric, Data Protection and Backup, Unified - Cloud Storage	1	pieces	gem-con3-pun@cdac.in	310
4	Any other services, allied works etc.	Operation and Maintenance for 3 years	1	pieces	gem-con3-pun@cdac.in	310
5	Any other items, component etc. required to complete the solution.	Any other items, component etc. required to complete the solution.	1	pieces	gem-con3-pun@cdac.in	310

Note:

1. Bidders shall be required to provide detailed BoM with cost for each item in the financial price breakup along with their financial quote to be submitted on the GeM portal.
2. The details such as Make/Model, Qty, Unit, Description etc. shall be provided for the items to be supplied and commissioned under the scope as per the format provided in Section V above for both Track-I & Track-II.
3. For item No. 4 i.e. Operation and Maintenance for 3 years, the quarterly payments shall be made in offline mode as per the provisions given in this RFP.

(END OF SECTION VI)

SECTION VII – ANNEXURES

ANNEXURE A – COVERING LETTER

Date:

To:
The Director General
Centre for Development of Advanced Computing (C-DAC)
Innovation Park, Panchavati, Pashan Road,
Pune - 411008 Maharashtra, INDIA

Subject: .....
Reference: .....

Dear Sir,
We, the undersigned, offer to ....., in response to your GEM Bid & ..... We are hereby submitting our proposal for same, which includes Technical bid and the Financial Bid through GEM (gem.gov.in) portal.

We hereby declare that all the information and statements made in this bid are true and we accept that any misinterpretation contained in it, may lead to our disqualification.

We undertake, if our proposal is accepted, to submit a ***Performance Security of 5%*** of the contract / order value, as per terms stipulated in the tender.

We confirm that the deliveries, installation will be done within ***310 days*** if the order is placed. The Post Warranty Comprehensive Annual Maintenance Charges (CAMC) charges shall not be more than 5% of the IT (hardware and software) and Non-IT items, as per requirements.

We certify that the O&M charges quoted by us under VALUE4 is ***not less than 3.5% of the VALUE2 (***Track-II: Non-IT and DC infrastructure installation and commissioning) **quoted by us in the RFP*.***

C-DAC reserves the right to continue the O&M services for the 4th and 5th year for the DC (Track II) with a maximum of 10% year on year escalation on the quoted prices (VALUE4).

We hereby certify that my/ our firm has not been disqualified and / or blacklisted by any Office/ Department/ Undertaking of the State Government / Central Govt. of India, PSU/ Autonomous Body of Government of India, as on the date/time of submission of this bid.

We agree to abide by all the terms and conditions of the tender document, including corrigenda. We would hold the terms of our bid valid for 180 days as stipulated in the tender document.

We understand you are not bound to accept any Proposal you receive.

The undersigned is authorized to sign this bid document. The authority letter to this effect is enclosed.
Yours sincerely,
Authorized Signatory:
Name and Title of Signatory: e-mail:
Mobile NO.

ANNEXURE B – AUTHORITY LETTER

Date:

To:
The Director General
Centre for Development of Advanced Computing (C-DAC)
Innovation Park, Panchavati, Pashan Road,
Pune - 411008 Maharashtra, INDIA

Subject: Authority Letter

Reference: GEM Bid Ref No. **.....**

Dear Sir,

We, M/s _____ (Name of the bidder) having registered office at _____(address of the bidder) herewith submit our bid against the said tender document.

Mr./Ms. _____(Name and designation of the signatory), whose signature is appended below, is authorized to sign and submit the bid documents on our behalf against said RFP

Specimen Signature:

The undersigned is authorised to issue such authorisation on behalf of us. For M/s ..... (Name of the bidder)

Signature and company seal Name
Designation Email Mobile No.

ANNEXURE C – UNDERTAKING(S) BY PRINCIPAL MANUFACTURER/OEM

This Annexure has two parts.

1. *Common Manufacturer Authorisation Form and is mandatory for every OEM whose product(s)/ item(s) are offered against this tender, irrespective of category — to be submitted in original, on the OEM's letterhead, one per OEM per item/category.*
2. *The category-specific declarations/clauses (a) through (h) mentioned under CATEGORY-SPECIFIC DECLARATIONS — the bidder shall attach only the applicable item /category clause being offered by that OEM, submitted along with the common MAF and signed by the same authorised signatory.*
3. *Where a category/item/product has no additional quantitative eligibility criteria, submission of MAF-1 alone is sufficient*

COMMON MANUFACTURER AUTHORISATION FORM (MAF-1)

(To be submitted in Original, on OEM's Letterhead — mandatory for every OEM submission)

Date: _____

To,
The Director General,
Centre for Development of Advanced Computing (C-DAC)
Innovation Park, Panchavati, Pashan Road,
Pune – 411008, Maharashtra, INDIA

Subject: Manufacturer Authorisation Form (MAF) against GeM/Tender No. _____ for supply of _____ [item/category] under the Schedule of Requirements.

Dear Sir,

We, M/s _____ (Name of the OEM/Manufacturer), having our registered office at _____ (address), being the Principal Manufacturer/OEM of _____ (name of product(s)/category), hereby certify as follows:

1. Relationship with Bidder (tick whichever is applicable and strike off the rest):
   (a) We are ourselves bidding directly against the above tender.
   (b) M/s _____ (Name of bidder) is our Indian subsidiary. (A separate letter from us certifying this subsidiary relationship is enclosed.)
   (c) M/s _____ (Name of bidder), having its office at _____, is our duly Authorised System Integrator/ Dealer for the range of products quoted by them against the above tender.

2. Within the scope of the requirement under the above tender, we undertake to provide technical and other support to fulfil the requirements of installation, commissioning, acceptance criteria, and product warranty services for the components supplied and installed at C-DAC by M/s _____ (Name of bidder) against the said tender.

3. We certify that the product(s)/item(s) offered are in current production and are not End-of-Life (EOL) / End-of-Sale (EOS) as on the date of bid submission, and shall continue to be supported by us for the three (3) year warranty period plus a further two (2) years thereafter.

4. We certify that M/s _____ (Name of OEM) is not blacklisted or debarred by C-DAC, or by any Educational/R&D/Government organisation or PSU, as on the date of bid submission.

5. We shall separately submit the Country of Origin and Country of Manufacture declaration in the format prescribed at Annexure F for the offered item/product/services etc.

6. We shall separately submit the Make in India (MII)/ local-content declaration in the format prescribed at Annexure F for the offered item/product/services etc.

7. The Post Warranty Comprehensive Annual Maintenance Charges (CAMC) charges are not more than 5% of the IT (hardware and software) and Non-IT items, as per requirements.

The undersigned is authorised to issue this certificate on behalf of M/s _____ (Name of the OEM/Manufacturer).

For M/s _____ (Name of the OEM/Manufacturer)

Signature & Company Seal

Name: _____
Designation: _____
Email: _____
Mobile No.: _____

****

CATEGORY-SPECIFIC DECLARATIONS – To be incorporated as per the items in the MAF by respective OEM
To be submitted along with MAF, on the same OEM's letterhead, signed by the same authorised signatory. Attach only the block applicable to the item/category being offered.

(a) — UPS / Chiller / DG Set OEM
We further certify that:
<Reiterate eligibility criteria>
(b) — AI Accelerator Server OEM
We further certify that:
<Reiterate eligibility criteria>

Evidence enclosed: Purchase Order(s)/Work Order(s) and completion/satisfactory-performance certificate(s) from end users; service centre address and details.

(c) — AI Accelerator OEM
We further certify that:
<Reiterate eligibility criteria>

Evidence enclosed: OEM-signed confirmation of shipment figures; service centre address and details.

(d) — High-Throughput Storage OEM
We further certify that:
<Reiterate eligibility criteria>

Evidence enclosed: Purchase Order/Work Order and completion/satisfactory-performance certificate from the end user.

(e) — Unified / Cloud Storage OEM
We further certify that:
<Reiterate eligibility criteria>

Evidence enclosed: Purchase Order/Work Order and completion/satisfactory-performance certificate from the end user.

(f) — DC-LAN OEM
We further certify that:
<Reiterate eligibility criteria>

Evidence enclosed: Purchase Order/Work Order and completion/satisfactory-performance certificate from the end user.

(g) Compute Fabric OEM
We further certify that:
<Reiterate eligibility criteria>
Evidence enclosed: Purchase Order/Work Order and completion/satisfactory-performance certificate from the end user.

(To be submitted in Original on Letterhead) Date:

ANNEXURE D – PROFORMA OF PERFORMANCE BANK GUARANTEE
(For the Successful Bidder – to be submitted after order placement by the Successful bidder)
(On non-judicial paper of appropriate value)

To,
The Director General
Centre for Development of Advanced Computing Innovation Park, PANCHAVATI,
Pashan Road, Pune – 411 008
BANKS GUARANTEE NO:
DATE:
Dear Sir(S)

This has reference to the Purchase Order No. .....Dated ..... been placed by Centre for Development of Advanced Computing(C-DAC), Pune on M/s ..... (Name & Address of vendor) for supply, installation, commissioning and warranty of..... _____(description of items) at C-DAC, Pune.

The conditions of this order provide that the vendor shall,

1. Arrange to deliver the items listed in the said order to the consignee, as per details given in said order, and
2. Arrange to install and commission the items listed in said order at client's site, to the entire satisfaction of C-DAC and
3. Arrange for the comprehensive warranty service support towards the items supplied by vendor on site as per the warranty clause in said purchase order.

M/s (Name of Vendor) has accepted the said purchase order with the terms and conditions stipulated therein and have agreed to issue the performance bank guarantee on their part, towards promises and assurance of their contractual obligations vide the Supply Order No. ..... _____M/s. ..... (name of vendor) holds an account with us and has approached us and at their request and in consideration of the promises, we hereby furnish such guarantees as mentioned hereinafter.

C-DAC shall be at liberty without reference to the Bank and without affecting the full liability of the Bank hereunder to take any other undertaking of security in respect of the bidders obligations and / or liabilities under or in connection with the said contract or to vary the terms vis-a – vis the bidder or the said contract or to grant time and or indulgence to the bidder or to reduce or to increase or otherwise vary the prices or the total contract value or to forebear from enforcement of all or any of the obligations of the bidder under the said contract and/or the remedies of C-DAC under any security now, or hereafter held by C-DAC and no such dealing(s) with the bidder or release or forbearance whatsoever shall have the effect of releasing the bank from its full liability of C-DAC hereunder or of prejudicing right of C-DAC against the bank.

This undertaking guarantee shall be a continuing undertaking guarantee and shall remain valid and irrevocable for all claims of C-DAC and liabilities of the supplier arising up to and until _____(date)

This undertaking guarantee shall be in addition to any other undertaking or guarantee or security whatsoever the that C-DAC may now or at any time have in relation to its claims or the supplier's obligations/liabilities under and / or in connection with the said contract and C-DAC shall have the full authority to take recourse to or enforce this undertaking guarantee in preference to the other undertaking or security (ies) at its sole discretion and no failure on the part of C-DAC in enforcing or requiring enforcement of any other undertaking or security shall have the effect of releasing the bank from its full liability hereunder.

We (Name of Bank) hereby agree and irrevocably undertake and promise that if in your (C-DAC's) opinion any default is made by M/s _____..... _____ (Name of Vendor) in performing any of the terms and /or conditions of the agreement or if in your opinion they commit any breach of the contract or there is any demand by you against M/s _(Name of Vendor), then on notice to us by you, we shall on demand and without demur and without reference to M/s _____(Name of Vendor), pay you, in any manner in which you may direct, the amount of Rs. ___/- (Rupees ..... _____Only) or such portion thereof as may be demanded by you not exceeding the said sum and as you may from time to time require. Our liability to pay is not dependent or conditional on your proceeding against M/s (Name of Vendor) and we shall be liable & obligated to pay the aforesaid amount as and when demanded by you merely on an intimation being given by you and even before any legal proceedings, if any, are taken against M/s ..... (Name of Vendor)

The Bank hereby waives all rights at any time inconsistent with the terms of this undertaking guarantee and the obligations of the bank in terms hereof shall not be anywise affected or suspended by reason of any dispute or disputes having been raised by the supplier (whether or not pending before any arbitrator, Tribunal or Court) or any denial of liability by the supplier or any order or any order or communication whatsoever by the supplier stopping or preventing or purporting to stop or prevent payment by the Bank to C-DAC hereunder.

The amount stated in any notice of demand addressed by C-DAC to the Bank as claimed by C-DAC from the supplier or as suffered or incurred by C-DAC on the account of any losses or damages or costs, charges and/or expenses shall as between the Bank and C-DAC be conclusive of the amount so claimed or liable to be paid to C-DAC or suffered or incurred by C-DAC, as the case may be and payable by the Bank to C-DAC in terms hereof.
You (C-DAC's) shall full liberty without reference to us and without affecting this guarantee, postpone for any time or from time to time the exercise of any of the powers and rights conferred on you under the contact with the said M/s .....(Name of Vendor) and to enforce or to forbear from endorsing any power or rights or by reason of time being given to the said M/s .....(name of Vendor) which under law relating to the sureties would but for the provisions have the effect of releasing us.

You will have full liberty without reference to us and without affecting this guarantee, postpone for any time or from time to time the exercise of any of the powers and rights conferred on you under the contract with the said M/s (Name of Vendor) and to enforce or to forbear from endorsing any power or rights or by reason of time being given to the said M/s (Name of Vendor) which under law relating to the sureties would but for the provisions have the effect of releasing us.

Your right to recover the said sum of Rs...../- (Rupees

_____only) from us in manner aforesaid will not be affected/ or suspended by reason of the fact that any dispute or disputes have been raised by M/s..... _____(Name of Vendor) and/ or that any dispute or disputes are pending before any officer, tribunal or court or Arbitrator.

The guarantee herein contained shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of the said M/s .....

