

भारत सरकार
अंतरिक्ष विभाग
सतीश धवन अंतरिक्ष केंद्र शार
श्रीहरिकोटा रेंज डा.घ. 524 124
श्री पोष्टी श्रीरामुलु नेल्लूर जिला, आंध्र., भारत
दूरभाष : +91-8623 245060 (6 जं)
फैक्स : +91-8623 222099



Government of India
Department of Space
Satish Dhawan Space Centre SHAR
Shriharikota Range P.O. 524 124
SPSR Nellore Dist., AP., India
Telephone : +91-8623 245060 (6 Lines)
Fax : +91-8623 222099

निविदा सूचना सं. NOTICE INVITING TENDER
No. SDSC SHAR/Sr.HPS/PT/SMPC-U1/02/2025-2026

भारत के राष्ट्रपति की ओर से वरि. प्रधान, क्रय एवं भंडार, सतीश धवन अंतरिक्ष केंद्र श्रीहरिकोटा निम्नलिखित वस्तुओं के लिए **ऑनलाइन निविदाएं** आमंत्रित करते हैं / On behalf of the President of India, Sr. Head, Purchase & Stores, SDSC SHAR, Sriharikota invites **online quotations** for the following:

क्र.सं. Sl.No	संदर्भ सं. Ref. No.	विवरण Description	मात्रा Qty.
01	SDSC SHAR/SMPC-U1 Purchase/SMPC/202500106301 E-Procurement (Public Tender - Two Part basis)	Supply, Installation, Testing and Commissioning of 5/9MeV Dual Energy Linear Accelerator (LINAC) system (along with its telescopic trolley)	1 No.

निविदा जमा करने की प्रारंभिक तिथि (ऑनलाइन)/Bid Submission Start Date (online) : 17-10-2025, 12:00 hrs.
निविदा स्पष्टीकरण की अंतिम तिथि (ऑनलाइन)/Bid clarification Due date(online) : 30-10-2025, 14:00 hrs.
निविदा जमा करने की अंतिम तिथि (ऑनलाइन)/Bid submission due date (online) : 14-11-2025, 14:00 hrs.
निविदाएं खोलने की तिथि (ऑनलाइन)/Bid opening date(online) : 14-11-2025, 14:05 hrs.
मूल्य निविदाएं खोलने की तिथि (ऑनलाइन)/Price Bid opening date(online) : 05-12-2025, 14:00 hrs.

निविदाकार के लिए निर्देश Instructions to Tenderers:

ईजीपीएस के माध्यम से भेजी गई निविदाओं पर निविदा शुल्क तथा बयाना जमा राशि लागू नहीं होगी।

Tender fee and EMD not applicable for tenders submitted through EGPS

- कार्य के सम्पूर्ण विवरण/जानकारी तथा नियम व शर्तों इत्यादि के लिए संलग्न अनुलग्नक को देखें। / For full details/scope of work and terms and conditions etc., please see the enclosed annexures.
- इच्छुक निविदाकार इसरो के ई-क्रय वेबसाइट <https://eproc.isro.gov.in> से ई-निविदा डाउनलोड कर सकते हैं तथा अपनी निविदा (बोली) को ई-क्रय पोर्टल पर ऑनलाइन जमा कर सकते हैं। Interested tenderers can download the e-tender from ISRO e-procurement website <https://eproc.isro.gov.in> and submit the offer online in the e-procurement portal.
- निविदा दस्तावेज इसरो की वेबसाइट www.isro.gov.in, इसरो ई-क्रय वेबसाइट <https://eproc.isro.gov.in> तथा सतीश धवन अंतरिक्ष केंद्र शार की वेबसाइट www.shar.gov.in पर भी उपलब्ध हैं। इन्हें डाउनलोड करके अपनी निविदा (बोली) को ई-क्रय पोर्टल पर ऑनलाइन जमा किया जाना चाहिए। / Tender documents are also available on ISRO website www.isro.gov.in, ISRO e-procurement website <https://eproc.isro.gov.in> and SDSC SHAR, Sriharikota website www.shar.gov.in. The same can be downloaded and offer shall be submitted online in the e-procurement portal.
- आखिरी समय पर होने वाली भीड़-भाड़ कम करने के लिए निविदाकार अपनी निविदा (बोली) ऊपर विनिर्दिष्ट समय के अंदर ही जमा कर दें। नए विक्रेता के रूप में अनुमोदन के लिए आवेदन / अनुरोध पत्र ई-मेल द्वारा निविदा दस्तावेज में अंकित निविदा संख्या का उल्लेख करते हुए ऑनलाइन जमा करें। / Tenderers shall submit their offers within the given time as specified above and last moment rush for bid submission shall be avoided. Request for new vendor approval shall be submitted online and the same shall be intimated by mail (mentioned in the tender document) referring the tender number.
- वरि. प्रधान क्रय एवं भंडार, सतीश धवन अंतरिक्ष केंद्र श्रीहरिकोटा के पास किसी भी या सभी निविदाओं को स्वीकार / अस्वीकार करने का अधिकार है। / Sr. Head, Purchase and Stores, SDSC-SHAR, Sriharikota reserves the right to accept or reject any/or all the quotations.

वरि. प्रधान क्रय एवं भंडार
Sr. HEAD, PURCHASE AND STORES
सतीश धवन अंतरिक्ष केंद्र, श्रीहरिकोटा

Satish Dhawan Space Centre, Sriharikota
दिनांक DT: 17.10.2025
भारतीय अंतरिक्ष अनुसंधान संगठन



Indian Space Research Organisation

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
SATISH DHAWAN SPACE CENTRE SHAR SRIHARIKOTA (SDSC SHAR)
NELLORE**

**Tender for Supply, Installation, testing & commissioing of 5/9MeV Dual
energy Linac system as per the specifications given in annexure**

Bids to be submitted online

**Tender No.: SDSC SHAR/SMPC-U1 PURCHASE/SH202500106301 dated 17-10-
2025**

A. Tender Details

Tender No :	SDSC SHAR/SMPC-U1 PURCHASE/SH202500106301
Tender Date :	17-10-2025
Tender Classification:	GOODS
Purchase Entity :	SMPC-U1 PURCHASE
Centre :	SATISH DHAWAN SPACE CENTRE SHAR SRIHARIKOTA (SDSC SHAR)

Supply, Installation, testing & commissioing of 5/9MeV Dual energy Linac system as per the specifications given in annexure

Supply, Installation, testing & commissioning of 5/9MeV Dual energy Linac system as per the specifications given in annexure.

(GeM Report ID: GEM/GARPTS/18092025/SK53VDPU8OCN)

NOTE: BEING A TWO PART TENDER, WE REQUEST YOU NOT TO DISCLOSE/INDICATE ANY OF THE PRICE VALUE WHILE SEEKING/PROVIDING CLARIFICATION. IN CASE IF YOU DISCLOSE ANY OF THE PRICE AMOUNT, YOUR OFFER WILL BE REJECTED. AS PER GENERAL TERMS AND CONDITIONS CLAUSE 4, ANNEXURE 2(d) & ANNEXURE-3 STANDARD TERMS AND CONDITIONS CLAUSE 2 OF RFP, BIDS SHALL BE SUBMITTED IN TWO PARTS. PART-1 : TECHNO COMMERCIAL PART OF THE BID & PART -2: PRICE PART OF THE BID. BIDDERS SHALL NOT DISCLOSE ANY PRICES IN PART-1 BID AND IF INDICATED, THE OFFERS WILL BE REJECTED.

A.1 Tender Schedule

Bid Submission Start Date :	17-10-2025 12:00
Bid Clarification Due Date :	31-10-2025 14:00
Bid Submission Due Date :	14-11-2025 14:00
Bid Opening Date :	14-11-2025 14:05
Price Bid Opening Date :	05-12-2025 14:00

B. Tender Attachments

NA

Instructions To Vendors

1. STANDARD TERMS & CONDITIONS

1. Tele No.08623-225174/226377

Fax No.08623-225170/22-5028

e-Mail ID : hps@shar.gov.in, spsoscfpurchase@shar.gov.in, smpcu1-purchase@shar.gov.in

1. Instruction to Indigenous Suppliers:

a) Payment Terms shall be as specified in RFP. If not specifically mentioned Our Normal payment term is 100% within 30 days after receipt and acceptance of the item at our site. Please confirm acceptance in your quotation.

b) GST/IGST: Please specify GST percentage, if any, in your offer. Please mention HSN/SAC code in your offer and Our GST No. is. 37HYDF00385A1DZ

c) Purchase / Price preference to MSEs

Purchase/Price preference will be applicable to the product reservation admissible to the Micro and Small Enterprises. Purchase/Price Preference shall be extended to the MSEs under the Public Procurement Policy for MSEs formulated under the Micro, Small and Medium Enterprises Development Act, 2006. The participating MSEs in a tender, quoting price within the band of L-1 plus 15% may also be allowed to supply a portion of the requirement by bringing down their price to the L-1 price, in a situation where L-1 price is from someone other than an MSE. Such MSEs may be allowed to supply up to 25% of the total tendered value. In case of more than one such eligible MSE, the supply will be shared equally.

Micro & Small Enterprises which have technical capability to deliver the goods & Services as per prescribed technical & quality specifications and may not be able to meet the qualification criterion relating to prior experience-prior turnover may be relaxed as per guidelines issued by Ministry of MSMEs & as amended from time to time.

Interested vendors shall specifically claim the benefit with supporting documents.

d) Purchase / Price preference to Make-in-India Products:

Preference shall be given to Class 1 local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a Class 1 local supplier is denoted in the bid document 50%. If the bidder wants to avail the Purchase preference, the bidder must upload a certificate from the OEM regarding the percentage of

the local content and the details of locations at which the local value addition is made along with their bid, failing which no purchase preference shall be granted. In case the bid value is more than Rs. 10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in-India) order 2017 dated 04.06.2020. In case Buyer has selected Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.

2. Instruction to Foreign Suppliers:

- a) Payment Terms shall be as specified in RFP. If not specifically mentioned Our normal payment term is SIGHT DRAFT, Please confirm acceptance in your offer, if you insist for L/C, and all bank charges shall be to your account. Confirm acceptance.
- b) Please specify whether any export clearance is required in case of an order on you.
- c) Warranty/Guarantee applicable for the item shall be mentioned in your offer
- d) Special Certification for packing Material : as per Plant Quarantine (Regulation of Control into India) Order 2003, Articles packed with packing material of plant origin viz., hay, straw, wood shavings, wood chips, saw dust, wood waste, wooden pallets, Dunn age Mats, wooden packages, coir pith, peat or sphagnum moss etc., will be allowed entry by Customs only with a Phytosanitary Certificate. In case of a Purchase Order, if you propose to us any of the above material for packing such a certificate issued by your local Plant Quarantine Authority shall be furnished.
- e) Confirm whether any Export License is required and for which End User Certificate is to be provided by us, in case of an Order on you. (Enclose format for EUC, if applicable)
- f) Either Indian Agent on behalf of the foreign principals or the foreign principal directly can quote against this order, but not both. In either case an Indian agent cannot represent more than one principal against the same tender.
- g) In case the quote is in INR we prefer to execute the same on HSS Basis and for which Concessional Customs duty as per Notification no.50/2017 Customs dated 30.06.2017, Serial No.539(A) as amended by Notification no.05/2018 dated 25.01.2018. In case the quote is on Indian Rupee (Outside High Sea Sale), the price shall include taxes and duties if any. We shall not be able to provide any duty or IGST tax exemption/concession certificates. If the item quote is of USA make, please quote for all-inclusive price since we prefer to get the item on FOB destination basis.
- h) Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with Competent Authority as specified in Office Memorandum no.F.No.6/18/2019-PPD, Ministry of Finance, Department of Expenditure, Public Procurement Division dated 23rd July 2020. All the conditions mentioned in the above OM is applicable for this tender.

Common terms to Indigenous and foreign suppliers:

3.Warranty

You shall provide applicable warranty for the items offered by you without fail. For the applicable period you shall provide necessary warranty certificate.

4.Performance Bank Guarantee

Towards the performance of the systems during the warranty period you shall submit a performance bank guarantee equivalent to 3% of the order value to cover the warranty period. This PBG shall be interest free and the same shall be returned to you on successful completion of all contractual obligations. The said PBG shall have a further claim period of 2 months.

5.Security Deposit

On acceptance of the order, you shall submit an interest free amount equivalent to 3% of the total contract/order value towards security deposit. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee/Demand Draft/FDR receipts duly endorsed in the name of the centre. The Security Deposit will be returned to you on successful completion of the Contractual obligations; failing which it shall be forfeited/adjusted.

6.Offer Validity : - In case of single part tender - the validity of offers/tenders should be 90 days. In case of two part tender - 120 days from the date of opening of Part-I bid and 60 days from the date of opening of Part-II bid. Tenders shorter than offer validity mentioned above will not be considered for evaluation.

7.Liquidated Damages:

If you fail to deliver the ordered items satisfactorily within the time specified or any extension thereof, Liquidated Damage @ 0.5%(zero point five percent) of the order value or part thereof the un-delivered items for each calendar weeks of delay shall be recovered from your bill. However total Liquidated Damage shall not exceed 10% (ten percent) of the order value.

FORCE MAJEURE:

Should a part or whole work covered under this contract be delayed in delivery/completion of work due to reasons of Force majeure which shall include legal lockouts, strikes, riots, civil commotion, fire, accidents, quarantines, epidemic, acts of God & War, stoppage of deliveries by the Government , freight embargoes etc; the delivery period/completion of work referred to in this Contract shall be extended by a period not in excess of duration of such Force Majeure. The occurrence shall be notified by either party within reasonable time.

8.Offers received through post, courier, fax or email will not be considered.

9. Technical and commercial bid (Part-I) shall not contain any price details. Optional accessories or other price details, if any shall be uploaded in Supporting documents related to Price Bid, to be opened along with Price Bid.

10. In respect of FIM being issued, the fabricator shall submit Bank Guarantee for equivalent sum compulsorily. In case, submission of Bank Guarantee is not possible, the reasons there for shall be clearly mentioned. However, for such cases the fabricators at their cost shall secure such FIM through

Insurance Policy with Director, SDSC SHAR as beneficiary. In case of PSU and Government Organization, Indemnity Bond in lieu of Bank Guarantee is acceptable. Balance FIM/Scrap, if any shall be returned along with the supply of the items. Please confirm acceptance in your quotation.

11. SDSC SHAR shall have the right to place part order among the parties for the items for which they are the lowest.

12. Arbitration:

In the event of any dispute/s, difference/s or claim/s arising out of or relating to the interpretation and application of the Contract, such dispute/s or difference/s or claim/s shall be settled amicably by mutual consultations of the good Offices of the respective Parties and recognizing their mutual interests attempt to reach a solution satisfactory to both the parties. If such a resolution is not possible, within 30 days from the date of receipt of written notice of the existence of such dispute/s, then the unresolved dispute/s or difference/s or claim/s shall be referred to the Sole Arbitrator appointed by the Parties by mutual consent in accordance with the rules and procedures of Arbitration and Conciliation Act 1996 as amended from time to time. The arbitration shall be conducted in Bengaluru in the Arbitration and Conciliation Centre Bengaluru (Domestic and International) as per its rules and regulations. The expenses for the Arbitration shall be shared equally or as may be determined by the Arbitrator. The considered and written decision of the Arbitrator shall be final and binding between the Parties. The applicable language for Arbitration shall be English only.

Work under the Contract shall be continued by the CONTRACTOR during the pendency of arbitration proceedings, without prejudice to a final adjustment in accordance with the decision of the Arbitrator unless otherwise directed in writing by the DEPARTMENT or unless the matter is such that the works cannot be possibly continued until the decision (whether final or interim) of the Arbitrator is obtained.

2. General Instructions to Vendor

1. Instructions to tenderers

TeleNo.08623-225174/226377

Fax No.08623-225170/22-5028

e-Mail ID : hps@shar.gov.in, spsoscfpurchase@shar.gov.in, smpcu1-purchase@shar.gov.in

1. Interested tenderers may, at their option, login to <https://eproc.isro.gov.in> and submit your offers.

2. TENDER FEE IS NOT APPLICABLE.

3. EARNEST MONEY DEPOSIT IS NOT APPLICABLE IF NOT MENTIONED IN THE RFP SPECIFICATION.

4. Indian agents while quoting on behalf of their principals are requested to attach Principals original quote, necessary authorization letter from their Principals, copy of agency agreement etc. in their bid.

5. TWO PART BIDS: In case of Two part tender, price details shall not be uploaded in the Technical & Commercial Bids (Part I), failing to which the bid will be treated as INVALID.

6. VALIDITY OF OFFER: - In case of single part tender - the validity of offers/tenders should be 90 days. In case of two part tender - 120 days from the date of opening of Part-I bid and 60 days from the date of opening of Part-II bid. Tenders shorter than offer validity mentioned above will not be considered for evaluation.

7. Due date & time: Sufficient time has been allotted for Bid submission. Vendors are requested to complete Bid submission well in advance. Last minute requests for due date extension citing server problems etc. will not be entertained. Bids will not be entertained after the due date and time.

7 (A). Request for the extension of the due date will not be considered.

8.

(a) Bid Opening for Public Tender: In case of Public Tender-Two Part Tenders: Technical and Commercial Bids will be opened on the first day specified for Tender opening. Interested vendors can attend the tender opening session to know the bidding details (Bidders presence is not mandatory to consider the quote for evaluation). Price Bid opening of the selected vendors will be scheduled later and it will be intimated to the selected Bidder (s).

(b) For Limited Tender: Bidders participation is not allowed.

9. Prices are required to be quoted according to the units indicated.

10. Preference will be given to those tenderers offering supplies from ready stocks and on the basis of FOR destination delivery at site.

11. (a) All available technical literature, catalogues and other data in support of the specifications and detail of the items should be furnished as attachments.

(b) Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of non-acceptance of tender, the tenderer will have to remove the samples at his own expense.

(c) Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensions details are available the same should be indicated in your offer.

(d) Specifications: Stores offered should strictly conform to our specifications. Deviations, if any, should be clearly indicated by the tenderer in their quotation. The tenderer should also indicate the Make/Type number of the stores offered and provide catalogues, technical literature and samples wherever necessary. Test certificates wherever necessary should be attached. Whenever options are called for in our specifications, the tenderer should address all such options. Wherever specifically

mentioned by us the tenderer could suggest changes to specifications with appropriate response for the same.

12. The purchaser shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portion of quantity offered and the tenderers shall supply the same at the rates quoted.

13. All amounts shall be indicated both in words as well as in figures. Where there is difference between amounts quoted in words and figures, amount quoted in words shall prevail.

14. The tenderer will be required to furnish a document containing the name of his bankers as well as the latest income-tax clearance certificate duly counter signed by the Income-tax Officer of the Circle concerned under the Seal of his office, if required by the Purchaser.

15. The Purchaser reserves the right to place order on the successful tenderers for additional quantity up to 25% of the quantity offered by them at the rates quoted.

16. Sr. Head, Purchase and Stores, SDSC SHAR SRIHARIKOTA reserves the right to accept or reject any bid in part or full without assigning any reason thereof.

17. Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with Competent Authority as specified in Office Memorandum no.F.No.6/18/2019-PPD, Ministry of Finance, Department of Expenditure, Public Procurement Division dated 23rd July 2020. All the conditions mentioned in the above OM is applicable for this tender.

18. Micro and Small Enterprises [MSEs]

a). In order to avail the benefits extended by Government of India to the Micro and Small Enterprises [MSEs] in respect of Goods and Services as per provision of the policy, MSEs registered with District Industries Centre [DIC] or Khadi and Village Industries Commission [KVIC] or Khadi and Village Industries Board [KVIB] or Coir Board or National Small Industries Commission [NSIC] or Directorate of Handicrafts and Handlooms or Udyog Aadhar Memorandum, or any other Body specified by Ministry of MSME have to submit a copy of Valid Certificate with self-attestation along with the Technocommercial bid. No Certificate claiming exemption will be entertained after Tender due date.

b). MSEs are entitled for [i] issue of Tender documents Free of Cost [ii] Exemption of Earnest Money Deposit [EMD]. However, Performance Security is mandatory for Goods and Services.

c). If the Tenderer[s] is/are SC/ST/Woman entrepreneur owned MSEs, specific mention for the same should be there in the valid certificate submitted by the tenderer.

d). Tenderers claiming MSME benefit shall furnish copy of UAM No. as uploaded on CPP portal to avail benefit.

19. Public Procurement [Preference to Make in India]:

Public Procurement (Preference to Make in India) order 2017- revision issued by Government of India, Department of Promotion of Industry and Internal Trade [DPIIT] Public Procurement [preference to Make in India] vide Order No P-45021/2/2017-PP(BE II) dated 16/09/2020 or as amended thereafter. The Tenders submitted are subjected these orders.

Bidders are required to submit necessary certificates & documents as detailed in the above referred GOI Order in support of their claim to avail benefit against this order. The bidders who claim Purchase Preference under Make in India Policy shall fulfill all requirements of tender document applicable for Indigenous Manufacturer. FAILURE TO SUBMIT THE REQUIRED DOCUMENTS MAY RENDER A TENDER UNACCEPTABLE.

Local Content means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

Local Supplier: Class-I Local Supplier means a supplier whose product offered for procurement has local content equal to or more than 50%. Class-II Local Supplier means a supplier whose product offered for procurement has local content more than 20% but less than 50%. Non-Local Supplier means a supplier whose product

Margin of Purchase Preference: For being eligible for purchase preference under this clause, the Margin of purchase preference shall be 20% (i.e. L1 plus 20% band). Preference: Purchase Preference shall be given to Class-I Local Supplier only in the manner specified here under:

(a) In the procurement of Goods which are divisible in nature:

i. If L1 is from a Class-I local supplier, the contract for full quantity will be awarded to L1.

ii. If L1 is not a Class-I local supplier, 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the Class-I local supplier will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier(s) quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such Class-I local supplier subject to matching the L1 price. In case such lowest eligible Class-I local supplier fails to match the L1 price or accepts less than the offered quantity, the next higher Class-I local supplier within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local supplier, then such balance quantity may also be ordered on the L1 bidder

(b) In the procurement of Goods which are not divisible in nature:

- i. If L1 is Class-I local supplier, the contract for full quantity will be awarded to L1
- ii. If L1 is not Class-I local supplier, the lowest bidder among the Class-I local supplier will be invited to match the L1 price subject to the Class-I local supplier(s) quoted price falling within the margin of purchase preference, and the contract shall be awarded to such local supplier subject to matching the L1 price.
- iii. In case such lowest eligible Class-I local supplier fails to match the L1, the Class-I local supplier with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the local suppliers within the margin of purchase preference matches the L1 price, then the contract may be awarded to the L1 bidder

(c) Class-II local supplier will not get purchase preference

Verification of local content:

- i. The Class-I local supplier / Class-II local supplier at the time of bidding shall be required to indicate percentage of Local Content and provide self-certification that the items offered meet the local content required for Class-I local supplier/ Class-II local supplier and shall give the details of the location(s) at which the local value addition is made .
- ii. False declarations will attract banning of business of the bidder or its successor(s) for a minimum period of three years along with any other penal action as may be deemed fit including rejection of the offer, forfeiture of all dues including EMD/ Security Deposit / banning of the firm.
- iii. A supplier who has been debarred by any procuring entity for violation of this order shall not be eligible for preference for procurement for the duration of debarment. It will be the bidder's responsibility to provide self-certification, clearly stating that the bidder is not serving debarment from any procuring entity for the tendered item at the time of tendering.

3. Tender- Two part Instructions

1. This requirement can be quoted only through online e-procurement mode using ISRO portal <https://eproc.isro.gov.in>. No manual tender will be considered.
2. The vendors have to get themselves registered in above site to download the tender details. To register in above ISRO portal (<https://eproc.isro.gov.in>) the vendors need to have digital certificate. The digital certificate can be obtained from any digital certifying authority like M/s (n)Code solutions; M/s Tata Consultancy Ltd., M/s Satyam Information System etc.
3. The parties are advised to download the tender and submit the bid online at least two days prior to tender closing date to avoid last minute network problem. The due date shall not be extended due to

network or computer related problems.

4. Tender fee is not applicable.

5. This being a two part tender i.e. Technical & Commercial Part and Price Part, the tenderer should not attach any documents containing Pricing information along with Technical & Commercial Bid. Normally we do not open PART-II (Price bid), if PART-I (Technical Offer) does not meet with our technical specification requirements. Price bid opening date mentioned in the tender document/ Schedule is tentative only. However, price bid opening will be made only after satisfactory completion of Part-I technical bid evaluation and with prior intimation to vendors.

6. Our Tender Enquiry contains technical requirements and specification. The detailed technical specification of your offer should be covered in the technical part. The Technical documents need to be attached online as a single PDF file without any prior information. The tender attachments containing Price details will be treated as unsolicited offers and rejected.

7. The quote should indicate quantity wise unit rate separately which have to be filled online. The Prices are to be mentioned both in figures as well as in words. The taxes, duties etc. are to be calculated and indicated in the column provided in online forms explicitly.

8. Bidders are expected to comply with the technical & commercial and other terms and conditions given in vendor specified terms of this tender. In case of any deviation, the reasons thereof should be clearly specified in the vendor specified terms column.

9. The vendors have to compulsorily submit the compliance statement online otherwise their offer will not be considered for further evaluation. Before entering the compliance statement, vendors are advised to refer the detailed specification provided in the Technical Write-up/ Drawings document. The specification offered by the vendors may also be indicated in the compliance statement wherever necessary.

10. The Technical Specification / Drawing / Product Catalogues / Works carried by vendor / Make offered etc. as a single PDF file without any financial details has to be uploaded online mode by the vendor. This being TWO PART TENDER the PDF document uploaded should not contain any commercial/pricing details. If the attached PDF contains any pricing detail the offer will be treated as unsolicited and will be summarily rejected.

11. Original Equipment Manufacturer (OEM) or their representative can submit bid. Indian agents while quoting on behalf of their principals are requested to attach necessary authorization letter from their Principals in their bid.

12. Instructions on Indian Agent (if any):- Bidders are required to provide the following information in respect of their authorized Indian Agent, if any, alongwith technical bid as the same is mandatory as is required for consideration of the bid. Name, Address, Telephone no. , fax no., email of the Indian Agent including the contact person.

13. A letter from the OEM in the current date certifying that the said Indian Agent is their authorized Indian Agent and also indicating the responsibilities/role of the Indian Agent under the proposed purchase. Remuneration/service charges payable to the Indian Agent under the proposed purchase.

14. The offer should be valid for a minimum period of 120 days from the date of tender opening or as specified in the tender document.

15. Due date & time: Sufficient time has been allotted for Bid submission. Vendors are requested to complete Bid submission well in advance. Last minute requests for due date extension citing server

- problems etc. will not be entertained. Bids will not be entertained after the due date and time.
17. The vendors may contact +91471 2565454/4574/2527/3753/3289 or eproc@vssc.gov.in for any technical assistance in bid submission.
 18. Once the offer is submitted in on line mode by the vendor and bid submission period is over, vendor will not be able to provide revised offer.
 19. Request for the extension of the due date will not be considered.
 20. Tender which are not prepared in terms of these instructions are liable to be rejected.
 21. Based on the response to the e-Public Tender Notice, SDSC SHAR reserves the right to change any milestone date of the tendering activity.
 22. SDSC SHAR reserves the right to verify all claims made by the bidder.
 23. Tender Opening : The Technical and Commercial Bid [Part-I] will be opened on the specified day mentioned in the schedule and in case any further clarification/ discussion are required, such clarification/discussion shall be called for before opening the Price Bid.
 24. The exact date and time of opening of price bid of successful tenderers will be intimated later.
 25. Tenderers can participate in the said tender opening to know the details on for which, the representative of the firm shall be duly authorized by Competent Authority. Against proper authorization only such representatives shall be allowed to attend the tender opening. Tenderer Presence is not mandatory to consider the Quote for evaluation.
 26. SDSC SHAR, SRIHARIKOTA reserves the right to accept or reject any/or all the tenders in part or full without assigning any reasons thereof.

4. Additional Instructions to tenderers

1. This requirement can be quoted only through online e-procurement mode using ISRO portal <https://eproc.isro.gov.in>. No manual tender will be considered.
2. The parties are advised to download the tender and submit the bid on online at least two days prior to tender closing date to avoid last minute network problem. The due date shall not be extended due to network or computer related problems.
3. Tender fee is not applicable.
4. Our Tender Enquiry contains technical requirements and specification. The detailed technical specification of your offer along with price details shall be provided.
5. The quote should indicate quantity wise unit rate separately which have to be filled online. The Prices are to be mentioned both in figures as well as in words. The taxes, duties etc. are to be calculated and indicated in the column provided in online forms explicitly.
6. Bidders are expected to comply with the technical & commercial and other terms and conditions

given in vendor specified terms of this tender. In case of any deviation, the reasons thereof should be clearly specified in the vendor specified terms column.

7. The vendors have to compulsorily submit the compliance statement online otherwise their offer will not be considered for further evaluation. Before entering the compliance statement, vendors are advised to refer the detailed specification provided in the Technical Writeup/ Drawings document. The specification offered by the vendors may also be indicated in the compliance statement wherever necessary.

8. The Technical Specification / Drawing / Product Catalogues / Works carried by vendor / Make offered etc. as a single PDF file has to be uploaded online mode by the vendor.

9. Original Equipment Manufacturer (OEM) or their representative can submit bid. Indian agents while quoting on behalf of their principals are requested to attach necessary authorization letter from their Principals in their bid.

10. Instructions on Indian Agent (if any):- Bidders are required to provide the following information in respect of their authorised Indian Agent, if any, alongwith technical bid as the same is mandatory as is required for consideration of the bid. Name, Address, Telephone no. , fax no., email of the Indian Agent including the contact person.

11. A letter from the OEM in the current date certifying that the said Indian Agent is their authorized Indian Agent and also indicating the responsibilities/role of the Indian Agent under the proposed purchase. Remuneration/service charges payable to the Indian Agent under the proposed purchase.

12. The offer should be valid for a minimum period of 90 days from the date of tender opening.

13. Due date & time: Sufficient time has been allotted for Bid submission. Vendors are requested to complete Bid submission well in advance. Last minute requests for due date extension citing server problems etc. will not be entertained. Bids will not be entertained after the due date and time.

15. The vendors may contact +91471 2565454/4574/2527/3753/3289 or eproc@vssc.gov.in for any technical assistance in bid submission.

16. Once the offer is submitted in on line mode by the vendor and Bid Sealing is done by SDSC SHAR, vendor will not be able to provide revised offer.

17. Request for the extension of the due date will not be considered.

18. Tender which is not prepared in terms of these instructions are liable to be rejected.

19. SDSC SHAR reserves the right to change any milestone date of the tendering activity.

20. SDSC SHAR reserves the right to verify all claims made by the bidder.

21. Tender Opening: Tenders will be opened on the specified day mentioned in the schedule.

22. Tenderers cannot participate in tender opening.

23. SDSC SHAR, SRIHARIKOTA reserves the right to accept or reject any/or all the tenders in part or full without assigning any reasons thereof.

