Bidders to note the following Additional Terms and Conditions for subject tender-

1. Tender Type	**Open Tender (Domestic-Indian)**	
2. Package	**D/G EOT CRANE UP TO 100T**	
3. Project	**2 X 800 MW NTPC LARA STPS STAGE - II**	
4. End Customer	**NTPC**	
5. Executing Agency	**BHEL-PSWR**	
6. Nature of Package (Divisible/Non-Divisible)	**Non-Divisible**	
7. Technical Scope	As per Technical specification No: PE-TS-508-501-A001 Rev 00	
8. Schedule of Pre-Bid Discussion	Based on Bidder's request, Pre-Bid meeting shall be arranged.	
9. PVC	Applicable Please refer PVC Annexure enclosed in GeM bid	
10. CIF APPLICABLE	NO	
11. QUANTITY VARIATION	AS PER GCC BOP (+/-10%)	
12. REVERSE AUCTION	**YES – BID TO RA** **H1 ELIMINATION**	
13. CUSTOMER APPROVAL REQUIRED	**YES**	
14. Eligibility of Local Supplier as per Make in India Guideline	**Only Class I Supplier (with local content 60% and above)**	
15. HSE Guideline	**Applicable**	
16. Prequalification Requirement	Financial PQR- YES	Technical PQR- YES
17. Delivery terms for Supply portion	FOR Despatch Station	
18. Bid Security/ Earnest Money Deposit (EMD)	**EMD is applicable. EMD amount shall be Rs. 6 Lakhs.** EMD is to be submitted by the all bidders along with their bids (exemption from EMD shall be as GeM GTC) **Modes of deposit** The EMD may be accepted only in the following forms: i) Electronic Fund Transfer credited in BHEL account (before tender opening) BHEL-PEM account details are as follows: Bank name, State Bank of India Account No: 39922687394 IFSC: SBIN0017313 BRANCH-CAG II NEW DELHI ii) Banker's cheque/ Pay order/ Demand draft, in favor of BHEL-PEM, Noida (along with the offer). iii) Fixed Deposit Receipt (FDR) iv) Bank Guarantee from any of the Scheduled Banks (refer Annexure A along with GeM Bid/NIT for BG Format)	

	v) Insurance Surety Bonds. **Validity period of EMD** The EMD shall remain valid for a period of 45 (forty-five) days beyond the final bid validity period. EMD shall not carry any interest. **Forfeiture of EMD** I. A bidder's EMD will be forfeited if the bidder withdraws or amends its/his tender or impairs or derogates from the tender in any respect within the period of validity of the tender or if the successful bidder fails to furnish the required performance security within the specified period mentioned in the Tender. II. EMD by the tenderer to be withheld in case any action on the bidder is envisaged under the provisions of extant "Guidelines on Suspension of business dealings with suppliers/ contractors (abridged version of guidelines is available on www.bhel.com)" and forfeited/ released based on the action as determined under these guidelines. **Return of EMD** I. Bid securities of the unsuccessful bidders shall be returned to them after expiry of the final bid validity period and latest by the 30th day after the award of the contract. However, bid securities of unsuccessful bidders during first stage i.e. technical-commercial evaluation etc. shall be returned within 30 days of declaration of result of first stage i.e. technical-commercial evaluation. II. Bid security shall be refunded to the successful bidder on conclusion of the order/ receipt of a performance security.
19. Performance Security (PS)	I. Initially 10% of the contract value (total order value in case of GeM POs excluding PVC/total Ex-works price in case of outside GeM POs excluding PVC). However, 5% of the contract value (as above) will be released after completion of Main Supply based on certification by Project Group/Purchaser OR II. 5% of the contract value (total order value in case of GeM POs excluding PVC/total Ex-works price in case of

	outside GeM POs excluding PVC). Additional 5% of the contract value will be retained from first bill & subsequent bill(s) of the same contract. The retention amount will be released after completion of Main Supply based on certification by Project Group/Purchaser **Validity of PS** Initial validity of performance security shall be 44 months from LOA date (Considering delivery period of 24 months + 18 months guarantee period + 2 months claim period is already mentioned in GTC cl no. 7.ii GeM 3.0). Further, extension if any shall be as per GeM Terms. Further, extension if any shall be as per GeM Terms **Modes of deposit** Performance security may be furnished in the following forms: a) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL. b) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL. c) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL). d) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL). e) Insurance Surety Bond. (Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith) Performance Security is to be furnished within 14 days from the date of PO/LOA and it should remain valid for a period of 60 (sixty) days beyond the date of completion of all contractual obligations of the supplier, including warranty obligations. **Remarks for PS** a) The performance security will be forfeited and credited to BHEL's account in the event of a breach of contract by the supplier.

	b) Performance security should be refunded to the contractor without interest, after he duly performs and completes the contract in all respects but not later than 60(sixty) days of completion of all such obligations including the warranty under the contract. The Performance Security shall not carry any interest.
20. Breach of contract, Remedies and Termination	In case of Breach of Contract, BHEL shall recover 10% of the contract value from the Vendor using following instruments: (i) encashment of security instruments like EMD, Performance Security with executing agency (PS-Regions/PEM as applicable) against the said contract (ii) balance amount (if value of security instruments is less than 10% of the contract value) from other financial remedies i.e. available bills of the Vendor, retention amount etc. with executing agency (PS-Regions/PEM as applicable) (iii) balance amount from security instruments like EMD, Performance Security and other financial remedies i.e. available bills of the Vendor, retention amount etc. with other units of BHEL (iv) if recovery is not possible then legal remedies shall be pursued The balance scope shall be got done independently without Risk & Cost of the failed supplier/ contractor. Further, levy of liquidated damages, debarment, termination, de-scoping, short-closure, etc., shall be applied as per provisions of the contract.
21. Integrity Pact Applicability -	YES
22. **Bidders can to download detailed technical specification number-** PE-TS-508-501-A001 Rev 00 **at www.pem.bhel.com and www.bhel.com**	
23. Bidders are requested to refer clause no 26.0 (Make in India) of GCC-BOP. "For this procurement, the local content to categorize a supplier as Class I local supplier/ Class II local supplier/ Non Local supplier and purchase preference to Class I local supplier is as defined in Public Procurement (Preference to Make India), Order 2017 dated 16.09.2020 issued by DPIT. In case of subsequent order issued by nodal ministry changing the definition of local content for item in NIT, the same shall be applicable even if issued after issue of this NIT but before opening of part-II bids against this NIT." This package is not divisible in nature. The margin of purchase preference shall be as per order dtd. 16.09.2020. **For this tender, offer from only class-1 local suppliers (meeting minimum 60% local content requirement) shall be considered.** Bidders are required to provide the following along with the part-1 bid:	

- Provide a certificate (in line with attached draft) from 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.

- Provide the details of the location(s) at which the local value addition shall be made.

24. Please furnish land border certificate as per enclosed format dully signed and stamped by Director or Company Secretary or authorised person by Board of the Company.

25. In line with cl. No. 12 of (ITB) BOP-GCC, following Independent External Monitors (IEMs) have been appointed by BHEL.
Shri Otem Dai, IAS (Retd.) (iem1@bhel.in)
Shri Bishwamitra Pandey, IRAS (Retd.) (iem2@bhel.in)
Shri Mukesh Mittal, IRS (Retd.) (iem3@bhel.in)

26. Delivery Schedule shall be as follows-
- Main Supply: "9 months from the date of LOA. Drawing/ documents submission and re-submission shall be as per Technical Specification."
- Mandatory Spares: 24 months from the date of LOA or 6 Months from the BBU approval whichever is later.
- E&C: Within 22 months from the date of LOA.

Note: Above delivery conditions are to be complied by bidder strictly.
Delivery on GeM portal shall be selected as 999 days. Same shall be indicative to suffice the GeM portal requirement.

27. **Payment Terms – As per GCC BOP.**
Provision of offline payment in GeM shall be utilized.

28. **Guarantee Period : As per GCC BOP**

29. Evaluation Criteria - **Total Package Price (including freight and taxes)**

Bidder has to quote the total package price of complete scope, as per technical specification, in GeM. Price break up of total package price shall be provided by bidder in price format uploaded in GeM.
In case of discrepancy between total package price and price break up, total price quoted on GeM shall prevail and break up shall be corrected accordingly.

30. **In case of single qualified bid, price bid of single qualified bidder shall be opened.**

31. In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following order of precedence:
i. Amendments to Purchase Order/ Work Order/ Framework Agreement
ii. Purchase Order/ Work Order/ Framework Agreement
iii. Letter of intent (LOI)/ Letter of Award (LOA)
iv. Clarifications agreed between Buyer and Seller as regards to the tender or the bidding conditions
v. The final set of deviations acceptable to purchaser with loading as specified in relevant section.
vi. Corrigenda to NIT, with those of later date having precedence over those of earlier date
vii. Enquiry letter along with Buyer specific ATC and annexures except documents listed in point no (vii) to (ix) below
viii. Technical specifications
ix. Special Conditions of Contract (SCC)
x. GeM GTC latest version applicable as on enquiry date.

Bidders to note the following Additional Terms and Conditions for subject tender-

1. Insurance Deductibles and Excess:

   For Marine Cover: Rs 20,000/-

   For Storage /Erection and Testing Cover:
   a. Normal Period: 5 % of the claim amount subject to a minimum of Rs. 2.25 Lakh.
   b. Testing Period: 5% of the claim amount subject to minimum of Rs. 6.0 Lakh.

   Act of God Perils: 10% of the claim amount subject to minimum of testing period excess.

   Fire / Explosion Claims: 20% of the claim amount subject to minimum of testing period excess

   Extended Maintenance Cover/ Defect Liability Cover: As applicable for testing period excess.

   Third Party Liability: The policy excesses (normal/testing periods) shall apply for third party liability property damage claims also. For third party liability claims arising out of acts of GOD perils. The excess applicable to AOG claims shall apply.

   "The above-mentioned insurance deductibles/excess are tentative in nature and may change after award of contract which will be applicable within quoted price".

2. Vendors shall submit billing documents for payment directly to BHEL. Payment will be released within days as mentioned below after submission of complete documents:

   i. 90 days for non MSME as per MSMED Act
   ii. 45 days for vendors qualified and registered as Micro and Small Enterprises MSEs as per MSMED Act
   iii. 60 days for vendors qualified as Medium Enterprises as per MSMED Act.

   Notes:

   1. Vendors are required to issue Tax Invoice inclusive of PVC value (if applicable) wherever indices are available. In case PVC indices not available, vendors to submit PVC invoices on availability of applicable indices.
   2. Any negative PVC, if not adjusted in earlier payments, will be adjusted at the time of remaining payments.

3. Bidder to note that this is an **Open Tender enquiry** & PBO/RA participation shall be subject to following condition:

   a. Qualifying Technical & Financial Pre-Qualification Requirement.
   b. Techno-commercial acceptance of offer by BHEL-PEM.
   c. Approval of bidder by End Customer: - Same shall be taken up with end customer based on the latest credentials/reference list furnished by bidder in the format. Accordingly, bidders are requested to submit credential along with their technical bid.