_____

(Name of Vendor) but shall in all respects and for all purposes be binding and operative until payment of all dues to C-DAC in respect of such liability or liabilities.

Our liability under this guarantee is restricted to Rs. ..... /- (Rupees _____Only).

Our guarantee shall remain in force until unless a suit action to enforce a claim under guarantee is filed against us within six months from (which is date of expiry of guarantee) all your rights under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there under.

We have power to issue this guarantee in your favour under Memorandum and Articles of Association of our Bank and the undersigned has full power to do under the power of Attorney dated.

Notwithstanding anything contained herein:

A. Our liability under this guarantee shall not exceed Rs.....(in words)
B. This bank guarantee shall be valid up to _____& unless a suit for action to enforce a claim under guarantee is filed against us within 1 year from the date of expiry of guarantee. All your rights under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there after i.e. after one year from the date of expiry of this Bank guarantee
C. We are liable to pay the guaranteed amount or any parts thereof under this bank guarantee only and only if you serve upon us a written claim or demand or before
D. The Bank guarantee will expire on (Min ..... months from the date of successful installations of the items in the order) .....

Granted by the

Bank
SEAL OF THE BANK

Yours faithfully, For (Name of Bank)

Authorised Signatory

ANNEXURE E — EMD (Bank Guarantee (BG) FORMAT –
To be submitted by the bidder in case of EMD being submitted as BG)

Date:

To
The Director General
Centre for Development of Advanced Computing
C-DAC Innovation Park, PANCHAVATI,
Pashan Road, Pune – 411 008

This Deed of Guarantee executed by the _____ (Bank name) (hereinafter referred to as "the bank") in favor of Centre for Development of Advance Computing, having its office at C-DAC Innovation Park (CIP), Panchwati, Pashan, Pune – 411008, Maharashtra (India) (hereinafter referred to as "C-DAC") for an amount not exceeding Rs. _____(Rupees_____ _____ only) at the request of (Bidder's Name & Address) _____ (hereinafter referred to as the "Bidder").

Therefore, we hereby affirm that we Guarantee and are responsible to you on behalf of the Bidder, up to a total amount of Rs. (Rupees only) and we undertake to pay you, upon your first written demand, without cavil or argument, any sum or sums as specified by you within the limit of Rs. (Rupees only).

C-DAC need not prove or show grounds or reasons for the demand of a part or the full amount of guarantee.

This Bank Guarantee will be valid for a period up to (for a period of 180 days from the last date of bid submission)

The bank hereby covenants and declares that the guarantee hereby given is an irrevocable one and shall not be revoked by a Notice or otherwise.

This Guarantee shall not be affected by any change in the Constitution of the Bank or the Bidder.

Dated at this day of YYYY Sealed & Signed by the Bank.

ANNEXURE F – CERTIFICATION FROM BIDDER/OEM - MAKE IN INDIA

Certificate from Bidder related to Make in India Orders

Date:

To
The Director General
Centre for Development of Advanced Computing
C-DAC Innovation Park, PANCHAVATI,
Pashan Road, Pune – 411 008

Ref: Tender / Bid No ..... for supply of .....

We hereby certify that the goods/ services being offered by us vide our proposal, comply with the provisions of the Order No.F.7/10/2021-PPD (1) (Public Procurement No. 4) dated 23.02.2023 issued by Procurement Policy Division, Department of Expenditure, Ministry of Finance, GOI. We hereby declare the COUNTRY OF ORIGIN OF OEM and COUNTRY OF MANUFACTURING of the offered product and/or services. Further the offered services and goods are in compliance to the Make In India Order No. P-45021/2/2017-PP(BE-II)-Part(4)Vol.II dated 19.07.2024 issued by Public Procurement Section, Department of Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI along with achieving Minimum Local Content as declared by the relevant Ministries/Departments Including MeitY Notification F. No. W-43/4/2019-IPHW-MeitY dated 07.09.2020, as amended from time to time, as applicable to the items offered.

We hereby certify the details pertaining to goods, services, works, software, etc. being offered by us, as given below:

SNo.	Item Description	Make & Model No.	Country of Origin of OEM	Country and Location of Manufacture of Item	Location in India at which local value addition is made, if any.	Percentage of Local Content
1						
2						
3						
4						
Total Local Content						

For the above solution / service the local content percentage (%) is ..... (consolidated figure for the complete solution i.e. including all items & services to be mentioned here.) Please note that the bidder has to include all the items mentioned in the Section V (BOM/BOQ) in this RFP.

Self-certification on Compliance to Make-in-India Order:

1. Select any one of the following options ***(Strike out / delete, the option which is not applicable in the declaration i.e. either a or b)***:
    a. We understand that the MII declaration is to be submitted duly certified by the Cost Auditor or Statutory Auditor (in the case of companies) OR from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies). However as per the provision of the said MII Order /OM we are submitting the self-certification for local content for the offered goods / software / solution / services etc. by us. In case, we emerged as the lowest bidder against this tender, at the time of execution of the project, we shall be required to give local content certification duly certified by Cost / Chartered Accountant in practice (as applicable). Further, we agree that, in case, we do not meet the stipulated local content requirement and the category of the supplier changes from Class-I to Class-II / Non-local OR from Class-II to Non-local, a penalty of 10% of the contract value shall be imposed on us.

OR ELSE

b. We are submitting the MII Declaration duly certified by the Cost Auditor or Statutory Auditor (in the case of companies) OR from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies). The document certifying agency /firm/ company is: (Strike out the option which is not applicable in your the declaration)
    i. ***our Cost Auditor or Statutory Auditor (in the case of companies)***
    OR
    ii. ***a practicing cost account / chartered accountant (in case of suppliers other than companies)***

We abide by the following terms and conditions of this GeM bid / enquiry

1. CDAC reserves the right to Accept / Reject / Cancel the bid / GeM inquiry, at its sole discretion, based on the responses received against the MII declaration submitted by the bidders / vendors.
2. Any deviation in this format or not-covering all the major components as per the RFP ask may result in disqualification of the bidder. The BOM/BOQ details should exactly match with the item details provided herein.
3. We also certify that, we are not from a country sharing land border with India as defined in Order No.F.7/10/2021-PPD (1) (Public Procurement No. 4) dated 23.02.2023 issued by Procurement Policy Division, Department of Expenditure, Ministry of Finance, GOI and the goods offered by us comply with the provisions of said order.
4. We have gone through the above-mentioned OM / Order and we have verified the information given in the Make In India (MII) declaration submitted by us and it is true to our knowledge.

For (Name of bidder)

Authorized Signatory
Name & Designation:
Mobile No:

ANNEXURE G - CERTIFICATE/UNDERTAKING FROM BIDDER/ OEM – LAND BORDER SHARING

To:
The Director General
C-DAC, Pune – 411008
Ref: Tender / Enquiry No. XXX dt. XXXX

We (including Named DC/IT partner / Consortium members – as applicable) have read the clause mentioned in the Order No.F.7/10/2021-PPD (1) (Public Procurement No. 4) dated 23.02.2023 issued by Procurement Policy Division, Department of Expenditure, Ministry of Finance, GOI. and further Order/OMs regarding restrictions on procurement from a bidder of a country which shares a land border with India (if any).

In view of this, we certify that,

a. We (including Named DC/IT partner / Consortium members – as applicable) are not from a country sharing land border with India and any registration as mentioned in said OM is not applicable to us.

OR

b. We (including Named DC/IT partner / Consortium members – as applicable) are registered with the competent authority as mentioned in said OM. The copy of registration No.xxx dt.xxx is enclosed.

(Delete whatever is not applicable)

For (Name of Bidder)
Authorised Signatory

(Name & Signature)

(Company's Seal)

ANNEXURE H – INTIGRITY PACT

(To be executed on Rs. 100/- Stamp paper duly notarised and applicable for all tenders of value above Rs.1 Crore)

This Integrity Pact ("the Pact") is made and executed on this _____Day of _____ _____Two Thousand Twenty _____at _____.

By and Between

Centre for Development of Advanced Computing (C-DAC), an autonomous scientific Society under the Ministry of Electronics and Information Technology, Government of India, registered under the Societies Registration Act 1860 and the Bombay Public Trusts Act 1950, having its registered Office at C-DAC Innovation Park, PANCHAVATI, Pashan Road, Pune – 411 008, hereinafter referred to as "C-DAC/Principal", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its administrators, successors or assignees, as the case may be. and

..... hereinafter referred to as "The Bidder(s)/Contractor(s)", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its administrators, successors or assignees, as the case may be.

(The Principal and the Bidder (s)/Contractor(s) are collectively referred to as "the Parties".

Preamble

The Principal intends to award, under laid down organizational procedures, contract/s for ------- - ----------("the Contract"). The Principal values full compliance with all relevant laws and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder/s and Contractor/s. The Principal intends to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into. The Principal also intends that Bidder/s and Contractor/s should abstain from bribing or indulging in any corrupt practices in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the Bidder/s and Contractor/s shall commit to prevent corruption, in any form, by its officials by following transparent procedures.

In order to achieve these goals, the Principal, by way of this Integrity Pact ("the Pact") will appoint Independent External Monitor ("IEM") who will monitor the tender process and the execution of the Contract for compliance with the principles mentioned above.
The parties hereto hereby agree to enter into this Pact and agree as mentioned below.

Section 1 Commitments of the Principal

1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following:-
   a) No employee of the Principal, personally or through relatives or any other person,

will in connection with the tender, or for the execution of the Contract, demand, promise or accept for himself/herself or any third person, any material or immaterial benefit or any other advantage from the bidder/s or contractor/s which he/she is not legally entitled to.

b) The Principal will, during the tender process treat all Bidder/s and Contractor/s with equity and reason. The Principal will in particular, before and during the tender process, provide to all bidder/s and contractor/s the same information and will not provide to any bidder/s or contractor/s additional/confidential information through which the bidder/s and contractor/s could obtain an advantage in relation to the tender process or the contract execution.
c) The Principal will exclude from the process all known prejudiced persons.

2) If the Principal obtains information on the conduct of any of its employees, which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a substantive suspicion and the same is prima facie found to be correct in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions In such a case while such enquiry is being conducted by the Principal, the proceedings under the contract shall not be stalled.

Section 2 Commitments of the Bidder/ contractor

1) The Bidder / Contractor commits to take all measures necessary to prevent corrupt practices, unfair means and illegal activities. He commits himself to observe the following during his participation in the tender process and during the contract execution:

a) The Bidder / Contractor undertakes that he/she has not given, offered or promised to give directly or indirectly any bribe, gift, consideration, reward, favour any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Principal, for which benefit etc. he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

b) The Bidder / Contractor will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Principal, for which benefit etc. he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract

c) The Bidder / Contractor will not enter into any agreement or understanding with other Bidders in connection with the bid, including but not limited to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelisation in the bidding process.
d) The Bidder / Contractor will not commit any offence under the relevant provisions of Anti-Corruption Laws of India/Indian Penal Code, 1860, Information and

Technology Act, 2000, Competition law or any other relevant laws, enactments, rules and regulations. Further the Bidder / Contractor will not use improperly, for purposes of competition or personal gain, or pass or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically. The Bidder / Contractor also undertakes to exercise due and adequate care of any such information so divulged.

e) The Bidder / Contractor further confirms and declares to the Principal that the Bidder / Contractor is the original manufacturer / integrator / authorised government sponsored export entity and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the Principal or any of its functionaries, whether officially or unofficially to the award of the contract to the Bidder / Contractor, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.
f) The Bidder / Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to make or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and the details of the services agreed upon for such payments.

g) The bidder(s)/ contractor (s) of foreign origin shall disclose the name and address of agents and representatives in India related to this tender. Similarly, the bidder(s)/ contractor(s) of Indian nationality shall furnish the name and address of their foreign principals or associates, if any, related to this tender.
h) The Bidder / Contractor shall not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

i) If the Bidder / Contractor or any employee of the Bidder / Contractor or any person acting on behalf of the Bidder / Contractor, either directly or indirectly, is a relative of any of the officers of the Principal, or alternatively, if any relative of an officer of the Principal has financial interest / stake in the Bidder's / Contractor's firm, proprietorship, company, etc. the same shall be disclosed by the Bidder / Contractor at the time of filing of tender/EoI. The term 'relative' for this purpose would be as defined in Section 6 of the Companies Act, 2013.
j) The Bidder / Contractor shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Principal.

k) The bidder / contractor shall disclose the circumstances, arrangements, undertakings or relationships that constitute, or may reasonably be considered to constitute, an actual or potential conflict of interest with its obligations specified in the tender process or under any Agreement which may be negotiated or executed with Principal. Bidder / Contractor and its employees, agents, advisors and any other person associated with the bidder / contractor must not place themselves in a position which may, or does, give rise to conflict of interest (or a potential conflict of interest between the interests of Principal or any other interests during this tender process or through operation of the Agreement.

l) The bidder(s)/ contractor (s) who have signed the Pact shall not approach the Courts while the matters/disputes/issues, related to tender process or the Contract are presented

before the IEM and awaiting the final decision.

2) The Bidder / Contractor will not instigate third persons to commit above mentioned acts / omissions / offences outlined above or be an accessory to such offences.

Section 3 Disqualification from tender process and exclusion from future contracts

1) If the Bidder, before the Contract is awarded, has committed a transgression through a violation of Section 2 or in any other form such as to put his reliability or credibility as Bidder into question:
   a) the Principal is entitled to disqualify the Bidder from the tender process or to terminate the Contract, if already signed, for such reason.
   b) the Principal is entitled to exclude the Bidder / Contractor from participating in future contracts/tenders. The imposition and duration of the exclusion will be determined by the Principal based on the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressors within the company hierarchy of the Bidder / Contractor and the amount of the damage. The exclusion will be imposed for a minimum of six (6) months and maximum of three (3) years.
2) An act/omission would be treated as a transgression after due consideration of the available evidence by the Principal.
3) The Bidder / Contractor accepts and undertakes to respect and uphold the Principal's absolute right to resort to and impose such disqualification/exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision of disqualification/exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.
4) If the Bidder / Contractor can prove that he has restored the damage caused by him and has installed a suitable corruption prevention system, the Principal may revoke the aforesaid disqualification/exclusion prematurely.