C. Bid Templates

C.1 Technical Bid - Supply, Installation, testing & commissioning of 5/9MeV Dual energy Linac system as per the specifications given in annexure

1. Supply and commissioning of 5/9MeV Dual energy Linac system as per the specifications given in annexure

Item specifications for Supply and commissioning of 5/9MeV Dual energy Linac system as per the specifications given in annexure

Sl No	Specification	Value	Compliance	Offered Specification	Remark
1	Supply and commissioning of 5/9MeV Dual energy Linac system as per the specifications given in annexure		-		

Document : Indent specifications annexure

Common Specifications (Applicable for all items)

Sl No	Specification	Value	Compliance	Offered Specification	Remark
1	Supply, Installation, testing and commissioning of 5/9MeV Dual energy Linac system as per the specifications given in annexure		-		

Supporting Documents required from Vendor

1. All supporting documents as per specification document

2. Technical bid & price bid as per specification annexure (Price Bid Related)

3. Documents mentioned in Pre-Qualification criteria (Do Not Mention/quote any price in the Technical Bid)

4. Vendor Evaluation Format

5. Compliance statement to the tender document duly signed and stamped by vendor without mentioning price

6. Udyam Registration Certificate

7. MII Local Content Declaration

8. Land Border sharing declaration

9. Duly filled in Annexures without revealing prices in technical part

10. Authorization Certificate from OEM (if any) duly mentioning that OEM will extend support during the warranty period

5 additional documents can be uploaded by the vendor

C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	As per specifications annexure	Yes / No / Explain	
2	GST AND OTHER COSTS, IF ANY: As per the Notification No. 6/2018-Central Tax (Rate) dt:25.01.2018 A(ix) S.No.243A as amended by Notification No.24/2018-Central Tax (Rate) Dt: 31.12.2018 b(viii) S.No.243B issued by Ministry of Finance (Dept. of Revenue) & Government of Andhra Pradesh, Revenue (Commercial Taxes-II) Department, G.O.MS.No. 93 Dated: 19-02-2018 A(ix) S.No.243A and as per the Notification No. 7/2018-Integrated Tax (Rate) dt:25.01.2018 A(ix) S.No.243A as amended by Notification No.25/2018-Integrated Tax (Rate) Dt: 31.12.2018 b(viii) S.No.243B issued by Ministry of Finance (Dept. of Revenue), SDSC SHAR is eligible to avail GST/IGST @5% for the procurements related to Scientific and technical instruments, apparatus, equipment, accessories, parts, components, spares, tools, mock ups and modules, raw material and consumables required for launch vehicles and satellites and payload. we will issue only End User Certificate for availing GST/IGST @5%. Hence, kindly confirm your acceptance and submit your price quotation accordingly. (As per General Terms and Conditions clause 5.1 of RFP) Note: Mention your GST registration details. SDSC SHAR GSTIN: 37HYDF00385A1DZ	Yes / No / Explain	

3	CUSTOMS DUTY: a) For imported items, Customs duty is "Nil" and IGST @ 5% is applicable as per Notification No. 50/2017 Customs Dtd. 30/06/2017, Sl.No.539(A) as amended vide Notification No.05/2018 dt.25.01.2018 and vide Notification No.05/2025 dt.01.02.2025. Customs Duty Concession Certificate is required for claiming "Nil" Customs duty which will be issued by Buyer against submission of FE Invoice, Airway Bill/Bill of Lading. b) Indicate whether any import components are involved and requirement of Customs Duty Concession Certificate. c) In case quoted items are fully imported and if there is no local value addition in India then applicable tax will be IGST @ 5% only. Separate IGST on imported components will not be paid extra. IGST which is already paid at the time of import should be taken as Input Tax Credit by the bidders. d) Indicate whether your quoted unit price is inclusive of IGST@5% or extra. (As per General Terms and Conditions clause 5.2 of RFP)	Yes / No / Explain	
4	DELIVERY SCHEDULE: Supplier shall deliver the LINAC and TPT system to SDSC SHAR within 18 months from the date of release of Purchase Order. Installation, testing, commissioning and demonstration of performance of the system as per specifications of the tender document shall be completed within 3 months after the site clearance issued by SDSC SHAR for commencing the installation (Detailed Delivery schedule as per General Terms and conditions clause 3 of RFP). Please confirm your acceptance.	Yes / No / Explain	
5	DELIVERY TERM: FOR-SRIHARIKOTA	Yes / No / Explain	

6	PAYMENT TERM: (As per General Terms and Conditions clause 6 Terms of Payment of RFP). Supplier has to clearly indicate acceptance to payment terms either in 6-A or 6-B payment term in their bid. Kindly note, Read the Advance payment clause which is also reiterated at Standard Terms and conditions clause 5 of Annexure 3 and confirm the following in case of acceptance of 6-B payment: " (A) Bank Guarantee for advance payments for equivalent amount to be furnished and advance payment will be recovered and interest will be levied as per the Marginal Cost of Lending Rate (MCLR) of SBI Plus 2% penal interest in case the vendor is not supplying the material within the delivery schedule after drawl of advance. This will be in addition to applicability of LD clause. (B) In case of any delay attributable to the supplier/contractor in effecting the supply after the prescribed delivery date, Interest at MCLR of SBI will be charged for the period beyond the specified delivery date on the amount of balance advance payment. (C) Interest will be loaded for advance payments/stage payments as per the lending rate of the bank and will be added to the landed cost for comparison purpose. In case of different milestone submitted by the parties, a standard and transparent methodology like the Net Present Value (NPV) will be adopted for evaluating the offers."	Yes / No / Explain	
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7	LIQUIDATED DAMAGES: Since Delivery is the essence of the order, If the supplier fails to complete the work within the time specified in the contract or any extension thereof, the purchaser shall recover from the supplier as Liquidated Damages a sum of 0.5 percent per calendar week or part thereof of the undelivered portion of the total price of the equipment or installation. The total Liquidated damages shall not exceed ten percent of the contract price of the unit or units so delayed. Stores will be deemed to have been delivered only when all its component parts are also delivered along with the equipment. If certain components are not delivered in time, the stores will be considered as delayed until such time as the missing parts are delivered. (As per General Terms and conditions clause 11 of RFP). Further Annexure 3 Standard terms and conditions clause 6 of RFP may be read as above only.	Yes / No / Explain	
8	WARRANTY: The offered items shall have warranty for a period of Twelve Months from the date of receipt commissioning (if any) and acceptance against any manufacturing defects/ bad workmanship. If any defects are noticed during the above period, the same should be rectified/ replaced at FREE OF COST. (As per General Terms and conditions Clause 12(a) to 12(d) of RFP)	Yes / No / Explain	

9	PERFORMANCE BANK GUARANTEE (PBG): A Bank Guarantee for 3% of the order value (or as notified by Govt. Of India/ISRO from time to time) shall be provided towards the performance of the system. PBG may be furnished in the form of Insurance Security Bonds, Account Payee Demand Draft, Fixed Deposit Receipt from a commercial Bank, Bank Guarantee (including e-Bank Guarantee) from a Commercial bank executed on Rs.200/- non-judicial stamp paper or online payment in an acceptable form valid till the successful completion of warranty period plus 60 days. This will not carry any interest and shall be returned to you after successful completion of warranty period against your request. In case of non-performance/poor performance the Bank Guarantee shall be forfeited. (As per General Terms and conditions Clause 12(f) and Annexure-3 standard terms and conditions clause 7 of RFP)	Yes / No / Explain	
10	SECURITY DEPOSIT: Security Deposit shall be submitted for 3% of order value (or as notified by Govt.of India/ISRO from time to time) in single installment through Insurance surety bonds/Account Payee Demand Draft/Bankers Cheque/Fixed Deposit receipts or Bank Guarantee(including e-Bank Guarantee) from a commercial bank executed on Rs.200/- non-judicial stamp paper or payment online in an acceptable form within 14 days after receipt of Purchase order valid till completion of the Delivery period plus 60 days claim period. This security deposit shall not carry any interest and shall be returned to you only after successful completion of total scope of work. In case of Poor performance/non-performance of the contractual obligation security deposit shall be forfeited. In case of non-submission of Security Deposit within the stipulated period, this order shall be liable to be cancelled. (As per General Terms and conditions Clause 12(e) and Annexure-3 standard terms and conditions clause 8 of RFP)	Yes / No / Explain	

11	COMBINED BANK GUARANTEE (PERFORMANCE SECURITY) : In case, if You are unable to provide two separate BGs, i.e., one for SD and one for PBG, You can submit a combined BG for SD & PBG for 3% of the Order value valid till the completion of total contractual obligation (i.e. Delivery period plus Warranty period plus 60 days). Please confirm.(As per General Terms and conditions Clause 12(g) of RFP)	Yes / No / Explain	
12	INSURANCE: Being a Govt. Of India Dept., Insurance is not required at our cost. Please ensure the safe delivery of the ordered item with proper transport worthy pack.	Yes / No / Explain	
13	Items supplied shall be of the Make specified. Offers other than these makes will not be considered. Please mention the offered make.	Yes / No / Explain	
14	In case of Specific Brand items, please provide Authorization certificate from OEM.	Yes / No / Explain	
15	Compliance to the Technical specifications shall be mentioned.	Yes / No / Explain	
16	All the supporting documents sought in the tender document shall be furnished.	-	

17	Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1 plus 15% (Selected by Buyer) of margin of purchase preference/price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 25% (selected by Buyer) percentage of total QUANTITY. Please specify whether you belong to MSE or not. If YES, supporting documents shall be uploaded. Latest Udayam registration certificate for the current Financial year shall be submitted.	Yes / No / Explain	
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18	Make-In-India (MII) Clause: For this procurement, provisions contained in Public Procurement (Preference to Make in India), Order 2017 issued by Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industries vide letter No. P-45021/2/2017-PP(BE-II) dated 16.09.2020 & directives related shall be followed. Accordingly, you are requested to indicate the percentage of local content in the material, clearly mentioning the details of location(s) at which value addition is made in line with clause 9 to O.M dated 16.09.2020 referred above. It may be noted that Local Content shall not include services such as Transportation, Insurance, Installation, Commissioning, Training and after sales service support like AMC/CMC etc.	Yes / No / Explain	
19	The Bidder shall give self-certification for local content in the quoted item (goods/works/services) at the time of tendering. However, at the time of execution of the project, for all contracts above INR 10 Crore, the contractor/supplier shall be required to give local content certification duly certified by cost/ chartered accountant in practice. For cases where it is not possible to provide certification by Cost/ Chartered Accountant at the time of execution of project, the supplier shall be permitted to provide the certificate for local content from Cost/Chartered Accountant after completion of the contract, within time limit acceptable to the procuring entity. In case the contractor/supplier does not meet the stipulated local content requirement and the category of the supplier changes from Class-I to Class-I or from Class-II to Non-local, a penalty upto 10% of the contract value shall be imposed. Bidders shall ensure that for tenders involving supply of multiple items, weighted average of all items to be taken while calculating the local content.	Yes / No / Explain	

20	The bidder shall provide compliance to Order No. F.No.6/18/2019 PPD dated 23.07.2020 and amendments thereof by Ministry of Finance, Department of Expenditure, Public Procurement Division regarding restrictions on procurement from a bidder of a country which shares a land border with India and comply to all the provisions of the Order. In this regard, you shall certify that the bidder entity is not from such a country or, is from such a country, has been registered with the Competent Authority.	Yes / No / Explain	
21	Do you have Unique GeM Seller ID? If YES, provide details. If NO, As per Office Memorandum No 6/9/2020-PPD dated 24/08/2020 of Department of Expenditure, it is mandatory for sellers providing Goods and Services to Central Government Organizations to be registered on GeM and obtain a Unique GeM Seller ID, at the time of Placement of Order/acceptance of contract. Tenderer shall ensure the same.	Yes / No / Explain	
22	FORCE MAJEURE: If at any time during the continuance of the order the performance in whole or part by either party of any obligation under this order shall be prevented or delayed by reasons of any war, hostility, acts of public enemy, civil commotion, sabotage, fire, floods, lightening, epidemic, quarantine restrictions, strikes, go-slow, lockout or acts of God, notice of which is given either party to the other within one month from the date of occurrence thereof, neither party shall be reasons of such eventually be entitled to terminate this order nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance. (As per General Terms and conditions clause 20 of RFP)	Yes / No / Explain	

23	ARBITRATION:- The Contract shall be interpreted, construed and governed by the Laws in India. In the event of any dispute/s, difference/s or claim/s arising out of or relating to the interpretation and application of the Work Package Order(s), such dispute/s or difference/s or claim/s shall be settled amicably by mutual consultations of the good Office of the respective Parties and recognizing their mutual interests attempt to reach a solution satisfactory to both the parties. If such a resolution is not possible, within 30 days from the date of receipt of written notice of the existence of such dispute/s, then the unresolved dispute/s or difference/s or claim/s shall be referred to the Sole Arbitrator appointed by the Parties by mutual consent in accordance with the rules and procedures of Arbitration and Conciliation Act 1996 as amended from time to time. The arbitration shall be conducted in Bengaluru in the Arbitration and Conciliation Centre - Bengaluru (Domestic and International) as per its rules and regulations. The expenses for the Arbitration shall be shared equally or as may be determined by the Arbitrator. The considered and written decision of the Arbitrator shall be final and binding between the Parties. The applicable language for Arbitration shall be English only. (As per General Terms and conditions clause 21 of RFP)	Yes / No / Explain	
24	Vendors may note the Guidelines on Debarment of Firms vide O.M No. F.1/20/2018-PPD dated 02.11.2021 in line with rule no.151 & 175 (Code of Integrity) of GFR (General Financial Rules)	Yes / No / Explain	
25	Please furnish Contact details i.e. valid E-mail id, Mobile no/ Landline no. etc. for further communication.	Yes / No / Explain	
26	Please send your queries through clarification provision only. However, bidder may also send a copy to smpcu1-purchase@shar.gov.in duly quoting tender number. Contact No.08623-22-6377.	Yes / No / Explain	

27	OTHERS: BEING A TWO PART TENDER, WE REQUEST YOU NOT TO DISCLOSE/INDICATE ANY OF THE PRICE VALUE WHILE SEEKING/PROVIDING CLARIFICATION. IN CASE IF YOU DISCLOSE ANY OF THE PRICE AMOUNT, YOUR OFFER WILL BE REJECTED.	Yes / No / Explain	
28	Country of origin for the quoted items if any	Yes / No / Explain	
29	Percentage of local content for the quoted items if any.	Yes / No / Explain	

30	As per General Terms and Conditions clause 13(b), the Purchaser reserves the right to avail Non-CAMC for which separate PO will be released after completion of warranty period. Kindly confirm your acceptance for the following standard AMC clauses in case of an Non-CAMC order: " (A) DOWN TIME COMPENSATION: In case the break-down calls are not attended to within 24 hours of intimation and if reported problem is not solved within 96 hours without valid reasons, down time compensation @ 0.5% (of the annual maintenance charges) per day shall be recovered from you subject to a maximum of 5%. (B) FALL CLAUSE: The service charges quoted by you shall in no event exceed the lowest charges at which you service the machines of identical description to any other party during the period of this Contract. If at any time during the said period, you reduce the service charges of such item to any other customers, it shall be forth with done after the date of coming in to force of such reduction of service charges shall stand correspondingly reduced. (C) PENALTY CLAUSE: In case, Services provided by the contractor is unsatisfactory during any period and any breach of Contract occurs, no payment will be made on that particular service and 5% penalty will be levied on the Bill of contractor for the period. (D) SECURITY DEPOSIT: After placement of AMC order, the service provider shall submit an interest free amount being 3% of the total AMC value towards security deposit. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee/Demand Draft/FDR receipts duly endorsed in the name of the Centre. The Security Deposit will be returned to you on successful completion of the Contractual obligations; failing which it shall be forfeited / adjusted."	Yes / No / Explain	
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31	Remarks, if any	Yes / No / Explain	
32	VALIDITY OF OFFER: - In case of single part tender - the validity of offers/tenders should be 90 days. In case of two part tender - 120 days from the date of opening of Part-I bid and 60 days from the date of opening of Part-II bid. Tenders shorter than offer validity mentioned above will not be considered for evaluation.	Yes / No / Explain	
33	Bidder shall note that indented item being the Critical in nature & highly reliable product in production environment which is crucial for launch missions, PRIOR EXPERIENCE relaxation cannot be given to MSEs and Start-ups. However Relaxation in Turnover will be given	Yes / No / Explain	

C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
1	Supply and commissioning of 5/9MeV Dual energy Linac system as per the specifications given in annexure	1.00 Nos.		-		

Common charges (Applicable for all items)

Additional Charges, if any (P&F, Freight etc.)	
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Specifications of
5/9 MeV Dual Energy Linear Accelerator (LINAC) system
(along with its Telescopic trolley)

For
NDT Facility-SMPC Unit 1



Satish Dhawan Space Centre SHAR
Indian Space Research Organization
Sriharikota -524 124, A.P

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General Terminology: It may be noted that SDSC SHAR may be referred to as Purchaser/ User/ Department/ Owner, etc. and so also the supplier as the Contractor/ Party/ Tenderer/ Seller/ Bidder/ Vendor etc. elsewhere in this document, to mean the same.

I. Overall Scope of Work

The scope of the supplier include design, manufacture, testing at shop floor, packaging and forwarding, safe delivery at our site, installation, testing and commission of Dual energy (5 MeV & 9MeV) Linear Accelerator (LINAC) based industrial X-ray Radiography System & Telescopic positioning trolley (TPT)/crab to handle the LINAC at SDSC SHAR, Sriharikota, India, for Industrial radiography as per the specifications given in **Annexure-4**.

TPT is a crab with telescopic cylinders in hoist mechanism and TPT shall be installed on the bridge girders of Existing Detector handling system (DHS) in 9MeV bay. The 5/9MeV LINAC head shall be assembled in TPT yoke. The dimensional details of the NDT facility and other interface details are explained in the specification document.

Suppliers having relevant experience as per pre-qualification on both LINAC & Its handling systems are eligible to participate in the bid, subject to pre-qualification criteria (**Annexure 2**, Clause-e). Supplier shall submit the offers as prescribed in the **price bid format as per Annexure-1** and bid preparation information is given in **Annexure- 2 ,3& 5**.

II. Responsibilities of Supplier and SDSC SHAR

1.0 Responsibility of Supplier

- 1.1 Fabrication of the LINAC system as per the specifications given in annexure-4 (a). Sub-system level checks (if any) as per approved quality assurance plan (QAP) shall be carried out.
- 1.2 Design, Fabrication, testing and installation of Telescopic positioning trolley (TPT) for LINAC machine handling as per the specifications given in annexure-4 (b). Sub-system level checks (if any) as per approved quality assurance plan (QAP) shall be carried out.
- 1.3 Factory acceptance testing of Dual Energy (5 MeV & 9 MeV) Linear Accelerator system at supplier / OEM site shop floor as per tender document specification (Annexure-4)
- 1.4 Packing and safe transportation of Linear accelerator system along with all accessories & sub-systems from OEM site to SDSC SHAR for installation and commissioning.
- 1.5 Installation of 5/9MeV LINAC head system in TPT trolley/crab and cable routing between existing DHS Located in the bay and to the control room/ modulator room at SDSC – SHAR site.

- 1.6 TPT/crab mechanical, EIC and electrical systems performance testing before & after integrating the LINAC head and cable routing and interfacing.
- 1.7 Testing and evaluation of the Linear Accelerator system (site acceptance test) as per the annexure-4(a) at SDSC SHAR.
- 1.8 All material handling equipment, special purpose tools/fixtures, loads required during erection & commissioning shall be arranged by supplier. However, any material handling support from SDSC SHAR will be provided by MAHAN, UNIT-1. If any special type of equipment is not available at SDSC-SHAR, supplier shall arrange at his own cost.
- 1.9 Supplier shall submit the general arrangement drawings and other details of LINAC system and interfacing arrangements with TPT.

1.10 Interfacing of LINAC head with TPT handling system:

It is suggested vendor to have site visit to SDSC, SHAR to assess the requirements of TPT & integrating it with DHS. LINAC related cable routings prior to offering their tender quotation.

Vendor shall submit the general arrangement drawings and other design details for sub systems which will be used for interfacing the LINAC head with the TPT.

- 1.11 Supplier shall be responsible for attending the periodic maintenance and major breakdown calls for a period of one year after commissioning and acceptance of Linear Accelerator system at SDSC SHAR without any additional cost.
- 1.12 Providing three sets in hard copy for operation procedures, maintenance manuals consisting of schematic wiring diagrams, layout and troubleshooting details of the LINAC system.
- 1.13 LINAC system: OEM shall have a trained agency in India for post sales service /AMC of system for a period of ten years at least after warranty period on chargeable basis. Any parts need to be changed mandatorily during annual maintenance shall be indicated in technical bid.
- 1.14 For any activity where personnel of party are involved, whether it is one of pre-discussions, installation testing, commissioning of system or extending maintenance services during warranty period, etc., local conveyance and other logistics requirements shall be borne by the supplier.

- 1.15 The party shall provide/install “search and secure” arrangement with push buttons and wiring inside & outside of the bay as per the radiation safety protocol. As per radiation safety rules this “search and secure” provision shall be interlocked with the customer interlock of 5/9 MeV LINAC system.
- 1.16 Vendor shall obtain the ‘type approval’ certificate for the supplied LINAC system from AERB, Govt of India. The same shall be submitted to SDSC SHAR at the time of system installation at our site. In case of denial of type approval from AERB/BARC, total PO will be cancelled by SHAR.
- 1.17 Preparation of Factory Acceptance Test (FAT) and site Acceptance Test (SAT) documents in consultation with the department. Party has to inform one month in advance about the PDI (pre-delivery inspection) @ OEM. QAP shall be prepared by party and submitted to SHAR for approval. Final approved QAP shall be followed for qualifying and acceptance of the LINAC system& TPT.

2.0 Responsibilities of SDSC-SHAR

- 2.1 SDSC SHAR will provide the building and necessary electrical power (as per Indian standard 415V, 3 phase, 50 Hz) for erection, testing and commissioning of the LINAC system& TPT.
- 2.2 SDSC SHAR will supply regular consumables like X-Ray films, film processing chemicals, other items /materials required to carry out tests as per SAT at site.
- 2.3 Supplier’s personnel will be provided accommodation at SDSC SHAR on chargeable basis subject to availability.

III. General Terms and Conditions

1. Make in India Clause

- (a) For this procurement, bids from Class-I & class-II Local Suppliers are admissible. Hence provisions contained in Public Procurement (Preference to Make in India), Order 2017 issued by Department for Promotion of Industry and Internal Trade (DIPP), Ministry of Commerce & Industries vide letter No. P-45021/2/2017-PP(BE-II) dated 04.06.2020 and subsequent amendment & directives shall be followed. Accordingly, offer from parties will be evaluated & processed in conformation with above referred GOI order (specially mentioned below). The bidder shall provide compliance and undertaking as per the order and hereafter amendments:

Order no: F.No.6/18/2019 PPD dated 23.07.2020 of Department of Expenditure, Ministry of Finance Under Public procurement division for the General Financial Rules (GFRs).

- (b)** Class-I local supplier means a supplier or service provider, whose goods, service or works offered for procurement, has local content equal to or more than 50%, as defined under order.
- (c)** Class-II local supplier means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%, as defined under this Order
- (d)** Verification of local content:
 - i. The Class I local supplier/ Class- II local supplier at the time of tendering, bidding or solicitation, shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for Class-I local supplier / Class II local supplier as the case may be. They shall also give details of the location(s) at which the local value addition is made.
 - ii. In case the bid value is in excess of Rs. 10 Cr., Class-I local supplier / Class-II local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
 - iii. False declarations will be in breach of the code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules (GFR) for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of the general Financial Rules along with such other actions as may be permissible under Law.
 - iv. A supplier who has been debarred by any procuring entity for violation of this order shall not be eligible for preference under this order for procurement by any other procuring entity for the duration of debarment.
- (e)** The percentage of local content should be specifically mentioned in the offer, without which it will be summarily rejected.
- (f)** Preference will be given to Class-I Local supplier and in their absence, Class-II Local supplier will be considered.

2. VALIDITY OF OFFER

Bid shall remain valid for acceptance for a period of 120 days from the due date of submission of the bid. The bidder shall not be entitled during the said period to revoke or revise his bid or to vary the bid except and to the extent required by SDSC SHAR in writing. Bid shall be revalidated for extended period as required by SDSC SHAR in writing if necessary. In such cases, unless otherwise specified, it is understood that validity is sought and provided without prejudice to the already quoted price and other terms & conditions bid finalized till that time.

3. DELIVERY SCHEDULE

Supplier shall deliver the LINAC & TPT system to SDSC SHAR within **18months** from the date of release of purchase order. Installation testing, Commissioning and demonstration of performance of the systems as per specifications of the tender document shall be completed within **3months** after the site clearance issued by SDSC SHAR for commencing the installation.

3.1 In case of Linac system, the delivery shall be 18 months including obtaining the export clearance (if any). In case if, the export clearance getting delayed, purchaser may extend the delivery date without affecting the project schedules.

3.2 In the event of supply of LINAC system well before the delivery date, department's clearance is required to schedule the installation and commissioning of the LINAC system by the party.

3.3 Clearance for LINAC machine& TPT installation / commissioning at SDSC-SHAR will be provided to the party only after conforming that all items are received at the site as per purchase order specifications.

3.4 Clearance for LINAC & TPT system commissioning at SDSC-SHAR will be given based on NDT-Facility readiness at SDSC-SHAR. In case of preoccupation of the facility, the commissioning schedules of the systems shall be adjusted accordingly.

Delivery schedule: LINAC & TPT system shall be supplied within 18 months from date of PO and installation & commissioning shall be completed within 3 months after facility clearance. The supply of the LINAC system shall be completed as per the milestone events mentioned in the table-1 from the date (T_0) of acceptance of purchase order (PO).

S.No.	Milestone events	Time	Schedule
1	P.O acceptance date	T ₀	T ₀
2	Submission of G.A drawings & design of TPT	T ₁	T ₀ +1 month
3	Department approval for S.No-2	T ₂	T ₁ + 0.5 Month
4	LINAC & TPT System supply to SHAR (after FAT/PDI & dispatch clearance by CLIP)	T ₃	T ₂ +16.5 Months
6	Installation& commissioning (SAT)	T ₄	Within 3 months after Site clearance.

Table-1: Milestone events and delivery schedule

4. Two-part bid

The bid by any vendor shall consist of two parts: (1) Technical bid and (2) Price bid. Sufficient care shall be taken in preparing the technical and price bids. Price shall be quoted in the format enclosed in Annexure-1.

5. TAXES AND DUTIES

5.1 GST: As per latest prevailing GST at the time of payment. : GST @5% is applicable as per the Notification No. 6/2018-Central Tax (Rate) dt:25.01.2018 A(ix) S.No.243A as amended by Notification No.24/2018- Central Tax (Rate) Dt: 31.12.2018 b(viii) S.No.243B & as per the Notification No. 7/2018-Integrated Tax (Rate) dt:25.01.2018 A(ix) S.No.243A as amended by Notification No.25/2018-Integrated Tax (Rate) Dt: 31.12.2018 b(viii) S.No.243B issued by Ministry of Finance (Dept. of Revenue), for the procurements related to Scientific and technical instruments, apparatus, equipment, accessories, parts, components, spares, tools, mock ups and modules, raw material and consumables required for launch vehicles and satellites and payload. End Use Certificate shall be issued.

5.2 Customs Duty: SDSC-SHAR is eligible for Customs Duty exemption. This may be taken into account while considering the pricing of the imported items (if any).

- For imported items, Customs duty is "Nil" and IGST @ 5% is applicable as per Notification No. 50/2017 Customs Dtd. 30/06/2017, Sl.No.539(A) as amended vide Notification No.05/2018 dt.25.01.2018 and vide Notification No.05/2025 dt.01.02.2025. Customs Duty Concession Certificate is required for claiming "Nil" Customs duty which will be issued by Buyer against submission of FE Invoice, Airway Bill/Bill of Lading.
- Indicate whether any import components are involved and requirement of Customs Duty Concession Certificate.
- Indicate whether your quoted unit price is inclusive of IGST@5% or extra.

5.3 INCOME TAX

Income tax at the prevailing rate as applicable and if applicable from time to time will be deducted from the supplier's bills as per Income Tax Act and a certificate will be issued (TDS Certificate).

6. TERMS OF PAYMENT

A. In general, our payment terms will be 100% within 30 days after receipt, installation & commissioning and acceptance by CLIP.

B. However, if the Suppliers request for advance payment, department may consider the same as per the details given below.

i. **After placement of confirmed Purchase Order:**

30% of supply cost as advance against submission of proforma invoice and advance bank guarantee for an equal amount from a nationalized/scheduled bank and shall be valid till the Contract completion period plus 60 days. Format of Bank guarantee shall be obtained from purchase department after the award of contract.

ii. **After receipt of items and acceptance at SDSC SHAR, Sriharikota:**

50% of supply cost +tax of the Purchase order against receipt and acceptance of LINAC & TPT systems (on 'PRORATA' basis) at department site.

iii. **After commissioning at SDSC SHAR, Sriharikota:**

Balance 20% of supply cost and 100% of commissioning charges after commissioning and acceptance of the LINAC & TPT (on 'PRORATA' basis) by the Department.

iv. Above schedule of payment terms will be made on PRO-RATA basis for the both systems i.e. LINAC and TPT systems as given in price bid format.

Advance Payment

Wherever advance payment is requested, Bank Guarantee from any Nationalized Bank/Scheduled Bank should be furnished. In case after drawing the advance payments, if the vendor/supplier **failed or delayed** to execute the order, the advance amount will be recovered and interest will be levied as per the Marginal Cost of Lending Rate (MCLR) of Nationalized Bank/Scheduled Bank plus 2% penal interest.

Further wherever advance payments are requested, Interest will be loaded for advance payments/stage payments as per the MCLR of Nationalized Bank/Scheduled Bank and will be added to the landed cost for comparison purpose while arriving at L1. In case of different

milestone payments submitted by the parties, a standard and transparent methodology like NPV will be adopted for evaluating the offers.

C. Supplier has to indicate their choice clearly as 6-A or 6-B clause while bidding.

D. MODE OF PAYMENT: Payments will be made through PFMS once the Bidders submit bank details/cancelled cheque.

7. Delivery Terms

Delivery of all the items shall be 'FOR, Sriharikota' basis and the supplier take responsibility to deliver the consignment at SDSC, Sriharikota.

8. PACKING

- a. The Supplier wherever applicable shall pack and crate all stores for suitable climate conditions, in accordance with internationally accepted practices and in such a manner to protect it from damage. The Suppliers shall be held responsible for damages if any due to improper packing.
- b. The supplier shall ensure that each box unit of shipment is legible and properly marked for correct identification. Any failure to comply with this requirement shall make the Supplier liable for additional expenses involved.
- c. The Supplier shall give complete shipment information concerning the weight, size, content of each packages etc.
- d. Apart from the dispatch documents negotiated through Bank, following documents shall also be airmailed to the Purchaser within 7 days from the date of shipment by sea and within 3 days in case of air-consignments.
 - (i) Invoice (3 copies)
 - (ii) Packing list (3 copies)
 - (iii) Test Certificates (3 copies)
 - (iv) Warranty Certificate
 - (v) Supplier shall also ensure that one copy of the packing list is enclosed in each case.

9. INSTALLATION, TESTING, EVALUATION & COMMISSIONING

- a) The testing and commissioning shall be completed within three months after issuing of site clearance by the department.
- b) The acceptance of the system is as per FAT&SAT Plans to be supplied by the supplier which shall be discussed and mutually agreed upon.

- c) Party shall provide detailed erection and commissioning schedule to SDSC SHAR. After due clearance from the department.
- d) Supplier shall submit all test certificates of individual sub-systems tested at supplier / OEM site.
- e) Testing will be conducted at SDSC SHAR as per mutually agreed SAT/QAP. Supplier shall submit the FAT&SAT document prepared as per mutual agreement. All Image quality indicators, focal spot measuring devices and any other measuring similar devices as per IS standards shall be brought by the supplier at the time of SAT.

10. INSPECTION & TRAINING

- a. Inspection of the LINAC System including witnessing of tests as per FAT at supplier/OEM site for ensuring/meeting of the PO specifications and issuing of dispatch clearance.
- b. SDSC SHAR Engineers shall be trained by the party/OEM personal on **operation and maintenance** of LINAC system during testing and commissioning of LINAC system at SDSC SHAR.

11. LIQUIDATED DAMAGES

If the Supplier fails to complete the work within the time specified in the contract or any extension thereof, the Purchaser shall recover from the Supplier as liquidated damages a sum of 0.5 percent per calendar week or part thereof of the undelivered portion of the total price of equipment or installation. The total liquidated damages shall not exceed ten percent (10 percent) of the contract price of the unit or units so delayed. Stores will be deemed to have been delivered only when all its component parts are also delivered along with the equipment. If certain components are not delivered in time, the Stores will be considered as delayed until such time as the missing parts are delivered.

12. Warranty & Replacement and Bank Guarantees

- a) The Supplier shall guarantee that the Stores supplied shall comply fully with the specifications laid down, for material, workmanship, and performance.
- b) During the warranty period party has to do the system maintenance checks once in 6 months and ensure the system performance.
- c) Warranty shall be applicable for a period of twelve months after the acceptance of the system by the purchaser at SDSC SHAR, if any defects are discovered therein or any defects therein are found

to have developed under proper use arising from faulty materials, faulty design or faulty workmanship, the Supplier shall rectify such defects at his own cost, provided he is called upon to do so within the said period from the date of acceptance thereof by the Purchaser who shall state in writing in what respect the Stores or any part thereof are faulty.

d) If in the opinion of the Purchaser, it becomes necessary to replace or renew any defective Parts, such replacement or renewal shall be made by the supplier free of all costs to the Purchaser provided the notice informing the supplier of the defect is given by the Purchaser in this regard within the said period from the date of acceptance.

e) **SECURITY DEPOSIT (SD):** Security Deposit shall be submitted at 3% (or as notified by Govt. Of India/ISRO from time to time) of the value of the Purchase Order as per the format issued by the purchaser for satisfactory execution of the Purchase Order/Contract. Security Deposit may be furnished in the form of Insurance Security Bonds, Account Payee Demand Draft, Fixed Deposit Receipt from a commercial Bank, Bank Guarantee (including e-Bank Guarantee) from a Commercial bank executed on Rs.200/- non-judicial stamp paper or first class National reputed bank abiding standard guidelines or online payment in an acceptable form and shall be valid for a period of sixty days beyond the date for completion of the Purchase Order/Contract. The bank guarantee or fixed deposit receipt submitted by the tenderer/Contractor shall be verified immediately from the issuing bank. In case the vendor fails to furnish the security deposit within the specified date, the Purchase Order/Contract shall be cancelled, and the EMD, if any, made earlier shall be forfeited.

f) **PBG:** To fulfill warranty condition as stated above, the supplier shall, furnish Performance Bank Guarantee (as prescribed by the Purchaser) from a reputed nationalized/scheduled Bank for an amount equivalent to 3% of the supply value of the Contract (valid till completion of warranty period +60 days) along with first shipment documents. The Bank Guarantee will be returned to the Supplier without any interest. Indemnity bond in case of central government/PSU organizations of INDIA.

g) **COMBINED BANK GUARANTEE (Performance Security):** If Party want, they can submit the Combined bank guarantee in place of SD & PBG. To ensure due performance of the contract, please furnish performance security for 03% of the value of the Purchase Order within 15 days of award/release of GeM contract/PO as per the format issued by the purchaser. Performance Security may be furnished in the form of Insurance Security Bonds, Account Payee Demand Draft, Fixed Deposit Receipt from a commercial Bank, Bank Guarantee (including e-Bank Guarantee) from a Commercial bank executed on Rs.200/- non-judicial stamp paper or

online payment in an acceptable form and shall be valid till the completion of total contractual obligation (i.e., Supply period PLUS commissioning period (if applicable) PLUS warranty period PLUS 60 days). This will not carry any interest and shall be returned to you after successful completion of contractual obligations against your request. In case of non-performance/poor performance/breach of contractual obligations, bank Guarantee shall be forfeited and in case if the vendor fails to furnish the performance security deposit within the specified date, the Purchase Order/Contract liable to be cancelled.

h) All the items to be replaced shall also be guaranteed for a period of 12 months from the date of replacement at Purchaser's site.