The bidders who are not registered with BHEL-PEM may apply for registration in BHEL-PEM through Registration Portal available at www.pem.bhel.com -->vendor section-->online supplier registration. All credentials and/or documents duly signed & stamped related to registration has to be uploaded on the website & submit the application for registration. One set of hard copy filled-up SRF downloaded from Online Registration Portal duly signed & stamped has to be submitted.

4. The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the firms debarred across BHEL, shall be rejected. The list of firms debarred across BHEL is available on BHEL web site www.bhel.com.

1.0 Integrity commitment, performance of the contract and punitive action thereof:

1.1. Commitment by BHEL: BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

1.2. Commitment by Bidder/ Supplier/ Contractor:

1.2.1. The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

1.2.2. The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

1.2.3. The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in malpractices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extant guidelines of the company available on www. bhel.com and/or under applicable legal provisions".

5. Bidders to ensure that Third party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name & designation of Issuing Authority and its organization contact number and e - mail Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.

6. Bidders to comply Govt. of India, Ministry of Power, order no-25-111612018-PG dated 02/07/2020 regarding mandatory testing of all the imported items/equipment's/components.

7. This item/Package falls under the list of items defined in Para 3 of Ministry guideline ref no.F.20/2/214-PPD(Pt.) dated.20-09-2016 (in respect of procurement of items related to public safety, health, critical security operations and equipment's, etc) & hence no relaxation of PQR for start-up/MSME vendors is envisaged for the items/Package"

8. Bidders may visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation etc. before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above.

9. The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines

10. A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:
    a) they have controlling partner (s) in common;' or
    b) they receive or have received any direct or indirect subsidy/ financial stake from any of them; or
    c) they have the same legal representative/agent for purposes of this bid; or
    d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder; or
    e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from one bidding manufacturer in more than one bid, or
    f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorize only one agent/dealer. There can be only one bid from the following:
        1. The principal manufacturer directly or through one Indian agent on his behalf; and
        2. Indian/foreign agent on behalf of only one principal,'

        or
    g) A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid, or
    h) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business. "

11. Bidder to quote non-zero freight %.

12. "Self-declarations/ auditor's/ accountant's certificates submitted by the manufacturer/ supplier may be verified randomly by the committee constituted as per MoP Order 28-07- 2020. In case of false documents/misrepresentation of the facts requisite action against such manufacturer/ supplier will be taken based on the recommendation of the Committee."

13. **Bidder to agree with all the clauses except (clause no-6.0 to 9.0, 13.0, 15.0 & 25.0 of ITB of GCC-BOP, 11.0 & 27.0 of GCTC of GCC-BOP) of GCC BOP (available on www.pem.bhel.com) & SCC Rev-00 of the project.**

14. All other correspondence thereof shall be addressed to the undersigned by name & designation and sent at the following address:

Vinod Kumar / SDGM, BOP **M/s Bharat Heavy Electricals Ltd.,** Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 E-MAIL: **vinod.kumar@bhel.in** Ph. No. 9873711252; 0120-6748091	**Amit Kumar / Manager– BOP** **M/s Bharat Heavy Electricals Ltd.,** Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 E-MAIL: **amitkum@bhel.in** Ph. No. 9910906336	

249320/2024/PS-PEM-MAX

PRICE ADJUSTMENT FORMULA FOR MAIN SUPPLY AND MANDATORY SPARES FOR DOUBLE GIRDER EOT CRANES UPTO 100T PACAKGE FOR 2x800MW LARA STPP STAGE-II

(1) The price adjustment formula is defined for price components related to Main Supply including commissioning spares and Mandatory spares.

(2) The amount of price adjustment shall be computed as under:

EC = EC1 - EC0

EC1 will be computed as follows:

$EC1 = EC0 \times \{F + a \times (0.8 \times A_1/ A_0 + 0.2 \times B_1/ B_0) + Lb \times L_1/ L_0\}$

Where

EC = Adjustment in Ex-Works supply Price.

EC1 = Adjusted Amount of Ex-Works supply Price.

EC0 = Ex-Works supply Price as per LOA.

(i) 'F' shall be fixed portion of the Ex-Works supply price and shall be considered as 0.15.

(ii) 'a' shall be co-efficient of major materials/ items involved in the Ex-Works Component of the Contract Price and shall be considered as 0.55.

(iii) 'A' shall be Wholesale Price Index for "MANUFACTURE OF BASIC METALS" as published in RBI Bulletin, Sl.no. 1.3.14, Base: 2011-12 = 100

(iv) 'B' shall be Wholesale Price Index for "MANUFACTURE OF ELECTRICAL EQUIPMENT" as published in RBI Bulletin, Sl.no. 1.3.17, Base: 2011-12 = 100

(v) 'Lb" shall be co-efficient for labour component in the Ex-Works Component of the supply Price which shall be considered as 0.3.

(vi) 'L' shall be consumer price index for industrial workers as published by RBI in RBI Bulletin, S.N. 1, Base year 2016=100 (Extract of website is pasted below for reference).

(vii) For the indices,
Subscript '0' refers to indices of the Base Month.
Subscript '1' refers to indices of the month before the month in which delivery is made. The latest available indices are to be extrapolated to the above defined month wrt the base month.

Source link of RBI bulletin: https://rbi.org.in/Scripts/BS_ViewBulletin.aspx?Id=20964

Note:

1) Prices shall remain firm till completion schedule as defined in LOA/s. Price adjustment as defined above, shall be applicable only beyond completion schedule as per LOA. Price adjustment shall be payable to vendor only if the delay is not attributable to the vendor. However, if the delay is attributable to vendor then the negative price adjustment (if applicable) shall be passed on to BHEL.

2) The price adjustment shall be limited to (+) 10% of Ex-Works Supply Price including commissioning spares, Mandatory spares.

PRICE ADJUSTMENT FORMULA FOR ERECTION & COMMISIONING (E & C) PORTION FOR DOUBLE GIRDER EOT CRANES UPTO 100T PACAKGE FOR 2x800MW LARA STPP STAGE-II

(1) The price adjustment formula is defined for price components related to Erection & Commissioning.

(2) The amount of price adjustment shall be computed as under:

ER = ER1 - ER0

ER1 will be computed as follows:

$ER1 = ER0 \times \{F + Lb \times L_1 / L_0\}$

Where

ER = Adjustment in E&C Prices (without taxes & duties).

ER1 = Adjusted Amount of E&C Prices (without taxes & duties).

ER0 = E&C Prices (without taxes & duties) as per LOA.

(i) 'F' shall be fixed component and shall be considered as 0.15.

(ii) 'Lb" shall be co-efficient for labour component in the Ex-Works Component of the supply Price which shall be considered as 0.85

(vii) 'L' shall be consumer price index for industrial workers as published by RBI in RBI Bulletin, S.N. 1, Base year 2016=100 (Extract of website is pasted below for reference).

(viii) For the indices,
Subscript '0' refers to indices of the Base Month.
Subscript '1' refers to indices of the current month. The latest available indices are to be extrapolated to the above defined month wrt the base month.

Source link of RBI bulletin: https://rbi.org.in/Scripts/BS_ViewBulletin.aspx?Id=20964

Note:

1) Prices shall remain firm till completion schedule as defined in LOA/s. Price adjustment as defined above, shall be applicable only beyond completion schedule as per LOA. Price adjustment shall be payable to vendor only if the delay is not attributable to the vendor. However, if the delay is attributable to vendor then the negative price adjustment (if applicable) shall be passed on to BHEL.

2) The price adjustment shall be limited to (+) 10% of E & C Prices (without taxes & duties).

2X800 MW LARA TPP STAGE II

TECHNICAL SPECIFICATION
FOR
DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY

SPECIFICATION No. **PE-TS-508-501-A001**

REV NO. 0

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

INDEX

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	**PE-TS-508-501-A001** **Rev. No. 00** **Date : APRIL 2024**

PROJECT INFORMATION

SL.NO	DESCRIPTION	DETAILS
1	**CUSTOMER**	**NTPC Ltd.**
2	**CUSTOMER CONSULTANT**	**N.A.**
3	**LOCATION**	The project is located in Raigarh district of Chhattisgarh State.
4	**DATA**	
4.1	THE BASIC WIND SPEED “Vb” AT TEN METERS ABOVE THE MEAN GROUND LEVEL.	44 METERS PER SECOND
4.2	THE RISK COEFFICIENT “K1”	1.07
4.3	CATEGORY OFTERRAIN	CATEGORY 2
4.4	OTHER FACTORS	IN LINE WITH IS 875
4.5	SEISMIC ZONE	ZONE-III AS PER IS:1893
4.6	DESIGN AMBIENT TEMPERATURE	50 DEG. CELCIUS
5	**ELECTRICAL DATA**	
5.1	RATED VOLTAGE	415 V
5.2	FREQUENCY	50 Hz
5.3	PERMISSIBLE VARIATIONS FOR	
a.	VOLTAGE	+/-10 %
b.	FREQUENCY	(-)5 to (+)3 %
c.	COMBINED VOLTAGE & FREQUENCY	10 %
5.4	SYSTEM FAULT LEVEL AT RATED VOLTAGE FOR 1 SEC	50 kA
5.5	SHORT TIME RATING FOR TERMINAL BOXES FOR 0.25 SEC	50 kA

BHEL	**TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY**	**PE-TS-508-501-A001** **Rev. No. 00** **Date : APRIL 2024**

SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Engineering, Manufacturing Of	
a)	Main Supply	YES
b)	Commissioning Spares	YES
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	YES
7	Supervision of Erection & Commissioning	NO
8	Performance Guarantee (PG) Test	YES
9	Mandatory Spares	YES
10	O & M Service	NO
11	O & M Spares	NO
12	Storage	YES