Section 4 Compensation for Damages

1) Without prejudice to any rights that may be available to the Principal under any law or the contract or its laid down policies and procedures, the Principal shall have the following rights in case of breach of this Pact by the Bidder/Contractor:
   a) To forfeit the Earnest Money/Bid Security if the Bidder is disqualified from the tender process prior to the award in terms of Section 3;
   b) To forfeit/invoke the Security Deposit/ Performance Bank Guarantee if the Principal has either terminated or is entitled to terminate the Contract of the Bidder in terms of Section 3.
   c) To immediately call of the pre contract negotiations without assigning any reason or giving any compensation to the Bidder / Contractor.
   d) To immediately cancel the contract, if already signed, without giving any compensation to the bidder / contractor. The Bidder / Contractor shall be liable to pay the compensation for any loss or damage to the Principal resulting from such cancellation / rescission and the Principal shall be entitled to deduct the amount so payable from the amount due to the Bidder / Contractor.
   e) To recover all sums already paid by the Principal, with interest at _% @ p.a. if any outstanding payment is due to the Bidder / Contractor from the Principal in connection with any other contract, such outstanding payment could also be set off to recover the aforesaid sum and interest.
   f) To recover all sums paid in violation of this Pact by the Bidder / Contractor to any middleman or agent or broker with a view to securing the contract.

Section 5 Previous transgression

1) The Bidder declares that he has not committed any transgressions in the last three (3) years against any Company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could invite/justify his exclusion from this tender process.
2) Any concealment of information or misrepresentation of facts, in regard to the aforesaid, can lead to his disqualification from the tender process or termination of the Contract, if already awarded, or invite any other appropriate action(s) as deemed fit.

Section 6 Equal treatment of all Bidders / Contractors / Subcontractors

1) The Principal will enter into Pacts on identical terms with all bidders and contractors.
2) The Bidder(s) / Contractor(s) assures to procure from all their subcontractors an undertaking for the adoption of this Pact. The Bidder (s) / Contractor(s) shall alone be responsible for any violation (s) of the provisions laid down in the Pact by any/all of their sub-contractor (s) or sub-vendor (s).
3) The Principal will be entitled to disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 Independent External Monitor / Monitors

1) The Principal appoints competent and credible Independent External Monitor as nominated and approved by the Central Vigilance Commission. The task of the IEM is to review independently and objectively, whether and to what extent the Parties comply with the obligations under this Pact. The IEM would be required to sign 'Non- Disclosure Agreements' alongwith a declaration of 'Absence of Conflict of Interest'. In case of any conflict of interest arises at a later date, the IEM shall inform Chairperson of the Board of the Principal and recuse himself/herself from that case.
2) The IEM is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairperson of the Board of the Principal. The IEM would be provided access to all documents/records pertaining to the contract for which a complaint or issue is raised before them, as and when warranted. However, the documents/records/ information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.
3) The Bidder / Contractor accepts that the IEM has the right to access, without restriction, all Project documentation available with the Principal including the documents/ records/ information provided by the Bidder/Contractor. The Bidder/Contractor will also grant the IEM, upon their request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The IEM is under contractual obligation to treat the documents/ records/ information of the Bidder/Contractor/ Subcontractor with confidentiality.
4) The Principal will provide to the IEM sufficient information about all meetings among the parties related to the Project provided that such meetings could have an impact on the contractual relations between the Principal and the Bidder/Contractor. The Parties will offer to the IEM the option to participate in such meetings.

5) As soon as the IEM notices, or suspects, a violation of this Pact, he will inform the Management of the Principal and request the Management to discontinue or rectify the violation or take any other relevant action. The IEM can in this regard submit nonbinding recommendations. Beyond this, the IEM has no right to demand from the Parties that they act in a specific manner, refrain from action or tolerate action. However, the IEM shall give an opportunity to the Bidder /

Contractor to present his case before making its recommendations to the Principal.

6) The IEM is expected to tender their recommendation on all the complaints within 30 days of their receipt, to the Chairperson of the Board of the Principal. Further, should the occasion arise, the IEM may submit proposals for correcting problematic situations.
7) If the IEM has reported to the Chairperson of the Board of the Principal a substantiated suspicion of an offence under relevant Anti-Corruption Laws of India/Indian Penal Code, 1860, or any other relevant laws and the Chairperson has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEM may transmit this information directly to the Central Vigilance Commissioner, Government of India.
8) The word 'IEM' would include both singular and plural.

Section 8 Pact Duration

1) This Pact comes into force when both parties have signed it. It expires for the Bidder / Contractor 12 months after the last payment under the respective contract, and for all other Bidders / Contractors 6 months after the contract has been awarded.
2) If any claim is made / lodged during the aforesaid duration, the same shall continue to be valid despite the lapse of this pact as specified above, till it is discharged / determined by Chairperson of the Board of the Principal.

Section 9 Other provisions

1) This Pact is subject to Indian Laws. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. Pune. The Arbitration clause provided in the main tender document / contract shall be applicable to any issue / dispute arising under this Pact.
2) If the Contractor is a partnership or a consortium, this Pact must be signed by all partners or consortium members.
3) In case of any allegation of violation of any provisions of this Pact or payment of commission etc. the Principal or its agencies shall be entitled to examine all the documents including the Books of Accounts of the Bidder / Contractor and Bidder / Contractor shall provide necessary information and documents and shall extend all possible help for the purpose of such examination.
4) If one or several provisions of this Pact are held to be invalid/unenforceable, the remainder of this Pact shall remain valid as though the invalid or unenforceable parts had not been included herein. In this case, the parties will strive to come to an agreement to their original intentions.
5) Issues like warranty/ guarantee etc. shall be outside the purview of IEM.

---------- ----------

For the Principal

Place ----------

Date ----------

For the Bidder / Contractor

Witness 1 : ----------

Witness 2: ----------

ANNEXURE I – UNDERTAKING BY NAMED DATA-CENTRE/IT PARTNER

Date:

To Director General,
Centre for Development of Advanced Computing (C-DAC)
Innovation Park, Panchavati, Pashan Road,
Pune – 411008, Maharashtra, INDIA

Subject: Undertaking by named Data Centre/IT Partner against GeM Bid No. _____ for the Supply, Installation, Commissioning & Operations of Sovereign AI Cloud and DC Infrastructure.

Dear Sir,

We, M/s _____ (name of the named Data Centre/IT Partner), having our registered office at _____ (address), hereby confirm that we have been engaged by M/s _____ (name of the Bidder), having their office at _____ (address), as their named Data Centre/ IT Partner for the execution of the works under the above tender, and we undertake as follows.

Select one of the following condition as applicable

A. Named Data Centre Partner

Within the scope of requirement as per the tender mentioned above, we undertake to design, build, install, test, commission, operate and maintain, on a turnkey basis, the whole of the Data Centre facility at the C-DAC campus at Chikhali, Pune as the Named Technical Data Centre Partner of the Bidder. The whole of the Data Centre facility technical & other support towards fulfilling the requirements of installation, acceptance criteria , product warranty services ,operation and maintenance of the components; to be supplied and installed at C-DAC, Pune by M/s.....(Name of bidder) against said tender.

OR

B. Named IT Partner

Within the scope of requirement as per the tender mentioned above, we undertake to supply, install, test, and commission the Track-I and Track-II(IT) as Named IT Partner of the Bidder. Technical & other support towards fulfilling the requirements of installation, acceptance criteria, product warranty services , of the components to be supplied and installed at C-DAC, Pune by M/s.....(Name of bidder) against said tender.

The M/s---------- (name of the Named Data Centre Partner/ Named IT Partner) shall not be blacklisted or debarred by C-DAC or by any Educational, R&D or Government organization or PSU as on the last date of bid submission.

Authority

The undersigned is duly authorized to issue this undertaking on behalf of M/s _____ (name of the Named Data Centre Partner/ Named IT Partner), and a copy of the authorization is enclosed.

For M/s

_____

(name of the Named Data Centre Partner/ Named IT Partner)

Signature and company seal

Name :

_____

Designation :

_____

E-mail :

_____

Mobile No. :

_____

Countersigned for M/s

_____

(Name of the Bidder)

Signature and company seal

Name :

_____

Designation :

_____

E-mail :

_____

Mobile No. :

_____

ANNEXURE J – TECHNICAL DOCUMENTS TO BE SUBMITTED ALONG WITH BID

Sr. No.	Document	Track-I IT Scope	Track-II IT Scope	Track-II DC Scope
1	**SOLUTION ARCHITECTURE AND DESIGN**			
1.1	High-Level Architecture Diagram (HLD) of the complete solution	✓	✓	✓
1.2	Low-Level Design (LLD) and component-level block diagrams showing interconnectivity, port allocation and cable schedule	✓	✓	✓
1.3	Detailed Bill of Materials (BoM) for every item — OEM, make, model, part number, quantity and specification	✓	✓	✓
1.4	Detailed Bill of Quantities (BoQ) for the complete solution, reconciled line-by-line with Section V and Section VI	✓	✓	✓
1.5	First Floor GAD/Layout, Outside Equipment GAD Various Section Drawings of First Floor and Outside Utility Areas, White-space floor layout, Grey-space floor layout, Rack elevation drawings including hot/cold aisle arrangement and containment etc.			✓
1.6	Electrical Single Line Diagram (SLD)- covering HT/LV distribution, CSS, switchgear, busbar trunking , cabling, Panels, UPS,Battery and DG etc. along with technical specification sheets of products			✓
1.7	Cooling P&ID — Covering both primary side of CDU up to Chiller Level and secondary side of CDU upto rack level for DCLC Cooling etc , including requirements for Air Cooling , room and other cooling , CDUs, FWU, PAHU(if any) , manifolds, piping, valve and instrument schedule ,Pumps, Ambient temperature & humidity considered, supply temperature, return temperature, delta T etc. targeted in various loops i.e CDU Primary side , CDU Secondary side, Air cooling loops , room cooling etc. along with technical specification sheets of products and selection sheets of products			✓

1.8	ELV Architecture including BMS , CCTV , Physical Security, Fire detection and suppression design, lighting etc.			✓
1.9	Tier -III OR above DC Design Compliance report from UPTIME INSTITUTE			✓
2.0	Structured cabling schematic — copper and fiber pathways, containment, cable routes and the labelling and naming convention		✓	✓
	Network logical topology — compute fabric, storage delivery fabric, DC LAN, in-band and out-of-band management, and security zoning	✓	✓	—
1.10	Redundancy and single-point-of-failure analysis for every layer, with the failure mode and the designed response for each		✓	✓
2	**TECHNICAL COMPLIANCE MATRIX**			
2.1	Clause-by-clause compliance statement against every clause of Section IV	✓	✓	✓
2.2	Compliance status against each clause — Complied / Complied with deviation / Not complied	✓	✓	✓
2.3	Document name and page reference of the supporting evidence for each clause	✓	✓	✓
2.4	Remarks and consolidated deviation statement, where applicable	✓	✓	✓
2.5	Equivalence justification: for every clause met through an “or equivalent” offering, the technical basis of equivalence with documentary support	✓	✓	✓
3	**PRODUCT DOCUMENTATION**			
3.1	OEM data sheet for every component quoted in the solution	✓	✓	✓
3.2	Software feature sheets — cluster management, orchestration, workload manager, cloud stack and AI software suite	✓	✓	—
3.3	OEM declaration that no quoted item is End-of-Life or End-of-Sale at bid submission, with the product roadmap and support horizon	✓	✓	✓

3.4	Manufacturer Authorization Form / OEM undertaking for every quoted item	✓	✓	✓
3.5	Statutory and product certifications for the quoted equipment (safety, EMC, energy efficiency, RoHS, as applicable)	✓	✓	✓
4	**BENCHMARK AND ACCEPTANCE TEST DOCUMENTS**			
4.1	OEM-signed declaration undertaking to meet every acceptance criterion of this section, covering all applicable test groups		✓	✓
4.2	Published MLPerf Training and Inference results (Closed division) for the offered accelerator and node configuration		✓	—
4.3	Storage benchmark evidence (IOR, mdtest, FIO, MLPerf Storage or equivalent) for the offered storage platform		✓	—
4.4	Schedule of declared values: for every acceptance criterion that this section expresses as a value declared in the technical bid, the value the Bidder commits to.		✓	✓
4.5	Undertaking to submit for approval and execute the Benchmark & Acceptance Test Plan (BATP) within four (4) weeks of Award of Contract		✓	✓
4.6	Draft Integrated Systems Test (IST) / Level-5 commissioning script for the Data Centre, including the failure scenarios to be demonstrated		—	✓
5	**POWER, COOLING AND RACK PLANNING**			
5.2	Total IT load calculation (kW), stated phase-wise and rack-wise, Per-rack power consumption and rack power density statement for every rack type		✓	✓
5.3	Rack layout plan with rack-unit (RU) utilization summary and growth headroom		✓	✓
5.4	Heat load and cooling requirement calculations, air-cooled and liquid-cooled, at 100% design load		✓	✓
5.5	UPS and battery sizing with autonomy calculation at full design load		—	✓
5.6	DG sizing, fuel storage capacity and autonomy calculation		—	✓