13. ANNUAL MAINTENANCE CONTRACT

a. Scope of after warranty AMC must include but not limited to system performance checks and corrections thereof if required to the system for its nominal performance continuance in preventive maintenance visits. Break down visits shall include total restoration of the system with full performance and within shortest breakdown period. Party shall attend to breakdown call within 24hrs once the break down is informed by the department.

b. Supplier shall quote for annual non-comprehensive maintenance charges separately for 5/9MeV LINAC system per year in the price bid format. **This is an optional item for the purchaser and the purchaser reserves the right to avail the services on a separate annual maintenance contract (AMC). For which separate PO will be released after completing the warranty period.** This AMC shall include 2 periodical preventive maintenance and 2 breakdown calls (free of cost). The supplier shall commit for AMC for a period of 5 years at the minimum.

c. AMC cost will be considered for arriving the "L1" bidder. However, separate PO will be released after completion of the warranty period as per the supply PO. (refer Annexure-1, price bid format)

14. LIST OF CRITICAL SPARES

a. Supplier shall supply standard spares along with the equipment for two years of trouble-free operations of LINAC system.

b. Supplier shall also quote for critical spares listed in Annexure-4 (a) and the cost break up for each listed item in proper format. SDSC SHAR reserves the right to order the spares as per its requirement along with the system. It is to be noted that spares cost will be considered to arrive at L1.

c. Supplier shall commit supply of spares for further trouble-free operation of LINAC system at the minimum of ten years. Supplier shall submit the declaration for the same.

15. Smoke Detection System:

This is an optional item. The cost of the same shall be quoted as given in annexure-1 (price bid format). This will be considered for arriving at L1.

- a. Minimum Four numbers of smoke detectors shall be provided in the X-ray Head (For any clarification regarding the arrangement and implementation of this system, party may visit SDSC SHAR to witness the existing schemes in existing machine and quote accordingly). Smoke detection system shall be provided in X-ray head and its control system unit is to be in the control room.
- b. Configuration/implementation of the above shall be finalized in consultation with SDSC SHAR.
- c. Performance of smoke detection system shall be demonstrated at SDSC (if it is opted by SDSC)

16. Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises (MSME) and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1 plus 15% (Selected by Buyer) of margin of purchase preference/price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 25% (selected by Buyer) percentage of total QUANTITY. Please specify whether you belong to MSE or not. If YES, supporting documents shall be uploaded.

Purchase/Price Preference will be extended to the MSMEs under the Public Procurement Policy for MSMEs formulated under the Micro, Small and Medium Enterprises (MSME) Development Act, 2006 and instructions issued by Government of India from time to time. Vendors who would like to avail the benefit of MSME should clearly mention the same and submit all the documentary evidences to substantiate their claim along with tender itself.

17. TECHNICAL DOCUMENTS

Supplier shall submit, three hard copies of the Technical Manual, consisting of Operating Instructions, Preventive Maintenance procedures, schematics and circuit diagrams & Trouble Shooting procedures

etc., in English. Any changes or modifications that may be found necessary at the time of test and evaluation shall be incorporated and the documents amended accordingly.

18. LANGUAGE AND MEASURES

All documents pertaining to the contract including specifications, schedule notices, correspondence, operating and maintenance instructions, drawings etc., shall be written in English Language. The metric system of measurement shall be used exclusively in this contract.

19. APPLICABLE LAW

The Supplier shall be interpreted, construed and governed by the constitutional laws of India.

20. FORCE MAJEURE

Neither party will be held responsible for non-fulfillment of their respective obligations under this agreement due to the exigency of one or more of the force majeure events such as but not limited to Acts of God, war, flood, earthquake, strike, lock-outs, epidemics, riots, civil commotions etc., provided on the occurrence and cessation of any such events, the party affected thereby will give a notice in writing to the other party within one month of such occurrence or cessation. If the force majeure conditions continue beyond six months, the parties will then mutually decide about the future course of action.

The subsequent agreement shall contain the modalities, terms and conditions of different services during the design development, testing and commissioning phases.

21. ARBITRATION

The Contract shall be interpreted, construed and governed by the Laws in India. In the event of any dispute/s, difference/s or claim/s arising out of or relating to the interpretation and application of the Work Package Order(s), such dispute/s or difference/s or claim/s shall be settled amicably by mutual consultations of the good Office of the respective Parties and recognizing their mutual interests attempt to reach a solution satisfactory to both the parties. If such a resolution is not possible, within 30 days from the date of receipt of written notice of the existence of such dispute/s, then the unresolved dispute/s or difference/s or claim/s shall be referred to the Sole Arbitrator appointed by the Parties by mutual consent in accordance with the rules and procedures of Arbitration and Conciliation Act 1996 as amended from time to time. The arbitration shall be conducted in Bengaluru in the Arbitration and Conciliation Centre - Bengaluru (Domestic and International) as per its rules and regulations. The expenses for the Arbitration shall be shared equally or as may be determined by the

Arbitrator. The considered and written decision of the Arbitrator shall be final and binding between the Parties. The applicable language for Arbitration shall be English only".

22. Risk and Cost Purchase: Timely delivery of goods/services is of prime importance and where the vendor fails to fulfil their contractual obligations, the Procuring Entity shall be entitled, and it shall be lawful on his part, to procure Stores and/ or services similar to those ordered/cancelled, with such terms and conditions and in such manner as it deems fit at the "Risk and Cost" of the Contractor and the Contractor shall be liable to the Procuring Entity for the extra expenditure, if any, incurred or accrued by the Procuring Entity for arranging such procurement. However, the Contractor shall not be entitled to benefits if any, from such procurements.

Prior to resorting to risk purchase the Purchaser shall consider impact of the default by the contractor, proper notice to the contractor to invoke risk purchase clause and method of recovering the additional amount spent by the Purchaser. The cost as per risk purchase exercise may be recovered from the Earnest Money Deposit/ Security Deposit/ Performance Security of the supplier and/or bills submitted by the supplier against the same contract or any other contract. GST will be charged / levied on Risk Purchase as per the provision of GST Act Rule thereon.

Risk purchase action may be initiated under any of the following conditions.

- a) When the supplier fails to deliver the materials even after extending the delivery period.
- b) When the supplier fails to respond to purchases request for supply of the materials and fails to provide any genuine and bonafide reason for the delay in supply.
- c) When the supplier breaches any of the terms and conditions of the supply order/ contract and as a result fails to execute the order satisfactorily.

PRICE BID FORMAT

S. No.	Description of the item	Unit	Total Cost
1	Supply of 5 MeV & 9 MeV Dual energy LINAC system as per given specification in annexure-4 (a) on FOR Sriharikota	1 No.	
2	Erection and Commissioning charges for dual energy (5 / 9 MeV) LINAC system	L.S.	
3	Design, Fabrication, testing, Supply, erection & commissioning of Telescopic positioning trolley-TPT system for LINAC handling including FHS as per the specification in annexure-4(b) FOR Sriharikota.	1 No.	
4	Erection and Commissioning charges for TPT system	L.S.	
5	Annual non comprehensive Maintenance (AMC) charge for dual energy LINAC system for 5 years	Per year	
6	Cost of critical spares for dual energy LINAC systems for 10 years maintenance (Optional items – Spares list is mentioned in annexure-4a (clause 5 (j)), break-up cost for each item shall be attached in price bid)	1 set	
7	Cost for arranging the smoke detection system in LINAC head as per Annexure – 4a (clause 5 (e)).	1 set	
8	Applicable GST (for items S.No: 1 to 7)		
9	Overall cost of LINAC & TPT system (Sum of S.No: 1 to 8)		

Bidder has to give the supply cost breakup (of S.No:3) for TPT & FHS as given below:

S.No	Description	Cost (Rs)
i	Fabrication & Supply of TPT system alone	
ii	Fabrication & Supply of Film handling system (FHS) module alone	
iii	Applicable GST (for i&ii)	

Note:

- Based on the overall cost arrived in S.No-9 of annexure-1, L1 will be decided. Cost towards AMC will be considered to arrive at L1. However, S.No-5, 6 & 7 are optional items. Based on the need same/separate Purchase order will be released for S.No-5, 6 & 7.
- Separate order will be released for AMC of the LINAC system after completion of warranty period.
- This is a Two-part bid. Prices are to be quoted only in price bid. In technical bid, prices should not be disclosed. However, **unfilled/blank format of the price bid** form shall be enclosed in Technical bid.
- Cost break-up, for each item of LINAC spares** shall be attached in price bid.

PREPARATION OF BIDS- INFORMATION TO BIDDERS

a. VALIDITY OF OFFER

Bid shall remain valid for acceptance for a period of 120 days from the date of opening of the tenders. The Supplier shall not be entitled during the said period to revoke or cancel his Bid or to vary the Bid except and to the extent required by Purchaser and communicated in writing. Bid shall be revalidated for extended period as required by Purchaser in writing. In such cases, unless otherwise specified, it is understood that validity is sought and provided without varying either the quoted price or any other terms and conditions of Bid finalized till that time.

b. COST OF BIDDING

All direct and indirect costs associated with the preparation and submission of Bid (including clarification meetings and site visit, if any), shall be to Supplier's account and the Purchaser will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Bid process.

c. SCHEDULE OF PRICES

The schedule of prices shall be read in conjunction with all the sections of proposal document. For Lump sum contract, the lump sum prices quoted by the Supplier shall be firm and fixed for the completion of the work, unless stated otherwise. The price must be filled in the format specified in the document.

d. DOCUMENTS COMPRISING THE BID

PART – I TECHNICAL AND UNPRICED COMMERCIAL PART

Technical bid shall be submitted online, and the following documents shall be attached along with the technical bid. If sufficient space is not available for online submission, the same in hard copy form shall be send to Department by courier/ post to reach before the tender opening date, failing which the on-line bid will not be considered for evaluation. No attachment with price information shall be attached along with the technical bid.

- i. Submission of bid letter along with one set of proposal document duly signed and stamped as token of acceptance
- ii. Copy of Company's registration number certificate.
- iii. Power of attorney in favor of authorized signatory of the bid / proposal documents.

- iv. All the annexures enclosed in proposal duly filled, signed, and sealed
- v. Unpriced copy of schedule of prices with all other commercial terms and conditions duly filled (Prices to be kept blank), signed and stamped
- vi. Data sheets for all the equipment & checklists enclosed in proposal duly filled, signed, & stamped.
- vii. Technical details, equipment general arrangement drawings with part list, catalogue, layout drawings, P & I diagram, catalogues etc. as applicable and any other drawing, document as mentioned in the proposal.
- viii. Audited balance sheet including profit and loss account for the last three financial years showing annual turnover.
- ix. Latest ITR for last 3 years.
- x. Bidder should possess a latest Solvency Certificate from Nationalized Bank for an amount of not less than Rs. 100 Lakhs in the current financial year.
- xi. List of projects in hand & completed during the last 3 financial year indicating the name of client, contact person, contract value, nature of work, work completed, work balance, name of consultant, month & year of commencement & completion etc.
- xii. Organization chart for the proposed work with bio data of key personnel
- xiii. Any other relevant document, Supplier desires to submit.

PART – II PRICED COMMERCIAL BID

Commercial bid shall be filled in online and no scanned copy should be attached to technical bid. No deviations, terms and conditions, assumptions, conditions, discounts etc. shall be stipulated in price bid. Purchaser will not take cognizance of any such statement and may at their discretion reject such bids.

e. PRE-QUALIFICATION CRITERIA

Sl. No	CRITERIA
i	Bidder shall be an OEM or authorized system integrator to an OEM. If Bidder is an authorized system integrator to OEM, Bidder shall produce an authorization letter along with the technical bid.
ii	Bidder shall have minimum 5 years of experience (ending with 31.03.2025) in supply/system integration of $\geq$ 5MeV LINACs/Dual energy industrial X-ray systems to reputed users.

	Documentary proof about the supplied & integrated systems shall be submitted including serial No, location of installation, focal point contact details etc. Project completion certificate from the user shall be submitted along with technical bid.
iii	Bidder or LINAC fabricator shall have the authorized service team in India for maintenance & other break down service support (if any) of the LINAC. Details of the service team & contacts shall be submitted along with technical bid.
iv	Bidder should produce documentary proof for the following along with technical bid. a) Bidder or Linac fabricator should have executed at least one LINAC system($\geq$ 5MeV energy) project in past 5 years in India and credentials shall be submitted along with technical bid.
v	Bidder who have executed following worth orders in the past 5 Years ending with March-2025, is eligible to participate in bidding. a. 1 order – Rs. 800 Lakhs (or) b. 2 orders – Rs. 500 Lakhs each (or) c. Average Annual turnover for last 3 FYs ending with 31.03.2025 shall be Rs. 500 Lakhs. d. Bidder should possess a latest Solvency Certificate from Nationalized Bank for an amount of not less than Rs. 100 Lakhs in the current financial year.

g. BID EVALUATION

- i. If the bid which does not satisfy the pre-qualification criteria as mentioned above shall summarily be rejected and shall not be considered for further evaluation. SDSC SHAR will scrutinize bids to determine whether the bid is substantially responsive to the requirements of the tender documents. For this clause, a substantially responsive bid is one which inter-alia conforms to all the terms and conditions of the entire Tender document without any deviations and reservations. The decision of purchaser shall be final in this regard.
- ii. The supplier should not have any record of precedence that any government agency or PSU banned or short closed the active contracts during last 5 years.
- iii. During evaluation, purchaser may request Supplier for any clarification on the bid upon additional documents, to which it is to be complied with; otherwise offer will be deemed incomplete.
- iv. Techno-commercial discussion shall be arranged with Supplier, if needed. Supplier shall depute his authorized representatives for attending discussions. The representatives attending the

discussions shall produce authorization from his organization to attend the discussion and sign minutes of meeting on behalf of his organization if required. The authorized representative must be competent and empowered to settle/decide on all technical and commercial issues.

- v. The complete scope of work is defined in the Proposal document. Only those Suppliers who undertake total responsibility for the complete scope of work as defined in the Proposal document shall be considered.
- vi. In case Bid does not fully comply with the requirement of Proposal document and the Supplier stipulates deviations to the clauses of the proposal in Schedule of deviations, which are unacceptable to the Purchaser, the Bid will be rejected.
- vii. Performance of Supplier on similar works executed/ under execution shall be taken into consideration before selecting the Supplier for opening his price bid.
- viii. Purchaser reserves right to visit client's site for verification/validation.
- ix. The time schedule for completion is given in the Proposal document. Supplier is required to confirm the completion period unconditionally.
- x. Purchaser reserves the right to accept a bid other than a lowest and to accept or reject any bid in full or part without assigning any reasons. Such decisions by the Purchaser shall bear no liability on the Purchaser whatsoever consequent upon such decision.
- xi. Purchaser shall not be obliged to furnish any information / clarification to unsuccessful Suppliers as regards to non-acceptance of their Bids.

h. Vendor Evaluation Format:

(i) Tenderer shall submit the following information along with the techno-commercial bid.

S. No	Description	Vendor Response
1.	Name of the company :	
2.	Type of the Company : (Proprietary/Pvt. Ltd/Public Ltd/Joint Venture/Consortium)	
3.	Registration number & certificate :	
4.	Name & Address of the Office of the : Chief Executive of the Company	

S. No	Description	Vendor Response		
5.	Contact person for this tender with : name & address and contact number			
6.	From which year the Company is in : operation			
7.	IT returns for the last 3 years : (last 3 years ending with 31.03.2025)			
8.	Financial parameters :			
9.	In Rs. Lakhs only	2022–23	2023– 24	2024 – 25
	Turnover ` in lakhs :			
	Profit/Loss in Rs. lakhs :			
	Details of availability of machinery and Testing equipment's	Machine Type	Qty	No. of Persons familiar to work
10.	Manpower details	Description	No. of Persons	Remarks
		Design & Analysis		
		Technicians		
		Engr / Supervisor		
11.	The major customers for whom similar : works are provided (Enclose copies of the Purchase Orders)			
12.	Any customers feedback on the services : which is in writing (Pl. enclose copies)			

(i) Details of experience of contractor in executing similar type of works which are completed

Sl. No	Full postal address of the client with Contact Person	Description of the work	Value of the work (Rs. in Lakhs)	Completion Time as per PO	Actual period of completion	Reasons for delay
1						
2						
3						
4						

Note: In order to consider as valid experience, all the experience has to be supported with the completion certificate and purchase order

Details of present works being executed by the contractor

Sl. No	Full postal address of the client with Contact Person	Description of the work	Value of the work (Rs. in Lakhs)

Note: copy of purchase orders may be enclosed.

Signature of Authorized Person with Seal

GOVERNMENT OF INDIA

DOS, SDSC-SHAR, PURCHASE DIVISION

Tele No.08623-225023/225174/225127/226377

Fax No.08623-225170/22-5028

E-Mail ID : hps@shar.gov.in,

STANDARD TERMS & CONDITIONS:

1. Offers shall be sent online only using standard digital signature certificate of class iii with encryption /decryption. The tenders authorized online on or before the open authorization date and time only will be considered as valid tenders even though the bids are submitted online.
2. The tenderer must authorize bid opening within the time stipulated in the schedule by SDSC SHAR. Otherwise the online bid submitted will not be considered for evaluation. Physical copy will not be considered even though it is received before the bid submission date.

For two-part tenders, parties shall submit their offers as follows: -

1) Part-I – Techno-commercial Bid

(No price details shall be mentioned in this bid and shall not upload the details of price along with the techno-commercial bid)

2) Part-II – Price Bid

In view of Two-Part Tender, the Offers submitted contrary to above instructions will be summarily rejected.

3. In case, the tenderer is not interested to participate in the tender, the tenderer shall submit regret letter giving reasons, failing which future enquiries will not be sent.
4. **Offer Validity:** The validity of the offers / tenders should be 120 days (in case two-part tender) from the date of opening of the tenders. Tenders with offer validity less than the period mentioned above, will not be considered for evaluation.
5. **Advance Payment** - Wherever advance payment is requested, Bank Guarantee from any Nationalized Bank/Scheduled Bank should be furnished. In case of advance payments, if the party is not supplying the material within the delivery schedule, interest will be levied as per the Prime Lending Rate of RBI plus 2% penal interest. Interest will be loaded for advance

payments/stage payments as per the prime lending rate of RBI and will be added to the landed cost for comparison purpose. In case of different milestone payments submitted by the parties, a standard and transparent methodology like NPV will be adopted for evaluating the offers.

6. **Liquidated Damages** - In all cases, delivery schedule indicated in the Purchase Order/Contract is the essence of the contract and if the party fails to deliver the material within the delivery schedule, Liquidated Damages will be levied @ 0.5% per week or part thereof subject to a maximum of 10% of total order value.
7. **Performance Bank Guarantee** - Performance Bank Guarantee for 3% of the order value should be furnished in the form of Bank Guarantee from nationalized/ scheduled bank or by Demand Draft valid till warranty period plus sixty days as claim period. Indemnity bond in case of central government/PSU organizations of INDIA.
8. **Security Deposit** – Security Deposit for 3% of the order value is mandatory. Party shall furnish the Security Deposit in the form of Bank Guarantee from nationalized/scheduled bank or by Demand Draft valid till completion of the contract period plus sixty days towards claim period for faithful execution of the contract. Indemnity bond in case of central government/PSU organizations of INDIA.
9. The delivery period mentioned in the tender enquiry, IF ANY, is with the stipulation that no credit will be given for earlier deliveries and offers with delivery beyond the period will be treated as unresponsive.
10. The Department will have the option to consider more than one source of supply and final orders will be given accordingly.
11. The bidders should note that conditional discounts would not have edge in the evaluation process of tenders.
12. Non-acceptance of any conditions wherever called for related to Guarantee/ Warranty, Performance Bank Guarantee, Security Deposit, Liquidated damages are liable for disqualification.
13. Wherever installation/ commissioning involved, the guarantee/warranty period shall reckon only from the date of installation and commissioning.
14. **Purchase preference to Micro and Small Enterprises (MSEs)**: Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order,

2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises (MSME) and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1 plus 15% (Selected by Buyer) of margin of purchase preference/price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 25% (selected by Buyer) percentage of total QUANTITY. Please specify whether you belong to MSE or not. If YES, supporting documents shall be uploaded.

Purchase/Price Preference will be extended to the MSMEs under the Public Procurement Policy for MSMEs formulated under the Micro, Small and Medium Enterprises (MSME) Development Act, 2006 and instructions issued by Government of India from time to time. Vendors who would like to avail the benefit of MSME should clearly mention the same and submit all the documentary evidences to substantiate their claim along with tender itself.

15. The drawings, specifications, end use etc., given by the Centre/Unit along with the tender enquiry are confidential and shall not be disclosed to any third party.

16. The following information/ documents are to be submitted wherever applicable.

1. Product Literature
2. Core banking account number of SBI, RTGS Details
3. PAN No. in quotation and invoices
4. In case of MSME, registration details / documents from Competent Authority.

17. EXCLUSION OF TENDERS

The following tenders shall be summarily rejected from the procurement process

- a. Tenders received from vendors who have not qualified in terms of their registration.
- b. Tenders received against publishing of a limited tender in the CPP portal.
- c. Tenders of vendors who have been removed from the vendor list or banned/debarred from having business dealings.

- d. Unsolicited tenders from vendors.
- e. The tenders which materially depart from the requirements specified in the tender document or which contain false information.
- f. The tenders of vendors who have not agreed to furnish Security Deposit, Performance Bank Guarantee and Liquidated Damages.
- g. The validity of the tenders is shorter than the period specified in the tender enquiry.
- h. The tenders received from vendors or their agents or anyone acting on their behalf, who have promised or given to any official of the Centre/Unit/Department, a gratification in any form, or anything of value, so as to unduly influence the procurement process.
- i. The tenders received from vendors, who, in the opinion of the Centre/Unit, have a conflict of interest materially affecting fair competition.
- j. If a firm quote 'NIL' charges / consideration, the bid shall be treated as un-responsive and will not be considered

Technical specifications

Total scope of work under this tender is covered in two parts. Annexure-4(a) is for supply scope of LINAC system and annexure-4(b) is for supply scope of Telescopic positioning trolley (TPT)/crab for handling the LINAC system.

5/9MeV Dual Energy Linear Accelerator (LINAC) based industrial X – ray radiography System

1.0 SCOPE

The scope includes design, manufacture, testing at shop floor, packaging and forwarding, safe delivery at site(supply), erection, testing and commissioning of a dual energy 5/9 MeV LINAC system at site. Also, the new LINAC head to be integrated in telescopic positioning trolley/ crab which is proposed to realize and supply along with LINAC system.

2.0 MAJOR COMPONENTS OF INDUSTRIAL 5/9MeV DUAL ENERGY LINAC SYSTEM

The dual energy LINAC system shall consist of following major components:

a) LINAC head

- i. LINAC head shall contain a high energy beam accelerator with switchable provision for energy selection of 5 MeV & 9 MeV or vice versa.
- ii. Suitable Microwave system consisting magnetron source and related components such as circulator, wave guides, water loads etc.
- iii. Pulse transformer
- iv. Electron gun assembly
- v. Target assembly
- vi. Target shielding
- vii. Ion chamber
- viii. Primary collimator assembly
- ix. Necessary interconnecting circuitry and water circulating lines for cooling.
- x. Beam pointing system with beam pointing Laser On/Off control shall be provided in local mode as well as remote mode (i.e., through LINAC Handling System Pendant switch and LINAC control console touch screen)
- xi. Beam Center Line (BCL) or the accelerator shall be of Standing Wave type.
- xii. Electrical discharge sticks shall be provided wherever necessary for human safety.

xiii. Sufficient forced ventilation (exhaust fans) shall be provided in X-ray head.

b) Modulator unit (Line type / solid state type):

- i. The modulator should either be a high voltage line type pulse modulator or solid state modulator capable of producing high voltage pulses to be applied to LINAC Head to generate X-rays.
- ii. The modulator shall also include subsystems such as main power supplies, pulse modulator and power distribution electronics etc.
- iii. Modulator unit shall display essential parameters such as, HT, LT, Beam-ON timer and Filament timer etc.
- iv. Other items includes HVPS/OC sensing points for monitoring, test points for low voltage supply, circuit breaker, emergency push buttons and those that are required for user friendly operation and maintenance, shall be provided.
- v. Modulator cabinet shall be designed to absorb the soft X-rays and UV rays that amenable from thyratron firing if modulator is to be a line modulator.
- vi. Electrical discharge sticks shall be provided wherever necessary.
- vii. Provision shall be made to connect a statutory external custom interlock system with the modulator effectively to operate the machine safely.
- viii. Based on the feasibility, following improvements shall be considered in the new machine,
 - 1) If possible, All the PCB's, low voltage power supplies, Relay boards and interconnecting terminals shall be accommodating with separate rack (Modulator control Rack).
 - 2) ALL BNC monitoring shall be extended to the Modulator Control Rack.
 - 3) FPGA / PLC and other control units shall be accommodating in Modulator Control Rack.
 - 4) All the interconnecting cables at terminal end and instruments end shall have double cross ferruling.
 - 5) Ferruling shall be printing format.

c) Control console:

Control console shall be a programmable logic controller (PLC) based system to control and monitor various functions of the LINAC system. The monitor shall display the status of interlocks, faults, dose rate, integrated dose, system diagnostic features and other necessary parameters and settings. If supplier is having FPGA based control console in Linac system, it is suggested to study the feasibility of supplying the PLC based control unit.

- (i) PLC shall have provision for interfacing LINAC with the external customer interlock system.
- (ii) The standard control console shall be a touch screen enabled PC system.
- (iii) Elapsed time shall be stored in the PLC and in addition the monitors shall also be located in the modulator to keep a record of tube Filament -ON and Beam-ON time history.
- (iv) Provision shall be available for the operator to preset the total exposure to a required value.
- (v) The control system shall shut off the X-ray beam automatically when a preset value of dose or pre-set time is reached.
- (vi) It is suggested, GUI shall consist authorized calibration page. It shall have the features of dose calibration and other monitoring scaling parameters.
- (vii) A monitor screen shall display the accumulated (integrated) exposure, elapsed time and the X-ray dose rate.
- (viii) The console shall have a “safety key” provision for Beam-ON / OFF operation
- (ix) The console wiring configuration shall be well isolated from EMI interference
- (x) The console shall have USB or MODBUS and Ethernet port for data communication.
- (xi) The software for controlling LINAC operations shall be compatible to run in major operating systems like WINDOWS/Linux/Mac OSX.
- (xii) The original software backup with endless license shall be provided to SDSC – SHAR.
- (xiii) Soft switch for the energy selection (5MeV or 9MeV) shall be provided.
- (xiv) The system software shall check and allow for operation after the proper closing of statutory and machine interlocks and human safety interlocks.
- (xv) Each interlocked function and fault function including those listed below shall be displayed on the monitor screen.

Note: There is a DFPD system available on the handling setup of 9MeV bay. It is proposed to install the TPT on the same bridge girders of DHS. Hence, bidder shall synchronize the 5/9MeV dual energy Linac with the existing DFPD panel. Necessary module/ software support etc to demonstrate the synchronization of the Linac & DFPD operation is in bidder’s scope.

d) System safety / Fault interlocks includes the following

- Water Fault (flow and pressure)
- Water temperature

(It is suggested; each subsystem flow shall be displayed separately in GUI. Water temperature also shall be extended to GUI)

- Vacuum fault
- Magnetron Filament Current
- Gun Filament

(it is suggested, all the filament voltage/current of Magnetron/gun/Thyratron shall be displayed in GUI & it shall be logged)

- Magnetron and Accelerator Solenoid Focus current
- Wave guide gas pressure
- VSWR
- MOD trip
- HVPS or OC Trip
- Exposure bay Door open
- Modulator/LINAC Head panel door open
- Ion Chamber Voltage
- Vacuum level of LINAC tube (vacuum power supply shall be positioned in control room)
- Smoke detection
- Search & Secure (S&S) & pull chord system
- Time delay (it shall have setting provision in authentication page of GUI for Count down timer, warm-up display)
- Safety Key

e) Mode / Control buttons:

- Energy Mode change
- Reset
- Standby (water Pump ON/OFF shall be through GUI)
- LT ON
- Ready
- Beam ON
- Beam off Reset
- Display reset

- Magnetron tuning control
- Laser On/Off control through control console (remote mode)

f) Monitoring / Measurement Parameters:

- Vacuum level of LINAC tube
- SF6 gas pressure level in waveguide
- TCU & circulation pump unit temperature, flow rate & pressure rate monitoring

g) Settable / resettable Parameters:

- X-ray Dose rate (rads / min)
- X-ray Accumulated Dose (rads)
- Elapsed Time (Min or Sec)
- Control console operating panel shall be designed with suitable size and aesthetical configuration for the sub systems of console after obtaining the due approval from SDSC SHAR.

In this regard, drawings of the operating panel shall be supplied to SDSC SHAR for approval.

h) Temperature control unit (TCU) & DM water circulation Pump

- TCU shall cool by a convection fluid to maintain the critical components in the LINAC head within required range of temperatures.
- TCU shall be operable from remote mode as well as local mode. Parameters of TCU shall be displayed at LINAC control room as well as at local controller.
- TCU shall work in the site ambient conditions of 10°C to 50°C temperature and 70 to 95 % relative humidity.
- The noise level shall be less than 80dB at 1mtr from TCU unit.
- TTCU shall contain internal closed loop cooling fluid tank, circulating pump, and controls for closed-circuit water-cooling system etc.
- Provision for monitoring of DM water Flow rate, pressure and temperature of TCU and pump station from control room shall be provided.
- The DM water circulation pump system shall be with standby pump

i) Power distribution control unit

This unit input shall match with the purchaser's available line power(3Phase 415V AC, 50 Hz, as per Indian standard) and have provisions to distribute appropriate power to various LINAC sub systems.

j) External collimator:

LINAC head shall be provided with an external collimator which shall consist of four motorized independent jaws with provision for X ray field sizing and also have rotation control. In addition, there shall be provisions for remote readout and operation of collimator from control room through LINAC control console. The essential specifications of the external collimators shall be as follows.

- (i) Field Size : Variable from 1° to 24°
- (ii) Adjustable : Independent vertical axis (up and down) Horizontal axis (left and right)
- (iii) Leakage through collimator : Less than 1% at maximum flattened dose output when collimator in closed condition.
- (iv) Rotation range : $\pm 45^\circ$
- (v) Rotation speed : Single speed
- (vi) Accuracy for jaw movement : 0.25° per jaw
- (vii) Remote readout : Display of collimator parameters in the LINAC control console
- (viii) Local read out : Mechanical dial indicator
- (ix) Color : Shall match with LINAC head
- (x) Calibration

k) Three Phase stabilizer

A three Phase servo stabilizer shall be provided (Make: M/s. Servomax, India or M/s. Atandra Energy Pvt Ltd) and the stabilizer rating shall meet the LINAC machine electrical load with contingencies as per standards.

l) Three Phase Ultra-Isolation transformer

A three Phase Ultra isolation transformer shall be provided (Make: M/s. Servomax, India or M/s. Atandra Energy Pvt Ltd) and the transformer rating shall meet the LINAC machine electrical load with contingencies as per standards.

3.0 SPECIFICATIONS OF THE LINAC SYSTEM:

(a) X-Ray beam energy

The nominal peak beam energies shall be 5 MeV and 9 MeV and shall be switchable from one to other by the operator from the LINAC control console.

(b) X-Ray beam Intensity or dose rate (Gy/min-m)

The un-flattened X ray dose rate of the X-ray beam at one meter from the target on the beam central axis shall be:

Parameter	5 MeV	9 MeV
Dose rate	2 Gy/min@1m or better	20 Gy/min@1m or better

(c) X-Ray beam Flatness

The minimum X-Ray beam flatness as a percentage of central axis dose rate measured at $\pm 7.5^\circ$ off the central axis with flattening filter shall be as follows

Parameter	5 MeV	9 MeV
Minimum Dose rate flatness	$\geq 65\%$	$\geq 55\%$

(d) X-ray Beam symmetry

X-ray beam asymmetry shall not exceed 5 % at $\pm 7.5^\circ$ off the central axis at 9MeV.

(e) X-ray beam stability

The time required for the X-ray beam to stabilize after initiation of “Beam-ON” shall not exceed 10 seconds. The X-ray dose rate shall be within $\pm 10\%$ during the above period. This shall be applicable for both 9MeV and 5MeV modes.

(f) X-ray beam focal spot size

Focal spot size shall be $\varnothing 2$ mm or less diameter for both 5 MeV and 9 MeV energies and qualified according to EN 12543-2 or equivalent standards.