	EXCLUSIONS	
1	Supply feeder and cable from feeder / MCC to isolating switch.	
2	Gantry girder	
3	Dead load for load/ overload testing at site	
	Note	
1	Load testing sling, cradles and any other item required by the vendor during the load testing shall be arranged by the vendor at no extra cost to the purchaser. Slings & cradles will be allowed to be taken back by the vendor, after completion of the test at site.	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024
	GENERAL TECHNICAL REQUIREMENT	
1.0	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.	
2.0	The equipment shall comply with all applicable safety codes and statutory regulations of India as well as of the locality where the equipment is to be installed.	
3.0	In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.	
4.0	The equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.	
5.0	Drawing/document submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drg/doc approval and training for the same. Bidder to ensure proper internet connectivity at their end.	
6.0	The first revision drawings/ documents submitted by vendor shall be complete in all respects.Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL / Customer's place as per the requirement for across the table discussions/ finalizations/ submissions of drawings.	
7.0	In case of any change in codes, standards & regulations between the date of bid opening (03.03.2023) and the date when vendors proceed with fabrication, the Employer shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the Employer such changes and advise Employer of the resulting effect.	
8.0	Bidder shall carry out the type tests as listed in the Quality Plan. OR Bidder shall furnish Type Test Certificate of specified Type Test as per quality plan for applicable equipment which has been carried out within last five years from 03.03.2023. These reports should be for the tests conducted on the equipment same (model / type / size / rating) to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. In absence of valid Type Test report vendor to conduct the same without any commercial & delivery implication to BHEL.	
9.0	Bidder shall submit stamped QP on compliance route in the event of order. In case, the bidder is supplying the item from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024
10.0	Sub vendor list is attached. Any additional sub - vendors proposed by biddder during contract stage shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.	
11	Document approval by BHEL / Customer shall not absolve the supplier of their contractual obligations of completing the work as per specification requirement without any commercial and delivery impact.	
12	**Mandatory Spares**	
12.1	One (1) Set is defined as 100% requirement for one crane for the entire cranes of similar size & capacity.	
12.2	.All essential spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is not applicable for particular equipment then suitable applicable alternate spare have been offered / shall be supplied without any financial implication.	
12.3	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the above list.	
12.4	Any item which is quoted as "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Bidder without any commercial implications. The Bidder shall note that if there in any change/ variation in equipment/ system during detail engineering which causes any change/ variation in the essential spares quantity, the same shall be supplied without any commercial implications. The price indicated for the mandatory spares shall be considered for the purpose of evaluation.	
12.5	Interchangeability and Packings: All spares supplied under this contract shall be strictly interchangeable with parts for which they are intended for replacements. These spares should include all mounted accessories like components, boards, add or items, fitting, connectors etc. and be complete in all respects so that the replacement of the main items by these spares does not require any additional item. The vendors must conform the pair to pair compatibility of each electrical spares modules with the modules should be supplied in the original package. All electronic modules should be pre set and/or preprogrammed for ready use at site. Alternatively, suitable instruction sheet indicating the details of required PCB jumper position, BCD which is setting, EPROM/PROM listing etc should be packed along with each module. Also a caution mark sign should be put on all such module which needs pre setting/pre programming before putting them in to service. The spare shall be treated and properly packed for long term storage.	
12.6	Identification: Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.	
13.0	The type of bearings for various parts as per IS:3177 (latest). Bearing life not less than 10,000 working hours.	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024
14.0	The crane shall be complete with trolley and truck, wheels and axles, Drive mechanisms, Hoisting Drums, Brakes, Creep Speed Arrangement, Lifting tackles, Buffers Electric Motors, Controls, Switch Board and cabling, horns, warning lights, Limit switches etc. Any item not mentioned herein but required to make the system complete for the satisfactory performance of the crane shall also be included.	
15.0	Trolley stops of spring type to be mounted independently on bridge rails to prevent trolley from running off.	
16.0	Buffers to be designed to bring the loaded crane to rest from a speed of 50% of the rated speed.	
17.0	Suitable guard to push forward or off the rail track any object placed across to be provided. Suitable guards to live electrical wirings downshop lead.	
18.0	Necessary access ladders shall be provided for access on to crane bridge platform form the gantry girder level, from crane bridge platform to trolley platform and from operating floor of pump to gantry girder level.	
19.0	The lifting tackle shall consist of a safety type lower pulley block, hook, necessary sheave and flexible steel wire ropes. The lower block sheaves and ropes shall be of adequate design and size to handle the specified loads.	
20.0	Each crane shall have a permanent inscription of English on each side, readily visible from the ground level, stating the safe working loads in tonnes for both the hooks, year of manufacture, crane serial number and manufacturer's name.	
21	SHOP TEST PROCEDURE FOR GEAR BOX	
21.1	Gear Box Running Test: The gear boxes shall be run under no-load condition at the rated speed for minimum four hours in each direction and the following are to be checked:	
a	All bolts at the joints remain tight.	
b	All gear mesh lines are getting enough lubrication.	
c	All bearings are getting enough lubrication.	
d	Bearing temperatures after running for four hours shall not exceed 50 deg. Centigrade or 15 deg. centigrade above ambient whichever is higher. Temperature shall be checked after every hour.	
e	Vibration : Maximum limit 125 microns (peak to peak)	
f	Sound: The gearbox shall not emit unusual sound as obtained under conditions of hard meshing, high spots etc. Maximum sound level shall be 85 dBA at a distance of 1000mm and 91 dBA at a distance of 300 mm.	
g	There shall be no Oil leakage at parting lines, bearing housings or inspection covers.	
21.2	**In addition to the above specific points, the following general points shall be ensured**:	
a	Inspection pockets are provided as required.	
b	Gear box casings are provided with at least two fit bolts/dowels at the parting line.	
c	Dip sticks with minimum / maximum level markings are provided.	
d	Drain plugs are provided at convenient locations preferably at vertical wall of the housing.	
e	Breathers are provided.	
f	Lifting lugs or eye bolts ar provided as required.	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024
g	Wherever bearings have splash lubrication, oil retainers are provided.	
h	Gear boxes are painted as per specification outside and inside. Inside surfaces shall be painted with Oil proof paint.	
i	In case of vertical gear boxes having more than two stage reduction, forced lubrication is also provided.	
j	Name plate should provide information eg. Ratio, KW rating, Bearing details and manufacturers name.	
22	**STAGE INSPECTION OF EOT CRANES AT WORKS**: Stage inspection of various components of crane shall be guided by the MQP attached with this specification. However, following shall be ensured and read in conjunction with relevant clause of MQP w.r.t. stage inspection:	
a	For tensile testing of hooks/ forgings, samples shall be drawn from the full cross section of the shank diameter of hooks/ forgings Samples forged to reduced cross section for testing purposes is not acceptable. Hooks shall be manufactured from Blooms, billets, rounds by forging with forging ratio of at least 3:1. Hooks manufactured from plates are not acceptable.	
b	Radiographs shall be inspected to a sensitivity of 2%.	
c	Gear boxes shall be checked at No load for backlash, tooth contact, noise, temperature rise and vibration.	
d	Acceptance and routine tests (HV and insulation) for all electrical and electro-mechanical components and system as per governing specification.	
23	**Testing at site**: Completely assembled crane at site shall be check for misalignment of gears, shafts and other items. The test shall be carried out with actual panel, RRC, Master Controller etc. Following minimum tests shall be conducted on the crane at the site	
a	Deflection test of bridge girder at rated load. Crane shall rest on centerline of LT wheels.	
b	Load test and Overload test (running of CT and Hoisting mechanism at 125% of the rated load). Capability of crane to lift the overload from mid-air shall be demonstrated. Electrical tests for brakes, panel, electrical equipment etc. as per IS - 3177	
c	All Other tests as per IS-3177.	
d	Speed test at rated load for hoisting, CT and LT mechanism.	
e	Brake test.	
24	**Services to be provided by the bidder**	
a	Packing, forwarding and transportation to site	
b	Development of storage space including ward & watch of the equipment and handling at site.	
c	**Unloading, storage and handling at site**. The Bidder shall provide means for all unloading and reloading for all consignments of plant; both during transport to Site and on the Site. Consignments shall be unloaded immediately on arrival at Site. The Bidder is required to take the necessary steps in order to provide the carriage, special supporting structures for heavy loads, etc. The following parts shall be stored inside enclosed warehouses:	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024
d	Bolts, pins, packing, tools, insulation materials, electrical parts with electrical devices attached, electric motors and excitation equipment, instruments, welding material and equipment, all small parts and all parts of the crane which already have been finally painted. If large parts are stored in the open air, they shall be provided with weather resistant and fire & resistant covers. Electrical parts, which are not packed in heavy duty polyethylene foil and those so packed, but whose packing has been damaged shall be kept in suitable places from the moment of storage to the moment of installation. All insulation materials which will be taken from the warehouse for installation and which are stored temporarily in the station shall be protected from weather or humidity. All the equipment shall be stored as per standard storage and preservation instructions etc. of the suppliers.	
e	**Arranging test load at site**: Collecting the test load at site within a radius of 1-2 KM from owner's storage to final testing bed of crane shall be under bidder's scope of work. Test load in the form of rolled steel, plates, girder, angle etc., as available at the site shall be made available by the purchaser. The test load shall be put back to the place from where it was lifted by the vendor, after the load testing. Load testing sling, cradles and any other item required by the vendor during the load testing shall be arranged by the vendor at no extra cost to the purchaser. Slings & cradles will be allowed to be taken back by the vendor, after completion of the test at site.	
f	Erection and Commissioning & E-Learning Package	
g	Demonstration / Load test at bidder's Works and at site.	
h	Obtaining clearance and acceptance certificate from the concerned competent Authority after site test and as and when required as per Government Norms /Statutory body till the time of final handling over to Customer. Necessary fees/expenditure as required shall be borne by the supplier.	
i	Any service mentioned in GCC & SCC as relevant to the package.	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

TECHNICAL DATA SHEET A

Sr. No.		DESCRIPTION	TECHNICAL PARTICULARS	
1.0.0		**General**		
1.1.0		**Basic Details**		
	a.	EOT Crane	2 nos. 75T Double Girder EOT crane : for BC Bay BFP handling 1 no. 70T Double Girder EOT crane: for CW Pump House 1. no. 30T Double Girder EOT Crane: for Heavy Material Store	
	b.	Location		
1.2.0	a.	**Design, fabrication and testing of the crane confirm to standard / code number**	Mechanical and Electrical as per IS: 3177-2020 & Structure design in accordance to IS 807:2006 / IS 800:1984.	
	b.	**Minimum thickness of Structural members**	a) Load carrying members: 8 mm b) Tubes with both ends sealed: 4.9 mm (6 SWG) c) Tubes with unsealed ends: 8mm d) Chequered plates: 6 mm O/P	
	c.	**MAXIMUM SPAN/DEPTH RATIO FOR GIRDER:**	Plate girders : 18	
1.3.0		**Number of crane**	Total 4 nos. 2 nos. 75T Double Girder EOT crane : for BC Bay BFP handling 1 no. 70T Double Girder EOT crane: for CW Pump House 1. no. 30T Double Girder EOT Crane: for Heavy Material Store	
1.4.0		**Crane classification**	M5 (Mechanical, Structural and Electrical) as per IS: 3177-2020, IS: 807-2006 and 13834 (part-5)-1993	
1.5.0		**Suitable for outdoor or indoor duty**	Indoor	
1.6.0		**Capacity**		
1.6.1		**Main hoist**		
	a.	Rated SWL – tonnes	75T : for BC Bay BFP handling Double Girder EOT crane 70T : for CW Pump House Double Girder EOT crane 30T : for Heavy Material Store Double Girder EOT Crane:	
	b.	Test load SWL – tonnes	Rated SWL and over load test : 125% of SWL (Safe Working Load)	
	c.	Lift	As per Crane clearance diagram	
1.6.2		**Aux. hoists**		
	a.	Rated SWL – tonnes	Not applicable	
	b.	Test load SWL – tonnes	Not applicable	
	c.	Lift	Not applicable	
1.7.0		**Span**	As per Crane clearance diagram	
1.8.0		Operation from	Pendent Push Button+ Radio remote control	
2.0		**CRANE PERFORMANCE**		
2.1.0		**Crane speed with full load**	Full speed m/min	Creep speed m/min
	a.	Main hoist	1.6	0.16 (10% of main speed thru' VVVF drives)
	b.	Aux. hoist	Not applicable	Not applicable
	c.	Trolley travel (CT)	4	0.4 (10% of main speed thru' VVVF drives)
	d.	Longitudinal bridge travel (LT)	8	0.8 (10% of main speed thru' VVVF drives)
2.2.0		**Acceleration values for LT motion (bridge travel) and CT motion (trolley travel)**	As per IS: 3177 (2020)	
2.3.0		**Hook Approaches from C.L. of rails**		
	a.	Main hook (non cabin side)	As per Crane clearance diagram	
	b.	Aux. Hook (non cabin side)	Not applicable	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