5.7	Electrical load flow, short-circuit and protection-relay coordination study, with fault calculations at various levels from source to load with detailed calculations etc, Cable /BBT schedule along with voltage drop calculations, Circuit breaker sizing, Panel & busbar sizing etc.		—	✓
5.8	Earthing, lightning protection and surge protection design		—	✓
5.9	Design PUE statement with the basis of calculation and the physical measurement points to be instrumented		✓	✓
5.10	CFD / airflow and thermal modelling report for the white space at design load		—	✓
5.11	Design basis and analysis of cooling solution at full and partial load conditions including complete details, assumptions made and the specific references/standards used for the same. Applicable de-ratings for Pune site conditions shall be considered while selecting all cooling units, and the bidder shall submit the product selection considering the site ambient conditions as per ASHRAE N=20 yr Data. Selection sheets shall be submitted for all products. The overall cooling solution should be designed to achieve better cooling and low operating cost. The room air temperature should be maintained at 22 +/- 2 Deg. C and humidity as per ASHRAE TC 9.9 2017 guidelines. Heating and humidifier to maintain correct operating environment throughout the data centre needs to be considered.		✓	✓
6	**STORAGE AND DATA PROTECTION**			
6.1	Proposed storage tiering architecture across the parallel file system and unified storage		✓	—
6.2	Data protection model — RAID / de-clustered RAID / erasure coding, rebuild behavior and failure tolerance		✓	—
6.3	Snapshot, clone and quota configuration approach, including per-tenant isolation		✓	—
6.4	Backup, archival and retention policy framework across disk and tape tiers		✓	—
6.5	RPO and RTO statement with the supporting disaster-recovery design		✓	—

6.6	Storage sizing calculation demonstrating the committed usable capacity after data protection, metadata, hot spare and system reserve overheads		✓	—
7	**SOFTWARE AND LICENSING**			
7.1	Complete list of every software licence required, with SKU / part number		✓	✓
7.2	Licence quantities, licensing metric support period for each.		✓	✓
7.3	Declaration that all licences are perpetual to use and enabled from Day-1 for the full quoted scale		✓	✓
7.4	Enterprise operating system support subscription confirmation		✓	—
7.9	BMS software licence details and integration documentation		—	✓
8	**IMPLEMENTATION METHODOLOGY**			
8.1	Detailed project implementation plan with work breakdown structure	✓	✓	✓
8.2	Deployment timeline with milestones mapped to the delivery schedule of Section II	✓	✓	✓
8.3	Resource deployment plan — roles, headcount and phasing	✓	✓	✓
8.4	Method statements for each major activity, including rack integration, liquid-cooling connection, energization and cutover		✓	✓
8.5	Site logistics plan — delivery sequence, unloading, storage, material handling and packaging disposal	✓	✓	✓
8.6	Environment, Health and Safety plan, including permit-to-work, LOTO and arc-flash procedures		—	✓
8.7	Risk register with mitigation and contingency plan for the execution period	✓	✓	✓
8.8	Integration plan for the existing NPSF (C-DAC Pune) — network extension, and software stack changes	✓		—
9	**OPERATIONS AND MANPOWER**			

9.1	Profiles and qualifications of the proposed on-site system and AI engineers	—	✓	—
9.2	Data Centre O&M manpower deployment plan mapped against the manpower table of Section IV, role by role	—	—	✓
9.3	Shift roster and escalation matrix for 24x7 operations	—	—	✓
9.4	Deployment commitment letter for the full contract period	—	✓	✓
9.5	Service management framework, SLA definitions and the periodic reporting model	—	✓	✓
9.6	Spares holding, replacement and logistics plan for the warranty period	—	✓	✓
9.7	Training and knowledge transfer plan with agenda, batch size and schedule	—	✓	✓
10	**SECURITY, COMPLIANCE AND CERTIFICATION**			
10.1	Security architecture document — zoning, segmentation, north-south and east-west controls, and zero-trust access model	—	✓	✓
10.3	Certification roadmap with timeline and audit schedule	—	✓	✓
10.4	Undertaking to appoint a CERT-In empaneled agency for VAPT and to close all findings before Final Acceptance	—	✓	✓
10.5	Physical security design — access control, anti-tailgating, CCTV coverage and surveillance retention	—	—	✓
10.6	Fire detection and suppression design with the applicable code compliance	—	—	✓
10.7	Data sovereignty and data localization compliance statement	—	✓	—
11	**DOCUMENTATION COMMITMENT AT COMMISSIONING (UNDERTAKING WITH THE BID)**			
11.1	As-built drawings and diagrams for every layer of the delivered solution along with warranty documents of products	—	✓	✓

11.2	Configuration backups of all devices, with the backup schedule and repository location	—	✓	✓
11.3	Standard Operating Procedures (SOPs) and operational runbooks	—	✓	✓
11.4	Preventive maintenance schedule and checklists for the warranty period	—	✓	✓
11.5	License inventory with entitlement records and renewal dates	—	✓	✓
11.6	Acceptance Test Report for each phase, in the form required by Item 17	—	✓	✓
11.7	Training material in editable soft copy, updated to the as-built configuration	✓	✓	✓
11.8	O&M manuals and the OEM support contact and escalation matrix	—	✓	✓

ANNEXURE K - DOCUMENT CHECKLIST

Sr	Description	Page No (s)
1	Covering letter, as per **Annexure – A.**	
2	Authority letter, as per **Annexure – B.**	
3	The undertakings from the Principal Manufacturers (OEMs) of products/ items offered as per **Annexure – C.**	
4	**Annexure-E** – EMD (In case of EMD in form of BG)	
5	**Annexure – F – Mandatory Declaration (M.I.I) - (All participants/OEMs etc.)**	
6	**Annexure – G – Mandatory Declaration (Land Border Sharing) - (All participants/OEMs etc.)**	
7.	**Annexure – H – Integrity Pact (All participants/OEMs etc.)**	
7	A copy of Certificate of Incorporation, Partnership Deed / Memorandum and Articles of Association / any other equivalent document showing date and place of incorporation, as applicable, in support of eligibility criteria. **(All participants/OEMs etc.)**	
8	Copy of GST registration certificates. **(All participants/OEMs etc.)**	
9	The detailed technical catalogues, specifications for the offered Items as per format given in **Section – III**	
10	Compliance statement indicating the compliance of the items, equipment, solution offered with the tender specifications	
11	Annexure I – In case of Named IT/ DC Partner	
12	The bidder must submit all the documents as per Document Checklist – **Annexure K**, with appropriate page nos for the same. **The flow of the submitted documents must be in the same order.**	
13	The certificate from a Chartered Accountant certifying the average annual sales turnover of the bidder for the last 3 financial years. **(All participants/OEMs etc.)**	
14	Other documents necessary in support of eligibility criteria, product catalogues, brochures etc. **(All participants/OEMs etc.)**	
15	The bidder must not be blacklisted by any Govt. Organizations as on date of submission of the bids. A certificate or undertaking to this effect must be submitted - **(All participants/OEMs etc.) (Annexure – A).**	
16	The bidder should provide sufficient documentary evidence to support the eligibility criteria and exemptions mentioned in the Document.	
17	Any other supporting document, data sheet etc. as requested in the tender document.	
18	Annexure J - TECHNICAL DOCUMENTS TO BE SUBMITTED ALONG WITH BID	
19	Annexure L – SLA – Signed and Stamped as acceptance	
20	Annexure M & N – Declaration by Consortium Partners and Consortium Agreement	
21	Annexure O – ISBS Formats (if applicable) for Bid and Peformance Security.	
22	Annexure P - Parent Company Guarantee (if applicable)	

23	Any other document, datasheet, specifications etc. to be submitted under this RFP	

ANNEXURE-L - SERVICE LEVEL AGREEMENT (SLA)

This SLA document provides for minimum level of services required as per contractual obligations based on performance indicators and measurements thereof to be offered by SI. The Bidder shall ensure provisioning of all required services while monitoring the performance of the same to effectively comply with the performance levels to provide quality services. The Bidder shall meet service level objectives and corresponding parameters to ensure the delivery and quality of services on time as per standard mentioned in the document. Service level indicators & and the target performance levels to be maintained by the Bidder during the contract period. SLA shall be strictly imposed, and a third-party audit/certification agency shall be deployed for certifying the performance of the Bidder against the target performance metrics. All logs, reports and data that shall be made available for the purpose of evaluation/audit of SLA parameters/target performance metrics should be system generated only.

The benefits of this SLA are to:

1. Trigger a process that applies Customer and the Bidder management attention to some aspect of performance when that aspect drops below an agreed upon threshold, or target.
2. Makes explicit the expectations that Customer has for performance.
3. Helps Customer to control the service level and performance of Bidder services.
4. The Bidder shall have to submit a quarterly report to monitor the performance of the services being provided by the Bidder and the effectiveness of this SLA

Brief Description of the services provided

The Bidder will provide following services for Operation and Maintenance of DC Infrastructure at the proposed site. The exact scope and boundaries of services provided as part of this Contract are detailed in Detail Scope of Work therein of this tender.

1. O&M of Data Centre in terms of the civil, electrical and mechanical work required to maintain the Data Centre.
2. Three years on-site comprehensive maintenance of all the equipment's and their components supplied in setting up the Infrastructure in the Datacenter.
3. Onsite support for Data Centre Infrastructure Operations on 24*7*365 basis by skill manpower / Personnel for a period of three years to ensure 99.982% availability

SLA Definitions

For purposes of this Service Level Agreement, the definitions and terms as specified in the contract along with the following terms shall have the meanings set forth below:

"**Availability**" shall mean the time for which the services and facilities offered by the Bidders are available for conducting operations from the equipment hosted in the Data Centre.

"**Downtime**" is the time the services and facilities are not available to Customer, which excludes the scheduled outages planned in advance for the Data Centre.

"**Helpdesk Support**" shall mean the Bidder's 24x7x365 Helpdesk Support Centre which shall handle Fault reporting, Trouble handling, Ticketing and related enquiries during this contract

"**Incident**" refers to any event / abnormalities in the functioning of the Data Centre Equipment / Services that may lead to disruption in normal operations of the Data Centre services.

Critical: Incidents, whose resolution shall require additional investment in component or time or shall involve coordination with OEMs. These incidents shall impact the overall functioning of the DC. For example, Power failure, failure of Spine switch, etc.

Medium: Incidents, whose resolution shall require replacement of hardware of software parts, requiring significant interruption in working of that individual component. For example, installation of operating system, replacement of switch, etc.

Low: Incidents, whose resolution shall require changes in configuration of hardware or software, which will not significantly interrupt working of that component.

"**Resolution Time**", means time taken by the Bidder staff to troubleshoot and fix the problem from the time the call has been logged at the Helpdesk till the time the problem has been fixed.

Category of SLA

This SLA document provides minimum level of services required as per contractual obligations based on performance indicators and measurements thereof. The Bidder shall ensure provisioning of all required services while monitoring the performance of the same to effectively comply with the performance levels.

The SLA has been logically segregated in the following categories:

1. Performance Related Service Level
2. Security and Incident Management
3. Manpower related Service Level
4. Compliance & Reporting Procedure
5. Civil major and minor Works

Targets of Service Level Agreement

SLA clause provides for minimum level of services required as per contractual obligations based on performance indicators and measurements thereof. The Bidder shall ensure provisioning of all required services while monitoring the performance of the same to effectively comply with the performance levels. The services provided by the Bidder shall be reviewed by the Customer shall:

1. Check performance of the Bidder against this SLA over the review period and consider any key issues of the past period's performance statistics including major incidents, service trends, etc.
2. Discuss escalated problems, new issues and matters still outstanding for resolution.
3. Review of statistics related to rectification of outstanding faults and agreed changes.
4. Obtain suggestions for changes to improve the service levels.

In case desired, C-DAC may initiate an interim review to check the performance and the obligations of the Bidder. The SLA may be reviewed and revised in accordance to the define procedures. The procedures will be used if there is a dispute between C-DAC and the Bidder on what the performance targets should be.

Performance Related Service Levels

S. No	Measurement	Definition	Interval	Target	Target in Time/ Incidences	Penalty
1	Data Center Availability	Availability = {1-[(Downtime) / (Total Time –Maintenance Time)]}*100 Availability of Power will be measured up to the socket level in the equipment room that will be providing power to the racks.	Quarterly	>= 99.982%		No Penalty
				>= 99.75% to <99.98%		0.5% of the QGR value
				< 99.75%		For every 0.25% reduction in the uptime there will be a penalty of 2% QGR. If availability in one Quarter is less than 99.50% then it will be Recorded as Event of Default],and a letter of warning may be issued to the Bidder.
2	Temperature	The server area temperature and DCLC supply temperature to the racks should be maintained all the time. Temperature log reports should be stored for a period of minimum 4 months.	Quarterly	Design Temp the server area and DCLC Supply temperature all the time. (With in range of server OEM recommendation)	1 instance in a week	No Penalty
				Design Temp in the server area and DCLC Supply temperature all the time. (With in range of server OEM	2 no of instances or more than that in a week	Penalty of 0.25% of the QGR value for each instance [If Instances count more than 10 in one Quarter then it Record as Event of

				recommend ation)		Default], a letter of warning may be issued to the Bidder.
3	Humidity	The server area humidity should be maintained all the time. Humidity log reports should be stored for a period of minimum 4 months.	Quart erly	The humidity should be With in range of server OEM recommend ation	0-4 instances	No Penalty
				The humidity should be With in range of server OEM recommend ation	5 no of instances or more than that in a week	0.25% of the QGR value [If Instances count more than 10 in one QGR then it Record as Event of Default], a letter of warning may be issued to the Bidder.
4	CCTV camera Availability Shall be measured for all cameras installed	Availability = {1-[(Downtime) / (Total Time – Maintenance Time)]}*100	Quart erly	>= 99.98%	25 minutes	No penalty
				Between 99.98% and 99.75%	<= 30 minutes to > 25 minutes of downtime	0.5% of the QGR value.
				< 99.75%	> 30 minutes of downtime	1% of the QGR value.
5	CCTV Footage Availability	CCTV footage data should be kept stored for at least 90 days	Quart erly	The bidder should maintain the CCTV footage recordings. The recordings should be taken	3 months with storage.	0.01% of the QGR value plus Letter of Warning to be issued to the Bidder.

				backup and store for minimum of 3 months.		
6	Availability of Access Control Devices	Availability = {1-[(Downtime) / (Total Time – Maintenance Time)]}*100	Quarterly	>= 99.98%	25 minutes	No penalty
				Between 99.98% and 99.75%	<= 30 minutes to > 25 minutes of downtime	0.5% of the QGR value on an incremental basis.
				< 99.75%	> 30 minutes of Downtime	1% of the QGR value

***QGR = Quarterly Gross Receipts for O&M Phase**

*** More than three warning letters may lead to forfeiture of PBG value up to one quarter O&M payment**

MANPOWER SERVICE LEVEL:-

Minimum no of Resource needs to be present in all shift at Data Centre should be not less than as specified in the tender. (Including Holidays)

The replacement of manpower by Bidder after deployment will be allowed (without penalty) only in below cases.