(g) Radiographic Quality

The LINAC system shall demonstrate a radiographic image quality level of 1-2T or better sensitivity as per in ASTM E142 and ASTM E94-4 in steel of following thickness ranges.

	5 MeV	9 MeV
Steel thickness range	40to 150 mm	75 to 250 mm

(h) X-Ray and neutron leakage

- (i) Average X-ray leakage radiation measured over any 100 cm^2 area at 1 meter from the target outside the beam cone defined by the primary X-ray collimator shall not exceed 0.1% of the central intensity.
- (ii) Special shielding shall be incorporated into the LINAC head to limit neutron leakage to approximately 0.1%Sv/Gray of X-rays in the forward cone from $\pm 60^\circ$ to $\pm 90^\circ$ outside the collimator and 0.01%Sv/Gray of X-rays in all other directions outside the primary beam.

(i) Beam Direction finder

The LINAC head shall be fitted with a laser beam direction finder which projects a laser light beam along the X-ray beam centerline. The spot of light projected shall be clearly visible under any reasonable room lighting conditions and at usable target to film distances. The laser source shall conform to Class-2 pulsed laser of ANSI Z 136 or BRH class-II requirements with power less than 5mW. **The laser On/Off control shall be provided through LINAC handling System pendant and also at control console.**

(j) Cabinet Enclosures

All system components including the LINAC head, modulator cabinet, and the temperature control unit (TCU) and pump unit shall be contained within grounded dust-tight sheet metal enclosures. Doors shall be detachable so that they can be easily removed for maintenance / servicing accessibility.

4.0 OTHER REQUIREMENTS THAT PARTY SHALL ADDRESS FOR CONSISTENT OPERATION OF LINAC SYSTEM

- a. The electrical line power can be tapped from a source of rating $415V \pm 10\%$ AC, 3 phase, 50 Hz located at about 25m from the proposed modulator location. Necessary armoured power cable to be supplied and end termination to be carried out by the supplier. Electrical grounding requirements for LINAC system shall also be met by the party.
- b. The ambient temperature at site varies from 10°C (winter) to 50°C (summer).
- c. The relative humidity at site varies from 70 to 95%

5.0 OTHER DETAILS

- a. The exposure hall details are provided in the enclosed sketch
- b. The LINAC supplier shall provide in detail for the following:
 - i. Drawings of all components of the dual energy LINAC system showing detailed dimensions and mass value including external collimator and the system balancing with external collimator is in vendor's scope.
 - ii. Power requirements in kilowatts (kW) for various components such as LINAC system, Temperature control unit and pump unit of the refrigeration system.
 - iii. Heat loads of all the components of dual energy LINAC system

- iv. Dimensional details of X-Ray Head.
- v. Centre of gravity (CG) offset of the LINAC head with attached external collimator.
- vi. Mass and size details of LINAC head and all related cables.
- vii. Total layout of the LINAC Head which includes electrical, mechanical and safety systems

c. Interconnecting Cables and Water hoses

- i. The dimensional details of inter connecting cables and hoses required to suit the site conditions are as follows.
- ii. All interconnecting cable lengths each between X-Ray Head and modulator is around 90 m. However, based on site condition required length of cables shall be supplied by party.
- iii. The distance between the modulator and the control console is around 20 m.
- iv. Water hoses between TCU and X-Ray Head shall be of length around 120 meters each.
- v. Party can also verify the above lengths during their mandatory site visit before tendering
- vi. Details of all necessary cable sizes and quantity shall be provided by the supplier.
- vii. All cable interface details shall be provided.
- viii. The details of interfacing cables between modulator & control console, between Modulator and x-ray head among others shall be provided by the party.
- ix. All the power, control and signal cables to be supplied along with its technical data sheet.
- x. All the interconnecting cables at terminal end and instruments end shall have double cross ferruling.
- xi. Ferruling shall be printing format.

d. General Arrangement

LINAC X-Ray Head with external collimator shall be interfaced with TPT /crab system (Refer annexure-4b). TPT/crab system is a EOT crane based handling arrangement for LINAC.

e. Smoke detection system (optional)

- i. Four numbers of smoke detectors shall be provided in the X-ray Head. In this regard, for any clarifications regarding the arrangement and implementation of this system, the party during its site visit to SDSC SHAR can examine the similar system in the existing old LINAC machine and quote accordingly. Smoke detection system shall be provided in X-ray head and its control system unit shall be located inside the control room.

- ii. Configuration/implementation of the above schemes shall be finalized in consultation with SDSC SHAR.
- iii. Performance of smoke detection system shall be demonstrated at SDSC on a dummy article before installing into LINAC head if it is to be opted by SDSC SHAR.
- iv. The smoke system kept inside the LINAC tube shall have the provision of Alarm in control room

f. Manuals

- a. Hard and soft copies of operator and maintenance and troubleshooting manuals of the LINAC systems, PLC controller, schematic electrical circuits, and mechanical drawings (in English) of **3 sets** shall be provided.
- b. A copy of backup for all PLC software used in the LINAC system shall be provided by the supplier.

- g. Service Tools kit:** The LINAC service tool kit shall include the following tools at free of cost.

Sl No	Items	Specifications/model	Qty
Mechanical Spares			
1	Screw driver set	+ & - standard sizes, (Stanley)	01 set
2	Chubby screw driver set	+ & - standard sizes, (Stanley)	01 set
3	Spanner set	in mm ring, standard sizes (Stanley)	01 set
4	Spanner set	in mm double end, standard sizes (Stanley)	01 set
5	Spanner set	in inches ring, standard sizes (Stanley)	01 set
6	Spanner set	in inches double end, standard sizes (Stanley)	01 set
7	Allen keys set	in mm, All standard sizes, (Stanley)	01 set
8	Allen keys set	in inches, All standard sizes, (Stanley)	01 set
9	Adjustable spanner	(small size & big size), (Stanley)	Each 01 No
10	Combination plier	Medium size (Stanley)	01 No
11	Monkey plier	Medium size (Stanley)	01 No
12	Wire stripper	(Stanley)	01 No
13	Lead cutter	(Stanley)	01 No
14	Nose plier	(Stanley)	01 No
15	Tweezer (forceps)	Straight, (Stanley)	02 Nos
16	Electric lug crimping tool (up to 16 square mm)	(Dowells make)	01 No
17	Hammer	Stanley make	01 No
Electrical and Instrumentation Kit			

18	Torque wrench set	Standard size (for waveguide tightening)	01 No
19	Pipe wrench	Standard size (for water hose assembly)	02 Nos
20	Digital Multimeter (AC volt and current, DC volt and current, diode, capacitor, continuity measurement) with accessories	(keysight, Model U1272A)	01 No
21	Clamp meter(AC & DC current) with accessories	Fluke 376 FC - 1000A True-RMS AC/DC Clamp Meter with iflex .	01 No
22	Soldering iron with station with tip sets (temp. variable)	(Weller, WSD 81i)	01 No
23	De-solder pump	weller	01 No
24	Tool bag / box with lock (able to carry all the tools)	Stanley/Snapon	01 No
25	4 channel, 200MHz, 2Gsa/Sec, Digital Storage Oscilloscope (Model: DSOX2024A, Infinivision Mega Zoom) with USB slot for storage purpose and with 4Nos of probes with accessories	4 channel Agilent/keysight make	1No

h. Customer Interlock panel:

Party shall provide customer interlock panel with visible indication lamps, push buttons, necessary terminal strips, Contactors, MCBs, IS barrier, Relays, search & secure and internal wiring of the panel etc., to interface the exposure bay safety systems with the LINAC system. See the possibility of displaying the customer interlocks status/reset in Linac control unit GUI.

i. Standard Spare Parts Kit:

The kit shall include standard individual components and set of all the PCBs of the LINAC System without any additional cost. A detailed OEM list of the same shall be provided.

j. CRITICAL SPARE PARTS FOR 5/9MeV LINAC:

Cost of the individual items shall be quoted separately as given in Annexure 1. Following list of critical spares shall be quoted by the vendor. The list can be extended or adjusted based on the type of modulator/any other sub-system (used in LINAC) supplied and any other spare which is critical in the assessment of OEM.

Sl. No.	Description	Qty (Nos)
1	Main thyatron	1
2	ELECT. PHASE SHIFTER	1
3	PCB ASSY, AUX. PWR DIST.	1

4	PCB, PLC I/F	1
5	E-OFF SWITCH	1
6	BCL FOCUSING, PWR SUPPLY	1
7	MAGNETRON SOL, PWER SUPPLY	1
8	PFN CAPACITOR	1
9	MOD, AIR FILTER	1
10	STEERING POWER SUPPLY	1
11	ASSY, WAVEGUIDE R	1
12	ASSY, WAVEGUIDE Q	1
13	ASSY, WAVEGUIDE MAG-CIRC	1
14	Charging Choke	1
15	Charging Diode & Reverse assembly diode	1 set of each
16	Electronic controller in the Heat exchanger	1
17	Electronic controller in the pump unit	1
18	Secondary collimator motor	2No's
19	PLC I/O module, Analog, digital module, counters	01 set
20	HMI control console	1
21	Standard Service Tool kit(*)	1set
22	Main Thyatron Filament transformer	1 No
23	DeQ Thyatron Filament transformer	1 No
24	Main Thyatron Trigger transformer	1 No
25	DeQ Thyatron trigger transformer	1 No
26	Isolation transformer (low Voltage)	1 No
27	DeQ thyatron	1 No

6.0 INSTALLATION AND ACCEPTANCE OF DUAL ENERGY LINAC SYSTEM:

- (a) Site Acceptance Test (SAT) and Factory Acceptance Tests (FAT) documents shall be supplied by the supplier according to mutually agreed acceptance test plan between party and SDSC - SHAR.
- (b) Prior to transportation to SDSC SHAR, the supplier shall perform factory tests as per FAT which include following for both 5 MeV and 9 MeV energies:
- i. X-ray output (Dose rate)
 - ii. Electron beam current
 - iii. X-ray energy,
 - iv. Focal spot size,
 - v. X-ray beam flatness and symmetry,
 - vi. Leakage percentage of X-Rays and neutrons
 - vii. Safety interlocks.

- viii. Chiller & Water circulation system
- ix. Modulator Test
- x. Microwave power measurement
- xi. Secondary collimator checks

(xii) LINAC system FAT-endurance test at full rated outputs:

- 2.5 hrs at 5MeV Energy mode
- 2.5 hrs at 9 MeV Energy mode

(c) A report of the test results shall be furnished to the purchaser. Upon completion of installation of LINAC system at site, final acceptance shall be based on SAT at both 5 MeV and 9 MeV energies:

- (1) Safety interlock test,
- (2) X-ray beam intensity (Flattened and Un-flattened) or dose rate,
- (3) Vertical and Horizontal beam symmetry,
- (4) Beam flatness,
- (5) X-ray energy,
- (6) Radiographic quality test,
- (7) Measurement of leakage radiation
- (8) Functioning of secondary collimator
- (8) SAT-Endurance test of LINAC system at full rated output.
 - 2hrs at 5MeV Energy mode
 - 2hrs at 9 MeV Energy mode
- (9) Performance of chiller unit & other systems as per approved QAP.

Specifications of Telescopic Positioning Trolley (TPT)

1. SCOPE

- (a)** The scope of the specification covers the design, preparation of detailed drawings, manufacture, inspection, testing at manufacturer's site, packing, forwarding, transportation to SDSC SHAR, unloading, erection, testing and commissioning of Telescopic Positioning Trolley (TPT)/Crab system for 5/9MeV LINAC machine handling on existing EOT based Digital detector handling system (DHS) in 9MeV bay, NDT, SMPC-U1 at SDSC SHAR, Sriharikota-524 124, India. Control philosophy and corresponding scope of work is briefed in this document and the same shall be supplied by Vendor.

There is a EOT based digital detector handling system (DHS) available in NDT facility, SMPC-U1, SDSC SHAR. Presently proposed TPT/crab is an additional trolley system which shall be erected on the existing CT bridge girders of DHS. In addition to the TPT trolley, a small telescopic Film handling system (FHS) need to be provided on the existing crab/trolley of DHS (refer Attached drawings in this document). FHS is only a Hoisting mechanism to handle/position the radiographic film frame (SWL: 20kg) at required heights during radiography. Details of this FHS are given in this document along with GA drawings. Details of existing DHS system are given in this document. Detailed specifications/requirements of TPT are given below

- (b)** The Telescopic Positioning Trolley (TPT) shall comprise the following sub systems:
- (i) Cross Travel(CT) system
 - (ii) Hoist system
 - (iii) Yoke system with Rotation (motorized) & Tilt (manual) mechanisms for LINAC
 - (iv) Hoist stabilization system: preferable to have mast based telescopic type stabilization system in the crab.
 - (v) Gravity limit switch shall switch off the total power supply. Load cell shall be arranged to LINAC hoist system to monitor the load on wire rope and control the hoist drive.
 - (vi) Necessary suitable intrinsic safe module to be planned for all the Proximity switches/ limit switches, push buttons and indication lamps planned in the hazardous area. Make: P&F.
 - (vii) Variable voltage and variable Frequency Drives(VVVF) and position sensing devices

- (viii) Necessary Line filter to be provided in input for reducing Harmonics (as recommended by OEM). Necessary filters for LINE and chokes for LOAD are to be supplied along with the VVFD drives. THD shall not exceed 5% as per IEEE519 guidelines
- (ix) Instrumentation controls and cabling to facilitate operations of the system locally as well as from the control room with the necessary key authorization switch.
- (x) All the signal cables are to be routed with suitable clearance from the power cables.
- (xi) Anti-collision system: The Telescopic Positioning Trolley (TPT)/crab and the existing digital detector handling trolley will run on same rails located on the CT girders. To avoid collision between them, a suitable anti-collision system shall be provided
- (xii) Mode of operation: TPT shall be operated both in local and remote mode. Local operation is through local pendent push button station and remote operation is through SCADA system from control room. Both mode inputs (Pendent & SACDA) shall be interfaced with PLC. SCADA shall have Auto & Discrete mode of operation. All profiles, based on user, shall be created in PLC/SCADA and also with custom jobs options. All the push buttons shall be directly interfaced to PLC through One In-Two Out IS Barriers in PLC RIO Panel using Control cable suitable for laying in Cable Drag Chain system. Cables to pendent push button station shall be hard wired.
- (xiii) **Pay load/Test load (SWL: approx 3000kg):** party has to prepare a test load or linac simulation load to simulate/satisfy the LINAC system handling requirements at vendor site as well as in SDSC SHAR. This load is only for carrying out the qualification testing, the supplier can take back (if required) the load after the commissioning activities. Also Over load test also shall be conducted with 125% of SWL (by adding 25% modular load to SWL).
- (c) Painting of all systems and structures shall be carried out as specified in this document.
- (d) Grouting of systems, wall mounting of cables etc.
- (e) Film Handling System (FHS): it is a hoist mechanism consisting of telescopic cylinders arrangement (SWL: 20kg) need to be fabricated and assembled in the space provided in the existing crab of DHS (refer attached configuration). The interface for fixing the telescopic cylinders was already created on existing DHS crab. Party has to fabricate & supply the elements of this hoisting mechanism (telescopic cylinders, cassette frame, wire rope, rope drum, geared motor, VFD drive, encoder, load cell, cables (length around 130mtrs) etc). Considering the existing space available on the crab, party has to plan the above elements and fix on the crab.

Cables of this FHS shall be routed through the existing drag chain system of DHS and separate drag chain is required for FHS. Installation of FHS and its performance demonstration is party scope. Stroke: approx. 5000mm, speeds: 4000mm/min & 500mm/min, minimum height of cassette frame from FFL is 550mm. FHS push buttons shall be arranged in the slots provided in existing pendent of DHS or in LINAC TPT pendent. Existing crab of DHS is provided with PLC & VFD drives. Party has to provide the interlocks between DHS crab movements and FHS hoist mechanism. This FHS mechanism shall be operable from both local pendent mode as well as remote SCADA mode (from control room). Corresponding SCADA modifications shall be made by the party for FHS operation in remote mode. However, SCADA PC/system is already available for DHS and same shall be used for FHS operation requirements.

- (f) **Cable Management system**: TPT Supplier shall provide a suitable cable drag chain system in LT, CT, Hoist directions. All cables & hoses of LINAC and its handling system (TPT) shall be incorporated in this cable management system, hence cable management system shall be selected accordingly. Vendor may visit the site to assess the requirement of drag chain system. ***Vendor shall plan the drag chain routing in the presently available brackets of DHS drag chain mechanism (in opposite direction/other half of brackets) due to the space constraint for new drag chain in the bay.*** The cable routing requirements shall be made as per site conditions. However

- All cable & hoses of LINAC will be supplied by the LINAC supplier at the time of LINAC assembly with TPT at SDSC SHAR. As per the attached layout drawings of the facility, the length of the LINAC related cable shall be **around 100meters** from control room to LINAC head in bay (TPT Yoke inside bay).
- TPT system cables need the drag chain system with a suitable cross section. All TPT & FHS cables shall be supplied by TPT supplier. Cable management system supply, erection and laying of cables & hoses for LINAC & TPT, FHS are in the scope of supplier.
- **For FHS**: No separate drag chain system is required for the cables of FHS. Required cable length is around 130mtrs. There is an existing drag chain system available for accommodating the cables of hoist mechanism of FHS. Party has to supply & lay cables in the existing system without damaging the DHS cables.

- (g) TPT system cables length were mentioned in this document is **about 130meters**. The facility layouts are shown in figures. However, required length of the cables shall be provided by the

supplier at the time of erection in SDSC SHAR. In case of extra length of cables is required, supplier has to provide the same without any extra cost. Same is the case with FHS hoist mechanism also.

- (h)** First fill of oil, grease, lubricants as required during start-up and commissioning
- (i)** All anchor bolts / foundation bolts, nuts, washers and inserts to be embedded in concrete for installing the system.
- (j)** Civil related works: Any grouting, drilling, wall mounting/hole making works required in the facility at the time of system erection at SDSC SHAR is in the scope of TPT supplier.
- (k)** Three sets of Operation and Maintenance manuals for the complete system
- (l)** Quality assurance plan for manufacture and testing
- (m)** Quality records, history docket, as built drawings and all documentation related to manufacturing, inspection, erection and testing
- (n)** Installation procedures, Maintenance procedures and Operating procedures shall be submitted.
- (o)** Any other system not indicated herein, but required to make the system complete shall be included and provided at no extra cost unless otherwise specifically excluded as indicated.
- (p)** Software for VFD to be supplied along with system to carryout modifications to meet future requirement. Hard and soft copy of parameters list to be furnished.
- (q)** Where ever specific makes or equivalent are mentioned and if the supplier is providing the equivalent makes prior approval from the purchaser shall be obtained.
- (r)** Supplier shall provide Software Requirements Specification & Software Design Document for PLC/SCADA and shall also provide Console Operation Manual Document.
- (s)** 3 sets hardcopies of As-built wiring diagrams of Instrumentation Panels along with soft copies shall be provided.

2. FUNCTIONAL REQUIREMENTS

- (a)** The Telescopic Positioning Trolley (TPT)/crab shall have provisions for motorized movements in cross travel (Y-axis), Hoist (Z-axis) and in yoke for rotation (about Z-axis, motorized type) & Tilt (about X-axis, manual type). Design and interface requirements of TPT should be as per the Specified LINAC (along with secondary collimator). LINAC system shall be interfaced with TPT.

- (b) The Telescopic Positioning Trolley (TPT) shall also be designed to run on existing CT rails of digital detector Handling (EOT crane based) system available in the Exposure hall (Refer figure-1) of 9MeV NDT Facility, SDSC SHAR.
- (c) As the Telescopic Positioning Trolley (TPT) is to maneuver the X-Ray machine during radiographic process in horizontal/vertical attitude (jobs will be on welding rotators / Roller stands, turn table etc) it shall have a PLC based operating system. The Telescopic Positioning Trolley (TPT) shall be accordingly provided with suitable VFDs, encoders, limit switches for operation using (i) Man-Machine Interface (MMI) from control room (safe area) and (ii) Local push button station / pendant system for manual operation locally (Hazardous area). The supplier shall also ensure following provisions for the TPT.
- (d) FHS: Both local and remote operations shall be provided for FHS also. However, DHS pendant is provided with dummy slots for FHS hoist mechanism push buttons. DHS display shall be used for connecting the hoist & load cell display. Same shall be used while installation of TPT in SDSC SHAR.
- (e) Supply of Hot standby (HSBY) PLC, IO modules as listed in tentative BOM and the PLC programming to meet functional requirements and providing all necessary interlocks for the TPT system is in the scope of supplier.
- (f) The Hot standby PLC and its local IO modules shall be mounted & wired in the PLC panel of DHS which is already available at Purchaser's site. All necessary accessories like TBs, MCBs, Fuse TBs, DIN rail, 1 in 2 out isolators, double compression glands etc., required for mounting and wiring the HSBY PLC & local IO modules is in the scope of Supplier.
- (g) Integration of existing DHS PLC of Siemens make with TPT HSBY PLC & acquiring, monitoring & logging of all these parameters in TPT SCADA is also in the scope of supplier.
- (h) One RIO panel shall be planned in DRIVE room for acquiring all process parameters & for commanding the drives for operation. Supply of RIO panel, IO modules as per the tentative BOM & its positioning, wiring, laying of cables from field elements in bay to RIO panel and RIO panel to PLC panel is in the scope of the party.
- (i) Supply of engineering station, SCADA software, Configuration & runtime license with unlimited tags and development of SCADA pages as per User Requirements Document (URD) to operate TPT/FHS in remote are in the scope of supplier. Hence SCADA based remote operations shall be demonstrated at SDSC SHAR.

- (j) Process Report Generation as per facility user requirements in excel format & EICS checklist generation as per Instrumentation User Requirements in excel format is in the scope of supplier.
- (k) VVVFDS of M/s Siemens make with suitable rating shall be provided for both motions (CT, Hoist, rotation), FHS-Hoist mechanism and they shall be located in non-hazardous area located about 130m away from LINAC. Necessary load side chokes/Filter to be planned as per the requirement.
- (l) The dynamic braking resistance shall also be located at about 20 m away from the drive panel located in the safe zone.
- (m) As Radiography operation requires precise positioning of LINAC, all interfaces & mechanisms shall be designed accordingly in TPT System.
- (n) The pendent / local push button station shall have provision for local display of position information of all motions. In case of FHS-Hoist mechanism, push buttons shall be arranged in existing pendent of DHS and corresponding display shall be configured to show the FHS positional/load cell details.

3. RESPONSIBILITIES OF SUPPLIER

- a) The design/ general arrangement/ Mechanical/ Electrical/Instrumentation drawings of the Telescopic Positioning Trolley (TPT)/FHS System shall have the approval of purchaser prior to commencing the fabrication. Fabrication drawings of all subsystems shall be submitted to SDSC SHAR.
- b) Provide General Arrangement drawing of TPT to the scale clearly showing dimensions and lay out of all items. Supplier shall provide all functional requirements mentioned in section 2.0.
- c) Supplier shall route all cables/hoses related to LINAC system (which will be supplied by LINAC supplier) & TPT system, from control room/panel room to TPT through cable management system. Supplier shall ensure/provide proper wall mounting of cables, cable drag chain system in LT, CT, Hoist of LINAC & TPT, FHS.
- d) **Modifications required in the existing bay/Equipment:** a). Anti-collision mechanism to be provided between existing detector system trolley and TPT of LINAC which are running on same CT rails. LT drive/movement is already designed & qualified to handle the **15t capacity additional trolley** (for the purpose of presently proposed TPT & LINAC). Also DHS trolley is designed to take the additional load of 1000kg (overall FHS system weight) for FHS. b). TPT of

LINAC shall be positioned on CT rails of DHS, hence the CT wheels and other interfaces shall be designed suitable to the existing DHS sub-systems. c). Provide 4Nos of holes, size: Ø150mm in 2100mm thick RCC wall at an inclination $>30^{\circ}$ for cables entry. d). FHS hoisting telescopic arrangement shall be installed on the existing trolley/crab of DHS. there is a space provided for FHS installation and all elements of FHS shall be selected and properly organized accordingly (Refer GA drawings).

- e) Design calculations for selection of drive systems, motors, brakes, gearboxes, couplings, and any other systems as required by purchaser during the process of realization.
- f) All the motors rated more than 2.2 kw shall be considered/selected such that, it should draw only 80% of the rated current while operating with SWL. Vender has to provide data sheet and clearance to be obtained before placement of order.
- g) All the drives shall be selected one rating above the rating of motor rating selected. Vender has to provide drive model no & ratings and clearance to be obtained before placement of order.
- h) All the motors are to be provided with Thermistor embedded in winding for winding over temperature protection irrespective of motor rating and same to be interlocked with VVVF drive / external thermistor relay for necessary alarm/tripping at 120 /130 deg C respectively.
- i) All the drawings shall show the bill of quantities and material specifications. There shall be a minimum factor of safety of 2.0 on yield for major load bearing structural members of TPT/FHS. However, all sub-system design requirements shall be made as per the prescribed standards and SDSC SHAR approved methodologies.
- j) Electrical circuit diagrams shall contain bill of materials, wiring layout drawings shall contain technical description meeting the requirements mentioned in this document.
- k) Datasheets of PLC, IOs, SCADA PC, Software & Licenses shall be approved from Department before procurement by Supplier.
- l) Quality Assurance Plan (QAP) shall be prepared by vendor and it shall be approved by the Purchaser. This QAP shall be followed during different stages of the fabrication, assembly and testing of TPT system. Tentative QAP has been discussed in this report.
- m) SDSC SHAR approved third party shall be deployed by vendor for inspection/qualification and checking of the sub-systems as per QAP.

- n) Provide delivery schedule with major mile stones / activities like procurement of raw materials, bought-out items, fabrication, testing & inspection at shop floor, transportation to site, inspection, erection & integration, testing, and commissioning.
- o) Arrange all necessary tools, subsystems required for completion of erection and commissioning & load testing at supplier site & SDSC SHAR, during this period all safety requirements of equipment and personal shall be taken care by supplier.
- p) All erection and commissioning activities shall be carried out by party as per the mutually agreed project schedule and sufficient number of skilled manpower shall be deployed in the work to meet the same. During project execution no damage shall happen to the department properties, in case of such any such events, supplier shall pay the penalty for the same.
- q) The Department's approval of the Supplier design/drawings shall not relieve the Supplier from his responsibility for errors or omissions. Even though works are being carried out based on department approved design/drawings, if there exist any minor changes / corrections observed while execution, those shall be corrected by the supplier at their expense.
- r) **INSTALLATION, TESTING, EVALUATION & COMMISSIONING**
 1. The entire commissioning and testing of TPT, LINAC & FHS shall be completed within Three months after issuing the site clearance by department/purchaser.
 2. The acceptance of the system is as per the Acceptance Test Plan to be supplied by the supplier which shall be discussed and mutually agreed upon.
 3. The detailed erection and commissioning schedule shall be provided to SDSC SHAR on mutual agreement.
 4. Supplier shall submit all the test certificates of individual sub-systems tested at supplier's site along with the systems.
 5. Acceptance Testing will be conducted at SDSC SHAR as per mutually agreed Acceptance Test Plan (ATP). Supplier shall submit the ATP document along with the offer in line with the Acceptance criteria proposed in the specification document.

4. INSPECTION & TRAINING

- 1) Inspection of the LINAC system and TPT/FHS shall be carried out by the purchaser at the supplier's premises for ensuring /meeting the specifications.
- 2) TPT: Dispatch clearance will be given only after verification/checks mentioned in QAP. Quality assurance plan (QAP) will prepared with mutual discussion between SDSC SHAR and Vendor.

Training should be given to SDSC, SHAR engineers on operation and maintenance of LINAC during testing and commissioning of LINAC at SDSC SHAR.

- 3) PLC Training: Party shall provide training on PLC from OEM/ OEM approved Training centers for minimum 3 Department persons.
- 4) SCADA Training: Party shall provide training on SCADA from OEM/ OEM approved Training centers for minimum 3 Department persons.
- 5) VVVF Training: Party shall provide training on VVVF system including configuration & trouble shooting from OEM/ OEM approved Training centers for minimum 3 Department persons.
- 6) During this period, the purchaser's representatives shall be trained in the operation and maintenance of the system including aspects of trouble shooting.

5. SUPPLY OF SPARES

LINAC System & TPT system: Supplier shall supply standard spares at free of cost for two years of trouble free operation. TPT standard spare parts list is given in Annexure-4(b) and party has to supply the same along with system free of cost. List of standard spare parts given by LINAC OEM shall be submitted along with Technical bid.

6. TECHNICAL DOCUMENTS

Supplier shall deliver, three copies of the Technical operational Manual consisting of Operation Instructions, service & maintenance procedures and Trouble Shooting etc., as-built electrical/instrumentation wiring drawings, mechanical fabrication drawings (both soft and hard copies) in English along-with the system. Any changes or modifications that may be found necessary at the time of test and evaluation shall be incorporated and the documents shall be amended suitably. The test certificates of all sub-systems shall be submitted. All electrical/instrumentation components that are planned to locate in 9Mev bay, shall be of flame proof/intrinsically safe and duly certified by department before installation.

7. CODES AND STANDARDS

- (a) All equipment, systems and works covered under this specification shall comply with all currently applicable statutes, regulations, standards and safety codes in the locality where the equipment will be installed. In particular, the latest editions of the following standards are applicable
- (b) Structural design & testing: IS 3177, IS 807, IS 800.

- (c) Electrical IS 5571, IS 5572, IS 2148, IS 5780, IS 325IS 8623(Pt1), IS 13947(Pt4/Sec1), IS7098&IS1554
- (d) Steel for general structural purposes: IS 2062,
- (e) Rolled sections and special sections: IS:808, IS:1161, IS:1173, IS:1252, IS:1730, IS:1731, IS:1732, IS:1863, IS: 1864, IS:2314
- (f) Other national or international standards established to be equivalent or superior to the codes and standards specified are also acceptable. The supplier shall furnish English translation of all standards specified in this specification. Where suitable Indian Standards are not available, other International Standards such as IEC, BS, ASTM, ANSI, ASME and DIN may be adopted with the prior approval of the purchaser.
- (g) If other standards are followed, all equipment and their accessories shall be designed, assembled and tested in accordance with the relevant standards published by the Bureau of Indian Standards wherever applicable so that specific aspects under Indian environmental conditions are taken care of.
- (h) In the event of any conflict between the codes and standards referred to in the specification and the requirements of this specification, the more stringent of these requirements shall govern. Unless indicated otherwise, all codes and standards referred to in this enquiry specification shall be understood to be the latest version on the date of offer made by the supplier.

8. INPUTS TO BE CONSIDERED FOR DESIGN

8.0 GENERAL ARRANGEMENT

The weight of the TPT system (Including cables and secondary Collimator) is the prime pay load for the handling system which will be around 3000kg, exact weight details will be given during TPT design phase. However, the interface and weight requirements shall be suitable to Make of LINAC & Model No. The configuration of the TPT shall be as per the details given in bay drawings. It is recommended party to have a site visit for better understanding of the site constraints/restrictions.

- (a) Following components shall be designed by the supplier and however masses of all four items shall be considered for the design:
 1. Yoke & its sub-system (rotation, tilt)

2. Hoist system components (including Stabilization/Mast system (telescopic cylinders)/ wire ropes and other machineries)
 3. Cross travel (CT) Trolley and connected components
 4. CT bridge girders & LT drive system of existing DHS system is designed to use for total weight of **around 15t** additional trolley system (including LINAC system). Hence TPT supplier shall ensure overall TPT crab weight along with LINAC shall not be more than 15t. Similarly FHS weight of 1000kg is considered in DHS crab design, so all subsystem elements weight of FHS shall not be more than 1000kg.
- (b) All TPT components shall have an appropriate service rating per the specified standards in this document.
 - (c) Supplier shall submit the general arrangement drawings and other design details for clearance by purchaser before commencing the fabrication of TPT/FHS.
 - (d) Supplier shall submit the structural analysis of TPT structural members like Yoke support frame, yoke, FHS telescopic system etc. for clearing the design of TPT/FHS. Design of TPT/FHS subsystem components shall be as per the IS standards mentioned in this report and other elements not covered shall be designed based on the SDSC SHAR guidelines and submitted for prior approval.
 - (e) There shall be a minimum factor of safety of 2.0 on yield for major load bearing structural members of TPT/FHS. However, all mechanical parts shall be designed as per SDSC SHAR approved design procedures. All structures and welded assemblies shall be designed and fabricated in accordance the applicable codes and standards listed in section 7.0 of this document. All non-redundant components directly supporting the load shall be of ductile materials. These components include, but are not limited to all hoist drive gear reducer housings, motor frames, flanged adapters and brake wheels and discs. Furthermore, all shafts, keys, gears, torque carrying coupling components and wire rope drum shall be made of steel as per IS codes.
 - (f) The TPT System shall operate indoors in a normally heated and cooled environment. The ambient temperature varies from 10°C to 50°C and maximum Relative Humidity is 95% and saline environment at the site.
 - (g) If required bidder may visit the SDSC SHAR facilities and get the better understanding of systems. SDSC SHAR will arrange the entry permit for the same.