	c.	Main hook (cabin side)	As per Crane clearance diagram	
	d.	Aux. Hook (cabin side)	As per Crane clearance diagram	
2.4.0		**Hand Rail Pipes**	32 mm NB Medium class of IS: 1161 having top and bottom rail at height of 1050 mm and 600 mm and vertical post spacing not exceeding 1500 mm with provision of kick plate (100 mm high and 6mm thick)	
3.0.0		**COMPONENT DETAILS**		
3.1.0		**Bridge girder**		
	a.	Type & Quantity	Box type – 2 nos. Material: Mild steel, grade 'Br' of IS 2062 in 100% killed, normalised and ultrasonically tested quality or high strength steel of IS 8500 as appropriate.	
	b.	Stress consideration	Following to be consider as per IS 807: Static load (dead load), loads due to working load multiplied by dynamic coefficiendt, two most unfavourable horizontal effects excluding buffer forces.All these loads must then be multiplied by amplifying coefficient	
	c.	Maximum Limit for Vertical Deflection	Maximum vertical deflection of the girder producedb y the weight of the trolley and the rated load (excluding impact factor)shall not exceed 1/900 of the span of the crane.	
	d.	Type of connection to end carriage	By fitted bolts	
	e.	Nut & bolts	As per IS:1363, IS:1364 and IS:1367. High Tension Friction grip bolts as per IS: 3757. High Tension Friction grip nuts as per IS: 6623.	
3.2.0		**Type of platform required on the bridge**	Chequered plate platform 6mm thick over plain as per IS : 3502	
	a.	Length	Full span length	
	b.	Walkways	Access walkways of not less than 800 mm (clear) with hand railing of height of 1100 mm along the both side of bridge girder and cross over walkways.	
	c.	Type of access from gantry girder level to crane bridge	Rung ladder at ends from gantry girder level walkway to crane bridges walkway	
	d	Type of access to maintenance cage from crane bridges walkway	Rung ladder	
	e	Type of access to Cabin from crane bridges walkway	cabin not applicable	
	f	Provided at both ends	Yes	
3.3.0		**End carriage span (wheel base)**	As per IS 807 (latest edition)	
3.4.0		**Trolley**	The trolley frame shall be built up from heavy steel plates, angles and channels adequately braced to resist vertical, lateral and torsional strains, welded to form a rigid one piece frame. Alternatively, it may be of cast steel construction and should be covered by flooring as far as possible.	
			On bottom of trolley frame, on each side a double spring bumper shall be provided to engage stops at each end of the bridge.	
			800 mm (clear) with hand railing of height of 1100 mm along the cross over walkways on trolley.	
	a.	Type	Fabricated	
	b.	Method of fabrication	Fusion welded	
	c.	Material	Mild Steel (Fe410) Gr-Br IS: 2062, 100% killed, normalized & Ultrasonically tested.	
	d.	Other requirements	Upper pulley block shall be approachable for maintenance.	
	e.	Whether jacking pads for lifting trolley provided or not	Yes	
3.5.0		**Rope drums**	**Main hoist**	**Aux hoist (if applicable)**
	a.	Material (Indicate IS)	Seamless pipe ASTM A -106 Gr. B or fabricated rolled section to IS: 2062 Gr. Br & stress relieved	
	b.	Flange / flangeless	Flanged	
	c.	Numbers provided	One for each hoist	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

	d.	Type of grooves	Identical Right hand and Left hand & other details shall be as per IS 3177:2020	
3.6.0		**Rope details**	**Main hoist**	**Aux hoist (if applicable)**
	a.	Construction	Extra flexible plough steel , 6 x 36 or 6x37 construction	
	b.	Standard conforming to	IS: 2266 (latest edition)	
	c.	Factor of safety	As per IS-3177 : 2020	
	d.	Type of core	Steel	Steel
3.7.0		**Sheaves details**	Main hoist	Aux hoist (if applicable)
	a.	Material	Fe 410 IS: 2062 Gr. Br / CS Gr. 280-520 IS: 1030 Design as per IS: 3177- 2020	
	b.	Type of guards provided	Fabricated from rolled steel plate	
3.8.0		**COUPLINGS & SHAFTING**		
3.8.1		**Coupling details (between motor and gear box)**	**(for Main hoist, Aux hoist (if applicable), Cross Travel and long travel)**	
	a.	Type	Flexible shock absorbing coupling	
	b.	Guards and enclosures	Provided	
	c.	Coupling material and hardness	All couplings shall be of cast, wrought or from forged steel, tooth portion to be heat treated to hardness HB241-280	
3.8.2		**Coupling details (between gear box and wheels)**	**Cross Travel (CT)**	**Long Travel (LT)**
	a.	Type	Flexible geared type	
	b.	Guards and enclosures provided	Yes	
3.8.3		**Coupling details (between gear box and rope drum)**	**Main hoist**	**Aux hoist (if applicable)**
	a.	Type	One of the following arrangements will be adopted for connecting the rope drum with the gear- box. 1.Flexible joint, incorporating flexible geared coupling housed within the drum. 2.Fully flexible geared coupling between the drum & gearbox.	
	b.	Guards and enclosures provided	Yes	
3.8.4		**Shafting (Output)**	**Cross Travel**	**Long Travel**
	a.	Factor of Safety	As per IS: 3177-2020	
	b.	Arrangement of lubrication	Grease cups / Nipple	
	c.	Type of lubricant	Grease	
3.9.0		**Gear box details**		
3.9.1		**Hoist Motions**	**MH and MH Micro**	**AH and AH Micro (if applicable)**
	a.	Type of mounting of gear box	Horizontal / Vertical	
	b.	Classification	Suitable for M5 duty	
	c.	Type of gears	For MH and AH: Helical / Spur For MH Micro and AH Micro: Not applicable	
	d.	Type of lubrication (grease / splash / pump lubrication)	Splash Lubrication	
	e.	Hardness (BHN) – gear	220 BHN (minimum)	
	f.	Hardness (BHN) – pinion	270 BHN (minimum)	
	g.	Difference in Gear and pinion hardness	Min 20 BHN	
	h.	Materials (gear/pinions)	Main Gears En 9/ 55C8/ IS2707 Gr. 1or 2. Pinions En 19/EN 24. Hardness conforming to IS: 3177-2020 Gears to be hardened, tempered & heat treated as per IS 4460	
	i.	Casings	Fabricated Fe 410w IS: 2062 Gr Br & stress relieved	
	j.	Noise level	85 db	
	k.	Standard conforming to	IS: 4460 / AGMA	
3.9.2		**Travel Motions**	**CT and CT Micro**	**LT and LT Micro**
	a.	Type of mounting gear box	Vertical/ Horizontal	
	b.	Classification	M5 duty	
	c.	Type of gears	For CT and LT: Helical / Spur For CT Micro and LT Micro: Through VVVF drive	

		TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024	
	d.	Type of lubrication (grease / splash / pump lubrication)	Splash Lubrication	
	e.	Hardness (BHN) – gear	220 BHN (minimum)	
	f.	Hardness (BHN) – pinion	270 BHN (minimum)	
	g.	Difference in Gear and pinion hardness	Min 20 BHN	
	h.	Materials (gear / pinions)	Main Gears En 9/ 55C8/ IS2707 Gr. 1or 2. Pinions En 19/EN 24. Hardness conforming to IS: 3177-2020 Gears to be hardened, tempered & heat treated as per IS 4460	
	i.	Casings	Fabricated Fe 410w IS: 2062 Gr Br & stress relieved	
	j.	Noise level	85 db	
	k.	Standard conforming to	IS: 4460 / AGMA	
3.10.0		**Wheels details**	**Cross Travel**	**Long Travel**
	a.	Material	Grade C55Mn75 of IS 1570 (Part 1 and Part 2/Sec 2) or 42CrMo4 or equivalent as per IS 3177-2020. UTS required for selection of PL value as indicated in Table 6 of IS 3177 shall be witnessed by BHEL.	
	b.	Hardness	300 – 350 BHN	
	c.	Depth of hardness	10 mm (min)	
	d.	Process of hardening	Volume hardening	
	e.	Type	Double flanged	
	f.	Min.Numbers provided	4 nos.	8 nos.
	g.	Specification conforming to	IS: 3177-2020	
	h.	Arrangement of lubrication	Grease	
3.11.0		**Lifting hooks**	**MH**	**AH (if applicable)**
	a.	Type	For 75T BC Bay BFP handling Double Girder EOT crane and 70T CW Pump House Double Girder EOT crane : Ramshorn type conforming to IS:5749 For 30T Heavy Material Store Double Girder EOT Crane: shank type conforming to IS:15560	
	b.	Safe lifting capacity	75T : for BC Bay BFP handling Double Girder EOT crane 70T : for CW Pump House Double Girder EOT crane 30T : for Heavy Material Store Double Girder EOT Crane	
	c.	Material	Class 2 as per IS 1875:1992 (re affirmed 2004) for hooks conforming to IS : 5749 Class 3 for hook of grades L & M respectively as per IS 1875:1992 for hooks conforming to IS : 15560	
	d.	Standard conforming to	IS-5749/ IS: 15560	
	e.	Hook can rotate	Yes	
	f.	Safety latch on hook provided	Yes	
	g.	Locking device on swivelling hook required or not	Provided	
3.12.0		**Buffers**	**Cross travel**	**Long travel**
	a.	Type	Spring loaded type. To be designed to bring the loaded crane (In calculation crane is considered to be loaded with SWL) to rest from speed of 50% of the rated speed.	
	b.	Numbers provided	4	4
	c.	Details of end stop	Mild steel, grade 'B' of IS 2062 in 100% killed, normalised and ultrasonically tested quality or high strength steel of IS 8500 as appropriate.	
3.13.0		**Brakes**		
3.13.1		**Hoist Motions**	**MH**	**AH (if applicable)**
	a.	Type of brake	AC Electro-Hydraulic Thruster operated	
	b.	Number provided per motor	2	2
	c.	Braking capacity (% of torque transmitted to the brake drum with full load.)	150%	150%
	d.	Material		
		· Brake liners	Ferrodo liners	
		· Drum	CS IS : 1030 / CL 4 IS : 1875	
		· Springs	As per manufacturers standard	
3.13.2		**Travel Motions**	**CT**	**LT**

		TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024	
	a.	Type of brake (ac / dc / thrustor)	AC Electro-Hydraulic Thruster operated	
	b.	Number provided per motor	2	2
	c.	Braking capacity (% of motor rated torque before derating)	125%	125%
	d.	Material		
		· Brake liners	Ferrodo liners	
		· Drum	CS IS : 1030 / CL 4 IS : 1875	
		· Springs	As per manufacturers standard	
3.14.0		**Motors**		
	a.	Type	Three phase Squirrel Cage Induction motors to be operated from VFD system shall be suitable for speed range and torque without exceeding temperature rise limits as specified elsewhere in this specification. These motors shall be provided with insulated bearing on at least one side for motor frame size above 250 frame. However, contractor's proven practice with respect to use of insulated bearing in VFD driven motor may be accepted subject to Employer's approval.	
	b.	Enclosure	TEFC	
	c.	Numbers furnished	For Main hoist: one no.	
			For aux hoist: Not applicable	
			For Cross travel: one no.	
			For long travel: 2 nos.	
	d.	Voltage, phase and frequency	415V ± 10%, 3 Ph., 4 wire, 50 Hz, +3/-5 % Combined voltage & frequency variation = 10% absolute	
	e.	Class of protection for motor including terminal box	IP – 55	
	f.	Rated capacity (KW)	The motor shall be suitable for 40% CDF. Motor nameplate rating at 50 C shall have Motor rating will be calculated keeping margin of at least 10% over the maximum power requirement in the duty condition specified.	
	g.	Duration factor/duty	40 % CDF / S-4	
	h.	Class of insulation	Class 'F' for sq. cage motors with temp rise limited to 70 C	
	i.	Number of starts/ hour	Starts / hr as per IS 3177-2020	
	j	Overload protection for motors provided	Yes	
	k	Space heater requirements	For motors of rating 30 KW and above. Separate terminal box for space heaters & RTDs shall be provided.	
	l	Motor Duty and pull out torque	Duty S4 and pull out torque 275% of full load torque	
	m	Terminal box of motor	-Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation.	
			-Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated.	
			- The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.	
			- Rotation at 90 deg	
	n	Cable glands and lugs	-Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used.	
			-Gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided in case of cable boxes.	
	o	Earthing points suitable for conenction	Motor body shall be grounded at two earthing points on opposite sides with two separate and distinct grounding pads complete with tapped holes, GI bolts and washers. LT Motors above 125 KW --- 50 x 6mm GS flat 25 KW to 125 KW --- 25 x 6mm GS flat 1KW to 25 KW --- 25 x 3mm GS flat.	

	p	Minimum spacing between gland plate & centre of bottom terminal stud	UP to 3 KW As per manufacturer's practice. Above 3 KW - upto 7 KW 85 mm Above 7 KW - upto 13 KW 115 mm Above 13 KW - upto 24 KW 167 mm Above 24 KW - upto 37 KW 196 mm Above 37 KW - upto 55 KW 249 mm Above 55 KW - upto 90 KW 277 mm Above 90 KW - upto 125 KW 331 mm Above 125 KW-upto 200 KW 385/203 (For Single core cables only) mm
	q	Minimum inter-phase and phase-earth air clearances with lugs installed	UP to 110 KW 10mm Above 110 KW and upto 150 KW 12.5mm Above 150 KW 19mm
	r	Other requirement	
	t.1	Squirrel cage Induction motor with VPI insulation shall be provided With VVVF system. Motor shall be energy efficient as per IS:12615, IEC 60034 and shall be Crane duty as per IS:3177. Winding & insulation shall be Electrolytic grade Copper conductor, Non-hygroscopic, oil resistant, flame resistant Insulation. Vibration shall be limited within the limits IS:12075.	
	t.2	For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time. permissible starting voltage for motor shall be as follows:Up to 85% of rated voltage for ratings below 110 KW.	
	t.3	The ratio of locked rotor KVA at rated voltage to rated KW shall not exceed 11 for motors above 50 KW upto 110 KW.	
3.15.3		**Storm brake**	Not applicable
3.16.0		**Drive system for hoisting**	
	a.	Arrangement of drive from motor to rope drum (main)	Through geared coupling and gear box
	b.	Arrangement of drive from pony motor to rope drum (creep speed)	Creep speed through VVVF drive.
3.17.0		**Bearings (for crane hook, Trolley wheels, rope drum, gear box or any other assembly)**	
	a.	Type	Antifriction ball / roller bearings
	b.	Number provided for each	As per assembly requirements
	c.	Method of lubrication	Centralised grease lubrication with hand operated grease pump for all bearings as per bidder's standard proven practice.
	d	Bearing life	not less than 10,000 working hours
3.18.0		**Rails**	
	a.	Type / section	Rails sections as per IS: 3443. Joint to be butt-welded by thermit welding or fusion welding/ CR-100 with 45 degrees angle.
	b.	Standard conforming to	IS: 3443
3.19.0		**Power conductors (DSL) & Cables**	
	a.	Design Criteria	Cable from main isolating switch (1.5M above operating floor) to motor terminal shall be so sized that the voltage drop does not exceed 2% of rated voltage at motor terminals.
	b.	Type	LT: PVC shrouded Cu/Al conductor bus bar. CT: EPR insulated, copper conductor trailing cables, as per IS: 9968, on the bridge/ energy chain trailing system
	c.	LT POWER CABLES	All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated, and sizes shall be of 1Cx150, 1Cx300, 1Cx630, 3Cx150, 3Cx185, 3Cx240& 3Cx300 Sq.mm. However for cable sizes upto 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable.

	c.1	1.1 KV grade XLPE power cables	1.1 KV grade XLPE power cables shall have multi stranded compacted aluminum conductor (tensile strength of more than 100 N/ sq.mm), XLPE insulated, PVC inner-sheathed (black color as per IS:5831), Armoured (For single core Armoured cables, armoring shall be of aluminum wires H4 grade. For multicore Armoured cables armouring shall be of galvanized steel round wire/strip), PVC FRLS outer-sheathed (black colour) conforming to IS: 7098. (Part-I).
	c.2	1.1KV grade PVC power cables	1.1KV grade PVC power cables shall have multi stranded aluminum conductor (compacted type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed ((black color as per IS:5831)) Armoured (For single core Armoured cables, armoring shall be of aluminum wires H4 grade. For multicore Armoured cables armouring shall be of galvanized steel round wire/strip), PVC FRLS outer-sheathed (black colour) conforming to IS:1554 (Part-I).
	c.3	LT Control Cables	LT Control Cables are Cu conductor 1.5 sq mm, PVC insulated, PVC inner sheath, GS wire/strip armoured and FRLS PVC outer sheath confirming to IS 1554 Part-1. Standard control cable sizes shall preferably be 3CX1.5, 5CX1.5, 7CX1.5 & 10CX1.5mm2, 14CX1.5 mm2.
	c.4	1.1 kV grade trailing cables	1.1 kV grade trailing cables shall have tinned copper (class 5) conductor, insulated with heat resistant elastomeric compound based on Ethylene Propylene Rubber (EPR) suitable for withstanding 90 deg.C continuous conductor temperature and 250deg C during short circuit, inner sheathed with heat resistant elastomeric compound, nylon cord reinforced, outer-sheathed with heat resistant, oil resistant and flame retardant heavy duty elastomeric compound conforming to IS 9968.
	d.	Size	a) Rated current of the equipment b) The voltage drop in the cable, during motor starting condition, shall be limited to 10% and during full load running condition, shall be limited to 3% of the rated voltage. c) Short circuit withstand capability Derating factors for various conditions of installations (variation in ambient temperature, grouping of cables) shall be considered while cable sizing.
	e.	Length	Suitable for bay length
	f.	Guard provided for DSL	Yes
3.20.0		**Operators cabin**	Not applicable.
	a.	Type of construction	
	b.	Area and minimum clear height	
	c.	Operator's seat	
	d.	Warning gong	
	e.	Alarm	
	f	Position of controllers	
	g	Ventilation	
	h.	Additional features	
3.21.0		**Limit switches**	
	a.	Type	For MH: Rotary gear + Gravity
			For AH: Not applicable
			For CT: Lever type (one way/ two way)
			For LT: Lever type (one way/ two way)
	b.	Number provided	For MH: 1+1
			For AH: Not applicable
			For CT: 2/1
			For LT: 2
	c.	Material of contacts	Double break Silver Cadmium
	d.	Control voltage / Enclosure	110 V/ IP 55

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

3.22.0		**Isolating switch**	
	a.	Main isolating switch (01 no.), mushroom type emergency STOP push buttons : At center of bay length(to be decided during detail engineering).	
	b.	BHEL will provide one number 415 V AC (3 PHASE 4 WIRE) supply feeder only up to isolating switch for each crane. Any other voltage level (AC/DC) required will be derived by the vendor.	
	c.	Motor starter shall be part of crane control panel.	
3.23.0		**Protective Panel**	Shall be Provided with isolating switch, power contactor control and indication to switch ON/OFF power to starter panels, control and lighting transformer.
	a.	Material	Cold Rolled Sheet steel 2 mm size,3mm for Gland Plates (CRCA/HR),1.6mm: Doors, covers etc
	b.	Numbers and location	One number
	c.	DOP	IP 54
3.24.0		**Control panel**	
	a.	Material	Cold Rolled 2 mm size,3mm for Gland Plates (CRCA/HR),1.6mm: Doors, covers etc: sheet steel 2mm size
	b.	Numbers and location	One each for MH, AH (if applicable), CT and LT located on bridge platform with space heaters.
	c.	Degree of protection	IP 54
3.25.0		**Master Controllers (Desk Type)**	Not applicable
	a.	Number of steps	
	b.	Voltage & current rating	
	c.	Type	
	d.	Location	
3.26.0		**Control for Hoists /CT/LT operations**	Through Variable Voltage Variable frequency drive
	a.	Speed control	Thru' VVVF with minimum 6 pulse design
	b.	Starting torque of VVVF	Up to 400 % typical with/ without encoder
	c.	Starting current	Less than 150 % of rated torque.
	d.	Temperature	VVVF system shall be capable of withstanding up to 50 o C without derating.
	e	Other requirements for VFD	Necessary input & output devices to be provided to reduce harmonics, as per IEEE519, at supply side of the drive at the switchgear.
	f	Other requirements for VFD	The Variable frequency drive (VFD) system shall be of a modern proven design for similar applications in power plants/industry. The system shall be either Current Source Inverter (CSI) or Voltage Source Inverter (VSI) type with minimum Twelve (12) pulse design / 6 pulse with active frontend harmonic filter. For drives less than 100 KW Six (6) pulse can be offered meeting all other requirements.
	g	Other requirements for VFD	All necessary protections e.g., Input Phase Loss, Earth Fault, Over Voltage, Output Short Circuit, Load Loss, Input Transient Protection, overload etc to be provided.
3.27.0	**a.**	**Contactors**	AC 4 duty for reversing application. AC 3 duty for non-reversing application
	b.	**Switches**	AC 23 for motor application, AC 22 for other application.
	c.	**Fuses**	HRC
	d.	**Overload relay**	Temperature compensated bimetallic with single phasing preventor.
3.28.0		**Power supply**	Owner shall provide Two (2) nos. 415 V, 3 phase, 4 wire supply at operating floor near A row column at centre of bay length shall be provided. Bidder shall provide change over switch in enclosure to receive above power supply.
3.29.0		**Cable glands**	Cable glands shall conform to BS:6121. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and Hardware shall also be made of brass with nickel chrome plating. Rubber components shall be of neoprene or better synthetic material and of tested quality.

		TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	**PE-TS-508-501-A001** **Rev. No. 00** **Date : APRIL 2024**

3.30.0		**Lugs**	Cable lugs/ferrules shall be solderless crimping type suitable for power and control cables as per the DIN 46239. Aluminium solderless crimping lugs/ ferrules shall be used for Aluminium cables and Copper lugs/ferrules shall be used for Copper cables. Bimetallic washers or bimetallic type lugs shall be used for bimetallic connections
3.31.0		**Transformer**	(Dry type, With Insulation Class B or Better)
	a.	Quantity	2 X 100 % for control, 1 no for lighting & 1 no for hand lamp.
	b.	Voltage Rating	Control 415/110V, Lighting 415/240V and hand lamp 415/24V.
	c.	KVA rating	20% over loading to be considered while sizing the rating
3.32.0		**Illumination**	
	a.	In cabin	Not applicable.
	b.	Over Bridge	4 no. 60W Bulk head fittings with Florescent lamp lamps and 4 nos.24V 20A -3 pin Industrial socket
	c.	Under bridge	4 nos. 250 W HPSV lamps
	d.	For inspection of crane components	One (1) portable 40W hand lamp with min. half span length flexible cable for inspection of crane compon-ents.
3.33.0		**Fire Extinguisher**	
	a.	Type and size	4.5 kg CO2 type
	b.	Location	One no. on bridge per Crane
3.34.0		**Maintenance cage**	Suitable inspection cages to accommodate two persons to facilitate inspection of down shop lead.
3.35.0		**Mechanical overload protection (Load Cell)**	To be provided for hoist mode
3.36.0		**RRC details**	
	a.	RRC should be supplied with transmitter unit, receiver unit, encoder unit, decoder unit, interface panel, coupling system, battery unit and any other control gear if required.	
	b.	The equipment should be based upon the microprocessor based digital technology with almost nil hard wiring.	
	c.	The remote unit should communicate up to the distance of approximately 100 meters.	
	d.	The system has to integrate with the control system of crane, which operates at 110 V AC, Single phase.	
	e.	The remote unit should have transmitter which can be mounted on shoulder by suitable belt. Main controls can be of single joystick movement or double joystick movement type stepped control with spring return. The Micro control should be toggle switch type or push control type.	
	f.	Frequency allotment for radio remote unit from Govt. of India, Dept. of Telecommunication or any other agency shall be the responsibility of supplier.	
	g.	The transmitter and receiver unit should have its own frequency and address code with each system having its own security code so that one particular set becomes unique and there is no interference from any other remote unit device. A microprocessor should check all security codes. The processor should have its own watchdog circuit. The receiver FM band should be sufficiently narrow to allow only passing of desired frequency and valid command. Any error should shut down the system immediately.	
	h.	The remote unit should have safety key to prevent any unauthorized operation. All the crane operations should stop at once the communication breakdown occurs.	
	i.	On local unit (receiver side), the system should be provided with one selector switch so that EOT crane can be operated either from Operator cabin or radio remote unit.	
	j.	In case tandem operation is envisaged, a suitable selector switch shall be provided in the cabin for selection of Tandem/normal operation.	
	k.	The receiver unit along with I/O interface unit should be able to bear the vibrations and shocks encountered in normal usage of EOT crane.	
	l.	The system should have very fast response time.	
3.37.0		**Sweep**	Sweep shall be attached to the end carriages and to the trolley to remove foreign materials from the rails.
3.38.0		**Whether tandem operation envisaged**	No
3.39.0		**Lifting Beam & its capacity**	Not applicable
3.40.0		**Anti Collision device**	Not applicable

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

3.41.0		**Lubrication**	
	a.	Provisions shall be made for proper lubrication of all parts.	
	b.	Bearings shall be provided with means of pressure lubrication.	
	c	The crane shall be provided with all necessary lubrication fittings.	
	d	Lubricating points shall be located for easy and safe access without the necessity of removing guards or other parts. Lubrication lines shall be securely fastened to the cranes structure and shall be located to provide the maximum protection and so that ordinary repairs can be made without removing the lines.	
	e	The crane shall be provided with a centralized lubrication system of reputed make. This system shall be manually operated, complete with a manual pump, reservoir, supply lines, connectors, valves, and discharge lines to all bearings. System shall be centralized lubrication type with at least, one pump mounted on the trolley and one on each of the crane bridge with supply line for connection to all lubrication points. .	
	f	Metering valves with indicators shall be provided for all points of grease application and shall be mounted at readily visible and accessible locations.	
	g	All piping shall be made of suitable metal tubing with flexible hoses where required.	
3.42.0		**DSL phase indicating lamps**	to be provided on both side of bay length.
3.43.0		**Consumables**	The Bidder's scope includes requirements of consumables such as oils, lubricants including grease, servo fluids, gases and essential chemicals etc. till one year after commissioning. Consumption of all these consumables till one year after commissioning shall also be included in the scope of the Bidder. Bidder shall also supply a quantity of the full charge of each variety of lubricants, servo fluids, gases, chemicals etc. used which is expected to be utilized till one year after commissioning. This additional quantity shall be supplied in separate Containers.
3.44.0		**E-Learning Package**	**(Applicable for BC Bay BFP handlng crane only)**
	a.	The courses shall be web based and mobile based Application type. It shall run on all possible versions of web browser like Internet Explorer, Google Chrome, Firefox etc. on Laptop/Desktop and shall be Smartphone/Tablet/ Mobile responsive. The Mobile responsive courses shall run on Android, Windows Mobile, Blackberry, iOS etc.	
	b.	The courses shall support liquid/fluid page layout so that the entire screen gets adjusted to PC, Laptop, Smartphone/ Mobile, Tablet and any other display devices.	
	c	Course content text shall be in English language and be associated with a voiceover in English language with Indian accent.	
	d	Courses shall be SCORM (Sharable Content Object Reference Model) compliant, version 1.2 which is compatible with LMS at PMI.	
	e	Each course shall have every physical and functional detail of the equipment / system supplied.	
	f	Each of the e-Learning course shall be based on multiple web pages and mobile pages with multiple modules.	
	g	There shall be option for self-assessment test after every course. In case the user doesn't opt for self-assessment test the user shall be able to go to the next course. There shall be no restriction in no. of times for repeating the assessments. All correct answers along with the answers marked by the users shall be displayed at the end of test/ quiz.	
	h.	If Java and Flash, as applicable are not available in the system to run the package, then there shall be a prompt message for updation of the same.	
	i.	Each course shall have a self-running interactive content with navigation buttons containing forward, backward, pause, bookmark and menu options in the course window.	
	j.	The course shall contain chapter titled 'Introduction/overview' that explains the purpose of the course.	
	k.	The course content shall contain descriptive text shall be factual, specific, terse, clearly worded, and simply illustrative, so that the user can understand it.	
	l.	The system shall provide the user with the ability to select the information with a Cursor.	
	m	The course menu should contain table of content linked to concerned pages. The user shall be given the capability to access all of the functions available on the system through a menu system. This shall consist of active buttons, which shall control a hierarchy of pull down/pop-up menus. Menu shall appear quickly and exist only while a selection is being made. The user shall be given the capability to position the cursor or pointer on the menu item and use pointer device such as mouse to activate the function.	

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

	n	Every course shall contain the 3D design/drawing/exploded view/3600 turn around view of the equipment/system, textual description of the equipment/system and its functionality with video (as applicable), animation and audio.	
	o	The users shall be able to control audio sound level associated with the courses.	
	p	Drawings / text in the courses shall be scalable (Zoom In/ Out).	
	q	The user shall have the capability to record a bookmark to mark displayed information for later recall, whenever he accesses the same course next time.	
	r	e-learning Package of an equipment / system shall include e-learning courses for each of erection, commissioning, operation and maintenance of that equipment / system.	
	s	e-learning courses on erection, commissioning, operation and maintenance of an equipment / system shall include e-learning lessons/chapters/modules (as required) for erection, commissioning, operation and maintenance respectively of that equipment / system.	
	t	The vendor shall get the approval of one sample course from EIC before proceeding for further courses.	
3.45.00		**Nuts & Bolts**	As per IS:1363, IS:1364 and IS:1367.
3.46.00		**Electrodes**	Radiography quality, covered electrodes with heavy covering as per IS : 814 and relevant requirements of ASME Sec. IX and IIC. Bare Electrodes as per IS:7280 and flux wire combination as per IS : 3613.

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

TECHNICAL DATA SHEET B

(SUCCESSFUL BIDDER TO FILL AFTER PLACEMENT OF ORDER)

Sr. No.		DESCRIPTION	TECHNICAL PARTICULARS	
1.0.0		**COMPONENT DETAILS**		
		Bridge girder		
	a.	Size		
	b.	Width		
	c.	Length		
2.0.0		**Trolley**		
	a.	Centre to centre distance of wheels (on the same rails)		
3.0.0		**Rope drums**	**Main hoist**	**Aux hoist (if applicable)**
	a.	Dimensions in mm length and diameter (PCD)		
	b.	Number of grooves		
	c.	Diameter on bottom of grooves		
4.0.0		**Rope details**	**Main hoist**	**Aux hoist (if applicable)**
	a.	Grade		
	b.	Diameter in mm		
	c.	Breaking strength		
	d.	Tensile designation		
	e.	Number of falls		
	f	Length of rope		
3.4.0		**Sheaves details**	**Main hoist**	**Aux hoist (if applicable)**
	a.	Diameter of main sheaves in mm on Root		
	b.	Diameter of Equalizing sheaves (in mm) on Root		
3.5.0		**COUPLINGS & SHAFTING**		
3.5.1		**Coupling details (between motor and gear box)**	**(for Main hoist, Aux hoist (if applicable), Cross Travel and long travel)**	
	a.	Size & Torque rating		
3.5.2		**Coupling details (between gear box and wheels)**	**Cross Travel (CT)**	**Long Travel (LT)**
	a.	Size & Torque rating		
3.5.3		**Coupling details (between gear box and rope drum)**	**Main hoist**	**Aux hoist (if applicable)**
	a.	Size		
3.5.4		**Shafting (Output)**	**Cross Travel**	**Long Travel**
	a.	Diameter in mm		
	b.	Number of support bearings		
	c.	Type of support bearing		
	d.	Max unsupported length of shaft in mm		
3.6.0		**Gear box details**		
3.6.1		**Hoist Motions**	**MH and MH Micro**	**AH and AH Micro (if applicable)**
	a.	Total number of reductions		
	b.	Type of gears for MH and AH		
	c.	Reduction ratio		
	d.	Hardness (BHN) – gear		
	e.	Hardness (BHN) – pinion		
	f.	Difference in Gear and pinion hardness		
	g.	Materials (gear/pinions)		
3.6.2		**Travel Motions**	**CT and CT Micro**	**LT and LT Micro**
	a.	Total number of reduction		

		TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY		PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024
	b.	Type of gears		
	c.	Reduction ratio		
	d.	Hardness (BHN) – gear		
	e.	Hardness (BHN) – pinion		
	f.	Difference in Gear and pinion hardness		
	g.	Materials (gear / pinions)		
3.7.0		**Wheels details**	**Cross Travel**	**Long Travel**
	a.	Material		
	b.	Hardness		
	c.	Depth of hardness		
	d.	Tread diameter in mm		
	e.	Tread width in mm		
	f.	Numbers provided		
3.8.0		**Lifting hooks**	**MH**	**AH (if applicable)**
	a.	Material		
3.9.0		**Brakes**		
3.9.1		**Hoist Motions**	**MH**	**AH (if applicable)**
	a.	Diameter of brake in mm		
	b.	Torque rating Kg. M		
	c.	Braking torque actually required		
	d.	Braking distance in mm		
	e.	Thruster material		
3.9.2		**Travel Motions**	**CT**	**LT**
	a	Dia of brake in mm		
	b.	Torque rating KgM		
	c.	Braking torque actually required		
	d.	Thruster material		
	e.	Braking distance in mm		
3.10.0		**Rails**	**CT**	**LT**
	a.	Weight per metre		
	b.	Top width in mm		
	c.	Height in mm		
3.11.0		**Motors**		
	a.	rating	For Main hoist: For aux hoist (if applicable): For Cross travel: For long travel:	
	b.	Speed (rpm)		
	c.	Contactors for motor		
	d.	Spacing between gland plate & centre of bottom terminal stud		
	e.	Minimum inter-phase and phase-earth air clearances with lugs installed		
	f.	Space heater requirements details		
	g.	Overload protection details		
3.12.0		**Limit switches**		
	a.	Rating of contacts		
3.13.0		**Protective Panel**		
	a.	Dimension		
3.14.0		**Control panel for MH, AH (if applicable), CT and LT**		
	a.	Dimension		

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001	
		Rev. No. 00	
		Date : APRIL 2024	

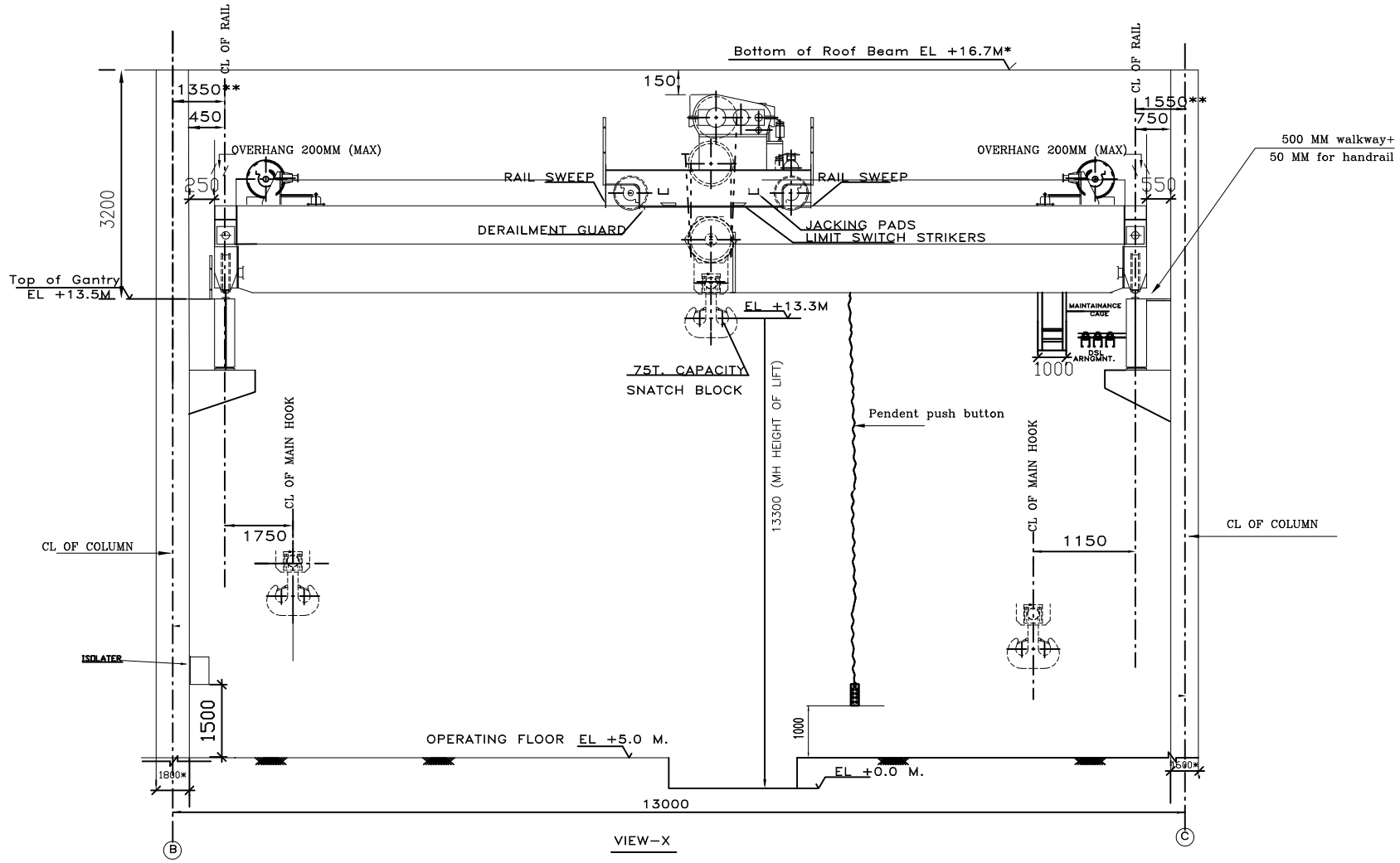
3.15.0		**Slings, suitable for load & overload test of EOT Crane (to be supplied alongwith load test certificate for joint at 2 X rated capacity)**	
	a	Length	
	b.	Size	

BHEL	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

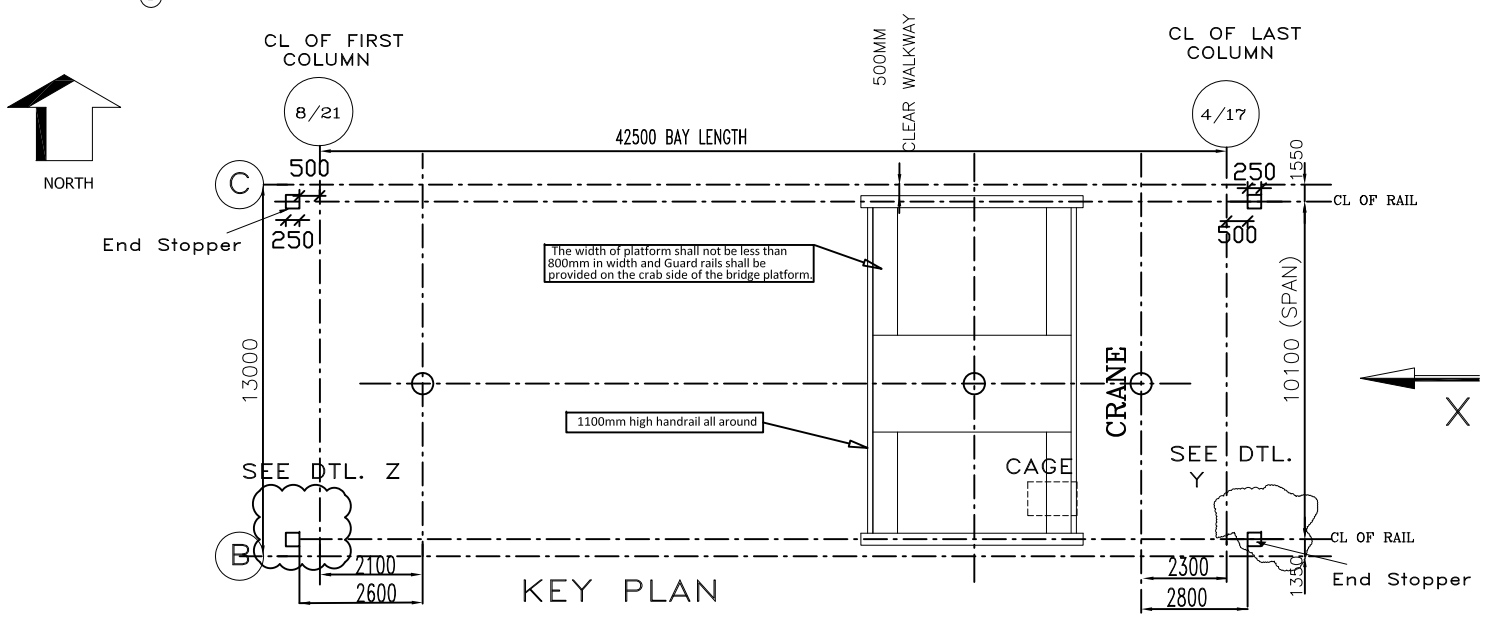
COMPLIANCE DRAWINGS

ALL DIMENSIONS ARE IN MM

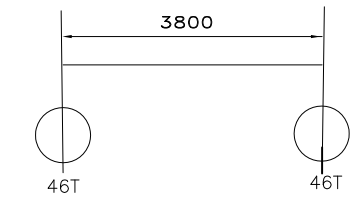
FIRST ANGLE PROJECTION



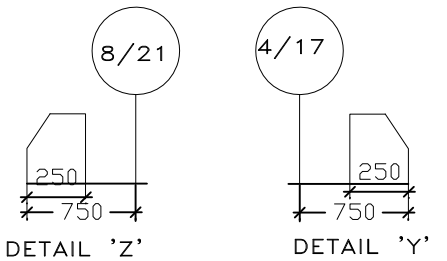
VIEW–X



WEIGHT OF SINGLE HEAVIEST ASSEMBLED COMPONENT	65T (Refer drawing no. 9587–001–110–PVM–B–044 GENERAL ARRANGEMENT OF TDBFP SET)
CRANE CAPACITY AFTER 10% MARGIN AS PER CONTRACT REQUIREMENT ON HEAVIEST WEIGHT	71.5T
CRANE CAPACITY CONSIDERED	75T (ONE NO. FOR EACH UNIT)



TENTATIVE LT WHEEL LOAD WITHOUT IMPACT



DETAIL 'Z' DETAIL 'Y'

NOTES:

1) DRAWING IS NOT TO THE SCALE.
2) ALL DIMENSIONS ARE IN MM & ELEVATIONS IN METRES.
3) EL 0.00 CORRESPONDS TO RL +209.500 (FINISHED FLOOR LEVEL IN TG BUILDING)
4) DESIGN CODE FOR EOT CRANE SHALL BE IS3177:2020.
5)* MARKED DIMENSIONS ARE TO BE CONFIRMED BY PEM CIVIL.
5)** MARKED DIMENSIONS SHALL BE FINALISED AFTER CONIFMATION OF * MARKED COLUMN WIDTH.