1. The resource leaves the organization by submitting resignation with present employer and a copy of resignation should be marked to C-DAC
2. Bidder will withdraw the resource as per its own organization policy in case of non-performance and non-corporation in line with the guidelines.
3. For Skills and Competence level the resource profile, educational qualification and certifications should be verified by C-DAC jointly prior to deployment.
4. No resource will be absent without prior permission from the designated authority.
5. A Background Verification may be carried out for selected resources to ensure no criminal history present.
6. All resources required to be covered under EPFO, ESIC and minimum wages as applicable.

Minimum O&M Resource Qualification and Skills:-

Sl No	Resource	Minimum Qty per Shift (Three shifts per day)	Minimum Qualification & Relevant Experience
1	**DC Facility Head**	1	BE/BTECH in Electrical/Mechanical Engg. or higher qualification with10+ years' of experience including minimum 5-years' experience in Data Centre environment.

2	**DC Electrical Engineer**	2	BE/BTECH in Electrical Engg. or higher qualification with 7+ years' of experience including minimum 3-years' experience in Data Centre environment
3	**DC Mechanical Engineer**	1	BE/BTECH in Mechanical Engg./HVAC or higher qualification with 7+ years' of experience including minimum 3-years' experience in Data Centre environment
4	BMS Technician	5	Diploma in Electrical/ EEE/Mechanical or higher qualification with 5+ years' of experience including minimum 3-years' experience in Data Centre BMS environment.
5	Electrical Technician	5	Diploma in Electrical with 5 Years' experience including minimum 3-year experience in Electrical HT/LT O&M in Datacenter Applications.
6	HVAC Technician	5	Diploma in Mechanical/HVAC with 5 Years' experience including minimum 3-year experience in HVAC O&M Maintenance in Datacenter Applications.

Compliance & Reporting Procedures

	Measurement	**Definition**	**Measurement**	**Target**	**Penalty**
1.	Submission of MIS Reports	The Bidder shall submit the MIS reports Quarterly and as and when required to the C-DAC.	Quarterly	Report for the previous quarter shall be submitted within the first week of next quarter.	No Penalty
				Delay beyond the date of submission	0.01% of the QGR value for every week time delay
2.	Incident Reporting	Any failure/incident on any part of the Data Centre infrastructure or its facilities shall be communicated immediately to Customer as an exceptional report	Quarterly	100% Critical incidents to be reported to Customer within 1 hour with the cause, action and remedy for the incident.	No Penalty

		giving details of downtime, if any.		Delay beyond an hour	0.01% of the QGR Payment for every hour's delay on an incremental basis.
3.	Change Management	Measurement of quality and timeliness of changes to the Data Centre facilities	Quarterly	100% of changes should follow formal change control procedures. All changes need to be approved by Customer. It should be implemented on time and as per schedule & without any disruption to business	0.01% of the QGR value for every non-compliance of Change request on an incremental basis.
4.	Scheduled Maintenance	Measures timely maintenance of the equipment installed at the Data Centre. The Bidder shall provide a detailed equipment maintenance plan on the commencement of O&M	Quarterly	100 % of scheduled maintenance should be carried out as per maintenance plan submitted by the Bidder. Any scheduled maintenance needs to be planned and intimated to Customer at least 2 working days in advance	0.01% of the QGR Payment for every non-compliance on an incremental basis
5.	Maintenance of Inventory	The Bidder should maintain an inventory of items that will be required on an ongoing basis for maintenance	Quarterly	100% as per the inventory log committed and maintained by Bidder.	0.1% of the QGR Payment for every non compliance

*QGR = Quarterly Gross Receipts/payments during O&M Phase

SLA Change Control

It is acknowledged that this SLA may change as Customer's business needs evolve over the course of the contract period. This document also defines the following management procedures:

1. A process for negotiating changes to the SLA and methodology.
2. An issue management process for documenting and resolving difficult issues.
3. Customer and Bidder management escalation process to be used in the event that an issue is not being resolved in a timely manner by the lowest possible level of management.

Any changes to the levels of service provided during the term of this Agreement will be requested, documented and negotiated in good faith by both parties. Either party can request a change. Changes will be documented as an addendum to this SLA and, subsequently, the SLA methodology and the Contract.

SLA Change Process

The parties may amend this SLA by mutual agreement in accordance with terms of this contract. Changes can be proposed by either party. The Bidder can initiate an SLA review with the Customer.

Normally, the forum for negotiating SLA changes will be Customer's meetings with consultant. Unresolved issues will be addressed using the issue management process described in Clause 5 of this document.

The Bidder shall maintain and distribute current copies of the SLA document as directed by Customer. Additional copies of the current SLA will be made available at all times to authorized parties.

Penalty

Penalty Capping:

Note: Equipment Availability Related penalties shall be governed by the following conditions:

The penalty shall be calculated on QGR as per the SLA defined.

Penalty for Non-Measurable of QGR Parameters:

The below penalty will not be included in the maximum overall QGR penalty of 10% enforced on SI. However, in case of non-measurable of any of the two QGR parameters mentioned below, then maximum penalty of 10% or 10% plus Non-Measurable Parameter Penalty which ever will be more will levied on SI.

a) For not measurable of Security and Incident Management SLA's. Penalty of Rs. 10,000/- would be enforced on SI.
b) For not measurable of Physical Infrastructure related SLAs. Penalty of Rs. 10,000/- would be enforced on SI.
c) For not measurable of Major and Minor Civil/ Electrical Works SLAs. Penalty of Rs. 5,000/- would be enforced on SI.
d) For not measurable of Compliance and Reporting SLAs. Penalty of Rs. 10,000/- would be enforced on SI.
e) For not measurable of Manpower Availability. Penalty of Rs 15,000/- would be enforced on SI.

Operations and Maintenance Management

The selected Bidder will provide 24x7x365 operating and maintaining services for a period of 3 years from the date of final acceptance test. The scope of the services for overall NON-IT infrastructure management during this period shall include 24x7X365 Monitoring, Maintenance and Management of the entire Data Centre, along with providing Helpdesk services to ensure an uptime efficiency of minimum 99.982. This provides guarantee and accountability for the operations team, service providers and end users to meet the criteria for 24 x 7 service requirement. The goal is to achieve full uptime potential, obtain maximum leverage of the installed infrastructure or design, improve operations efficiency and realize opportunities for energy efficiency. This mainly provides the guidance and framework to drive best practices for the effective management and operations of the Datacenter.

1. Human Resource and Planning
2. Policies and Procedures
3. Maintenance Management
4. Operations Monitoring
5. Access Management
6. Training and Development
7. Reports
8. Documentation
9. Certification
10. Automation of Services
11. Human Resource and Planning

The right number of qualified individuals organized correctly is critical to Datacenter meeting long-term performance objectives. Enough qualified in-house staff and/or vendor support must be available to perform all the maintenance activities and operate the Data Centre to provide the greatest opportunity to meet the uptime objective. All personnel working in Datacentre must have the experience and technical qualifications necessary to perform their assigned activities without impacting the Data Centre operations.

Requirements

1. Organizational Structure - this shows the structure of DC department and define which team is responsible or related to the Data Centre operations.
2. DC Team Escalation Matrix – this specifies multiple user contacts to be notified in the event of critical issues or emergency.
3. Staff Qualifications – this is to ensure that the team assign to handle the Data Centre are qualified, trained and has enough experience to properly manage its operations.
4. RACI Matrix – this clearly states or assigns who is Responsible, Accountable, Consulted or Informed in relation to each specific tasks to be defined as per the requirement.

Policies and Procedures

An effective Datacenter management strategy includes policies and procedures that needs to be documented and enforced to ensure that they are understood and followed as inconsistencies in the performance can lead to service interruptions or downtime.

Requirements

1. Data Centre User Manual – This includes all information that is critical to run the Data Centre from construction phase to operation.
2. Data Centre Instructions – This are set of rules inside the Data Centre that prevents any risk to Data Centre operations.

3. Emergency / Crisis Management Plan – this is to ensure control and management inside the Data Centre during an emergency or abnormal situations.
4. SOP's – Set of instructions or guide to operate DC configurations on normal conditions
5. Health & Safety Procedures – Set of HSE guidelines specifically for the Data Centre to prevent accidents or harm to the DC team or visitors.
6. Change Management Procedures – this is to review and approve the proposed changes and evaluate the risk that comes with it.
7. Access Procedures - this access guideline specifies the criteria for granting access to specific individuals or groups, and the different levels of access allowed.
8. Maintenance Procedures – this specifies how a maintenance procedure is scheduled and performed.

Maintenance Management

An effective maintenance program is necessary to keep equipment in an optimum condition, minimize failures and prevent downtime. This includes preventive and predictive maintenance, strong vendor support, failure analysis, life cycle tracking and documentation. Any level of vendor support to maintain infrastructure should have a corresponding list of qualified vendors with formal contracts specifying the scope of work, call-in process, qualifications, and response times to ensure the level of service required meets the uptime objectives. Housekeeping is also an equally important aspect of maintenance to keep combustibles and contaminants out of the Data Centre and technical rooms. For the purpose of proper upkeep of equipment's installed at Datacenter, there is a need to study OEM documents:

Requirements

1. List of Equipment – this includes Generator, UPS, HT Panel, LT Panel cooling, Fire Alarm & Suppression, Access control & CCTV and related sensors. It is an indicative list not an exhaustive one.
2. Specialized Vendor Details – This contains the details of the vendor(s) assigned to maintain DC equipment. Technician information, qualifications and certifications should be available.
3. Service Level Agreements – Should clearly define the Response Time and Conditions to match our requirement as well as OEM recommendations.
4. Planned Preventive Maintenance (PPM) – PPM schedule should be fixed for the entire period of contract. So we can plan other activities accordingly without conflict.
5. Sequence of Operation – This shows the operation of any equipment with redundant functionality in case of a primary source failure. Example: UPS, Generator, Etc.
6. Escalation Matrix or Emergency Call-out Matrix – This allows to clearly identify the response team responsible for any equipment failure
7. Service Evaluation – This is to evaluate the assigned team and request for changes if required. This will increase the quality to the support from the service team.
8. Methodology and Risk Assessment – This is to provide information on how the maintenance will be performed and the risk that comes with it. This is required for all maintenance activities – may it be major or minor.
9. Critical Spare Parts - These are list of spare parts to be made available on site to sustain operation of DC critical equipment.
10. End-of-life study – This is to indicate that the product is in the end of its useful life and the vendor stops marketing, selling, or sustaining it.
11. Life Cycle study – This will enable the team to know when the equipment has reached its peak performance and will be subject to replacement.

12. Predictive Maintenance – This will allow the team to alter PPM schedule to match the equipment maintenance as required.
13. Anticipation and Forecasting – This is essential for laying out plans to sustain or improve the Data Centre services.

Operations & Maintenance Monitoring

The O& M monitoring should continuously observe at the network level for the ability to look at all assets, physical and virtual, that reside on the LAN, even those that are offline, and all interconnections between them. This monitoring should be done on a continuous basis and should be capable of monitoring dynamic network fabrics. This is should also include monitoring for missing patches or application or configuration changes that can introduce vulnerabilities that can be exploited.

Requirements

1. Physical or Visual Inspection – This should be on daily basis at random times. Daily inspection should be routine work for the Data Centre managers. This involves visual checking of the electrical devices, cooling equipment, UPS, sensors, lighting, etc.
2. Online / Remote monitoring – This type of monitoring is applied to all Data Centre components connected to the BMS alerts. This shows actual information received from sensors, smart devices, etc.
3. Critical Alerts – There should be an automated system capable of sending alerts or notification through Email or SMS to all Data Centre manages for any critical system failure that requires immediate action.

Access Management

This access guideline specifies the criteria for granting access to specific individuals or groups, and the different levels of access allowed. These are composed of instructions and policies to restrict and prevent unauthorized and unqualified access that may cause any type of risk to our operation.

Requirements

1. Permit to Access (PTA) – This provides access to the Data Centre strictly for inspection or survey purposes only. Any type of work or configuration will not be allowed.
    a. Permanent Access – given to authorized or qualified Data Centre managers or operations team only.
    b. Temporary Access – also called visitor access. This is given to individuals authorized to access the Data Centre for a period of time, with proper approval from C-DAC or authorized person.
2. Permit to Work (PTW) – This allows an individual to do work such a configuration, updates, shutdown, patching, maintenance etc. This also applies to DC maintenance vendors.
3. Permit to Modify Equipment (PTME) – This allows an individual to add, remove or replace any equipment from the Data Centre, with proper approval from C-DAC or authorized person.
4. No Objection Certificates (NOC) – This is to allow any new requirement or projects directly impacting Data Centre operations.
5. Change Request Forms (CR) – This is required for any major modification or change request on the existing setup of the Data Centre. This also covers revoking access permissions to existing permanent users.

Training and Development

Proper training and induction ensure that the team understands the policies, procedures, and unique requirements for working inside the Data Centre. This is essential in avoiding unplanned outages and ensuring proper response to both anticipated and unplanned events.