8.1 Long Travel (LT) system details of existing DHS (for the information of supplier)

- (a) The bridge of the LT system is of the top riding type/EOT with rotating axles.
- (b) The bridge wheels are of double-flange type with rotating axles. Wheels will move on CR-80 rail which being used for 50 capacity EOT crane in the bay.
- (c) The wheel base in LT is as shown in fig
- (d) Total width of LT system (end buffer to buffer) is shown in Fig-5a
- (e) The wheel treads and flanges are flame hardened as per IS3177/IS3443. The bridge will run on available EOT crane runway rails with a 16400 mm span (Refer Figure-5a).
- (f) The speed range for the bridge motion is from 500 to 2000 mm/min and selectable through PLC/VFD from both pendent (through selector switch) /SCADA stations
- (g) Length of travel is around 14000mm
- (h) Since the area of operation (Exposure hall) is hazardous (Zone 1, gas group IIA, IIB, T4 class), all electrical motors are with embedded thermistor in the winding with flame-proof construction only with relevant standards and certificates and brakes are of electro hydraulic thruster (EHT)/ department suitable type and flame-proof in construction with relevant standards and certificates.
- (i) The EHT brakes are of fail-safe type that automatically set whenever the current is cut off from the drive motor(s) in case of power supply failure
- (j) The brakes have separate supply for release.
- (k) The brakes also have the thermal capacity for the frequency of operation required by the service.
- (l) VVVF cabinet for LT system is located in safe area about 130 m away from DHS, refer attached bay configuration drawings.
- (m) Appropriate number of junction boxes for power cables (Flame proof type).
- (n) Driven side of the mechanism, there is provision for flame proof absolute encoder. The encoder position is such that the desired positional accuracy is achieved.
- (o) Power, control and signal cables are routed through cable drag chain of department approved make.

8.2 Telescopic Positioning Trolley (TPT) for LINAC: Present scope of work is to supply this TPT & FHS. In case of TPT, it is handle the LINAC system in Cross travel (CT), Hoist movement in

UP/DOWN directions, Yoke movements (swiveling/Rotation-Motorized, Tilt-Manual). Detailed specifications of these individual movements are explained here.

8.2.1 CROSS TRAVEL SYSTEM (CT)

- (a) The trolley for the cross travel system shall be of the top riding type with rotating axles and shall run on CR rail (60LB/yd) on the bridge girders.
- (b) Configuration of trolley: There are no assembly hooks available to the bay roof. As the head room availability is less in the facility (refer attached bay drawings), based on LT bridge girders spacing & CT trolley width shall be designed such that trolley along with telescopic cylinders' assembly shall be taken/lifted between bridge girders (using mobile crane) and oriented/placed on CT rails. During site visit, party may see the better feasibility of TPT assembly on DHS.
- (c) The Trolley wheels shall be of the double-flange type with rotating axles and wheels shall be finished in equal diameters and in pairs.
- (d) The speed range for the Trolley motion shall be from 500 to 2000 mm / min, with stroke around 7500mm.
- (e) The positional accuracy of CT system shall be ± 10 mm at 500 mm / min., selectable through PLC/VFD
- (f) The wheel treads and flanges shall be flame hardened as per IS3177/IS3443. Since the area of operation (Exposure hall) is hazardous (Zone 1, gas group IIA, IIB, T4 class), all electrical motors shall be with embedded thermistor in the winding with flame-proof construction only with relevant standards and certificates and brakes shall be flame-proof EHT type in construction with relevant standards and certificates.
- (g) The EHT brakes shall be of fail-safe type that automatically set whenever the current is cut off from the drive motor(s) in case of power supply failure
- (h) The brakes shall have separate supply for release.
- (i) The brakes shall also have the thermal capacity for the frequency of operation required by the service.
- (j) VVVF cabinet for CT system shall be located in safe area about 130 m away from DHS.
- (k) Motors shall have provision for mounting ex-proof incremental encoders.
- (l) Power, control and signal cables are routed through cable drag chain.

8.2.2 YOKE system for LINAC

The design of yoke system shall take into account the total mass of the LINAC system, shielding, cables and the attached secondary collimator. Yoke shall be provided with two movements i.e for LINAC swiveling/rotation about vertical axis and tilt about horizontal axis. Rotation movement shall be motorized type and tilt movement shall be of manual actuation type for small adjustments. However, to know the positional/angular information of LINAC machine, graduated scale shall be provided for these two movements. Hence there will be an electrical motor/VFD drive system, absolute encoder for Rotation movement and no motor/drive & encoder for tilt movement of YOKE. Necessary gear box and manual operation mechanism shall be provided such that the manual effort shall not be more than 5kg-m for tilt. These movements shall have the self-locking arrangement. The rotation & tilt sub-systems shall be part of the yoke assembly. The specification parameters include the following:

- The design parameters from LINAC point of view, will be submitted by LINAC supplier at the time of detail designing of the TPT. LINAC approx (l X b x h)= 1900 x 600 x 950mm and weight is around 3000kg.

1. Manual Tilt movement:

(a) The tentative angular range of tilt movement of LINAC panel is as follows

- Tilt up/down* : $\pm 5^\circ$

* Corresponding manual mechanism with stoppers shall be arranged. Mechanism shall be designed such that around 5kg-m torque shall be sufficient to tilt the Linac head. Any change of range in the sense of tilt that might be proposed by the purchaser will be communicated to the supplier at the time of finalizing the configuration of TPT system and the same shall be implemented.

2. Rotation movement:

(a) The rotation speed shall be variable from 90⁰ per min (0.25rpm) to 2.0 rpm with VVFD of suitable rating selectable through PLC/VFD and ex-proof absolute encoders. The rotation angle shall be displayed in the display module.

(b) The range of rotation of LINAC system is as follows (Reference axis for angular measurement is Z-axis in XY plane): (Rotation when viewed from top)

- Counter clockwise rotation (CCW)* : 0 to 90°
- Clockwise rotation (CW)* : 0 to 45°

- (c) * Any small change of above rotation angles will be communicated to the supplier at the time of finalizing the configuration of TPT system and the same shall be implemented.
- (d) VVVF cabinet shall be located in safe area about 130m away from DHS.
- (e) Motors shall have provision for mounting ex-proof incremental encoder.
- (f) Appropriate number of junction boxes for power cables (Flame proof type).
- (g) The brakes (flame-proof integrated disc break) of Rotation motor shall have a torque rating of 200% of the full motor torque. There shall also be provision for manual release of brakes.

8.2.3 HOIST SYSTEM

- (a) Telescopic Hoist system on crab shall be configured/positioned such that the vertical planes of LINAC LASER and Flat panel detector (of DHS) shall be within 50mm offset. Vendor shall ensure the present available position of flat panel detector system and correspondingly finalize the LINAC-mast location of TPT during configuration/design phase of TPT.
- (b) There shall be synchronized & individual modes of operation in hoist for both TPT and DHS (local & remote mode).
- (c) The hoist system for LINAC shall integrate with the Yoke assembly which shall have tilt & rotation arrangement.
- (d) The hoist system shall have a true vertical lift with sufficient lifting design margin of safety and an equalizer bar. All wire ropes shall be XIPS 6 x 37 IWRC (FOS: 6.0) with actual breaking strength certifications.
- (e) The equalizer bar/rope system shall have a load cell arrangement (Intrinsic safe type/ATEX certified) that will give the feedback on loading of wire ropes. The display shall be provided independent for better supervision of the overloading of the wire ropes. If required, it shall be interlocked with hoist motor through PLC. Load cell shall be selected such that the load cell information shall be provided at SCADA through PLC.
- (f) Double wire rope arrangement shall be provided for fail safe hoisting of the LINAC.
- (g) If the stabilization system is telescopic type, it is preferable to design the cylinders sliding with linear guideways.
- (h) The speed range for the hoist shall be from 500 to 2000 mm / min., selectable through PLC/VFD from both pendant through selector switch /SCADA stations.
- (i) The positional accuracy of Hoist system shall be within ± 10 mm at 500 mm/min.
- (j) The hoist stroke of LINAC shall be ≥ 4500 mm.
- (k) The lowest point of the LINAC LASER shall be around 500 mm from finished floor level (FFL)
- (l) While LINAC lowering, micro speed should be activated 100mm before the lower most position.

- (m) There shall be a display read out (DRO) of the same on the control console.
- (n) The hoist system shall have an upper limit switch mechanically actuated by the load block.
- (o) The hoist system shall also have a rotary limit: The upper limit shall activate prior to the load block limit switch above and the lower limit switch shall activate when the hoist reaches its lower limit of travel. These limits shall be factory set, but field adjustable if needed.
- (p) The hoist shall have two independent flame-proof EHT brake systems (main & redundant) when powered brakes will get opened and will be closed when not energized (Fail safe). The brake shall hold the full capacity of the hoist without the assistance of any other system. The second brake shall be a mechanical load brake that will prevent the motor from being overrun allowing the load to accelerate downward. The load brake shall ensure that the lifting and lowering speeds are nearly identical.
- (q) VVVF panel shall be located in safe area about 130m away from the DHS.
- (r) The hoist motor shall be provided with dedicated ex-proof incremental encoder (hollow shaft type) for vector control of VFD to get better dynamic performance. There shall be separate absolute encoder mounted in driven side of hoist mechanism. The Motor Absolute Encoder shall be directly interfaced to PLC for Absolute Positional Information.
- (s) Motors shall have provision for mounting encoder on shaft. The encoder shall be of hollow shaft encoder.
- (t) Motors shall have provision for mounting explosion proof incremental encoders.
- (u) Appropriate number of junction boxes for power cables (Flame proof type).
- (v) Encoder for positional information shall be of absolute encoder with intrinsic safe Profibus communication.
- (w) There shall be two independent relay outputs to drive brake contactors from VFD and there shall be two contactors connected in series to power brake. This arrangement will avoid inadvertent brake opening in case of welding of VFD relay contact or brake contact.

8.2.4 SYSTEM STABILIZATION

- (a) The structure of the mast/stabilization system must be sufficiently stable so that no oscillation of LINAC machine shall be observable around two minute after the hoist movement (in micro speed).
- (b) Design and analysis of the stabilization system shall be submitted and after SDSC SHAR approval only fabrication shall be taken-up.
- (c) If Telescopic rigid mast is used, then it shall be made of structural steel members with multiple sections. All sections shall move smoothly using sealed bearings and hardened

wheels. However, it is the responsibility of the vendor to build a TPT system as per the requirement mentioned in Point (a).

- (d) Stabilization system Functioning: It is for dampening/suppression of the vibrations/oscillations that are developed on LINAC/pay load during Hoist movement. All oscillations shall be damped around two minute after hoist movement micro movement.
- (e) All gearing shall be totally enclosed in oil tight gear cases. These cases shall be fully sealed to prevent any oil leak. A protected vent plug may be used, as well as an oil level sight plug; however, these plugs must be designed to prevent leaks. Rotating shafts shall have seals. All machinery shall operate smoothly through the complete range of speeds.
- (f) All rotating members with projecting elements such as key, couplings, set screws, etc. as well as all other moving parts shall be guarded as per relevant standards.

8.3 Film hoisting system (FHS): As described in this document, FHS is a hoisting mechanism for handling of radiographic film cassette frame. Net weight of the cassette frame is 20kg. FHS will have only hoist movement with telescopic cylinders. This FHS shall be installed on the existing crab of DHS. As shown in the GA drawings, location is identified for this sub-system on DHS-crab. FHS shall be configured such that all elements of FHS shall be accommodated in the space provided on DHS crab. No separate cable management system & pendent required for FHS. DHS pendent & cable drag chain system shall be used for the same.

Major elements of FHS are Cassette frame, wire rope, telescopic cylinder system, rope drum, geared motor/servo motor, incremental & absolute encoder, Rotary limit, gravity limit, load cell, VVVF drive, cables, push buttons and other associated elements for demonstrating the FHS functionality.

FHS shall be operable from both Local & remote modes from control room. Communication shall be established to SCADA through DHS/TPT PLC. Load cell and Hoist positional information shall be displayed in the DPM available in the DHS/TPT pendent. System parameters of FHS are given below:

SWL : 20kg

Speed : 4000mm/mint to 500mm/mint

Stroke : 4500mm

- (x) At Bottom most position, Radiographic cassette frame shall be 550mm from FFL. Load cell data shall be interlocked with hoist motor tripping. FHS shall operate only when DHS hoist is

at top limit condition. Cassette frame handling interface jaws shall be designed with 200mm envelope. The cassette frame shall be of removable type (can be bolted to the telescopic system) Four number of cassette frames (two with full cassette frame size, two for half cassette frame) shall be supplied along with system. Full cassette frame shall accommodate 3 cassettes and half cassette frames shall accommodate 2 half cassettes. These cassette frames are made from SS sheet metal around 1mm thickness as shown in drawings. However, this is a simple frame, full details will be shared during details engineering.

9. ELECTRICAL SYSTEMS:

9.1 Scope of work for Electrical Systems consists of

- i. Design, Fabrication, supply and installation of VVVF Drive Cum Switchgear Panel. The VFD panel shall consist of VVVF Drives and associated switchgears along with protection elements as per detailed specification mentioned in this document.
- ii. Supply of Flame Proof Motors with Integrated Brakes (with incremental Encoder for Hoist Axis Motor) for TPT Axis Motions: Hoist, Cross Travel & Rotation as mentioned in the Document & FHS.
- iii. Supply of suitable rating Power Cables for Interconnecting Motors & Drives, Control cables for Interfacing of Pendent Push Button Station & Axis End limits to the RIO panel through IS barriers suitable for the Cable drag chain system. Testing and commissioning of VVVF Drive Cum Switchgear Panel Including parameterization of VVVF Drives & Complying all Functional, Operational & Safety Interlocks.
- iv. Site Acceptance Tests, Operational, Functional & Interlock checks, Endurance Trials & Complete System Functional Checks until Complete Satisfaction of Department.

9.2 General Terms:

- i. Party shall realize VVVF Drive Cum Switchgear Panel as per detailed specifications furnished below.
- ii. Party shall engage panel manufacturer, obtain and submit GA Drawing, power and control circuit drawings, including selection of switchgear ratings, Control drawing, VVVF Drives, Bill of material for Dept. Approval prior to start of fabrication.
- iii. The panel shall undergo functional checks, Dielectric strength checks, Dimensional checks and other qualification tests as per standards at panel manufacturer works in the presence of the Department.
- iv. Instruction, Operation and maintenance manuals of items like VFD, switch gears etc. shall be submitted along with dispatch document.
- v. Rubber mats of 2mx1m, 33 kV grade shall be provided for the complete length of all the panels (the panels which are in the scope of supplier) both in front and back side such that persons stand on rubber mats during maintenance.

- vi. The vendor shall supply documents consisting of as built drawings (power & control drawings), catalogue of all bought out electrical items, VFD parameterization Details.
- vii. The supplier shall provide three complete sets of all the drawings, operation and maintenance manuals and test certificates for the operation and maintenance purpose of the department.
- viii. Panel cubical keys, Handles, interlock keys, are to be handed over to department during supply.
- ix. Party shall submit the following for approval before fabrication
 - ❖ Detailed Schematics Panel
 - ❖ General arrangement drawings with complete bill of materials, installation details etc.
 - ❖ Control wiring drawings.
 - ❖ Switchgear/Cable Ratings
- x. The party should incorporate all changes/modifications /rectifications suggested by Department after verifying Drawings and bill of materials.
- xi. Any specification deviations required on technical grounds or non-availability of specified items have to be brought to the department notice in a separate deviations table and changes in these regards shall only be acceptable with the approval of the department
- xii. Any item not specified but required for satisfactory functioning and integration of the total system to be considered and included by the party and demonstrating the total functionality of the system as specified is the responsibility of the party.

9.3 Specification for VVFD cum Switchgear panel:

- i. Party shall carryout supply, Testing & Commissioning of front operated indoor, Stand mountable, suitable for operation on 3-Phase, 4 wire 415V $\pm$ 10%, 50Hz $\pm$ 3% AC supply.
- ii. The panel should be designed, manufactured and tested in accordance with IS 8623(Pt1), IS 13947(Pt4/Sec1) and as per the specifications issued by us.
- iii. Enclosure symmetrical frame construction of rolled hollow sections made up from 1.5mm Thickness sheet with holes on a 25mm DIN pitch pattern.
- iv. Door shall be fitted with concealed hinge to ensure >180 deg opening& shall be Lockable with Handle type opener with Key.
- v. Panel lighting shall be provided in the cable chamber and it shall be LED lamps only. The same needs to be controlled with panel door open / close limit switch.
- vi. The structure shall be mounted on a rigid base frame of ISMC channel stand. The design shall ensure that the weight of the components is adequately supported without deformation or loss of alignment during transit or during operation.
- vii. The panel can be limited to maximum height of 2200 mm including ISMC Channel stand.
- viii. The ISMC channel stand shall be made of 100 mm ISMC Channel with a Height of 1.5ft (45 CMs) to ease the glanding of Cables and shall be provided with adequate no. of holes at bottom in order to ensure installation convenience at site.

- ix. Detachable, split gland plates of 3mm thick sheet steel shall be provided at bottom.
- x. All live parts shall be shrouded with non – deteriorating insulating barrier to prevent against accidental contact.
- xi. Provision shall be made for lifting and handling of panel by eyebolts.
- xii. The panel shall have high mechanical and dielectric strength.
- xiii.** If any Bus bars are utilized, support conductors shall be FRP type firmly fitted to the frame work of the panel.

9.4) Table for VVVF Drive cum Switchgear panel for TPT & FHS		
Description	Capacity (KW)	Specification
Incomer	To be arrived by Vendor	➤ MCCB with adjustable short circuit, earth fault and overload. Refer data sheets for Specifications ➤ AC-3 duty Line Contactor to switch OFF the I/C supply in case of activation of Emergency Stop PBs ➤ Multi-Function meter with Profinet/ Ethernet connectivity for local display and remote data logging. Refer Data Sheet for Specifications ➤ Shall have RYB indication lamps, on, off, trip status, Line contactor ON, 24V DC ON indication lamps ➤ Suitable CTs to be provided for current measurement and display at Multi-Function meter. ➤ Digital Earth Leakage Relay with CBCT Refer Data Sheet for Specifications ➤ 2 Nos of 24V DC SMPS Unit with ‘OR’ ing Module. Input 230V +/- 10% AC, Output: 24V DC. ➤ 1000VA, 415V/230V AC Control T/F for 230V AC Control supply requirements
Outgoing Feeders (Drive Feeders)		
Axis	Motor Capacity	Arrangement
TPT Hoist	Motor capacity Shall be Arrived by vendor considering the Mechanical System Requirements projected in the Document	➤ Switchgear: SDF with Semi-Conductor Fuses (as per VFD OEM recommendation) for Each Power module ➤ <u>VFD for details refer VFD specification table:</u> ▪ Drive Application: suitable for crane application and varying the speed of induction motor (using VVVF technique) ▪ 2 Power Module Main & Redundant for each motor (Total: 08 Nos) ▪ 1No Common Control unit for Controlling TPT-Hoist main Power module and FHS Hoist Redn Power module, 1No Control Unit for FHS-Hoist Main Power module & TPT-Hoist Redn Power module, 1No Control Unit for TPT -CT Main Power module & Rotation Redundant Power module, 1No Control Unit for TPT-CT Redundant Power module and Rotation Main Power module (Total: 4Nos) [Tentative Scheme is illustrated in this below document] ▪ 4Nos Advanced Operator Panel (AOP) for Monitoring/configuration of each Control unit ➤ Changeover arrangement: Input & Output Power Contactors to the Each power module of Drive with Selector switch on panel. ➤ Input, output Chokes & Filter as per OEM Recommendations. ➤ Switchgear for Motor Brake: MPCB (Power Supply should be tapped from Incomer) & Power Contactor 9A, 3P, 230V AC. For Hoist Motor brake two contactors in series shall be arranged. Each Brake Power Contactor shall be independently operated by dedicated individual VFD DOs ➤ Winding Temperature Relays (2 sets for each motor): To interface the each Motor PTCs for Winding Over Temperature Protection.
TPT Rotation		
TPT CT		
FHS-Hoist		
Requirements on VVVF Drive Panel Hinged Door		

- (a) Indication Lamps: Indication Lamps for the status of
 - Incomer R, Y, B Indication lamps (Shall be Connected before I/C MCCB)
 - Line contactor On, 24V DC Power Supply is OK
 - Motor ON/OFF, Drive Healthy & Trip for each Axis Motor.
- (b) Multi-Function Meter:(Refer data Sheets for Specifications) to acquire data from incomer Feeder Voltage & Currents.
- (c) Advanced Operator Panel (AOP) for Monitoring/configuration of all Control units
- (d) Selector Switches for selection of Main & redundant Drive Units.
- (e) Emergency OFF Pushbutton: A Mushroom Emergency Push Button shall be interfaced with Incomer MCCB Shunt Trip Coil& Line contactor
- (f) Foldable Base Frame with 5A/15A Socket for Laptop: Laptop base frame (Foldable while Locking the Door) shall be provided inside the hinged door for positioning or working with the Laptop during commissioning time along with a 5A/15A socket for laptop charging.
- (g) Pocket for Drawings: A pocket for Placing Panel Drawings inside the panel shall be provided.

Table for VVFD & Accessories Specifications	
Description	Essential Specification
Configuration	Control Unit (CU): Enabling Parameterization & Controlling of all Axis Power Modules detailed specifications mentioned below. Power Module: To Provide Variable Voltage Variable Frequency Supply to Each Axis Motors from 3 Phase Input AC supply along with Interfacing module with CU. There shall be provision for interfacing Motor PTC Temperature Sensor
Specifications of VVVF Drive	
Power Module:	
Main voltage	380-480 V , 3 Phase
Input Frequency	48-63 Hz
Output rating	One size higher standard Drive rating of selected motor full load rating. Note: The respective drive rating shall be of Heavy overload duty only
Overload capacity	150 % for 57 sec, 200% for 3 Sec
Communication Interface	Dedicated Ethernet (RJ45) Ports (Minimum 3 nos) Communicable with Control Unit with necessary Interfacing Module if any.
Additional Interfacings	PTC Temperature Sensor Interfacing
Make & Model	SIEMENS, PM240-2 or Equivalent Model
Control Unit (For Single CU):	
Control	Enabling the Power Module to act according to the desired parameterization. The DI/DO/AI/AO requirements are listed below. Additional Expansion Modules shall be provided to meet the following DI/DO/AI/AO requirement and shall be interfaced with CU.
Digital inputs	Minimum 16 Nos Digital Inputs.
Bidirectional Digital channels (DI/Dos)	Minimum 08 Nos Bidirectional Digital Inputs / Digital Outputs (Which can be Used as Digital Input or Digital Output to meet the requirements).
Digital Outputs	Minimum 04 Nos Relay Outputs.
Analog inputs	Minimum 2 Nos programmable (0-10 V, 0-20 mA, 4-20 mA).
Analog outputs	Minimum 2 Nos programmable (0-10 V, 0-20 mA, 4-20 mA).
Communication interfaces	Dedicated Ethernet (RJ45) Interfaces with Motor Modules (Minimum 4). Dedicated Ethernet (RJ45) Interface for Communication with LAN Network. Dedicated Two Profinet/Profibus Communication Protocol interfacing ports for having Ring Topology Communication with PLC/SCADA.

	Dedicated Communication Port for interfacing with the Advanced Operator Panel for Parameterizations & Monitoring.
Safety guidelines	IEC 61800
Ambient Temperature	50 Deg C
Make & Model	SINAMICS CU320-2 PN or Equivalent Model
Other VFD Accessories	
Choke or filter	Input & output Chokes/Filters suitable rating to limit THD as per OEM recommendation and to address Motor to VFD Distance issues.
DBU & DBR	Considering the Drives used for Crane applications, The Drive shall compromise DBU & DBR to dissipate the Regenerative Energy (DBR shall be placed 20m away from drive panel in safe area). The DBR selection criteria is to be submitted for Departmental approval. Wiring to VFD DBR (dynamic Braking resistors) shall have Teflon or other appropriate high temperature insulation.
Operator panel	Advanced Operator panel (AOP) mounted on panel cubicle door providing for acquiring required Axis Parameters (Control & Monitoring and also maintaining Backup of the Parameterizations).
Communication/ Interfacing cables	The necessary Communication/ Interfacing Drive Cliq cables for Interfacing Between Control unit, Power unit & AOP etc.,

9.5 Drive Parameterizations with all Operational, Functional & Safety Interlocks (Followed in the Document).

Operation Modes:

- **MODE -1:** SCADA operations from Control Room

Control Scheme: SCADA → PLC → VVVF → MOTOR.

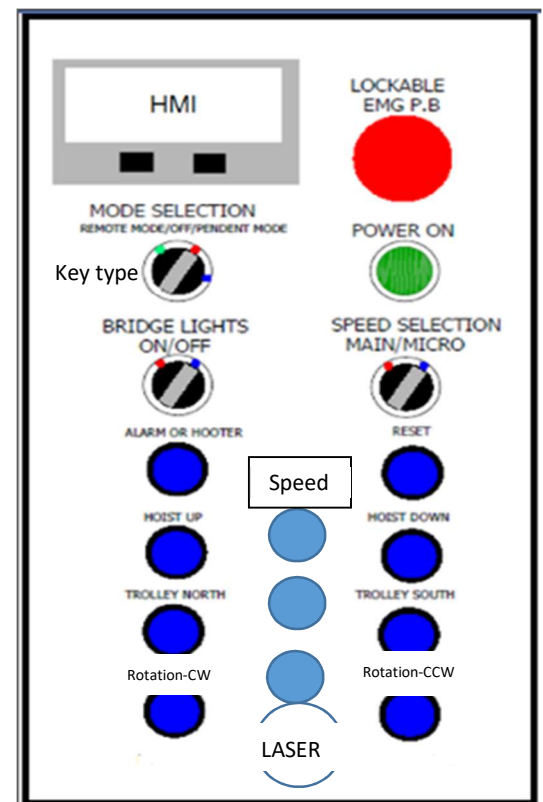
In this mode entire operation will be operated through SCADA/PLC Commands.

- **MODE -2:** Local Bay Operations from Intrinsic Safe Push Button Pendant

Control Scheme: LOP → PLC → VVVF → MOTOR.

In this mode entire operation will be operated through Local Pendant Push Button Station.

LINAC Laser ON/OFF button shall be provided in the Pendant. In Both the Modes the following Commands are to be received from PLC Hardwired Digital Outputs to the VFD as Digital Inputs to carry out the operations. Hence, there shall be sufficient DI/DOs in PLC/VFD stated as below.



Component	Purpose	Interfacing to
Lockable Emergency OFF	Switching of Total Power Supply by De-Energizing Line Contactor	VFD
Mode Selection	Selecting for Mode of operations. Pendant Mode, remote mode & Disabling both Modes	PLC

Speed Selection	For selection of Main or Micro Operations of all Motions	PLC
Alarm/Hooter	For providing alarm of operations	Power Contactor in VFD Panel which is energised through PLC DO
Reset	To Reset Faults	PLC
Motion operating PBs	For Machine Motion for all Axis	PLC

Command /Status Interfacing:

S. No	Command / Status	PLC Element	VFD
Commands from PLC to VFD for Each Drive (Total - 8Nos):			
01	FWD/UP ON with main speed	DO	DI
02	REV/DOWN ON with main speed	DO	DI
03	FWD/UP ON with micro speed	DO	DI
04	REV/DOWN ON with micro speed	DO	DI
05	Reset Command	DO	DI
06	Selection of main or Redundant VFD	---	DI
07	Forward End Limit	IS Barrier O/P	DI
08	Reverse End Limit	IS Barrier O/P	DI
Status from VFD to PLC for Each Drive:			
01	Run Feedback	DI	DO
02	Drive Healthy/Drive Trip	DI	DO

Data Acquisition of Electrical Systems:

S. No	Command / Status	PLC Element
SCADA (Operating desk):		
01	Main I/C MCCB ON/OFF/Trip Status	Hardwired DI to PLC
02	24V DC Healthy	
03	Control Transformer I/C MCB ON	
04	Control Transformer O/G MCB ON	
05	Line Contactor ON/OFF	
06	Each Emergency Stop PB Status	
07	Drive Selection status for each axis motor (Main/Red)	
08	Each Motor Currents, Frequency & Speed	From VFD through Comm
09	Incoming Voltage, Current & Power	Multifunction Meter through Comm
LOP HMI:		

01	Run Feedback	From VFD through Comm
02	Drive Healthy & Drive Trip	
03	Currents & Speed of each Motor	

Emergency OFF requirements:

Mushroom type Emergency Push button shall be provided at following Stations:

- 1. LOP @ Bay:** There shall be one Mushroom Type Emergency Stop Push Button with Lockable provision in Intrinsic Safe Push Button Pendant
- 2. Operating desk @ Control Room:** There shall be one Mushroom Type Emergency Stop Push Button with Lockable provision in operating desk easily accessible to Operator to shut down entire process in case of emergency.
- 3. VVFD Panel:** There shall be one Mushroom Type Emergency Stop Push Button on Hinged Door of VVFD Panel.
- 4. Top of the Bridge:** There shall be one Mushroom Type Emergency Stop on top of the bridge.

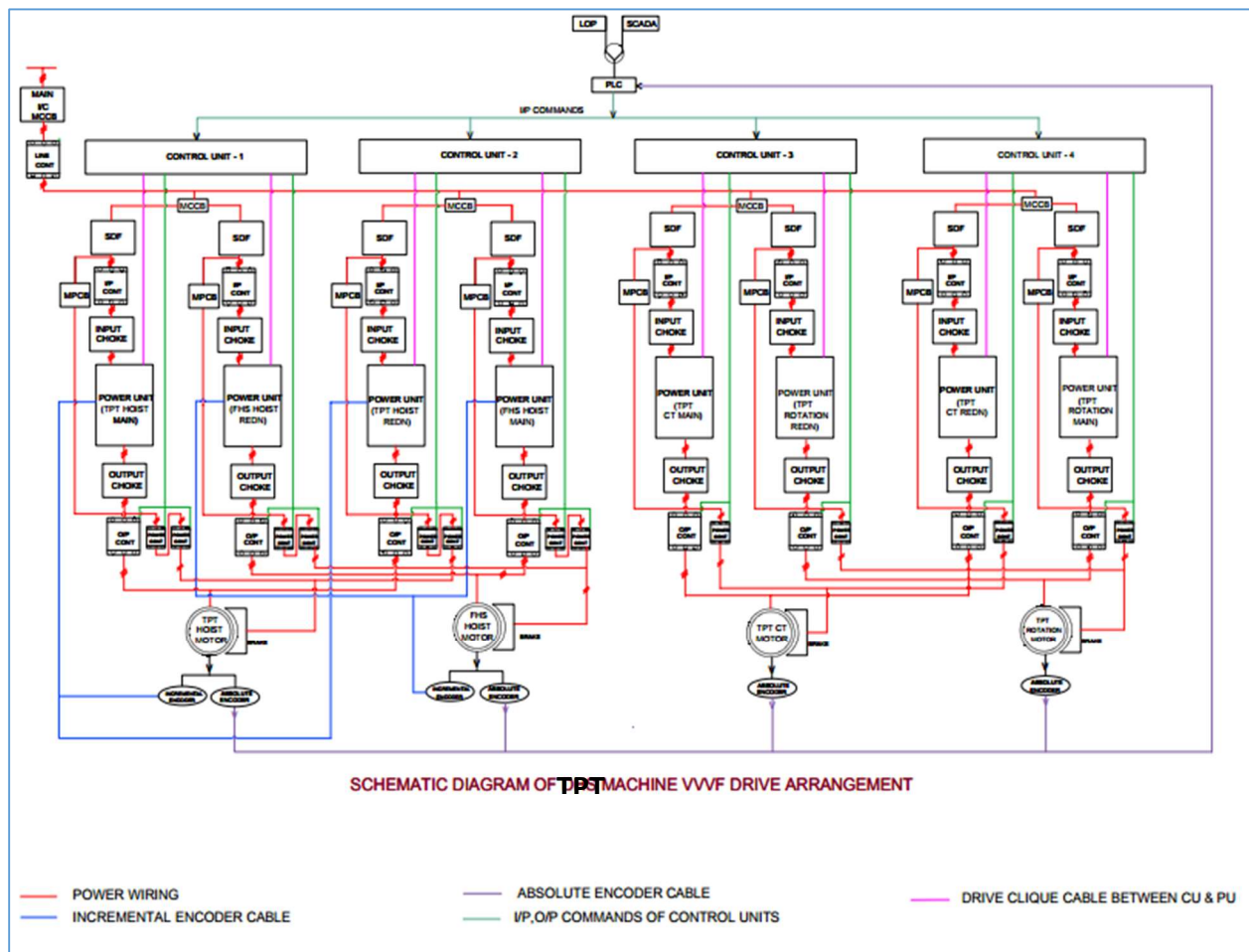
The above stated Emergency Pushbuttons shall be interfaced with VFD Panel Line Contactor So that Incoming Supply will be switched off in case of emergency Requirement. All the Emergency OFFs shall be directly interfaced with the Line Contactor in VFD Panel through One IN Two out IS Barrier. The other output of IS Barrier shall be interfaced with PLC or interlock/status Power Supply ON Indication Lamp in LOP shall be wired from Line Contactor NO through IS Barrier and Illumination Module (For information of Power Supply ON Status)

Interlock Requirements			
Interfacing of End Limit Switches with Drives for ensuring FHS/TPT Safety Limits:			
01	Hoist	Rotary FLP End Limit switches for UP & Down interlocks, Gravity Limit Switch for UP to Shut down the Incoming supply (Shall be interfaced to Line Contactor)	
02	Rotation	CW/CCW End Limit Switch	
03	CT	Right FLP End Limit Switch	a) Left FLP End Limit Switch. b) 2 Nos of Proximity Sensor for anti-collusion between DHS & TPT
04	FHS-Hoist	Cassette frame shall be full up condition when DHS-DFPD hoist is in operation	a) FHS- hoist shall operate only when DHS-DFPD is in full up condition b) Rotary FLP End Limit switches for UP & Down interlocks, Gravity Limit Switch for UP to Shut down the Incoming supply (Shall be interfaced to Line Contactor)
Yoke		There shall be 3Nos of Proximity Sensors shall be mounted on Yoke frame on each side and to be interfaced to RIO panel for user Interlock requirements	
DHS CT & LT movements interlock with FHS		When FHS is at the Center of Rotary table: DHS CT < should move only when FHS hoist is at top limit condition	
The End Limits are achieved through FLP limit switches or proximity sensors provided for each axis. The Limit Proximity Sensors are interfaced with One Input Two Output IS Barrier accommodated in PLC Panel. One Output from this IS Barrier is taken to Relays/Aux Contactors provided in VFD Panel to achieve interfacing with Drive. Mandatory Inclusion: As the TPT is employed in the same rail on which existing DHS is working there will be additional Proximity Sensors after FLP Limit switches for DHS CT operation towards TPT. There shall be Two Proximity sensor (one each mounted on DHS crab & TPT crab) and each proximity Sensor shall be linked to respective CT VFDs (i.e.,			

TPT CT VFD & existing DHS CT VFD) so that whichever CT is in motion during anti-collision shall be switched OFF. This is to avoid collision in case failure of FLP End limit switch. Both Limit Switch & Proximity Sensor are to be separately wired to PLC Panel IS Barriers.