Requirements

1. Data Centre Induction – This is having the team familiarize with the existing configuration of the Data Centre and to follow the guidelines for operation.
2. Data Centre Trainings – All DC operations team should have the basic and effective knowledge on how the facility operates as per the implemented design. This involves network connection, power, cooling and support.
3. Bidder shall provide all necessary training to C-DAC officials and authorised team members for the purpose of successful functioning of the Data Centre operation and management.

Documentation

These are set of references or records provided on paper or on digital media. These documents act as the store of collective organizational and operational knowledge regarding the processes and can be accessed by anyone in times of need. All these documents should be latest, updated, protected and available.

Requirements

1. Asset list – list of equipment installed for Data Centre operations.
2. As-built drawings – final approved layouts as installed before activation. This is used as basis and includes civil, electrical, and passive components.
3. Licenses – licenses for all applications, databases and passive components (wherever applicable) should be made available for support and service.
4. Operation manuals – used as reference for the equipment functions.
5. Procedure manuals – used as reference for the specified OEM procedures.
6. Data Sheets – reference for equipment specification.
7. Equipment Set Points – reference for equipment configuration.
8. Testing and Commissioning – verifies proper operations of systems via documented testing procedures and establishes performance criteria in line with OEM standards.
9. Warranty Certification – an effective warranty management program secures operational stability through knowing the limits and exceptions of the product as per OEM. This includes all electrical, Mechanical, and passive components (wherever applicable) and should be made available for support and service.

Monthly reports

Consolidated component-wise infrastructure availability and resource utilization report as mentioned bellow has to be submitted to all the stockholders involved in the project in hard as well as in softcopy.

1. Component wise infrastructure availability and resource utilization.
2. Consolidated SLA / non-conformance report.
3. Summary of issues / complaints logged at the Technical Support desk
4. Summary of resolved unresolved and escalated issues / complaints
5. Issues / Complaints Analysis report for virus calls, call trend, call history, etc.
6. Summary of systems rebooted.
7. Log of backup and restoration undertaken
8. Summary of issues / complaints logged with the OEMs.
9. Summary of changes undertaken in the Data Centre including major changes like configuration changes, patch upgrades, database reorganization, storage reorganization, etc. and minor changes like log truncation, volume expansion, user creation, user password reset, etc.
10. Summary of component wise Data Centre uptime.
11. Summary of changes in the Data Centre.
12. Log of preventive / scheduled maintenance undertaken
13. Log of break-fix maintenance undertaken
14. Summary of attendance of Bidder's staff at the Data Centre.
15. Inventory of spare parts in the Data Centre.

Performance - Monitoring, Management and Reporting

The proposed performance management system shall integrate network, server and database performance information and alarms in a single console and provide a unified reporting interface for network components. The proposed performance management system must integrate network, server & database performance reporting information and alarms in a single console in order to provide a unified reporting interface.

Constitution of the Team

1. The Bidder shall provision for adequate onsite support to provide 24x7x365 onsite operations and maintenance services to C-DAC as defined in the scope of work.
2. Onsite resources will follow six working days per week cycle and will be entitled for all national holidays. In required resources would be called on Holiday/odd hours, in such case they will be entitled for compensatory leaves.
3. All the critical onsite resources deployed at DC have to be on Bidder's or their authorised partner's payroll.
4. Onsite resources for technical support will work in shifts to provide 24x7x365 onsite operations and maintenance services to DC.
5. All the concerned onsite staff shall log an attendance on a daily basis. Bidder shall maintain a database of attendance of his staff at the DC. The attendance database should have facility to track attendance and draw out MIS reports as desired by C-DAC. Bidder shall submit the attendance records in a format and as per schedule desired by C-DAC.
6. SI should ensure that all the personnel identified for this project have high level of integrity. Bidder should undertake necessary due diligence to ensure that the personnel have high standard of trustworthiness. Bidder should obtain an undertaking from each of the personnel assigned and the same should be submitted to C-DAC as and when demanded by C-DAC.
7. SI shall be responsible for any mishaps or security breaches that happen due to Bidder's personnel / personnel appointed by Bidder for execution of services.

8. SI should estimate and propose the personnel required during the Installation, Commissioning and Maintenance phase and provide the estimation as part of the Technical Bid in the format specified in Contents of the Bid.
9. The following clause defines the skill sets and qualification requirement for Project In-Charge.

O & M Roles and Responsibilities

Responsibilities of the Bidder:

1. Bidder shall prepare and then seek approval from C-DAC on all the infrastructure solution architecture, diagrams and plans before commencement of installation.
2. Bidder shall follow Change Management Procedures, Information Security Policies as suggested by C-DAC.
3. Bidder shall ensure proper handover/ takeover of documents & other relevant materials in the event of change in personnel.
4. Bidder shall share and review all internal documents / reports used to monitor & execute the project with C-DAC as and when desired.
5. Bidder shall proactively interact with other vendors / third parties / OEMs to ensure that the equipment is upgraded and maintained at a periodic interval. C-DAC would only pay the services charges applicable for operations and maintenance of the Data Centre.
6. Bidder would manage all aspects of Vendor management.

Responsibilities of C-DAC:

1. C-DAC shall provide approvals & signoffs to the deliverables within the stipulated time period.
2. C-DAC shall direct and monitor the activities performed by the Bidder as per the tender Document and in turn validate the service levels attained as per the SLA document.

Annexure –M – Declaration by Consortium Partners

(Original signed copy on company letterhead of Lead bidder)

Date:

To Director General,
Centre for Development of Advanced Computing (C-DAC)
Innovation Park, Panchavati, Pashan Road,
Pune – 411008, Maharashtra, INDIA

Ref: Declaration by consortium partners

- I/We agree to adhere with the schedule of implementation and deliver the services as specified in this invitation for application document.
- I/We agree to submit the Consortium Agreement duly stating the Lead bidder and the Consortia member.
- I/We agree to that the Lead bidder will be held accountable by C-DAC for all the delivery and tender conditions and will be held responsible for breach of conditions, agreements, SLAs as stated in this document.
- I/We agree that C-DAC would release payment only to the Lead bidder.
- I/We agree to submit any other agreements with the bidding consortium partner that conflict with the terms and conditions of this document.
- I/We agree that our bid might be summarily rejected in case the Proposal Evaluation committee finds any such agreement that effect the execution of the terms of this document.
- If there is any prior agreement between Lead bidder and the Consortia member which conflicts with any of the clauses of this tender document, I/We agree that it is the responsibility of the Lead bidder to ensure that the prior agreement is modified so that it is compliant with the conditions of this document .

Lead bidder Name:
Signature:
Signing Authority Name:
Designation:
Seal of the Lead bidder:

(Non-Lead bidders)
Consortia member Name:
Seal of the Consortia member
Signature:
Signing Authority Name:
Designation:

[Please add the above for all the Consortia members]

ANNEXURE-N
CONSORTIUM AGREEMENT

(To be executed on non-judicial stamp paper/e-stamp of appropriate value under the applicable stamp law)

(Sovereign AI Cloud and DC Infrastructure — GeM Bid No. .....)

This Consortium Agreement ("Agreement") is executed on this ..... day of ..... 20..... at ....., between:

(1) **M/s .....**, a company incorporated under the Companies Act, 1956/2013, or a partnership firm or LLP registered under the Indian Partnership Act, 1932 or the Limited Liability Partnership Act, 2008 (CIN/LLPIN .....), having its registered office at ..... (hereinafter the "**Lead Member**", which expression shall include its successors and permitted assigns), of the FIRST PART;

(2) **M/s .....**, a company incorporated under the Companies Act, 1956/2013, or a partnership firm or LLP registered under the Indian Partnership Act, 1932 or the Limited Liability Partnership Act, 2008 (CIN/LLPIN .....), having its registered office at ..... (hereinafter the "**Consortium Member**", which expression shall include its successors and permitted assigns), of the SECOND PART;

(the Lead Member and the Consortium Member each a "Member" and together the "Consortium"); and

(3) Centre for Development of Advanced Computing (C-DAC), a Scientific Society of the Ministry of Electronics & Information Technology, Government of India, having its office at Innovation Park, Panchavati, Pashan Road, Pune – 411008 (hereinafter the "Purchaser"), of the THIRD PART, which joins this Agreement solely to accept, and to be entitled to enforce, the undertakings given in its favour.

RECITALS

A. The Purchaser has invited bids through the GeM portal vide Bid No. ..... dated ..... for "Supply, Installation, Commissioning & Operations of Sovereign AI Cloud and DC Infrastructure", together with the RFP, annexures, clarifications and corrigenda issued from time to time (the "Tender"), including Corrigendum No. ..... dated ..... authorising bids by a consortium (the "Consortium Corrigendum").

B. The Tender, as amended by the Consortium Corrigendum, permits a bid by a consortium of exactly two entities, being one Lead Member and one Consortium Member, where the Lead Member bids in its own name and remains the single point of contact and contracting party for the Purchaser.

C. The Members wish to bid jointly for the entire scope of the Tender and, if the contract is awarded, to execute it, on the terms below.

D. The Purchaser has agreed to evaluate the bid and, if successful, to award the contract on the strength of this Agreement. The Members acknowledge that this is good and sufficient consideration for each undertaking given in favour of the Purchaser.

E. The Tender requires the Members to submit the Declaration by Consortium Partners prescribed under the Consortium Corrigendum, and to disclose, submit or amend any prior or inter se agreement that conflicts with the Tender; this Agreement is executed, amongst other things, in fulfilment of those requirements.

F. The Members intend that every undertaking in this Agreement in favour of the Purchaser is binding on, and directly enforceable against, each of them from the date of execution of this Agreement by both Members, whether or not the Contract is awarded and whether or not the Purchaser has then countersigned this Agreement.

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. DEFINITIONS AND INTERPRETATION

1.4 "**Contract**" means the GeM order/contract placed on the Lead Member for the Tender, including the Tender documents, SLA, corrigenda, and every amendment, variation or addition.

2.4 "Entire Scope" means all supply, installation, commissioning, benchmarking, certification (including Uptime Tier-III TCDD, TCCF and TCOS), operation, maintenance, warranty, support and other obligations under the Contract (Track-I, Track-II (IT), Track-II (DC) and O&M), including anything incidental that the Contract requires.

3.4 "Contract Period" means the period from the date of this Agreement until the later of
3.1.4 the end of the warranty and O&M period,
3.2.4 final discharge of the Performance Security, and
3.3.4 settlement of all claims of the Purchaser under the Contract.

4.4 References to the Tender, RFP clauses and Annexures are to the Tender as amended by corrigenda. Nothing in this Agreement varies, or shall be read as varying, the Tender or the Contract. In case of conflict, the order of precedence is:
4.1.4 the Contract (including the GeM order and the terms incorporated in it);
4.2.4 the Consortium Corrigendum and other corrigenda to the Tender;
4.3.4 the Tender;
4.4.4 this Agreement, which shall at all times be read subject to, and consistently with, the foregoing.

2. FORMATION, EXCLUSIVITY AND PURPOSE

1.3 The Members hereby irrevocably constitute a Consortium for the sole purpose of bidding for, and if awarded, executing the Contract for the Entire Scope.

2.3 Neither Member shall participate in the Tender individually or as a member of any other consortium, or as a Named DC/IT Partner or named sub-contractor of any other bidder, or offer its products (as an Original Equipment Manufacturer-OEM/ Original Service Provider-OSP etc.) to any other bidder in the Tender in breach of the Tender conditions.

3.3 Each Member shall bear its own pre-tender and bidding expenses.

3. ELIGIBILITY ALLOCATION

1.5 The eligibility criteria of the Tender shall be satisfied as allocated in **Schedule 1**. Each criterion shall be met in full by the Member named against it, standing alone. There shall be no aggregation or pooling of experience, certifications or manpower across the Members, save that turnover shall be assessed on the combined basis prescribed by the

Consortium Corrigendum, with each Member separately meeting the minimum turnover required of it and maintaining positive net worth as required thereunder.

2.5 The Members warrant that all certificates, work orders, completion certificates and other documents submitted for eligibility are genuine and belong to the Member relied upon. A misstatement by either Member is a misstatement by both. Each Member shall promptly notify the Lead Member and the Purchaser of any event that renders, or is likely to render, any eligibility representation, declaration or evidence relating to it inaccurate or invalid, including any threatened debarment, loss of technical manpower required to be on its rolls, or change in control.

3.5 The Member whose credentials are relied upon for any criterion shall remain in the Consortium and shall actually perform the Track(s) mapped to it in **Schedule 2** for the whole Contract Period.

4.5 Each Member shall, throughout the Contract Period, maintain the eligibility on the strength of which it was relied upon, including, as applicable, the technical manpower required to be on its rolls, its non-blacklisted status and the deployment of only Indian nationals residing in India, and shall provide updated evidence of the same to the Purchaser on demand.

5.5 The Member performing Track-II (DC) shall obtain and keep valid the Uptime Tier-III certifications (TCDD, TCCF and TCOS) required under the Contract for the whole of the operations and maintenance period, and neither Member shall do or omit to do anything that causes any such certification to lapse.

4. LEAD MEMBER — SOLE CONTRACTOR AND SINGLE POINT OF CONTACT

4.1 The Lead Member is, for all purposes of the Tender and the Contract, the bidder and the contractor, and alone shall:

(a) submit the bid and all documents on GeM;
(b) negotiate and accept the Contract;
(c) furnish the Performance Security and any other security;
(d) raise invoices and receive all payments;
(e) receive and respond to all notices, instructions and correspondence;
(f) manage the Consortium's dealings with OEMs and sub-contractors;
(g) respond to and resolve disputes with the Purchaser.
(h) accept, within the limits of the Contract and as approved by the Purchaser, amendments, variations or extensions of the Contract, which shall bind both Members.

4.2 The Consortium Member irrevocably authorises the Lead Member to act for it in all the above matters and shall execute a Power of Attorney and Board resolution to that effect, annexed hereto. Any act, statement, commitment or acceptance of the Lead Member binds both Members.