- EHT Brake shall be interlocked such a way that, in case of VVVF drive failure or Trip fault, brake shall not get opened. i.e., fail safe brake shall be planned.
- EHT Brake shall be interlocked such a way that, brake should get opened in case of VVVF drive healthy and sufficient torque developed by motor through drive logic and brake closing logic shall be through VFD drive.
- The electrical system shall be designed to allow simultaneous motions of the Rotation, TPT-hoist, CT, and FHS-Hoist mechanisms.
- The motors shall run smoothly, without torque pulsations at the lowest speed and shall be energized up to, but not exceeding 50 Hz.
- All controls of the TPT shall be operated with intrinsic safety system with IS isolators of P&F make.

Tentative VVVF DRIVE PANEL INTERFACING SCHEME:



9.6 Installation, Commissioning & Testing Requirements:

- The Transportation, installation, testing & commissioning of new VVVF cum Switchgear Panel & Motors is under Vendor scope.

- There shall be dedicated FLP JB's (8 Nos approximately) on wall & crane for termination of Power & control cables of TPT & FHS. The cable of TPT & FHS shall be laid separately & terminated in dedicated FLP JB's.
- The Interfacing of Drive DI/DIO/AI/AOs as per the requirement shall be carried out by vendor. The Drive parameterization (Including ID Run) with Operational & Functional requirements shall be carried out by vendor.
- After Commissioning the System vendor shall carry out all Functional, Interlock Checks & Endurance Trials in the presence of Department personnel.
- Till Clearance of Complete Satisfactory Functioning of the System by Department, Vendor is responsible for all bought out items & shall replace/repair any item which is not functioning properly.

Earthing:

- Two runs of Individual Earthing shall be provided for all Motors, VFD panels, JB's, Pendent etc., with necessary size of earth wire/strip as mentioned in the document & as per recommended IS standards.
- Earth copper bus bars of minimum 300 Sq. mm size shall be provided throughout the length of the VVFD panel.
- Within the VVFD Panel all the switch gear bodies shall be duty connected to the earth bus bars.
- Provision for connection to the plant earth grid shall be provided at both the ends of the VVFD panel.
- All hinged doors with electrical accessories shall be provided with flexible copper earth connections.
- The VFD panel earth points shall be connected to the Earth Pits with in 100Mts length using 32 x 6 mm GI Strip
- All electrical equipment mounted on crane including Mechanical structure to be earthed with double runs. Suitable Bridge Clamp provided on crane for tapping earth points.
- Along with pendent control cable an additional wire braided flexible copper strip of 12mm wide shall run as a special earth from the control panel up to the pendent station.
- SDSC will only provide ground riser at 1mtr height inside bay for grounding. Further connection from this riser to EOT system for earthing will be in bidder's scope.

9.7 DATA SHEETS

A) Specifications of Switch Gear - MCCB	
Description	Essential Specification
Maximum rated current (In max)	Standard Rating • Incomer Feeder- 150% Rated Current • Motor Loads-150% Rated Current • Other loads-125% Rated Current

Rated short circuit breaking capacity Ics(=Icu)	55kA for incomers and main feeder switches,35kA for sub feeders
Rated insulation voltage Ui	1000V
Rated operational voltage Ue	690V
Standard	Circuit breakers shall comply with the following standards: ▪ IEC 60947-2 ▪ IEC 60947-1 ▪ Isolating features in accordance with IEC 60947-3
Over current release features	Main Incomer MCCB: ▪ Micro Processed based Overload protection (L-tripping), Short time delay short circuit protection(S-tripping), Instantaneous short-circuit protection (i-tripping), Earth fault tripping settable with LCD Display. ▪ Load monitoring, short circuit protection and overload protection switchable to I2t. Outgoing Feeder MCCB: ▪ Thermal Magnetic based adjustable Overload protection (L-tripping), Instantaneous short-circuit protection (i-tripping)
Auxiliary releases	Shunt trip, Signalling switch
Make	M/s Siemens / L&T / Schneider
Model	Latest series meeting the above specification
B) Specifications of Switch Gear – Power Contactor	
Description	Essential Specification
Maximum rated current (In max)	▪ 32A, AC-3 duty for Line Contactor in I/C ▪ 9A, AC-3 duty for Each Motor Brake supply
Rated short circuit breaking capacity Ics(=Icu)	50kA or better
Rated operational voltage Ue	415V
Control Coil Voltage	230V AC
Standard	IEC 60947, IS13947
Aux Contacts Required	2NO + 2NC (minimum)
Add on Accessories	Shall be provided with surge suppressor
Make	M/s Siemens
Model	Latest series meeting the above specification
C) Specifications of Switch Gear – Aux. Contactor	
Description	Essential Specification
Control Coil Voltage	230V AC
Standard	IEC 60947, IS13947
Aux Contacts Required	2NO + 2NC
Add on Accessories	Shall be provided with surge suppressor
Make	M/s Siemens
Model	Latest series meeting the above specification
D) Specifications of Switch Gear – Earth Leakage Relay	
Description	Essential Specification

Detail	Microprocessor based Earth Leakage Relay with CBCT of Resin Cast (Digital Display)
Current Range	30 mA – 3000 mA
Current Range Setting	18 steps
Tripping time	0 – 5 sec
Auxiliary Voltage	85 – 275 V AC
CBCT Type and Size	Resin cast Circular
Contact rating	8A, 250V AC / 8A 30V DC 2 C/O Contacts
Mounting	Flush
Dimensions	96m x 96 m x 70 mm (W x H x D)
Make	M/s Siemens / L&T / Schneider
Make & Model	PROK DVS, MPEL-02
E) Specification of Switch Gear – Multifunction Meter	
Details	Power Monitoring Device for displaying all the relevant system Parameters in low-voltage power distribution. It is capable of single-phase, two-phase or three-phase measurement and can be used in two-wire, three-wire, and four-wire, TN, TT and IT systems.
<u>Technical Specifications</u>	
Power Supply	95 ... 240 V AC (50/60 Hz) or 110 ... 340 V DC
Measuring Input:	
Voltage	Min: 3 Ph, 40V (Phase Voltage), 50 Hz/60Hz Max: 3 Ph, 290V (Phase Voltage) or 500V (Line Voltage), 50 Hz/60Hz or Better, Accuracy: ± 0.3 % or Better
Current	3 Ph x AC / 1 A (+ 20%, max. 300 V), Accuracy: ± 0.2 % or Better
Frequency	50/60Hz, Accuracy: ± 0.05 % or Better
Output:	
Display	LCD Display
Configuration	The Parameterisation along with Configuration of Limits and assigning of DI/DOs as per requirements shall be possible with LCD Navigating Display system along with Monitoring of Measured Values
Monitoring	Voltages (Phase, Line), Currents, Power factor, frequency, Power (Active, reactive, apparent), THD (Current, Voltage), Energy (Active, reactive, apparent), Imbalance (Voltage, Current) Universal Counter, Working Hours
Digital Inputs	24V DC, Digital Inputs-4 Nos
Digital Outputs	External Supply with 12-24V DC, Digital Outputs: 02
Communication Interface	RJ45 Communication Interfacing Supporting Profinet/Ethernet Communication Protocol in Ring Topology
Make & Model:	M/s Siemens, PAC3220/4200
F) ELECTRIC MOTOR SPECIFICATIONS:	
All motor ratings shall be arrived based on the load inputs given by User. The final requirement is to achieve the specified speed and operational requirements. So the party should ensure the ratings are adequate/suitable and any change required may be adopted with department approval. Ensuring smooth functioning of all components as a system is the responsibility of the party and any change required in this regard to be brought to the notice of department and to be implemented with approval of department.	

Motor Capacity	The motor capacity should be selected such that motor shall draw only 80% of rated current at full load. Design calculations to be submitted towards arrival of motor power rating and approval to be obtained
RPM (Ns)	1000 or as per design
Motor type	Flame Proof Induction motor (Ex "d")
Operating Voltage	415 V $\pm$ 10 %, 3 Phase
Operating Frequency	50 Hz $\pm$ 3 %
Duty class	S4 or better
No of Starts Per Hour	300 or better
CDF	60% or better
Protection	IP 55 or better
Insulation class	F and temperature rise limited to class B
Efficiency	IE 2 or Better
Thermistor	PTC110- 3Nos, PTC130 – 3Nos Embedded in windings for winding over temperature protection.
Gas group	IIA, IIB
Area of Classification	Zone-I
Standard	Motors shall comply IS:325 /IEC :60034-1
Make	Baharat Bijlee/ SEW/ Crompton Greaves/ Kirloskar / Marathon / CEMP
Model:	Latest series meeting the above specification

Note: Any deviation in the above specifications if required on technical grounds, the party has to bring out the requirement with technical justification & can be adapted with Dept. Approval

G) Specifications of FLP Junction Box

Description	Essential Specification
Enclosure	Ex d, Gas Gr. IIA IIB, as per IS:2148-2004 & IS:13346-2004
Degree of Protection	IP-65 as per IS:12063-1987
Type of Protection	Flame Proof - Exd
Area of Classification	Div/Zone 1 & 2, Gas Group IIA IIB, as per IS: 5572
Material of Construction	Cast Aluminium Alloy: LM-6
Surface Temperature Classification	Minimum T4
Terminals Rating	Upto 32 A, 415 Volts, 50 Hz
Components	4 Way terminal block 15 A, Clipon Type 2.5 Sq.mm, 8 Nos. Max or Type 4 Sq.mm, 6 Nos. Max
Gasket	Endless, Moulded Neoprene
Earthing	1 No Inside, Screw M5 and 2 Nos. Outside, Screw M6
Mounting	Wall / Structure
Finish	Light Grey Anti Corrosive Epoxy Shade 631 as per IS:5
Cable Entry	As per Design Requirements.
Name Plate	Stainless Steel
Accessories	Suitable Stopping Plug (certified) & Cable Glands (certified)
Certificate	Item should be supplied along with the approved test laboratory certificate, CMRI/ERDA or any other approved test agency.
Dimensions / Drawings	As per approved test laboratory certified only will be acceptable.
Make	Baliga /FCG/ STAHL
Model	Latest series meeting the above specification

H) Specifications of LED Cluster Lamp	
Description	Essential Specification
Power Supply	14 to 30V DC/18 to 22mA
Conforming Standards	EN50020:1994
Make & Model	P&F, BEKA
I) Specifications of Incremental Encoder	
Description	Essential Specification
Encoder Type	FLP Incremental Encoder
Resolution	1024 PPR or Higher
Hazardous Zone Requirements	Zone I, IIA IIB, T4. (Exd only)
Make	BAUMER/P&F/LIKA
Model	Latest series meeting the above specification

9.8 Power cables & Control cables, Cable Drag Chain system:

Power Cables:

The Power Cables shall be calculated based on the Motor Capacity (shall be arrived by vendor). The Power Cable Size shall be capable of carrying at-least 150% of FL Current of Motor by considering the Voltage Drops (Individual Approx. cable Length is provided below). Minimum 4 Sq mm x Copper Conductor Armored XLPE Cable shall be used. Only Copper Conductor & armored Power Cables are accepted. All the components inside the panel shall have a proper identification.

TPT & FHS detailed Cable schedule Details:						
S.no	Cable Description	VFD panel@ Panel room to FLP JB @ Bay(Armoured)		FLP JB @ Bay to Motors (Drag chain cable)		Remarks
		Route Length	Cable Specifications	Route Length	Cable Specifications	
I) Power Cables:						
i) TPT						No. of cores & Route lengths are tentative only. Incase of requirement, the same shall be increased as per actual
1	Power Cable From Drive Panel to Hoist Motor	80	4 Core, 2.5 sqmm Armored, XLPE, Copper Conductor Cable	75	4 Core, 2.5 sq.mm Flexible Copper Conductor Cable suitable for drag chain applications	
2	Power Cable From Drive Panel to Hoist Motor Brakes	80	2Rx4Cx 2.5mm ² Armoured XLPE, Copper Conductor Cable	75	2Rx4Cx 2.5mm ² Flexible Copper Conductor Cable suitable for drag chain applications	
3	Power Cable From Drive Panel to CT Motor	80	4 Core, 2.5 sqmm Armored, XLPE, Copper Conductor Cable	75	4 Core, 2.5 sq.mm Flexible Copper Conductor Cable suitable for drag chain applications	

4	Power Cable From Drive Panel to CT Motor Brake	80	1Rx4Cx 2.5mm ² Armoured XLPE, Copper Conductor Cable	75	4Cx 2.5mm Flexible Copper Conductor Cable suitable for drag chain applications	measurments.
5	Power Cable From Drive Panel to Rotation Motor	80	4 Core, 2.5 sqmm Armoured, XLPE, Copper Conductor Cable	75	4 Core, 2.5 sq.mm Flexible Copper Conductor Cable suitable for drag chain applications	
6	Power Cable From Drive Panel to Rotation Motor Brake	80	1Rx4Cx 2.5mm ² Armoured XLPE, Copper Conductor Cable	75	4Cx 2.5mm Flexible Copper Conductor Cable suitable for drag chain applications	
7	Power Cable From PLC Panel to Load Cell	100	1Rx4Cx 2.5mm ² Armoured XLPE, Copper Conductor Cable	100	4Cx 2.5mm Flexible Copper Conductor Cable suitable for drag chain applications	
ii) FHS						
8	Power Cable From Drive Panel to FHS-Hoist Motor	80	4 Core, 2.5 sqmm Armoured, XLPE, Copper Conductor Cable	75	4 Core, 2.5 sq.mm Flexible Copper Conductor Cable suitable for drag chain applications	
9	Power Cable From Drive Panel to FHS-Hoist Motor Brakes	80	2Rx4Cx 2.5mm ² Armoured XLPE, Copper Conductor Cable	75	2Rx4Cx 2.5mm ² Flexible Copper Conductor Cable suitable for drag chain applications	
10	Power Cable From PLC Panel to FHS-Load Cell	100	4Cx 2.5mm ² Armoured XLPE, Copper Conductor Cable	100	4Cx 2.5mm Flexible Copper Conductor Cable suitable for drag chain applications	
11	PCC panel room to VFD drive room	150	4Cx25sq.mm XLPE insulated armoured copper conductor cable			
II) Control Cables:						
i) TPT						
1	Hoist motor Thermistor cable from VFD panel to Motor	80	4 Core, 1.5 sqmm screened Armoured, XLPE, Copper Conductor Cable	75	4Cx 1.5mm Screened Flexible Copper Conductor Cable suitable for drag chain applications	
2	Rotation motor Thermistor cable from VFD panel to Motor	80	4Core, 1.5 sqmm Screened Armoured, XLPE, Copper Conductor Cable	75	4Cx 1.5mm Screened Flexible Copper Conductor Cable suitable for drag chain applications	

3	CT motor Thermistor cable from VFD panel to Motor	80	4Core, 1.5 sqmm Screened Armored, XLPE, Copper Conductor Cable	75	4Cx 1.5mm Screened Flexible Copper Conductor Cable suitable for drag chain applications
4	Control cable From LOP @ Bay to FLP JB @ Bay through cable drag chain system	---	---	100	2R X 25 Core x 1.5 Sqmm Copper Conductor Control cable suitable for drag chain applications
5	Control cable From FLP Limit switches / Proxy sensors to FLP JB @ Bay	---	---	85	7R X 6 Core x 1.5 Sqmm Copper Conductor Control cable suitable for drag chain applications
6	Control cable From FLP JB @ Bay to PLC Panel (Interfacing of LOP & End Limits)	80	6R X 16 pairx 1sq.mm twisted pair Copper Conductor Screened Armored data cable	---	---
7	Control cable From FLP JB @ Bay to VFD Panel (Interfacing of Emg.OFF & Powers ON Status)	80	8 Core x 1.5 Sqmm Copper Armored Conductor Control cable	---	---
8	Screened Encoder Cable for Interfacing of Hoist Incremental Encoder Cable to VFD Panel	---	---	160	As per OEM recommendation suitable for Encoder cable drag chain system
9	Screened Encoder Cable for Interfacing of Each Absolute Encoder Cable to PLC Panel	---	---	160	Drag chain certified profibus Cable- 4 runs
10	Power cable for powering of Absolute encoders			100	3Cx 1.5mm Flexible Copper Conductor Cable suitable for drag chain applications
11	Interfacing cable From PLC to Drive panel	20	5R X 16 Core x 1.5 Sqmm Copper Conductor Screened Armored Control cable	---	---

12	Interfacing Cable from Control Room to VFD Panel	120	4 Core x 2.5 Sqmm Copper Conductor Armored Control cable	---	---
13	Screened Profibus cable from PLC/RIO panel to HMI	---	---	160	Drag chain certified profibus Cable
14	Earth cables for Motors, Brakes etc.,	---	Suitable size cable/Strip as per Standard	300	Green/yellow colour code earth wire-suitable for cable drag chain system
ii) FHS					
15	Hoist motor Thermistor cable from VFD panel to Motor	80	4 Core, 1.5 sqmm screened Armored, XLPE, Copper Conductor Cable	75	4Cx 1.5mm Screened Flexible Copper Conductor Cable suitable for drag chain applications
16	Control cable From FLP Limit switches / Proxy sensors to FLP JB @ Bay	---	---	85	2R X 6 Core x 1.5 Sqmm Copper Conductor Control cable suitable for drag chain applications
17	Control cable From FLP JB @ Bay to PLC Panel (Interfacing of LOP & End Limits)	80	1R X 16 pairx 1sq.mm twisted pair Copper Conductor Screened Armored data cable	---	---

Cable Drag Chain System:

- i. **TPT:** The Above Stated Power & Control Cables of TPT shall be accommodated in the dedicated Cable Drag Chain System as Projected in this Document. Supply of cable drag chain system is in scope of vendor.
 - ii. **FHS:** Power, Encoder, Load cell & Limit switches Cables of FHS as listed above shall be laid in the existing DHS Cable Drag Chain System. If the existing drag chain system is not sufficient to accommodate fully, then suitable drag chain system shall be planned.
- (a) Power and control cables of the TPT shall be routed on walls & trenches in the safe area (130m away from DHS) and by a cable drag chain system in the Exposure hall (hazardous area). Suitable cutouts/openings shall be made by vendor on the RCC wall which is of 1200mm thick.
 - (b) Inside the Exposure hall TPT & LINAC cables shall be in suitable cable drag chain system (department approved make).
 - (c) Necessary cable end termination shall be planned (for both power, control and signal cables) using necessary FLP JB & FLP glands suitable for Hazardous location as applicable.

- (d) The cable drag chain system shall be mounted on the wall and will allow the detector cables to move with the system. Enough material shall be supplied to ensure full range of motion

10 LOCAL OPERATED PENDENT

A metallic pendant (intrinsically safe type) pushbutton station shall be suspended from the bridge. The system-grounding conductor shall be brought to the pendant enclosure. The hoist, trolley and yoke motors shall be separately controlled by one pushbutton for each direction of travel. LINAC Laser ON/OFF button shall be there on this pendent and its inputs shall be taken from LINAC.

Provision shall be incorporated to avoid simultaneous operation of HOIST UP and DOWN motions and similarly for other movements. This shall be achieved by following.

- Pendent level interlocking
 - Auxiliary contactor level interlocking
 - Drive logic level interlocking
- (a) All bridge/hoist/and yoke functions shall be controlled by pendant controls as described below.
- a. "Power ON" red pilot light.
 - b. "Stop" red mushroom pushbutton with lock provision, which will de-energize the line contactor in VFD panel.
 - c. Key operated local/remote mode selection switch with center off position
 - d. Main/Micro Speed selector switch for each Axis as shown in schematic
 - e. "TPT-Hoist Up"
 - f. "TPT-Hoist Down"
 - g. "CT right"
 - h. "CT Left"
 - i. "Rotation CW"
 - j. "Rotation CCW"
 - k. FHS-Hoist UP
 - l. FHS-Hoist Down
 - m. "Sound Horn"
 - n. LASER ON/OFF
 - o. Drive Reset PB

- p. Positional display shall be there on pendent, showing positional information of Rotation, CT, Hoist movements including load cell data on HMI.
- q. **HMI** – To display all axis status including positional information etc., as per user requirement

Note: Following items mounted in suitable FLP enclosure with suitable FLP glands shall be supplied along with system.

11. STANDARD SPARES of TPT:

These spares shall be supplied by party along with system.

Sl. No	Item Name	Qty
1.	Thruster for Hoist	1No
2.	Thruster for CT	1 No
3.	Support/bearing blocks for all Linear guideways in telescopic system	2Nos, Each type
4.	Oil Seals for Gearboxes (Each type used in TPT)	5 Sets
5.	Brake liners for brakes (Each type used in TPT)	1Sets each
6.	FHS-Hoist: Support/bearing blocks for all Linear guideways in telescopic system	2Nos, Each type
7.	FHS wire rope	1 set/run
8.	Wire rope compound	5 litre
9.	Load cell (each one for TPT & FHS)	1 No each type

Electrical:

S.No	Description	Qty
1	VVVF drive (Control unit & power unit) rating suitable for TPT Hoist with Interfacing cables between CU, PU & AOP	1 Sets
2	VVVF drive (Control unit & power unit) rating suitable for CT, Rotation with Interfacing cables between CU, PU & AOP	1 Set each
3	Advanced operator panel for VFD	1 No
4	Semiconductor Fuses for each Drive rating (1 set consist of 3Nos for Each Drive)	Total 3Sets
5	Incremental Encoders	1 No
6	Heavy Duty Limit Switches	3 No's
7	Key type 3 position Selector Switches	1 No
8	1 in 2 Out IS barriers (230V AC aux supply)	5 No's
9	Intrinsic safe Switch amplifier & LED cluster indication lamp suitable for hazardous area	1 Set
10	Power contactor rating suitable for Drive	4 Nos
11	Aux contactors with 2NO/NC add ON blocks	10 Nos

Instrumentation & control system:

S.No.	Description	Qty
1	PLC CPU (Similar to Hotstandby PLC)	1 Nos
2	PLC Comm card	1 Nos
3	DI Module	1 Nos

4	DO Module	1 Nos
5	IM Module	1 Nos
6	Encoder cable	300 meters
7	Armoured CAT6 Ethernet Cable	500 meters
8	P&F AI Isolator – 1 in 2 out (STC)	10 Nos
9	P&F DI Isolator – 1 in 2 out	10 Nos
10	P&F Power Fed Modules	6 Nos
11	P&F Power Rail	10meters

b) Tentative BOM for Major items & Preferred Make

S.No.	Item	Make	Qty.
1	Control unit	Siemens (CU320-2 PN)	4
2	Power Modules	Siemens (PM240-2)	8
3	Advanced Operator panel	Siemens	4
4	Main Incomer MCCB	Siemens, L&T, Schneider	1
5	Multifunction meter	Siemens	1
6	HSBY PLC along with HSBY link, memory card & communication modules	Siemens S7-1517Hor latest	1 set
7	Profinet Interface modules	Siemens	4
8	8 Channel AI Module	Siemens	2
9	16Channel DI Module	Siemens	7
10	16 Channel DO Module	Siemens	5
11	4 Channel AO	Siemens	2
12	Encoder Interface module	Siemens	2
13	Profibus Redundancy Module	Siemens	1
14	RS 485 IS Couplers	Siemens	As required
15	DC Power Supplies for PLC/RIO	Siemens/ Phoenix/ Aplab	4
16	Diode Oring Module	Phoenix	2
17	1 in 2 Out IS Isolators (I/I)	P&F	As Req.
18	1 in 2 Out IS Barriers	P&F	As Req.
19	Power fed Module	P&F	8
20	Ex proof Absolute Encoders	P&F/Lika	4
21	SCADA PC	HP/Dell	1
22	RIO Rack in Drive room	Rittal/ Adarsha/Equivalent	1
23	Industrial grade DIN Mount L2 Ethernet Switch	Extreme, Antaira, Moxa, Schneider, Siemens, Any other with approval of Dept	4
24	Power SPD	Phoenix/ Dhen/ Citel	3
25	Signal SPD	Phoenix/ Dhen/ Citel	As required
26	Encoder Cables	Siemens/ P&F	As required
27	Accessories	--	As req.
28	MCCB/ MCB	Siemens/ Schneider	As Req.

29	Indication Lamp	Siemens	As Req.
30	Selector Switch	--	As Req
31	Power, Data, Control Cables	--	As Req
32	Other Accessories & Units for commissioning	--	As Req.
33	Solid state relay for each DO	Phoenix	As per DO Module
34	PLC programming Software along with license	Siemens	1
35	Drive Programming Software	Siemens	1
36	Configuration & runtime License SCADA with unlimited Tags	Siemens	1
37	49" TV	LG	2
38	ATEX Certified Loadcell	T20	2
39	ATEX Certified HMI	Redlion	1
40	Ex-proof Incremental encoder	P & F, Baumer, LIKA	2

12. Instrumentation: FUNCTIONAL REQUIREMENTS OF DACS

- a) The data acquisition and control system should remotely monitor, control, and record the process parameters of TPT System, FHS and also the existing DHS PLC parameters.
- b) The operations of TPT, FHS and DHS are to be monitored and controlled through SCADA System located in control room.
- c) Supplier shall provide consoles for housing SCADA PC, TPT System PC & 2 more PCs(Total 4 Monitor console) for LINAC and shall have provision for keeping Network Video Recorder, 2 No's of DIN rail mounted 24V DC Power supplies, 1 No. of DIN rail mounted Managed ethernet switch, 1 No. of DIN rail mounted LIU.
- d) A HSBY PLC along with its local IO modules, LIU, MCBs, TBs, Power Supplies, 1 in 2 out isolators shall be planned in PLC panel of DHS system in control room as per IO requirements with spare channels, as mentioned below, in each IO Module.
- e) Remote IOs with suitable Interface modules having Ethernet communication shall be provided in a separate IO rack in drive room with panel attached AC (Panel AC is optional if drive room is an AC room) for AI/AO/DI/DO module as per details provided in sub sequent chapters.
- f) The RIO in drive room shall acquire all Handling system parameters in field like sensors, encoders, push buttons/Indication lamps/Selector switches on pendant, etc and commanding drive systems through DO module.
- g) Pendant shall have Ex-proof Certified HMI to display all position parameters.
- h) For each AI & AO module, minimum of 2 channel spare shall be available.

- i) For each DI & DO module minimum of 4 channel spare shall be available.
- j) Supplier has to consider all 3 modes of operation namely Auto, Discrete and Local and has to build the SCADA screens as per user requirement; parameters mentioned in the User Requirement Document shall be monitored, recorded and controlled.
- k) Drive parameterisation for motor control is in the scope of the supplier and shall be tuned to meet desired machine operation.
- l) All the interlocks pertaining to process shall be controlled by PLC. PLC has to monitor the health of drive modules and has to take care of associated interlocks. All interlocks and process requirements shall be implemented as specified in URD.
- m) The Drives, PLC, I/O cards, Signal Conditioner / interfacing modules will be located in non-hazardous area. Supplier has to lay cables from panel to respective equipment's. Supplier is advised to visit facility and plan cable routing.
- n) Panels should have suitable ventilation arrangements. If panels are placed in non-AC rooms, supplier should provide panel AC of suitable capacity.
- o) Party shall lay 24 core armoured single mode fiber optic cable from Drive room RIO panel to control room PLC rack with suitable Managed ethernet switch with minimum of 8UTP & 2 SFP ports.
- p) **Splicing of Fiber shall be carried out in 24 port DIN rail mount LIU (Light Interface Unit) and shall be mounted inside RIO & PLC rack. All necessary patch cords, LIU, cables, etc. are in the scope of the party.**
- q) All the field junction boxes shall be of Explosion Proof Type. (Ex-d)
- r) All control system elements located in the Hazardous Area shall be Explosion Proof type (Ex-d) with ATEX approval or equivalent zone-1 certified items.
- s) All electronic equipment should be powered by redundant 24VDC power supplies with diode-ored modules. Two set of power supplies shall be provided – One in Control room PLC panel & other set in Drive room RIO panel. The status& data of all power supplies shall be monitored & logged in SCADA.
- t) Surge protection devices should be installed at both ends of cables which are running outside building for both Power & signal cables.
- u) Supplier has to provide 1 in 2 Out IS Isolators (I/I) of P&F make wherever required to duplicate signal at panel level.

- v)** PLC shall have dedicated communication card to communicate with SCADA. Any other option shall be selected with the approval of department.
- w)** Cable entry shall be planned from rear side / bottom/ side way entry which is deemed fit by purchaser.
- x)** A Single phase energy meter shall be mounted inside PLC panel to monitor UPS Voltage & current and same shall be interfaced with PLC & acquired in SCADA.
- y)** Transducers with communication feature shall be supplied to monitor DC Voltage & Current in PLC & Drive panel. Same shall be interfaced with PLC & SCADA
- z)** All I/O should be routed through IS barriers of P&F make. Redundant power fed modules shall be used to power all P&F barriers.
- aa)** Responsibility of the supplier, if warranted, any mechanical fittings / mounting changes should be done at supplier's scope with prior approval of purchaser.
- bb)** Critical MCB, MCCB status shall be monitored through PLC.
- cc)** Mounting of trays with suitable wall mounting clamps & bends with tray cover is in the scope of supplier.
- dd)** All unarmoured cables shall be laid through PVC sheathed metallic conduit and routed in cable trays.
- ee)** Interfacing of all systems with SCADA system and developing of PLC & SCADA program is in the scope of the supplier. All original source codes of PLC & SCADA shall be handed over to department.
- ff)** Software Requirement Specification (SRS) document & Software Design Document (SDD) of both PLC & SCADA shall be provided by the party after design of the system to department as per format provided by dept.
- gg)** Movements:
 - Cross Travel (Y-axis)
 - Hoist (Z-axis)
 - Rotation movement in yoke for rotation (about Z-axis)
 - Manual movement in yoke for Tilt (about X-axis)
 - FHS-Hoist mechanism
- hh)** Hard end limits are through two numbers of proximity switches (redundancy) and soft limit by Absolute encoder for each above axis shall be provided.

- ii) The distance between encoder and drive panel is around 130-meter, suitable encoder module with PROFIBUS communication shall be selected and same shall be interfaced to PLC with suitable communication module. Since all encoders will be located in hazardous area, a proper IS coupler shall be used for encoders profibus communication.
 - jj) All signals in pendants are also interfaced through IS barriers for DI as well as for indication lamps.
 - kk) Interfacing of existing standalone PLC of DHS system with HSBY PLC of TPT & FHS system & monitoring, logging & commanding of all DHS parameters from TPT& FHS SCADA is also in the scope of supplier.
- II) Approximate I/O Module is given below.

Drive Room RIO panel		
S.No	Module	Qty
1	8 channel AI Module	2
2	16 channel DI Module	6
3	16 Channel DO Module	4
4	4 Channel AO Module	2
5	Interface Module for encoders	1
6	Interface module for PLC Communication	1
Control Room		
1	8 Channel AI Module	1
2	16 Channel DI Module	1
3	16 Channel DO Module	1
The above quantity is tentative& minimum to be supplied. Actual number of modules as per design by considering spare channels in each IO Module & approval from department shall be provided &interfaced at the time of commissioning.		

- 1) Channel density for Digital Input/output module shall be 16/32 channels, and for Analog Input shall be 4/8 channels.
- 2) Each axis shall be identified with set of 16 DI channels & 8 DO Channels
- 3) HSBY PLC shall be provided with two dedicated communication card- one for Drive communication & other for SCADA Server communication. Any other option shall be brought by the party for approval.
- 4) All IO modules shall be terminated in Terminal blocks in RIO & PLC Panel
- 5) There shall be separate pages in SCADA to monitor each individual System
- 6) Supply of SCADA software with run time and configuration (RT+RC) license of unlimited tags is in the scope of supplier.
- 7) 1 no. of licensed PLC programming software shall be supplied.

- 8) Party shall use only drag chain certified communication cable with prior approval of department.
- 9) All multi turn encoders shall be certified to use in Zone-1, IIB area. Certificates shall be submitted for approval.
- 10) Rotation – 1 Absolute Encoder
- 11) Cross Travel – 1 Absolute Encoder
- 12) TPT Hoist – 1 Absolute Encoder
- 13) FHS Hoist - 1Absolute Encoder
- 14) All Encoders shall be with Profibus Communication
- 15) HSBY PLC hardware& SCADA software shall be supplied vendor, preferably Siemens make
- 16) Architecture shall be submitted for approval along with all BOM
- 17) Necessary Accessories such as HDMI cables, HDMI Extenders shall be provided as per site requirements

a) TECHNICAL SPECIFICATION:

24V DC Power Supplies

Description	Essential Specification
Input voltage	230V AC $\pm$ 10%, 50 Hz
Output voltage	24V DC
Output current	10 A (PLC Panel) 20A (RIO Panel)
Overload & short circuit protection type	Required
Load	As required.
Ripple	100 mV peak – peak or better
Mounting	DIN rail mounted.
Operating temperature	Ambient to 50 Deg C
Oring	Quint Diode O-ring Module with protective coating (2 x 10A& 2 x 20A)
Fault Contact	Shall be available
Quantity	2 Nos –PLC Panel – 24V/10A (with O-ring module) 2 Nos – Drive Panel – 24V/ 20A(with O-ring module)
✓ PLC and I/O racks shall be powered with Dual Redundant Power supply with Qunit Diode-O-ring modules of Phoenix make. ✓ Status& values of each Power supply and Diode O-ring module status. Accordingly, DI& AI channels shall be considered. ✓ Power supply load calculations are to be submitted during design phase. Power supplies shall be 60% de rated.	

Isolators

Type of isolator	Make & Model
Analog input	P&F -KFD2-STC5-EX1.2O or latest
Power Fed Module	P&F – KFD2-EB2-R4A.B or latest
Universal Power Rail	P&F – UPR-03 or latest
Digital Input IS Barriers	P&F –KFD2-SR2-EX1.W.LB or latest
Quantity	As Required

Programmable Logic Controller

Description	Essential Specification
Type	Preferably Hotstandby S7-1500H Series latest
CPU features	Minimum work memory for CPU shall be 2 MB or better
	Cycle time of PLC shall be less than 200 ms.
	Number of ports: Profinet/ Ethernet ports-as per requirement
CPU rack power supply	Dual 24VDC/ 230 VAC powered backplane or powering from external dual Diode ored power supplies.
Interface for communication between PLC to I/O modules & 3 rd party devices.	Communication technologies like; PROFINET / Modbus TCP/ Ethernet IP shall be used as per OEM standard for interfacing 3 rd party devices to PLC.
Self-diagnostics features	Required for each and every module available in the PLC (i.e. CPU, PS, I/O modules, other communication interface modules etc).
Programming languages	All IEC61131 languages shall be supported.
User program password protection	Password protection and block encryption.
Programming and downloading to PLC	1 No. of latest and licensed professional version of PLC programming software shall be provided for Engineering Station.
Quantity	HSBY PLC Qty - 1 Set

Input/output modules (Located in Non-Hazardous area)

Description	Essential Specification	
Analog input module (4-20 mA)	Channels per module (Nos.)	8 Channels or supplier shall submit spec for approval
	Input	4-20 mA
	Accuracy	0.2% of FS or better
	Resolution	16 bit
	Type of isolation	Galvanic / optical
	CMRR	>60 dB
Analog output module	Channels per module (Nos.)	4/8 Channels.
	Output	4-20 mA, 2 wire
	Accuracy	0.25% of FS or better
	Resolution	12 bit with sign or better

	Type of isolation	Galvanic / optical
	CMRR	>70 db
Digital input module	Channels per module (Nos.)	16/32
	Type of input	Potential free/ NAMUR (proximity sensors).
	Interrogation voltage	24V DC
	Type of isolation	Galvanic/ Optical
	LED status indication	Required for each channel.
Digital output module	Channels per module (Nos.)	16/32
	Type of output	Relay/ TTL outputs for operating solenoid valves, relays, indication lamps etc.,
	Interrogation voltage	24V DC
	Type of isolation	Galvanic/ Optical
	LED status indication	Required for each channel.
LED display	Required for all channels in all modules.	
Short circuit/ wire break/ reverse polarity protection/ monitoring.	Required.	
Quantity	As per the requirement	

Supervisory Control and Data Acquisition system (SCADA)

Description	Essential Specification
Operating system	Win11 or latest in Engineering station
Essential Features: - ✓ Mimic refresh rate shall be less than 1 second. ✓ OPC Support shall be available to interface with centralized DAS. ✓ Dynamically configurable Mimics ✓ Real time & Historical data trends display ✓ Data logging & Report generation in user prescribed format (excel, pdf) ✓ Tags (PLC & Third-party device tags). ✓ Alarms & Events Logging. ✓ Access security management.	
Mimics	✓ Sub-system wise screens to monitor the process status ✓ MMI-PLC-IO network configuration screens with critical diagnostic information and messages ✓ Diagnostics screen for PLC hardware components, ✓ Alarms screen (Sub-system wise filtering to be provided). ✓ Trends screen (Sub-system wise trends to be provided). ✓ Any other screen as per the user requirement.
Trends	✓ Real time & historical trends. ✓ Trends data export to MS Excel (.xls) and pdf format. ✓ Print option for trend chart.
Data logging	✓ Min. 1 sec data logging interval ✓ Event based data logging

	✓ All logging shall be done in SQL based Database
Alarms & Events Logging	✓ Alarms & Events shall be logged separately. ✓ Sub-system wise filtration option shall be provided.
Process Report Generation	✓ Reports shall be generated for logged data, alarms & events as per the user defined formats. ✓ From- & to- date and time shall be user selectable. ✓ Time interval shall be user selectable. ✓ Options to export data in MS Excel, MS Access, SQL formats. ✓ Print report option shall be provided.
EICS Checklist Generation	✓ Checklists shall be generated for IO diagnostics of instruments, health status of all electronic instruments available in PLC/RIO panels as per the user defined formats. ✓ Options to export data in MS Excel, MS Access, SQL formats. ✓ Print report option shall be provided.
License	Supply of Run-time + Configuration license of unlimited Tags

SCADA Engineering Station

Description	Specification
Processor	Intel Xeon i7 processor eight core or latest Gen
Hard disk capacity	4 TB SATA HDD. (Min 2 Nos HDD to meet 4TB)
Memory (RAM)	32 GB ECC DDR4 RAM.
Drive controller	Integrated or add-on SATA controller.
Network Interface card	Onboard – 1 No of 1 Gbps Addon – 4port × 1Gbps.
Optical Drive	DVD RW.
Graphics	8 GB graphics card with quad HDMI.
Cables	HDMI/compatible cables are to be provided.
I/O ports and connectors	4 Nos. USB
Power supply	230V AC, 50Hz Indian power cords to be supplied.
Operating system	Licensed version of Windows 11 (64 bit)
Software to be supplied and loaded on system.	MS Office 2021 Professional or latest with full license.
Monitor	23" –FULL HD LED or better Supported resolution 1920x1080 & above.
Keyboard	QWERTY full stroke type
Optical Mouse	Optical mousewith scroll.
CD's for all software & drivers	Required.
Quantity	1 Nos.

L2 Switch

Description	Essential Specifications
Type	Manageable, Layer-2 Fast Ethernet switches.
Physical Ports	Minimum 8 UTP RJ45 Port. Minimum 2 Nos of SFP port with single mode Fiber SFP Module

SNMP management feature	Required
Power	230V AC / 24V DC (Dual powered) – DIN Rail Mounted
Diagnostics	LEDs for power & duplex mode indication. Fault status relay shall be available which shall be acquired to PLC IOs.
Security	Port security
Quality of service	Required
Spanning tree protocol	Required
Associated software	Required of the same make as the Ethernet switch
Type of communication on LAN & protocol	Ethernet, IEEE 802.3u and TCP/IP
Virtual LAN capability	Required
Quantity	3 Nos

IO Rack

Description	Essential Specifications
Service	Housing PLC, I/O modules, DCPs, P&F Isolators, P&F IS Relays, MCBs, Drives etc RIO Rack – 1 Nos (Drive room)
Type	Free standing for RIO Rack
Cable entry	Bottom/ Side/ rear entry. Base Mounting Height shall be of Minimum 300 mm for free entry of cables.
Door	Required
	Front & rear door : Double leaf lockable
	Concealed type hinges & a 180 degree swing.
Temperature	Ambient to 50 Deg C
Painting	Inner: Glossy white colour Outer: Siemens grey colour (RAL7032)
Shield bus	Through screw connection
Mounting and wiring	Double compression SS glands (FCG, Baliga or equivalent) Separate Fuse TBs/ TB for analog, digital and different voltage level signals (Phoenix or WAGO) of Screw/gage terminal type
Dimensions	Min 1800 mm(H) × 600 mm (D) × 1200 mm (W) or more based on requirement.
Material	Sheet material thickness: CRCA-COLD rolled 2mm
	Gland plates thickness : 3mm
	Gasket for door & cover: neoprene
	Plugs for spare cable entries: required
Channels	Shall provide with bolt & nut
Anti-vibration pads	15 mm thickness
Light	Fluorescent lamp/ LED Light
Lifting	Eye-bolts
Plugs	For incoming & outgoing
Metal tag name plate	Required
Clamps	Required

Fixtures	Required, both door shall have lockable hinges. One door manual & another door via lock.
Bolts, nuts & gaskets	Required
Earthing	Power Earth & Instrumentation Earth shall be separated.
Pocket	Plastic pocket shall be provided to keep manuals/ wiring diagrams
Lock & key	Required
Spares	20 % spare entries to be provided for incoming & outgoing cables. 20 % spare for terminal blocks, 20 % spare space for future requirement.

Push Buttons/ Lamps

Description	Essential Specification
Power supply	24V DC/ 230V AC
Approval	Suitable to use in Hazardous area / Safe Area.
Quantity	As per the requirement

Relays

Description	Essential Specification
Primary element type	Solid state relays
Input	24V DC from DO Card
Mounting location	I/O racks/ IJB
Output	Potential free contacts with minimum 1 No. of NO/NC. For each DO output

Surge Suppressor

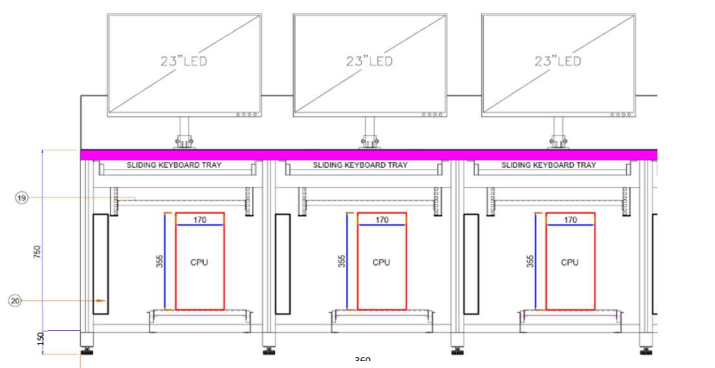
Description	Essential Specification
Location	UPS Output & IO Rack Input (Lightning & Surge Protection for power supplies)
Use	All single phase UPS power incoming in RIO, PLC & Drive panel shall have Type 1/2 SPD with fault contacts
Type	Type 1/2
Mounting	Pluggable SPDs between LN, LE , DIN Rail Mounting
Quantity	3 Nos

Control consoles

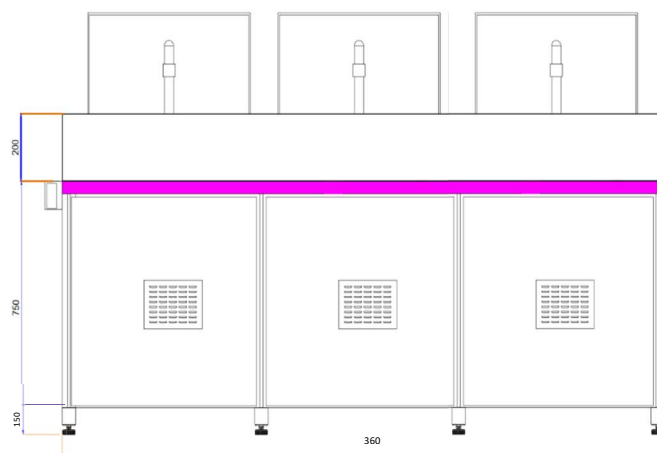
Description	Essential Specification
Quantity	1 Nos
Service	Housing MMIs along with mouse & keyboard, Telephones & CCTV NVR, CCTV Keyboard, L2 Ethernet switch, LIU, 24V Diode rectified Power Supplies etc.,
General	- The consoles shall be fully modular in design and construction. - Consoles shall be ergonomically designed for operator comforts and suitable for housing One Operator station, Telephones & wireless sets etc., - Console system shall have option of being one or two tiers high.
Construction features	Cabinet shall be made of high-quality wood ASS with very good finish. The top layer of the surface shall be capable of withstanding day to day usage of the work

	surface (Free usage) without losing the high-quality finish. The surface should be made of tough material that withstands mild abrasions without losing finish. • Shall have Ball bearing pull out CPU trays, height adjustable & pull-out key board trays, mouse wire holes, Solid floor panels with cable entries, movable equipment shelves, rails for DIN mounting equipment's. • Structure: Powder Coated Aluminium Sturdy Structure and extreme side Aesthetic Legs. • It shall Hold three PC with 23 Inch Monitors (3 NOs), Telephone and related Accessories • PC CPU shall be placed on a sliding tray in the cabinet for ease of operation. • It shall have pole for holding 1 or 2 Nos of 43" LED TV at either ends of the Console. The pole shall be detachable. The mounting will be decided at the time of Commissioning.
Door	Front & rear hinged ASS wood doors.
Monitor tiers	• Heavy duty pipes have swivel head. The monitor angle can be adjusted up/down/left/right and also vertical height can be adjusted as desired. • Flexible telephone tray. • Extreme ends with aesthetic elements.
Work surface	Made up of 12mm Acrylic solid surface (ASS) and 25mm of MDF wood. Desired colour shade matching with control room interiors will be decided by user. Console top shall be provided with a same shape glass with around 10mm thick.
Electrical	• The Console System should provide a concealed cable routing system. • The separation necessary between network and power cabling shall be taken care off. All trays should be easily accessible during installation and maintenance. The horizontal cable tray should have arrangement to accommodate plug connectors and sockets of varying sizes. • Power distribution for console equipment with 5/15-amp surge protector, 3 pin sockets, MCBs & TBs. • RJ-11 (2 Nos.), RJ-45 (4 Nos). Earthing kit. • In Console, the right most cabinet (From front View) has to accommodate following items ○ 1 No.s of DIN rail mounted Ethernet switches ○ 1 No. of LIU ○ 19" rack mount NVR ○ 2 no.of DIN rail mounted 24V DC/10A power supplies along with Oring Module ○ VHF base station power supply (approximate dimensions 150X50X150) ○ along with necessary MCBs for power supplies, NVR & TVs • Each modular cabinet should have 2 no.s of gland plates for cable entries, and the sliding keyboard trays and a shelf type rack arrangement inside each cabinet for placing any HDMI splitters/converters. Cable ducts inside the console for proper routing of cables.
Light	Required. LED lamp
Chairs	Godrej High back Revolving Type with backrest and height adjustment, Leoma-Mid back- 3Nos and Leoma-Visitor type: 3Nos

TV Mounting Stands	2 No.s of 55 inch TV mounting stands shall be supplied
Dimensions	Approximate Dimensions provided below and may vary based on the requirement. Party has to submit the final drawings before fabrication for the approval from Department. Dimensions will vary as per site requirements.
Other items to be supplied along with TPT/FHS	
Display	55" Display monitors, Qty: 2Nos, LG make
BOSCH Hammer drilling machine	Battery operated wall drilling machine: Make:BOSCH, Model: Professional GBH 180Li, 18V, 4.0Ah, Li-Ion with drill bits kit, Qty:1No
HDMI Splitters	4K HDMI 1 in 4 out Splitters – 5 No.s
Power extension switch boards	Qty:3Nos , with • 4No of 16+5 Amps socket with switches (brand: Anchor or Goldmedal) • 32 amps ELCB (Brand: Havels or Legrend or L&T) • Power indicator lamp (brand: Anchor or Goldmedal) • 30 meter 2.5 square mm cable with 16 amps plug top. (cable brand: Finolex) • Metal housing box
Water Pumps	• Kirloskar make water pump, 1HP capacity-Qty:2Nos,



INTERNAL FRONT VIEW



b) Tentative BOM for Major items & Preferred Make

S.No.	Item	Make	Qty.
1	Control unit	Siemens (CU320-2 PN)	4
2	Power Modules	Siemens (PM240-2)	8
3	Advanced Operator panel	Siemens	4
4	Main Incomer MCCB	Siemens, L&T, Schneider	1
5	Multifunction meter	Siemens	1
6	HSBY PLC along with HSBY link & communication modules	Siemens S7-1500H series latest	1 set
7	RIO Profinet Interface module	Siemens	1
8	8 Channel AI Module	Siemens	3
9	16 Channel DI Module	Siemens	7
10	16/32 Channel DO Module	Siemens	5
11	4 Channel AO	Siemens	2
12	Encoder Interface module	Siemens	1
13	RS 485 IS Couplers	Siemens	As required
14	DC Power Supplies for PLC/RIO	Siemens/ Phoenix/ Aplab	4
15	Diode Oring Module	Phoenix	2
16	1 in 2 Out IS Isolators (I/I)	P&F	As Req.
17	1 in 2 Out IS Barriers	P&F	As Req.
18	Power fed Module	P&F	8
19	Ex proof Absolute Encoders	P&F/Lika	4
20	SCADA PC	HP/Dell	1
21	RIO Rack in Drive room	Rittal/ Adarsha/ Equivalent	1
22	Industrial grade DIN Mount L2 Ethernet Switch	Extreme, Antaira, Moxa, Schneider, Any other with approval of Dept	3
23	Power SPD	Phoenix/ Dhen/ Citel	3
24	Signal SPD	Phoenix/ Dhen/ Citel	As required
25	Encoder Cables	Siemens/ P&F	As required
26	Accessories	--	As req.
27	MCCB/ MCB	Siemens/ Schneider	As Req.
28	Indication Lamp	Siemens	As Req.
29	Selector Switch	--	As Req
30	Power, Data, Control Cables	--	As Req
31	Other Accessories & Units for commissioning	--	As Req.
32	Solid state relay for each DO	Phoenix	As per DO Module

33	PLC programming Software along with license	Siemens	1
34	Drive Programming Software	Siemens	1
35	Configuration & runtime License SCADA with unlimited Tags	Siemens	1
36	49" TV	LG	2
37	ATEX Certified Loadcell	T20	2
38	ATEX Certified HMI	Redlion	1
39	Ex-proof Incremental encoder	P & F, Baumer, LIKA	2

13. APPROVED MAKES/BRANDS OF BOUGHT OUT ITEMS:

The approved brands of bought out items are as given below.

- 1) Motors : Crompton Graeves, Cemp, SEW, kirloskar, Marathon, BB
- 2) Gear boxes : Elecon, Shanthi, SEW
- 3) VVVF drives : Siemens,
- 4) Fasteners : TVS, Unbrako
- 5) L T power/Control cables : Universal, Finolex, IGUS, LAPP, Polycab, Havells, KEI, Gloster, CCI, RR Kabel
- 6) Control panels : Rittal
- 7) Ex-proof Incremental encoder : P & F, Baumer, LIKA
- 8) Pendant : Schnieder or other make with department approval
- 9) IS Barriers : P&F.
- 10) Intrinsic safe display unit : Beka
- 11) Indication lamps : Siemens/L&T
- 12) Paints : Asian Paints, JENSON, Berger, Bombay paints, Nerolac.
- 13) Wire rope : Usha martine
- 14) Bearings, Couplings : SKF, FAG, Fenner
- 15) Brakes : Bubenzer-BREMSEN, Wittoncramer, SIBRE, Elektromag
- 16) MCCB : Siemens, L&T, Schnieder
- 17) MPCB/Contactor/OLR/Aux. contactor: Siemens
- 18) Current transformers : KAPPA, AE
- 19) ELR : PROKDVS
- 20) Timer : Siemens, L&T
- 21) MCB : Siemens, Schnieder, Legrand
- 22) Ex-proof Absolute Encoder : P&F/BAUMUR, LIKA
- 23) Multi-function meter : Siemens
- 24) FLP items : Baliga, FCG, STAHL
- 25) Intrinsic safe items : PEPPERL & FUCHS
- 26) Push buttons : Siemens
- 27) Cable –Control : Havells/ Finolex/ Polycab/ IGUS/ Gloster/ Lapp/ KEI/ RR Kabel
- 28) Cable (Panel wiring) : Havells/ Finolex/ Lapp/ RR Kabel
- 29) Cable-Power(1.1KV) : Havells/Finolex/CCI/Universal/Polycab/ IGUS/ Gloster/ Lapp/KEI

- 30) Cable drag chain : IGUS/LAPP or any other make with department approval
31) Limit switches : SIEMENS/ L&T or equivalent

14. PAINTING

- a) The surfaces of all steel components shall be prepared by sand / steel grit blasting confirming to SA 2 ½ prior to painting.
- b) The surfaces that may become inaccessible after erection or installation or both, shall be prepared and painted with two coats of epoxy paint and one coat of polyurethane enamel final paint positively of different color to prove application of two coats before assembly.
- c) The following painting scheme shall be followed.

Inorganic zinc silicate Primer DFT : 65 µm (min) at shop floor.

Inhibitive polyamide epoxy, DFT : 100 µm (min) at shop floor.

Aliphatic acrylic polyurethane, DFT : 40 µm (min.) at shop floor/site.

15. TESTING OF TPT

- (a) The supplier shall perform a load test (125% of rating-Over load) for all drive units and inspect all parts of the TPT for compliance with this specification prior to shipment.
- (b) FHS-Hoist mechanism also shall be tested in line with TPT. Based on the feasibility of FHS mechanism required parameters shall be demonstrated as per approved QAP
- (c) The supplier shall notify the purchaser one month in advance of such inspections, so that personnel from department will witness them.
- (d) TPT will be inspected at supplier's site for all intended functional requirements except LT/CT movement on gantry girders. However, LT/CT movement shall be checked in no load condition by de-coupling the motors. Same shall be successfully demonstrated at SDSC SHAR for all loading conditions as per QAP.
- (e) **All interlock requirements and other checks involving PLC&SCADA requirements shall be demonstrated at SDSC SHAR.**
- (f) Test load/ Yoke adaptor: party has to prepare a test load to simulate the detector system handling requirements at vendor site as well as in SDSC SHAR.

16. PERFORMANCE TESTING

- (a) The supplier shall submit detailed testing procedure for approval by the department.
- (b) Prior to final acceptance of the TPT, the performance of the TPT shall be checked as per approved test procedure. All conditions not in compliance with this specification or found

to be otherwise defective, shall be corrected at the supplier's expense. The tests shall then be repeated.

(c) The following nomenclature shall apply within this specification:

Rated Load 100% TPT Capacity

Over load 125% TPT Capacity

(d) The purchaser shall operate the system without a load under all phases of operation. Such operation shall include travel over entire length of the runway and actuation of all controls, brakes, warning, and safety devices.

(e) The operation of up/down limit switches in the hoist shall be checked by carefully raising and lowering the load block to the point where these limit switches actuate

(f) The structure of the Bridge shall be checked to determine if all members are secured and that all switches, stops, interlocks, and all other safety devices perform as specified.

(g) Electric wiring and system shall be inspected for compliance to the requirements of this specification and to codes and standards.

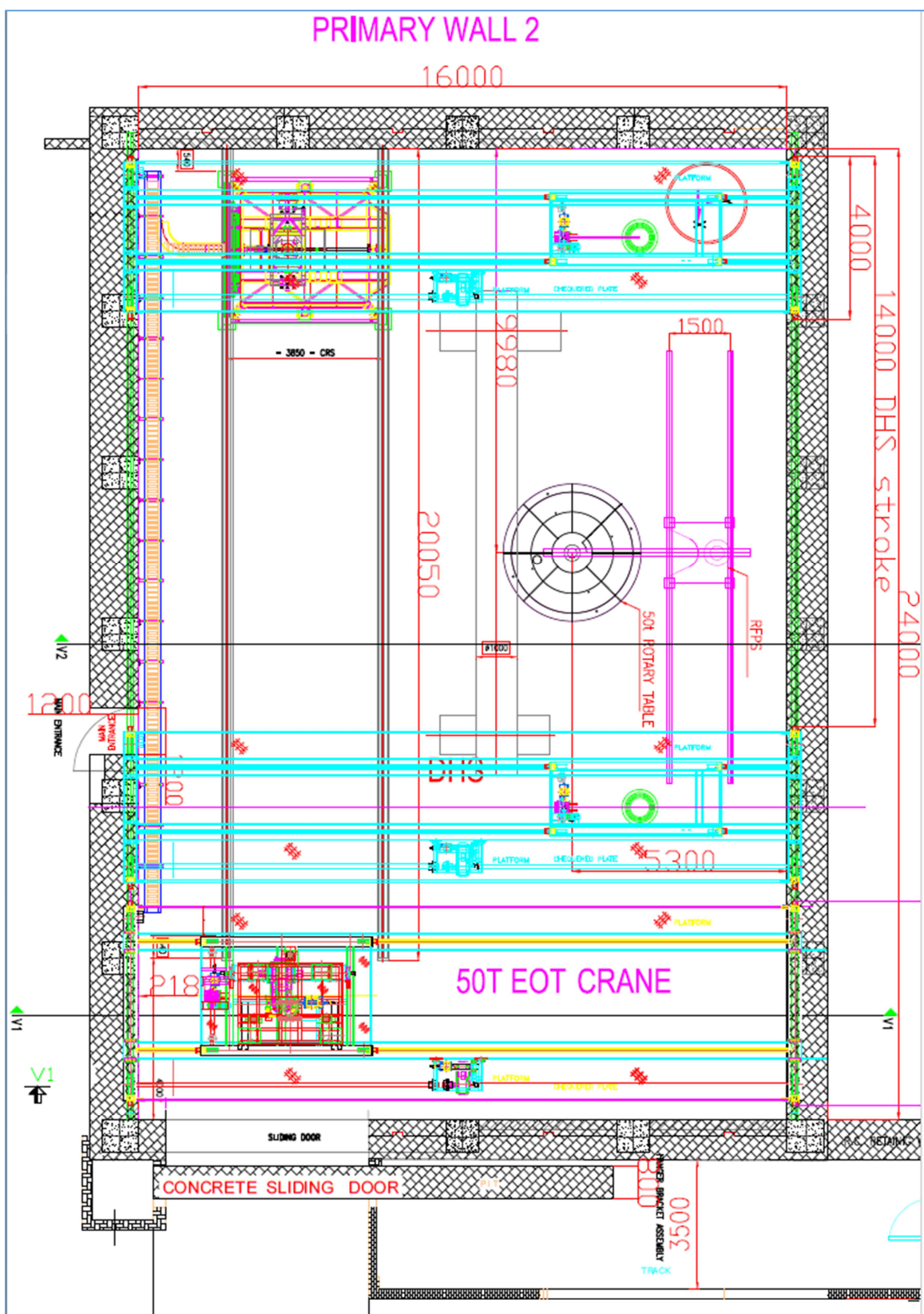
(h) The test load shall be lifted 18 to 24 inches from the floor and held in this position. The safety brake shall hold the test load without any slipping or drifting. If the load drifts, the brake shall be adjusted and the test redone as stated above. The hoist shall raise and lower the test load smoothly without excessive noise or chatter from the hoisting mechanism. Gear box or other mechanisms Noise levels should be less than 85db. However, it is preferred to maintain below 80db.

(i) The hoist load brake shall be tested as follows: Raise the test load about 5 feet from the floor, stop, and then reverse the load direction so that the load is descending. The test load shall raise and lower smoothly. If the test load accelerates or can't be controlled, the brake is not acceptable. After repair or adjustment, the above test shall be redone.

(j) After successful load test and qualification of the TPT, LINAC system shall be integrated with TPT (including all system cables). The TPT shall be operated throughout the complete range of travel and speeds with the LINAC system. Operational speeds and duty cycles shall be checked with the hoist supporting the rated load. During this Rated Load test a temperature rise and an electrical load test for each motor shall be performed. Data from each motor shall be recorded and shall include TPT motion, speed, duration, duty cycle, current per phase, and temperature rise.

17. DOCUMENTS TO BE SUBMITTED ALONG WITH SUPPLY OF TPT

- a)** Three copies of final drawings (Mechanical & Electrical) and design data of TPT which have been approved by the purchaser.
- b)** Three copies of Operating and Maintenance manuals, with lubrication charts. Supplier shall submit total QAP document (bound book) with material test certificates, test certificates for brought-out items, load bearing elements, fabrication, internal inspection reports, etc., along with supply of TPT.
- c)** Apart from hardcopy, all final drawings of TPT, major assembly drawings of major components and circuit diagrams of both electrical and instrumentation shall be submitted in soft copy in 'CD' in AUTOCAD format.



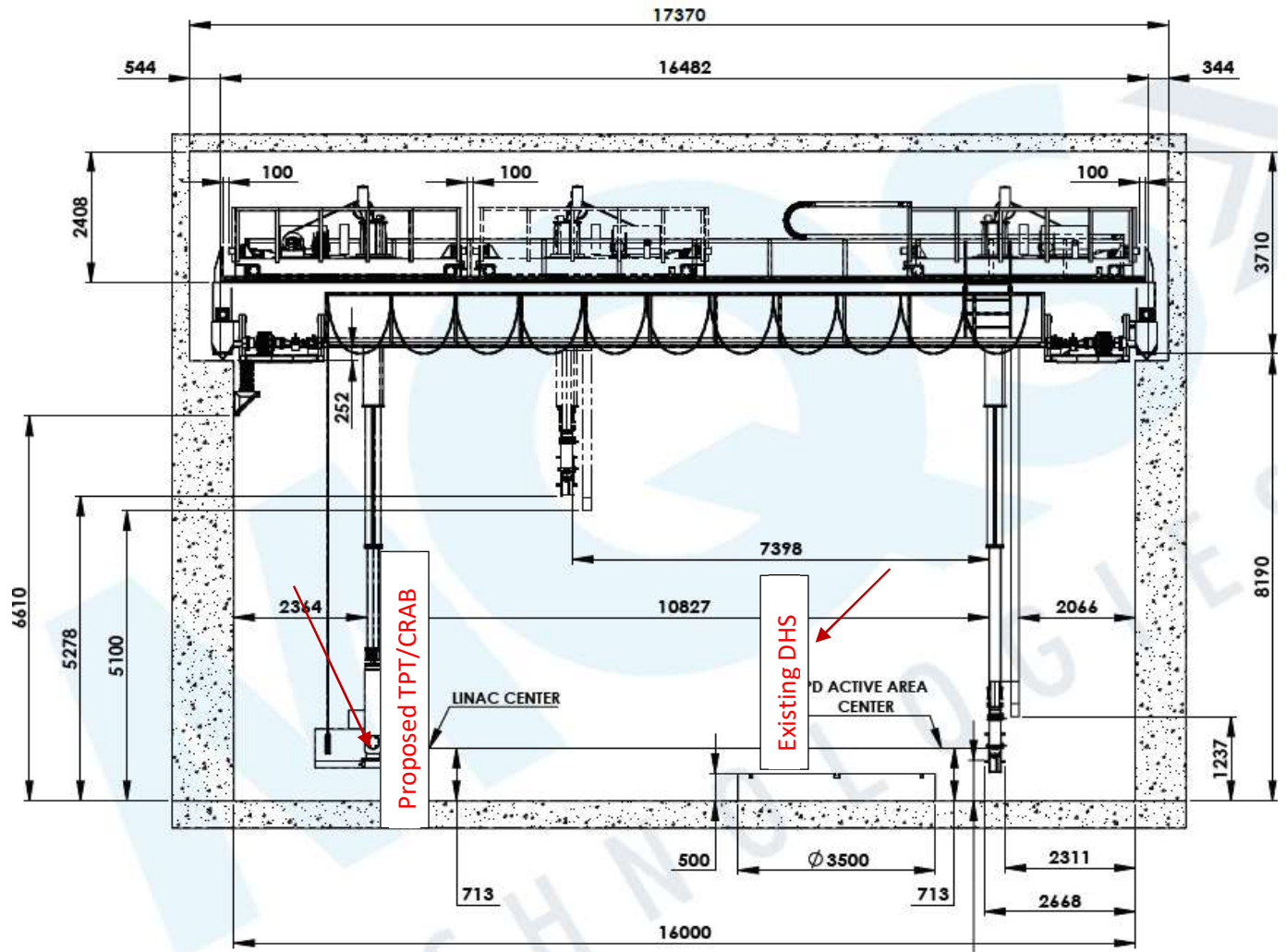


Fig-3: TPT & DHS arrangement

CT rails (60lb/yd): TPT has to be installed on the available DHS (EOT crane based) CT rails . The details of the CT rails will be given at the time of drawings preparation.