4.3 Any notice, instruction, approval, demand or correspondence served by the Purchaser on the Lead Member shall be deemed served on both Members. The Purchaser need not communicate with the Consortium Member.

4.4 The Consortium Member shall not communicate with the Purchaser on the Contract except through or with the written concurrence of the Lead Member, save where the Purchaser itself invites direct communication.

5. JOINT AND SEVERAL LIABILITY

1.4 The Members shall be jointly and severally liable to the Purchaser for the Entire Scope and for every obligation, warranty, indemnity, penalty, liquidated damage, risk-purchase cost,

and loss or damage arising under or in connection with the Tender and the Contract, whether the same arises from the act or default of the Lead Member, the Consortium Member, or any OEM or sub-contractor of either, subject always to the limitation of liability provisions of the Tender and the Contract (including any monetary cap and the exceptions to it), which shall apply to the liability of each Member.

2.4 The Purchaser may, at its sole option, proceed against the Lead Member alone, the Consortium Member alone, or both, simultaneously or successively, and shall not be bound to proceed against or exhaust its remedies against the Lead Member (or any security) before proceeding against the Consortium Member. A decision of the Purchaser to deal with, or enforce against, only one Member shall not be an election and shall not release or prejudice its rights against the other.

3.4 The allocation of Tracks in Schedule 2 exists only to map eligibility to execution. It is not a division of responsibility as against the Purchaser, shall not limit the liability of either Member, and shall not entitle either Member to contend that a default, delay or defect is the responsibility of the other.

5.4 Any loss, penalty or deduction levied by the Purchaser shall be paid by the Lead Member on demand; if not paid, the Purchaser may recover it from the Consortium Member without demur. The Members' rights of contribution, indemnity or reimbursement between themselves are inter se matters under Article 12 and shall not be set up against the Purchaser.

6. PERFORMANCE SECURITY

6.1 The Performance Security required under the Tender shall be furnished by the Lead Member in the name of the Purchaser, for the amount and duration stated in the Tender. The Members shall jointly ensure that it remains valid and sufficient throughout, including any extension required on account of extension of the Contract Period.

6.2 The Performance Security is without prejudice to, and shall not limit, the Purchaser's other remedies, or the liability of either Member under this Agreement.

6.3 The Earnest Money Deposit (EMD) required under the Tender shall be furnished by the Lead Member in the form and manner required by the Tender. As between the Members, the Consortium Member shall, within 7 (seven) days of demand, reimburse the Lead Member for its agreed share of the EMD and of any extension or additional security, and shall indemnify the Lead Member against any forfeiture of the EMD to the extent attributable to the Consortium Member's act or default. This clause is inter se and shall not limit the Purchaser's rights.

6.4 The Members shall jointly and unconditionally ensure that, if the bid is accepted, the Lead Member accepts the GeM order, signs the Contract and furnishes the Performance Security within the time prescribed by the Tender, and neither Member shall withdraw, revoke or qualify the bid during its validity.

6.5 If the Performance Security is invoked or becomes insufficient, the Consortium Member shall, as between the Members, contribute its agreed share and do all acts required to reinstate or extend it, without prejudice to the joint and several liability of both Members to the Purchaser.

7. RIGHTS AGAINST THE PURCHASER

7.1 All rights, claims and entitlements under the Contract, including the right to payment, are vested in the Lead Member alone. The Consortium Member waives any claim, set-off, lien or right of action against the Purchaser arising from the Tender or the Contract and shall look solely to the Lead Member for its remuneration.

7.2 Payment by the Purchaser to the Lead Member in accordance with the Contract is full and valid discharge of the Purchaser as against both Members.

8. DEFAULT, CURE AND STEP-IN

1.4 No dispute, disagreement, delay or default between the Members, and no act or omission of the Consortium Member, shall be a ground for delay, suspension, non-performance, claim for extension of time, or relief from penalty or Force Majeure under the Contract. As against the Purchaser, a default of the Consortium Member is a default of the Lead Member.

8.2 On notice from the Purchaser to the Lead Member of any default, the Lead Member shall cure it within the period given by the Purchaser, by performing itself, or by replacing the Consortium Member with the prior written consent of the Purchaser under Article 9, or otherwise as the Purchaser may accept.

8.3 If the Lead Member (a) fails to cure within the period given, or (b) becomes insolvent, enters liquidation, is blacklisted or debarred, or ceases or is unable to carry on its business, the Consortium Member shall, on written notice from the Purchaser, with the prior written consent of the Purchaser and in accordance with the Tender and GeM requirements, assume the role of Lead Member and complete the Entire Scope under the Contract, and the Lead Member shall give all cooperation and assignment needed for that purpose. The Purchaser may also exercise its rights of termination, risk purchase and recovery under the Contract.

8.4 A Member that withdraws from the Consortium, suspends or abandons performance, or is replaced in breach of this Agreement shall remain liable to the Purchaser under Article 5, shall indemnify the continuing Member for all additional costs of completing its share of the Entire Scope, and shall provide all cooperation, documents and access required by the Purchaser for continuity of performance.

8.5 No inter se dispute, and no arbitration or proceeding between the Members, shall suspend or delay performance of the Contract, the Lead Member's obligation to cure, or the exercise by the Purchaser of any of its rights or remedies.

9. NO CHANGE IN CONSORTIUM

1.4 Throughout the period from bid submission until the end of the Contract Period, neither Member shall

1.1.4 withdraw from or dissolve the Consortium;

1.2.4 assign, transfer or delegate any right or obligation under this Agreement or the Contract;

1.3.4 change the constitution of the Consortium or add any member; or

1.4.4 undergo any change in control, merger, demerger or restructuring that affects its eligibility or ability to perform, without the prior written consent of the Purchaser.

2.4 Any replacement of a Member approved by the Purchaser shall satisfy the same eligibility criteria that the outgoing Member satisfied, shall execute a fresh agreement in this form, and shall be bound from the date of its accession, and the outgoing Member shall remain liable for all acts and omissions up to the date of replacement.

3.4 This Agreement shall remain unaffected by any change in the Memorandum or Articles of Association, name, or constitution of either Member, or by the insolvency of either Member.

10. CROSS-DEFAULT; INTEGRITY AND COMPLIANCE

1.4 Blacklisting, debarment, or any action under the Tender for fraudulent or corrupt practice, forfeiture of EMD, or termination of the Contract in respect of either Member shall be deemed to be in respect of both Members.

2.4 Each Member shall

2.1.4 Sign the Integrity Pact;

2.2.4 Furnish the declaration under Annexure G (Land-Border Restriction) and the make-in-India/local-content declarations (Annexure F) applicable to its scope;

2.3.4 Confirm that it is not blacklisted or debarred by C-DAC or any Government organisation or PSU; and

2.4.4 Deploy only Indian nationals residing in India as required by the Tender.

3.4 The Tender provisions on sub-contracting, fall clause, indemnity, limitation of liability, insurance, confidentiality and security shall apply to both Members. Sub-contracting by either Member shall be notified to the Purchaser as required by the Tender and shall not relieve either Member of any liability.

11. WAIVER OF SURETY-TYPE DEFENCES

1.4 The liability of each Member to the Purchaser is primary and independent. To the fullest extent permitted by law, neither Member shall be discharged or released, nor have its liability diminished, by (a) any variation, amendment, modification or extension of the Contract or the Contract Period; (b) any time, forbearance or indulgence granted to the other Member; (c) any compromise, settlement or release of the other Member or the giving up of any security; (d) any change in the constitution, insolvency or incapacity of the other Member; or (e) any invalidity or unenforceability of any obligation of the other Member. Each Member waives any defence otherwise available under Sections 43, 44 and 133 to 139 of the Indian Contract Act, 1872 to the extent inconsistent with this Article.

12. INTER SE MATTERS

1.4 The Members may separately agree their commercial split, cost sharing, and rights of indemnity or contribution against each other. Such arrangements are inter se, do not bind the Purchaser, and cannot be raised against the Purchaser. The Purchaser shall not be a party to, or obliged to take notice of, any inter se dispute.

2.4 Any dispute between the Members shall be resolved first by senior management of both Members within 15 days and, failing that, by arbitration by a sole arbitrator under the Arbitration and Conciliation Act, 1996, without in any way suspending performance of the Contract or affecting the rights of the Purchaser. The seat of arbitration shall be ___, the language of the arbitration shall be English, and the sole arbitrator shall be appointed by the Members by mutual consent within 15 (fifteen) days, failing which by the High Court of Judicature at ___ on the application of either Member.

3.4 The Lead Member shall promptly inform the Purchaser of any dispute that is likely to affect performance of the Contract.

13. PURCHASER AS PARTY AND BENEFICIARY

1.4 The Purchaser is entitled to rely on and directly enforce every undertaking in this Agreement given in its favour, against either or both Members. This Agreement forms an integral part of the Contract.

2.4 No amendment, waiver, or termination of this Agreement shall be effective against the Purchaser without its prior written consent. The Purchaser's signature below is for acceptance and creates no obligation on the Purchaser to either Member.

3.4 The undertakings given in favour of the Purchaser under this Agreement are binding on each Member, and directly enforceable by the Purchaser against either or both Members, from the date of execution of this Agreement by both Members, whether or not the bid is accepted and whether or not the Purchaser has then countersigned this Agreement. The Purchaser may countersign this Agreement at any time for acceptance; its countersignature creates no obligation on it to award the Contract.

14. DURATION

1.4 This Agreement is effective from the date first written above, is irrevocable, and shall continue in force until the end of the Contract Period and until the Purchaser has certified in writing that all obligations and liabilities under the Contract have been discharged. If the Consortium is not awarded the Contract, this Agreement shall lapse on the expiry of the bid validity or on the return of the EMD, whichever is later, but without prejudice to any liability for acts or breach before that date, including forfeiture of EMD.

15. CONFIDENTIALITY

1.4 The Members shall keep confidential all information about the Tender, the Contract, drawings and site information shared by the Purchaser, and any NDA signed with the Purchaser shall bind both Members. Each Member shall comply with the security, access-control and data-protection requirements of the Tender applicable to its work, shall not remove the Purchaser's data or documents from the site without authority, and shall notify the Lead Member and the Purchaser of any security incident affecting the Contract within 24 (twenty-four) hours.

16. GENERAL

1.4 This Agreement is governed by the laws of India. Subject to the dispute resolution provisions of the Contract with the Purchaser, the courts at Pune shall have exclusive jurisdiction in all matters under this Agreement.

2.4 If any provision of this Agreement is invalid or unenforceable, the rest shall remain in force. This Agreement, with its Schedules, is the entire agreement on its subject and may be amended only in writing signed by both Members and consented to by the Purchaser.

3.4 Each Member represents that it has full authority and Board approval to enter into and perform this Agreement, certified Board resolutions of both Members being annexed.

4.4 This Agreement shall be executed on non-judicial stamp paper of appropriate value, duly notarised, in three originals, one for each party.

IN WITNESS WHEREOF, the Parties have executed this Agreement on the date first written above.

For the LEAD MEMBER	For the CONSORTIUM MEMBER
M/s …… Signature: …… Name: …… Designation: …… Board Resolution dated: …… Common Seal / Company Seal	M/s …… Signature: …… Name: …… Designation: …… Board Resolution dated: …… Common Seal / Company Seal

ACCEPTED for the PURCHASER (for acceptance of the undertakings in its favour; creates no obligation to award)
C-DAC, Pune Signature: ..... Name: ..... Designation: ..... Date: .....

WITNESSES:

1. .....

2. .....

SCHEDULE 1 — ELIGIBILITY ALLOCATION

Each criterion below is to be met in full by the Member named, standing alone, save the turnover criterion (Sr. 3), which is to be met on the combined basis stated there. The criteria and RFP references below are to be read as amended by the Consortium Corrigendum, which prevails in case of any inconsistency.

Sr.	Criterion (short form)	To be met by
1	Single bid for the Entire Scope (IT and DC); consortium of exactly two	Both (undertaking)
2	Registered entity for at least 5 years	Each Member separately
3	Combined minimum average annual turnover of Rs. 2,000 crores during the last three financial years with Lead Member not less than Rs. 1,000 crores and Consortium Member not less than Rs. 300 crores and positive net worth of each Member in each of those years (as amended by the Consortium Corrigendum)	Both Members jointly (combined turnover); individual minima and net worth by each Member separately
4	Not blacklisted or debarred	Each Member separately
5	OEM not quoting through others if bidding directly	Each Member for its OEM items
6	Service centre in Pune (or undertaking)	Lead Member
7	Annexure G — land-border declaration	Each Member separately
8	Consolidated local content (Annexure F)	Lead Member (Member supplies data)
9	OEM criteria and OEM authorisations (Annexure C)	Respective OEMs
10	AI compute cluster and high-speed storage experience, as applicable	Applicable to the IT Experience member

11	Tier III DC, DC execution capacity and technical manpower, as amended by the Consortium Corrigendum	Applicable to the DC Experience member
12	DC execution capacity, Tier III certification and technical manpower, as amended by the Consortium Corrigendum	Applicable to the DC Experience member
13	Compute cluster experience, as applicable	Applicable to the IT Experience member
14	Any other eligibility as defined under this RFP.	Shall be applicable based on the experience either on the DC / IT Experience member or Jointly as per RFP ask.

SCHEDULE 2 — ATTACHMENTS AND NOTICE DETAILS

1. Power of Attorney by the Consortium Member in favour of the Lead Member.
2. Certified Board resolutions of both Members.
3. Authorised signatories' specimen signatures.
4. Notice addresses and e-mail IDs of each Member: .....
5. Earnest Money Deposit instruments or evidence of payment, as required by the Tender.
6. OEM support letter(s) required under the Tender for the type of bid submitted.
7. Declaration by Consortium Partners in the form prescribed by the Consortium Corrigendum, signed by both Members.
8. Annexure F (local content) and Annexure G (land-border restriction) declarations of each Member, and the consolidated Annexure F declaration of the Lead Member.
9. Undertakings of each Member regarding non-blacklisting, eligibility evidence and deployment of Indian-national personnel.
10. Any other document as per the RFP ask.