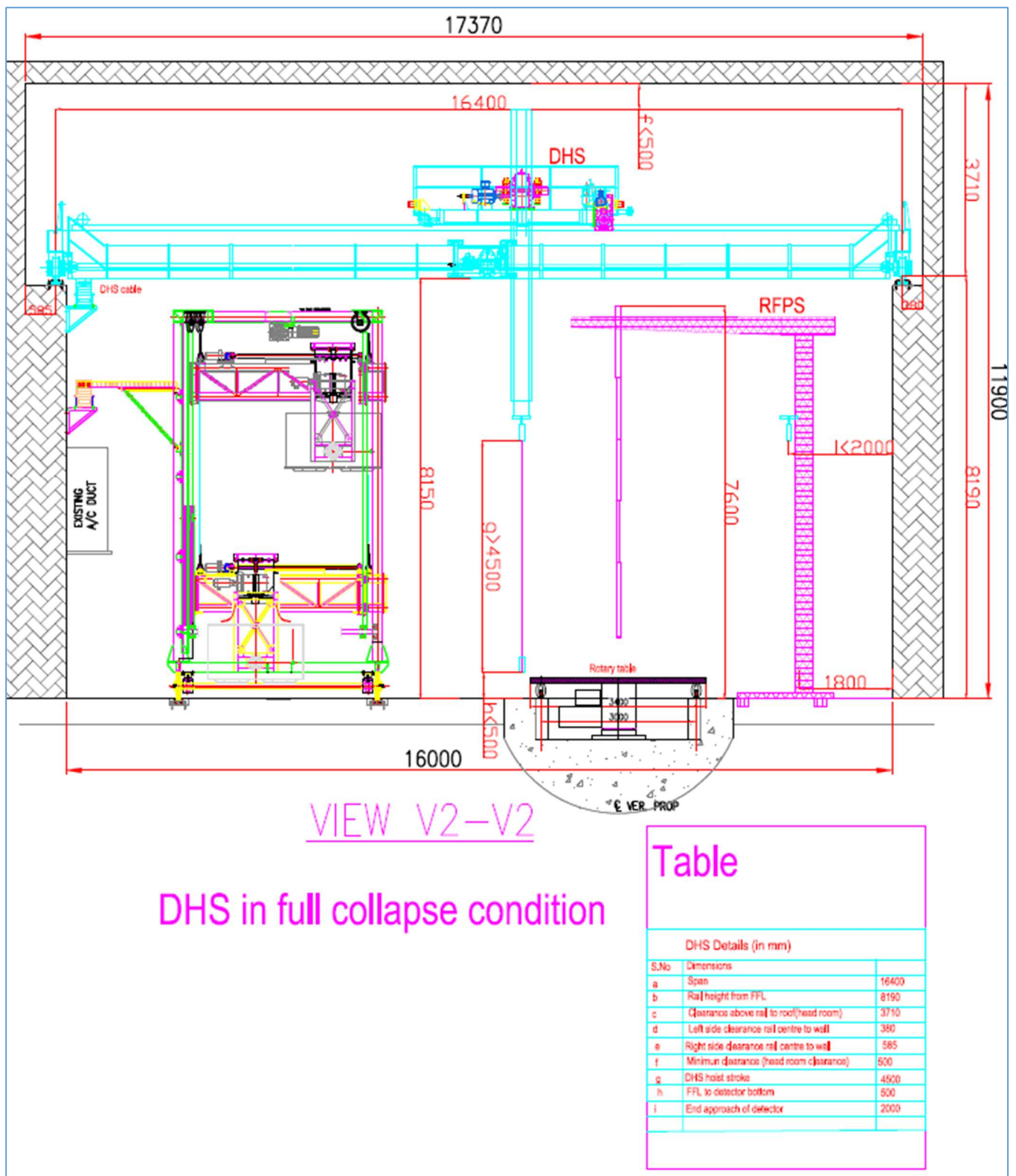


Fig-4: DHS-Hoist cylinders in collapse condition

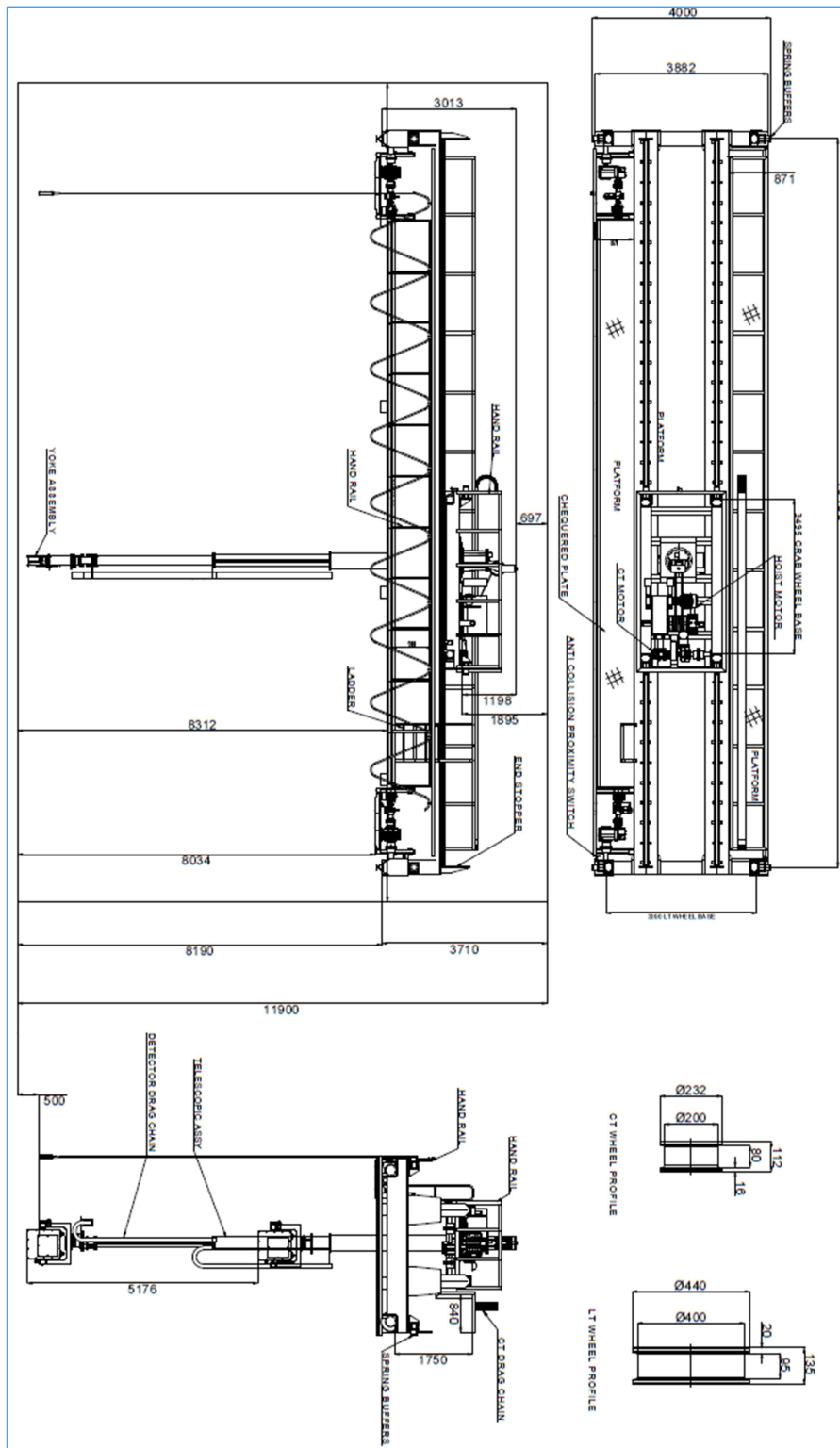


Fig-5(a): Existing DHS GA drawing

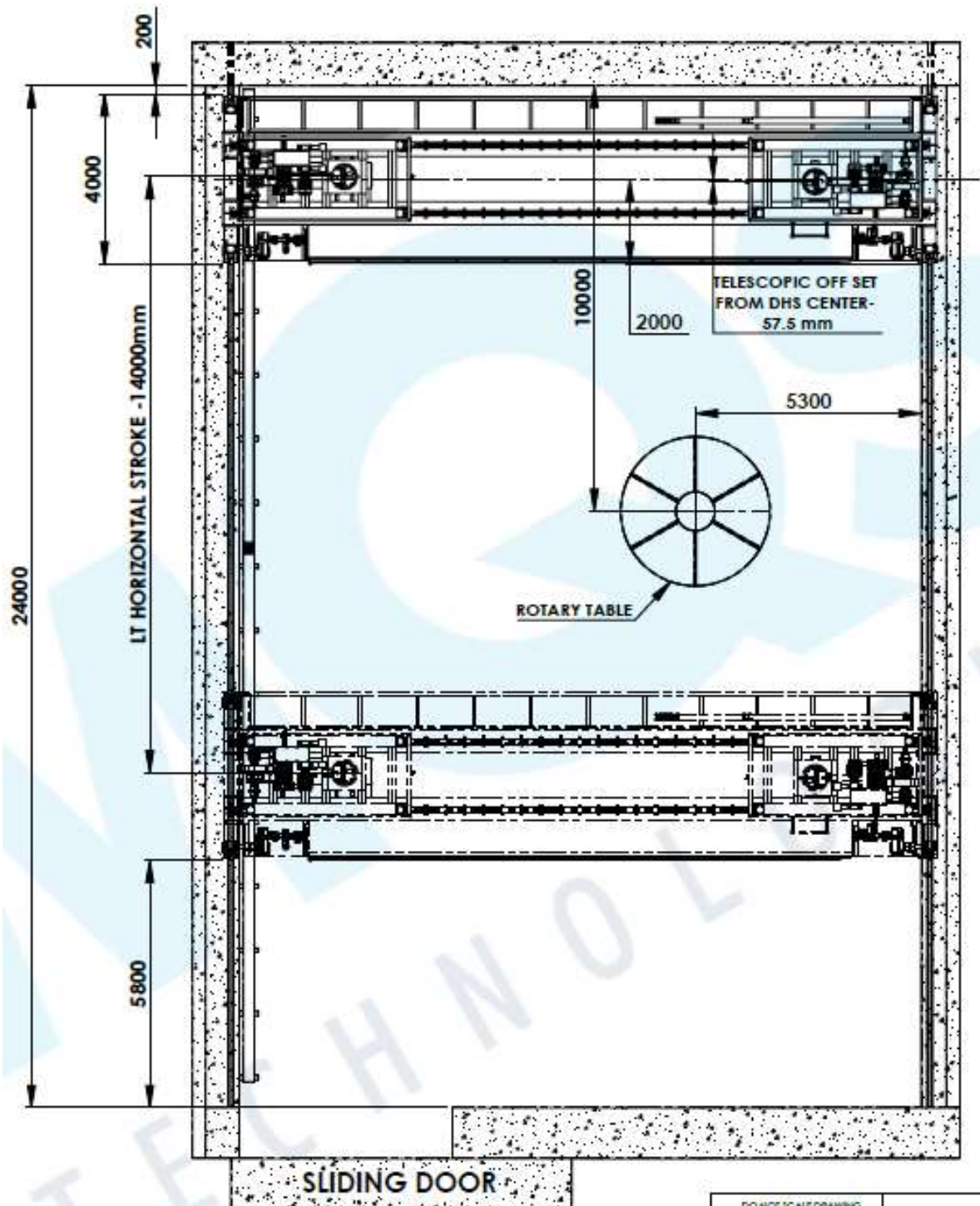


Fig-5 (b): GA of TPT on DHS (plan view)

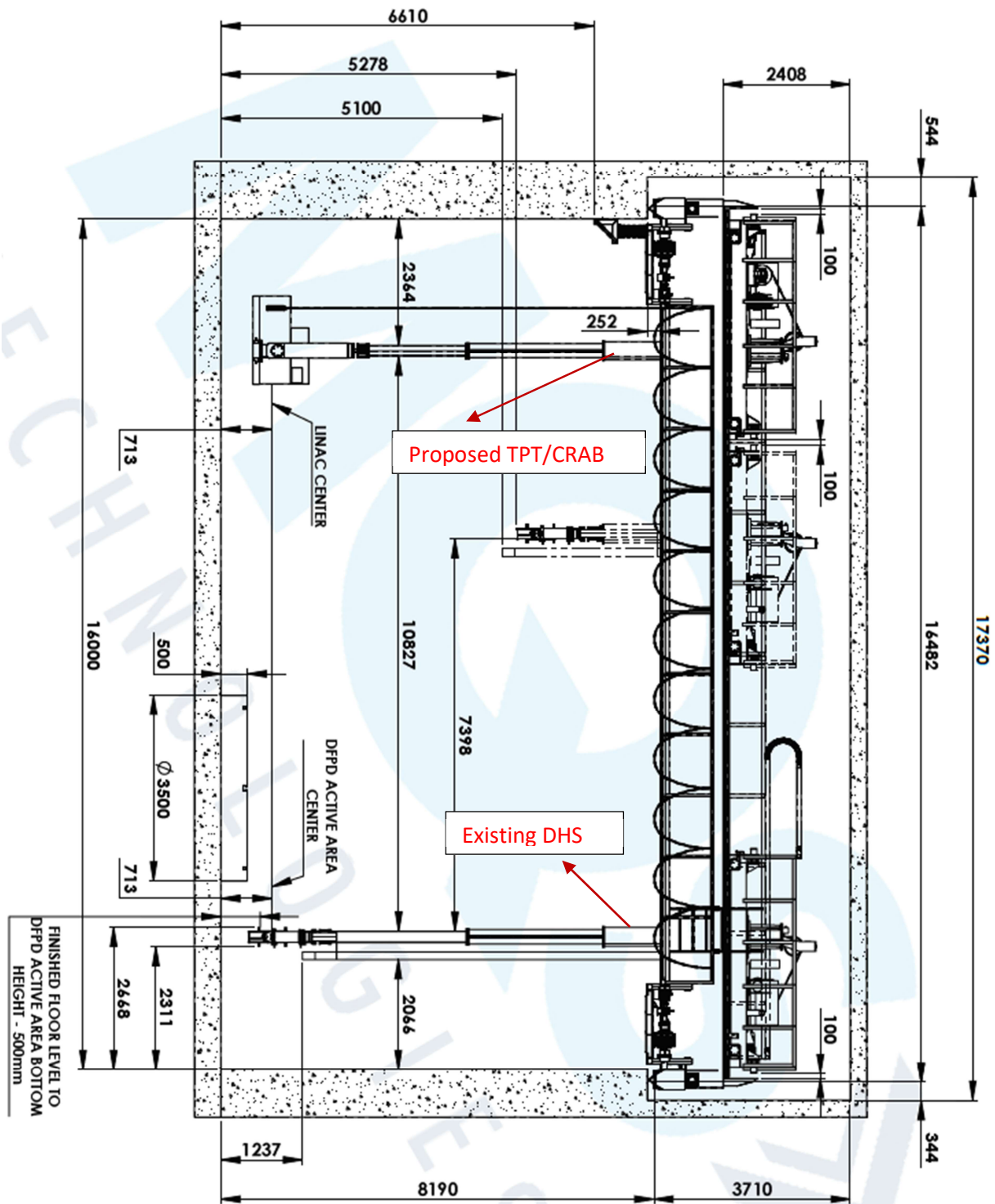


Fig -5(c): GA of TPT on DHS (Front view)

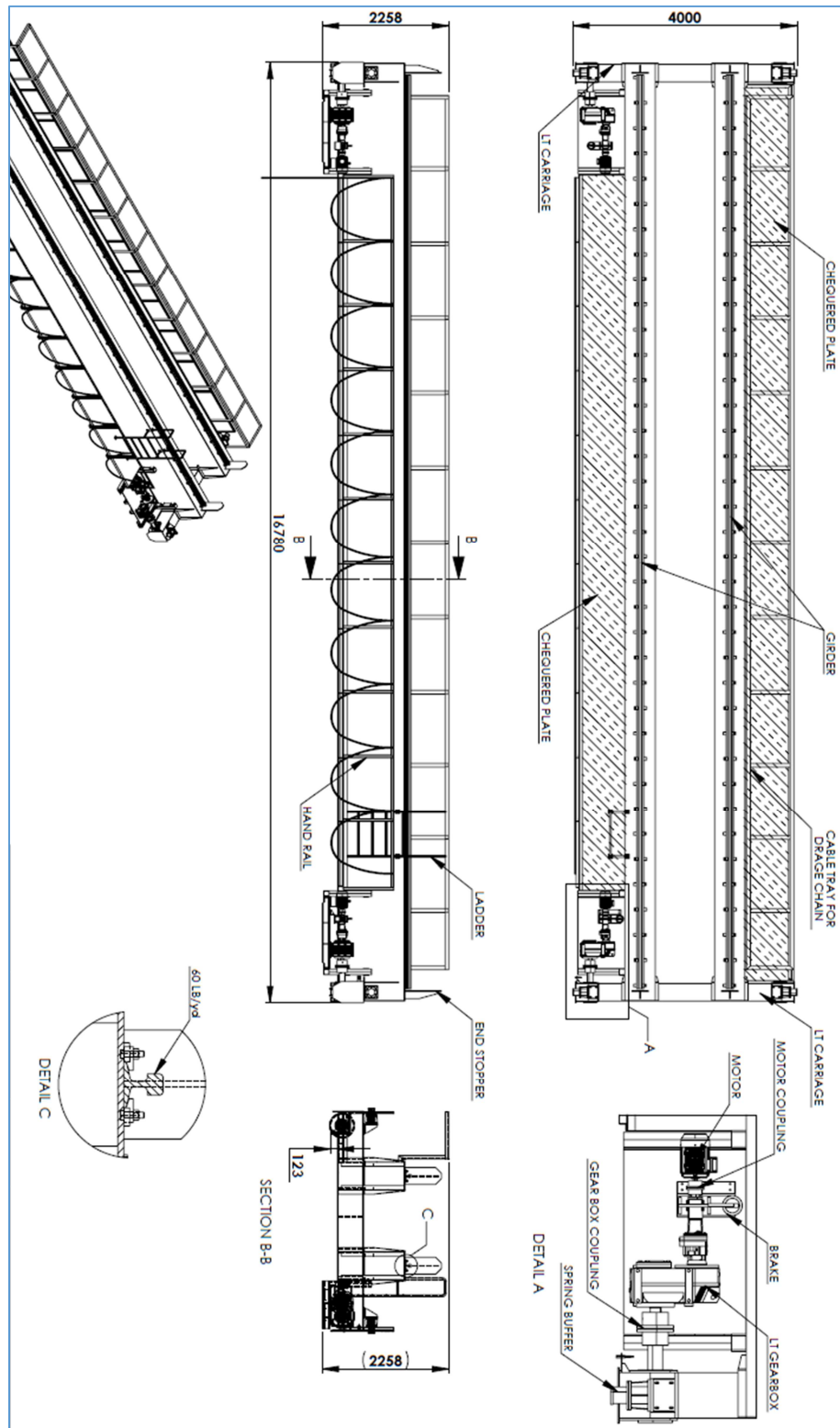


Fig-5(d): Details of DHS-CT bridge girders

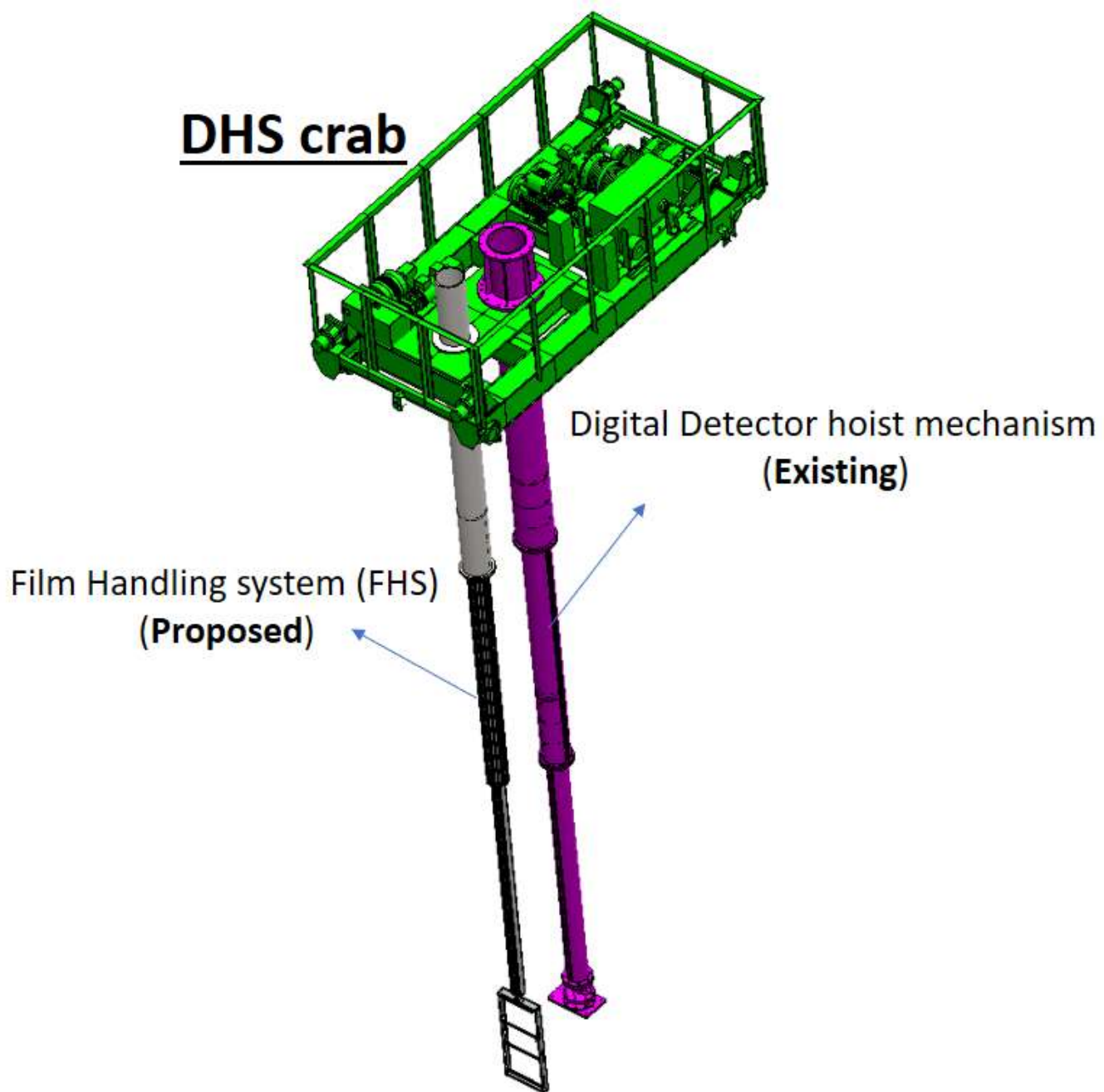


Fig-6(a): Configuration of FHS (on DHS Crab)

DHS crab

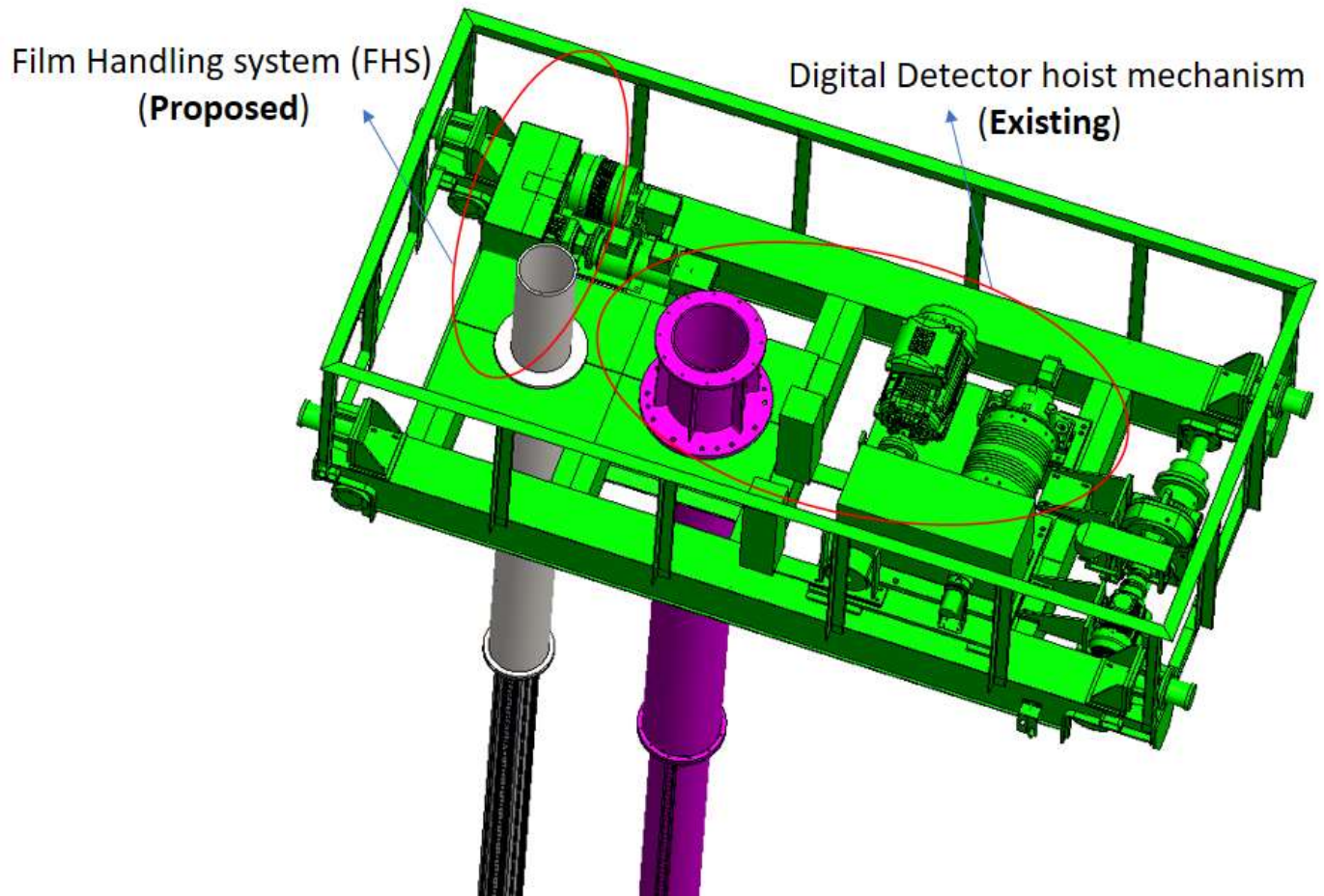


Fig-6(b): FHS arrangement on DHS crab

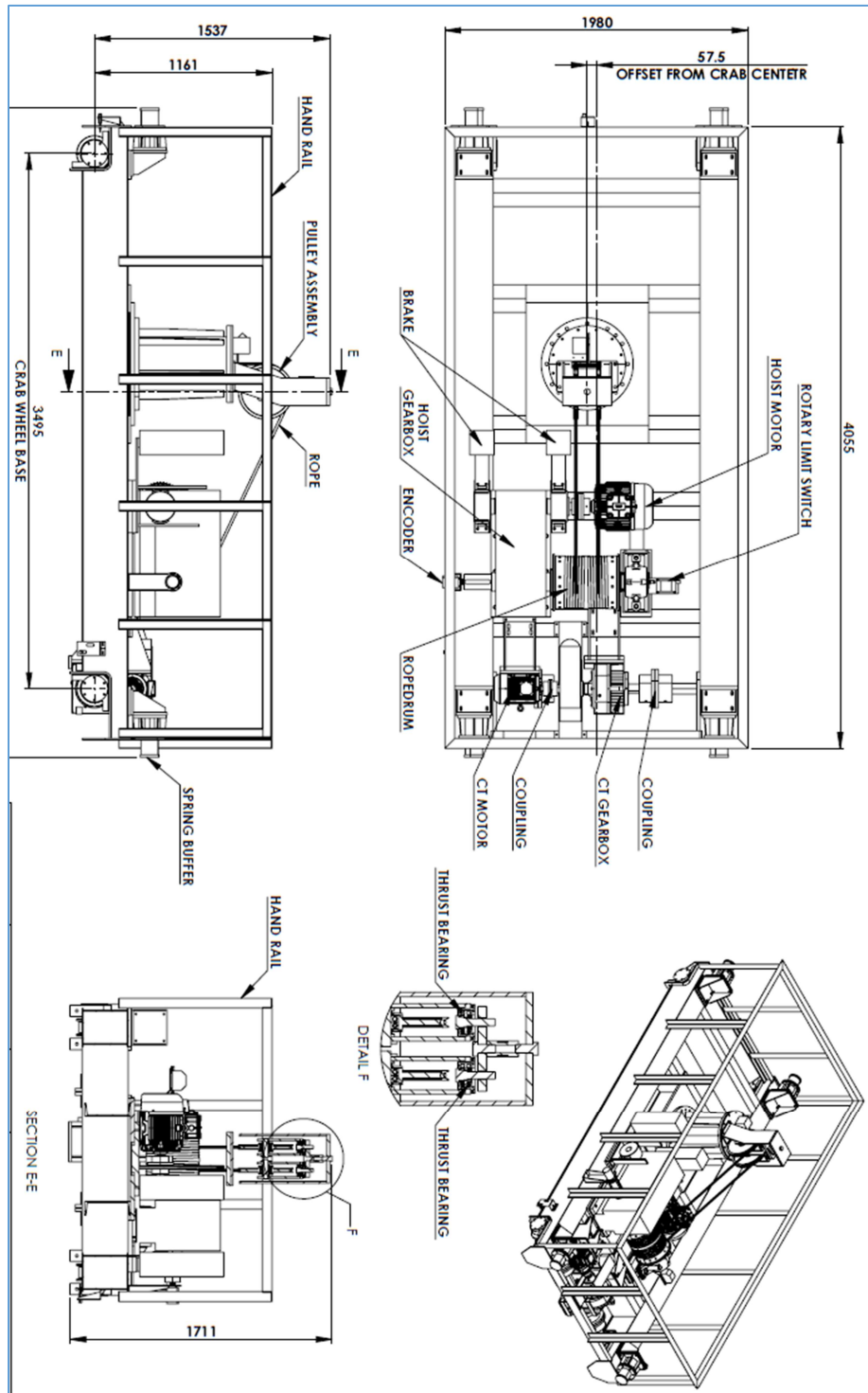


Fig-7: GA of DHS Crab

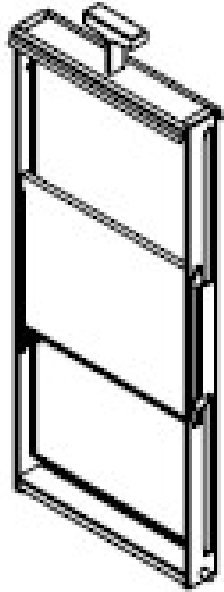
 Overall size: 950 x 450 Sheet thickness: >1mm	 Overall size: 900 x 250 Sheet thickness: >1mm
Full cassette frame	Half cassette frame

Fig-8: Details of Radiographic Cassette frames

Annexure: 5 (Documents to be submitted along with technical bid)

CHECK LIST OF TECHNO-COMMERCIAL TERMS

S.No	Description	Compliance
1.	The detailed scope of work and technical specifications are under stood and price was quoted accordingly.	Yes / No
2.	Submission of bid letter along with one set of this tender document duly signed and stamped as token of acceptance	Yes / No
3.	Bids shall be submitted in two parts: 1. Technical bid, 2. Commercial bid	Yes / No
4.	Documents mentioned in technical bid have been submitted.	Yes / No
5.	Declaration for supply of spares for the period of 10 years to ensure the trouble-free operation of LINAC system on chargeable basis.	Yes / No
6.	The Unpriced copy of schedule of prices with all other commercial terms, taxes, duties, exemption certificates and conditions duly filled (prices to be kept blank), signed and stamped.	Yes Ff/ No
7.	Documents mentioned in commercial/price bid have been submitted. Dashboard should contain only annexure-4 should be filled and scanned copy shall be attached with commercial bid.	Yes / No
8.	Validity of Offer is 120days	Yes / No
9.	Supporting documents are attached for bid pre-qualification criteria	Yes / No
10.	Declaration of Make in India content (MII as a whole of the system)	Yes / No
11.	OEM authorization letter for LINAC system supply	Yes / No
12.	GST to be indicated in % if not mentioned it shall be assumed that the price quoted are inclusive of taxes	Yes / No
13.	Delivery Schedule is acceptable	Yes / No
14.	Accepted the Department Payment Terms	Yes / No
15.	Warranty after the receipt and acceptance for a period of minimum 12 months	Yes / No
16.	3% of the Order Value shall be submitted as Security Deposit for the performance of the contract, valid till acceptance of the system.	Yes / No
17.	3% of the Order Value shall be submitted as Performance Bank Guarantee.	Yes / No
18.	3% of the order value shall be submitted as SD or SD-cum-PBG, valid till the completion of total contractual obligation for SD. In case of SD cum PBG, it should be till supply period plus Warranty period plus 60 days. Indemnity bond in case of central government/PSU organizations of INDIA.	Yes / No
19.	Liquidated Damages clause acceptable	Yes / No
20.	Attached the list of major Imported components	Yes / No

Signature of Authorized Person with Seal