Annexure O: Format for Insurance Surety Bond (ISBS)
(Both bonds are to be executed on non-judicial or e-stamp paper of appropriate value)

O1. Insurance Surety Bond for Bid Security (EMD)

ISB No.: ..... Date: .....

RFP / Tender No.: ..... Track: .....

To,
Director General,
Centre for Development of Advanced Computing (C-DAC)
Innovation Park, Panchavati, Pashan Road,
Pune – 411008, Maharashtra, INDIA

WHEREAS M/s ..... (the "Bidder") has submitted its bid dated ..... against the above RFP (the "Bid").

WE, ... (name of Insurer), registered with IRDAI (Registration No. .....) and authorised to underwrite surety insurance, having our office at ..... (the "Surety"), are bound to C-DAC for ₹ ..... (Rupees ..... only) [Bid Security amount as specified in the RFP] (the "Bond Amount"), on the following terms:

1. **Conditions.** The Surety shall pay C-DAC if the Bidder (a) withdraws or modifies its Bid during the bid validity period, including any extension; (b) having been notified of acceptance of its Bid, fails to sign the contract or to furnish the Performance Security as required by the RFP; or (c) does anything else for which the RFP provides forfeiture of Bid Security.
2. **Undertaking.** The Surety irrevocably and unconditionally undertakes to pay up to the Bond Amount on C-DAC's written claim that a condition in Clause 1 has occurred, without demur, protest or reference to the Bidder. C-DAC's claim is conclusive, notwithstanding any dispute between C-DAC and the Bidder.
3. **Claim and payment.** C-DAC may first call on the Bidder to pay, with a copy to the Surety. If the Bidder does not pay within 14 days, C-DAC may send its claim, signed by an authorised officer, with a copy of that call and of this Bond. The Surety shall pay within 45 days of receiving the claim. No other document or proof of loss is required.
4. **No discharge.** The Surety's liability is not affected by any extension of bid validity, any indulgence to the Bidder, the Bidder's insolvency or change of constitution, or any dispute. C-DAC may proceed against the Surety first, as principal debtor.
5. **Premium and cancellation.** The premium and all dealings between the Surety and the Bidder are the Bidder's alone. Non-payment of premium, non-disclosure or any dispute between them does not affect the Surety's liability to C-DAC. The Surety shall not cancel or revoke this Bond without C-DAC's written consent.
6. **Validity.** This Bond is valid up to ..... [bid validity as per the RFP]. A claim received within 90 days after that date shall be honoured. If bid validity is extended, the Surety shall extend this Bond on C-DAC's request.
7. **Limit.** The Surety's liability is limited to the Bond Amount. This Bond is issued in Indian Rupees under IRDAI rules.
8. **Law.** Indian law applies. The courts at Pune have exclusive jurisdiction.
9. **Verification.** C-DAC may verify this Bond with the Surety at: ..... (address, telephone, e-mail, claims e-mail). The Surety shall confirm it in writing within 7 days of request.

Dated this ..... day of ..... 20..... at .....

Signed for and on behalf of the Surety	Witness 1	Witness 2

Signature:	Signature:	Signature: .....
Name and designation:	Name:	Name: .....
Power of Attorney No.:	Address:	Address: .....
Seal of Insurer		

02. Insurance Surety Bond for Performance Security

ISB No.: ..... Date: .....

RFP / Tender No.: ..... Contract / PO No.: .....

To,
Director General,
Centre for Development of Advanced Computing (C-DAC)
Innovation Park, Panchavati, Pashan Road,
Pune – 411008, Maharashtra, INDIA

WHEREAS C-DAC has awarded to M/s ..... (the "Contractor") a contract by Letter of Acceptance / Purchase Order No. ..... dated ..... valued at ₹ ..... (the "Contract"), and the Contractor has agreed to furnish a Performance Security of 5% of the Contract value.

WE, ... (name of Insurer), registered with IRDAI (Registration No. .....) and authorised to underwrite surety insurance, having our office at ..... (the "Surety"), are bound to C-DAC for ₹ ..... (Rupees ..... only) [5% of the Contract value] (the "Bond Amount"), on the following terms:

1. **Undertaking.** The Surety irrevocably and unconditionally undertakes to pay C-DAC, up to the Bond Amount, any and all monies payable by the Contractor under or in connection with the Contract, including liquidated damages, extra cost under risk purchase, refunds under the Fall Clause, damages and any amount forfeitable as Performance Security. It shall pay without demur, protest or reference to the Contractor. C-DAC's claim is conclusive as to the amount due and the default, notwithstanding any dispute between C-DAC and the Contractor.
2. **Claim and payment.** C-DAC may first demand payment from the Contractor, with a copy to the Surety. If the Contractor does not pay within 14 days, C-DAC may send its claim, signed by an authorised officer, with a copy of that demand and of this Bond. The Surety shall pay within 45 days of receiving the claim. No other document or proof of loss is required. C-DAC may claim more than once, in whole or in part, up to the Bond Amount.
3. **No discharge.** The Surety's liability is not affected by any extension of time, variation or indulgence under the Contract, the Contractor's insolvency or change of constitution, or any dispute. C-DAC may proceed against the Surety first, as principal debtor, whatever other security it holds.
4. **Premium and cancellation.** The premium and all dealings between the Surety and the Contractor are the Contractor's alone. Non-payment of premium, non-disclosure or any dispute between them does not affect the Surety's liability to C-DAC. The Surety shall not cancel or revoke this Bond without C-DAC's written consent.
5. **Validity and extension.** This Bond is valid up to ..... [one year from the date of this Bond]. A claim received within 90 days after that date shall be honoured. If the Contract period is extended, the Surety shall extend this Bond on C-DAC's request. If it is not extended at least 30 days before expiry, C-DAC may claim the full Bond Amount and hold it as cash security, to be released without interest on receipt of a replacement bond.
6. **Limit.** The Surety's liability is limited to the Bond Amount. This Bond is security only and does not limit the Contractor's liability under the Contract. It is issued in Indian Rupees under IRDAI rules.
7. **Law.** Indian law applies. The courts at Pune have exclusive jurisdiction. This Bond is independent of the Contract and its dispute-resolution clause.

8. **Verification.** C-DAC may verify this Bond with the Surety at: ..... (address, telephone, e-mail, claims e-mail). The Surety shall confirm it in writing within 7 days of request.

Dated this ..... day of ..... 20..... at .....

Signed for and on behalf of the Surety	Witness 1	Witness 2
Signature:	Signature:	Signature: .....
Name and designation:	Name:	Name: .....
Power of Attorney No.:	Address:	Address: .....
Seal of Insurer		

Instructions for execution (ISBS 01 and 02 – as applicable)

1. Execute on non-judicial or e-stamp paper of appropriate value, bought in the name of the Insurer or the Bidder/ Contractor not more than six months before execution.
2. The Surety must be an IRDAI-registered insurer authorised to underwrite surety insurance. The Bond must be in Indian Rupees.
3. The executing officer shall give name, designation, Power of Attorney No., telephone and e-mail. Each page shall be signed and stamped; the last page shall be signed in full with two witnesses, under the Insurer's seal.
4. A separate Bid Security bond is required for each Track, for the amount specified in the RFP.
5. Submit the original as required by the RFP. The Insurer shall also send a copy directly to C-DAC with a forwarding letter. C-DAC will verify the Bond with the Insurer; non-confirmation may lead to rejection.
6. The format shall not be altered. Added conditions, exclusions or the Insurer's own standard wording will lead to rejection.

Annexure P – Parent Company Guarantee

ANNEXURE P: PARENT COMPANY GUARANTEE

(On non-judicial / e-stamp paper of appropriate value, notarised)

This Guarantee is made on .....[DATE] at .....[PLACE]

BY ..... [PARENT COMPANY NAME], incorporated under the laws of ..... [COUNTRY], registration no. [.....], registered office at ..... [ADDRESS], acting through ..... [SIGNATORY, DESIGNATION] (the **"Guarantor"**),

IN FAVOUR OF Centre for Development of Advanced Computing (C-DAC), a Scientific Society of the Ministry of Electronics & Information Technology, Government of India, Innovation Park, Panchavati, Pashan Road, Pune – 411008 (the **"Purchaser"**).

RECITALS

A. The Purchaser has invited bids through GeM Bid No. ..... dated ..... for "Supply, Installation, Commissioning & Operations of Sovereign AI Cloud and DC Infrastructure", with the RFP, annexures, clarifications and corrigenda (the **"Tender"**).

B. ..... [BIDDER NAME], CIN / Registration Number ..... (the **"Bidder"**), is bidding as ..... [Sole Bidder / Lead Bidder / Consortium Member] and is [a wholly owned subsidiary of the Guarantor] / [formed by demerger from the Guarantor on [DATE]] **(select as applicable)**.

C. Under Clauses of the cited Tender, the Bidder relies on the experience, eligibility and turnover of the Guarantor. This Guarantee is furnished under this Annexure and is a condition of the Bidder's eligibility.

OPERATIVE PROVISIONS

1. **Confirmations.** The Guarantor confirms that:
   a. the Bidder is 100% owned by the Guarantor, directly or through wholly owned entities;
   b. the Bidder's demerger or incorporation took place on [DATE], not more than five (5) years before the date of publication of the RFP;
   c. neither the Guarantor nor any affiliate has bid, or will bid, in the same RFP process in any capacity (Sole Bidder, Lead Bidder, Consortium Member or Named IT/DC Partner); and
   d. the credentials relied upon are those of the Guarantor, are genuine, and are as described in the bid along with supporting document proof.

2. **Guarantee.** The Guarantor irrevocably and unconditionally guarantees to the Purchaser the due performance of all obligations of the Bidder under the Tender and any resulting Contract (the **"Obligations"**). This includes the Bidder's obligations as Sole Bidder or Lead Bidder, or, if applicable, its joint and several liability as a Consortium Member under the Consortium Agreement. It also covers obligations performed through any Named IT/DC Partner, sub-contractor or OEM.

3. **Liability.** If the Bidder fails to perform any Obligation, the Guarantor shall, on the Purchaser's written demand, either perform it (or procure its performance to the Purchaser's satisfaction) or pay all sums due within [fifteen (15)] days. The Guarantor's liability is co-extensive with that of the Bidder, including the limitation of liability under the Tender and Contract, and the Guarantor is liable as a primary obligor, not merely a surety. The Guarantor shall also indemnify the Purchaser against loss arising from any Obligation being unenforceable against the Bidder.

4. **Credentials.** The Guarantor shall not withdraw, deny or dilute any experience, eligibility or turnover relied upon in the bid, and shall furnish evidence of them on the Purchaser's request.

5. **Ownership.** Until all Obligations are discharged, the Guarantor shall retain 100% ownership of the Bidder, and shall not transfer, pledge or dilute any shareholding without the Purchaser's prior written consent. It shall notify the Purchaser within [seven (7)] days of any insolvency, change of control, merger or event likely to affect performance.

6. **Continuing guarantee; no discharge.** This is a continuing guarantee. The Purchaser need not first proceed against the Bidder or any security. The Guarantor's liability is not discharged by:
   a. any variation, extension, new Order or indulgence given to the Bidder;
   b. the insolvency, winding up, merger, demerger or change in constitution of the Bidder or the Guarantor;
   c. the invalidity or unenforceability of any Obligation against the Bidder; or
   d. termination of the Contract (which does not release liability for pre-termination and resulting claims).

   The Guarantor waives its surety defences under Sections 133, 134, 135 and 139 of the Indian Contract Act, 1872, and any right of subrogation against the Bidder until the Purchaser is paid in full.

7. **Demand.** A written demand by the Purchaser stating the Obligation breached and the amount claimed is sufficient, and payment shall not be withheld because of any dispute between the Bidder and the Purchaser. Payment shall be made in INR, without set-off or deduction.

8. **Duration.** This Guarantee takes effect on execution, applies from bid submission, and remains in force until all Obligations (including warranty and O&M) are fully discharged and the Purchaser so confirms in writing. If the Bidder is not awarded the Contract, it lapses on expiry of bid validity or return of EMD, whichever is later, without prejudice to liability for earlier breaches.

9. **Representations.** The Guarantor represents that:
   a. it is validly existing and has full authority to give this Guarantee, supported by a certified board resolution;
   b. no further approval is required, and no law binding on it is violated; and
   c. it is not from a country sharing a land border with India as covered by Order No. F.7/10/2021-PPD (1) dated 23.02.2023, or, if it is, it is registered with the competent authority and a copy is enclosed.

10. **Law and disputes.** This Guarantee is governed by Indian law. Disputes shall be settled by a sole mutually decided arbitrator, under the Arbitration and Conciliation Act, 1996, seat Pune, language English, and the courts at Pune have exclusive jurisdiction.

11. **General.**
    a. The Purchaser may assign this Guarantee to any successor or replacement to which the Contract is assigned; the Guarantor may not assign.
    b. Amendments are valid only in writing signed by both parties.
    c. No delay by the Purchaser is a waiver.
    d. Invalid provisions are severable.
    e. The Guarantor bears all stamp duty and costs.

f. Notices go to the Guarantor at .....[ADDRESS, Attn: Group Counsel, email] and to the Purchaser at .....[ADDRESS].

g. <u>This Guarantee is executed in two originals.</u>

FOR THE GUARANTOR	**ACCEPTED: FOR THE PURCHASER**
Name:	Name:
Designation:	Designation:
Signature & Seal:	Signature & Seal:
Witness 1 / Witness 2:	

Enclosures:

(1) Board resolution of the Guarantor;
(2) Shareholding / ownership certificate;
(3) Legal opinion on capacity and enforceability (foreign Guarantor only).

(END OF SECTION VII)

* * * ***(End of Document)*** * * *