REFERNCE DRAWINGS

1) 9587–001–110–PVM–F–053 (MAIN PLANT TG HALL CROSS SECTION)
2) 9587–001–110–PVM–F–049 (TG EQUIPMENT PLAN AT 0.0 M FLOOR)
3) 9587–110–110–PVM–B–044 (GENERAL ARRANGEMENT OF TDBFP SET)

NTPC DRG NO	9587–001–110–PVM–B–416
OWNER	NTPC LTD
CONTRACT	LARA STPS EXPANSION PHASE–II (2 X 800MW)
PRINT SCALE	

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE		NAME	SIGN	DATE
	DRN	RG		13.03.24
	DESN	RG		13.03.24
	CHD	PK		13.03.24
	APPD	PK		13.03.24

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD

SUB–CONTRACTOR

TITLE

CRANE CLEARANCE DIAGRAM OF BFP HANDLING EOT CRANE

DEPT. SCALE

SIGN

DATE

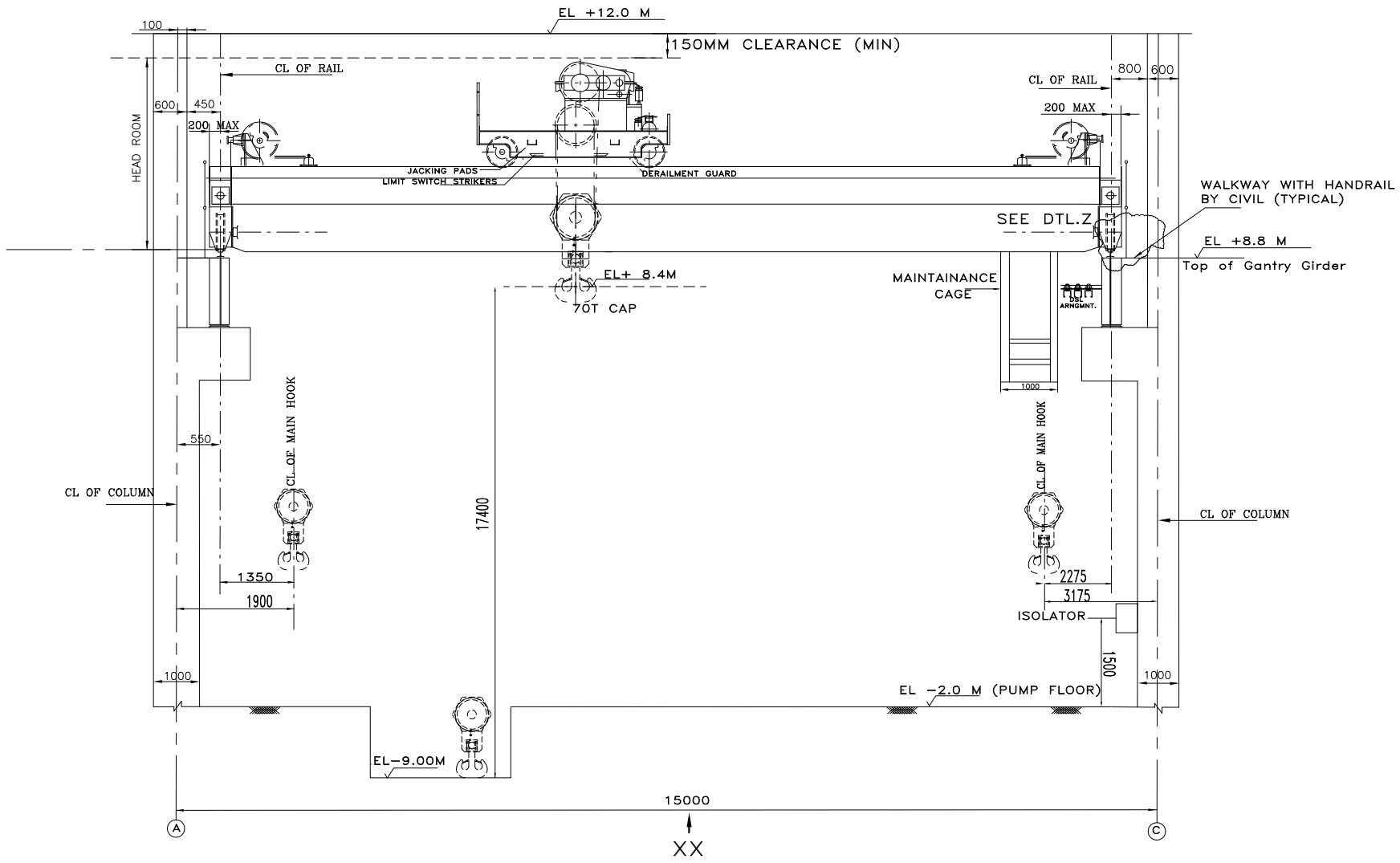
BHEL DRG NO : PE–DG–434–501–A001

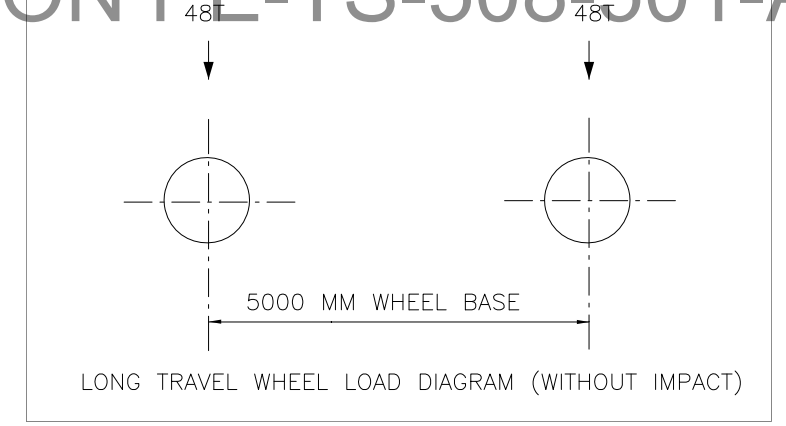
SHEET 1 OF 1 REV 0

SIZE–A2

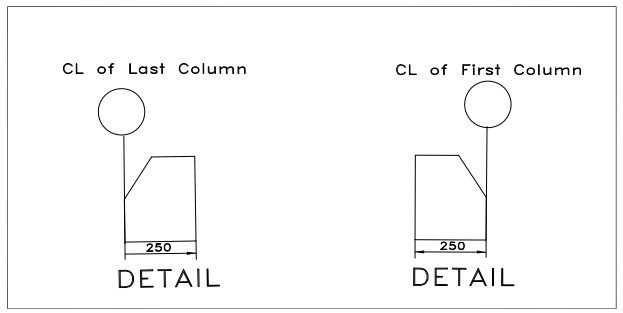
249304/2024/PS-PEM-MAX

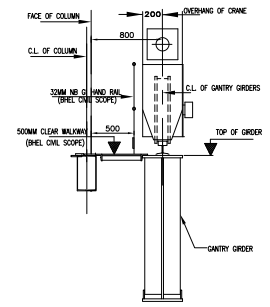
COMPUTER FILE NAME : TAL5





LONG TRAVEL WHEEL LOAD DIAGRAM (WITHOUT IMPACT)





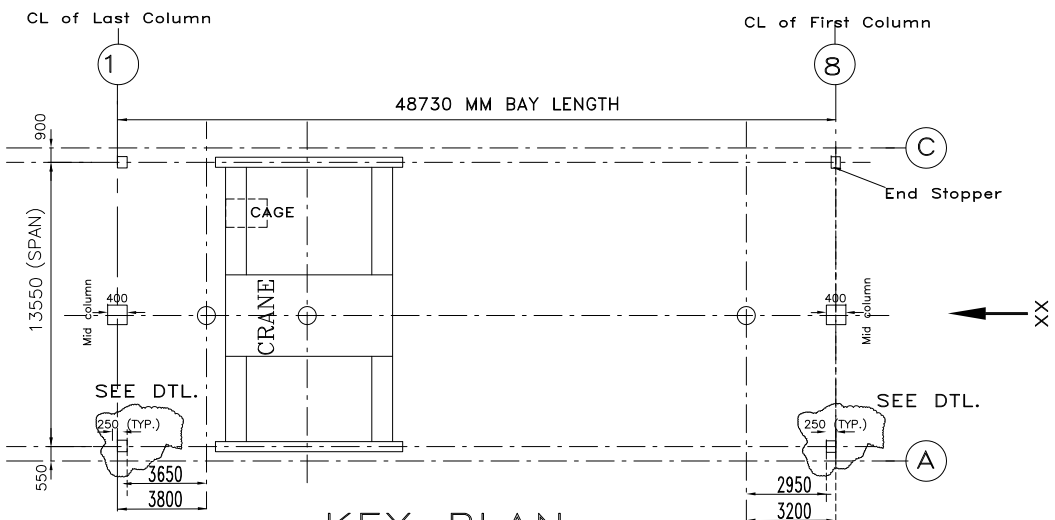
DETAIL 'Z'

DESIGN CRITERIA (CRANE)

HEAVIEST WEIGHT (CW PUMP MOTOR) TO BE LIFTED = 53 T
(Reference drg.HY−DG−CVP−GA−LARA II)
CONSIDERING 25 % MARGIN = 13.25T
TOTAL DESIGN LOAD = 66.25 T
MINIMUM CRANE CAPACITY AS PER TENDER = 60T
CRANE CAPACITY SELECTED = 70 T

NOTE:

1) DRAWING IS NOT TO THE SCALE.
2) ALL DIMENSIONS ARE IN MM & ELEVATIONS IN METRES.
3) THE WEIGHTS AND DIMENSIONS INDICATED ARE PRELIMINARY AND SUBJECT TO CHANGE DURING DETAIL ENGINEERING AFTER AWARD OF CONTRACT TO BHEL'S SUB CONTRACTOR.
4) TOP OF RAIL IS SUBJECT TO CHANGE DURING DETAIL ENGINEERING.
5) (*) MARKED DIMENSIONS ARE TO BE CONFIRMED BY CIVIL.



KEY PLAN

REFERENCE DRAWING:−

1. MECHANICAL GA OF CW & ACW PUMP HOUSE: 9957−001−133−PVM−B−050
2. GA & FOUNDATION DETAILS OF CONCRETE VOLUTE TYPE CWP + MOTOR: HY−DG−CVP−GA−LARA−II

REV.	DATE	ALTD	CHD	APPD
Rev 01	28.11.2022	RG	WH	PK

REVISED AS PER NTPC COMMENTS.

ग्राहक ड्राईंग संख्या CUSTOMER DRAWING NO.

ग्राहक/CUSTOMER: एन टी पी सी लिमिटेड N T P C LIMITED

परियोजना PROJECT: LARA SUPER THERMAL POWER PROJECT STAGE−II(2X800MW)EPC PACKAGE

कार्य संख्या- JOB NO. 508
स्थिति STATUS: CONTRACT
मुद्रण स्केल मीटर में PRINT SCALE IN METRE: 0 10 20 30 40 50

भारत हेवी इलेक्ट्रिकल्स लिमिटेड BHARAT HEAVY ELECTRICALS LTD
पावर सेक्टर/POWER SECTOR
परियोजना अभियांत्रिकी प्रबंधन PROJECT ENGINEERING MANAGEMENT
नोएडा (उ॰प्र॰)/NOIDA (U.P.)

DEPT CODE: M

	नाम NAME	हस्ताक्षर SIGNATURE	दिनांक DATE
तैयारकर्ता/DRN	RG		19.08.2023
डिजाइनकर्ता/DESN	RG		19.08.2023
जाँचकर्ता/CHD	WH		19.08.2023
अनुमोदनकर्ता/APPD	PK		19.08.2023

शीर्षक/TITLE: CRANE CLEARANCE DIAGRAM OF 70T CWPH EOT CRANE

एमपीएल MPL	सिविल CIVIL	इलेक्ट्रिकल ELEC	सीएंडआई C&I	एमएसई MSE	मेक्स MAX	विभाग DEPT.	स्केल – SCALE– NTS

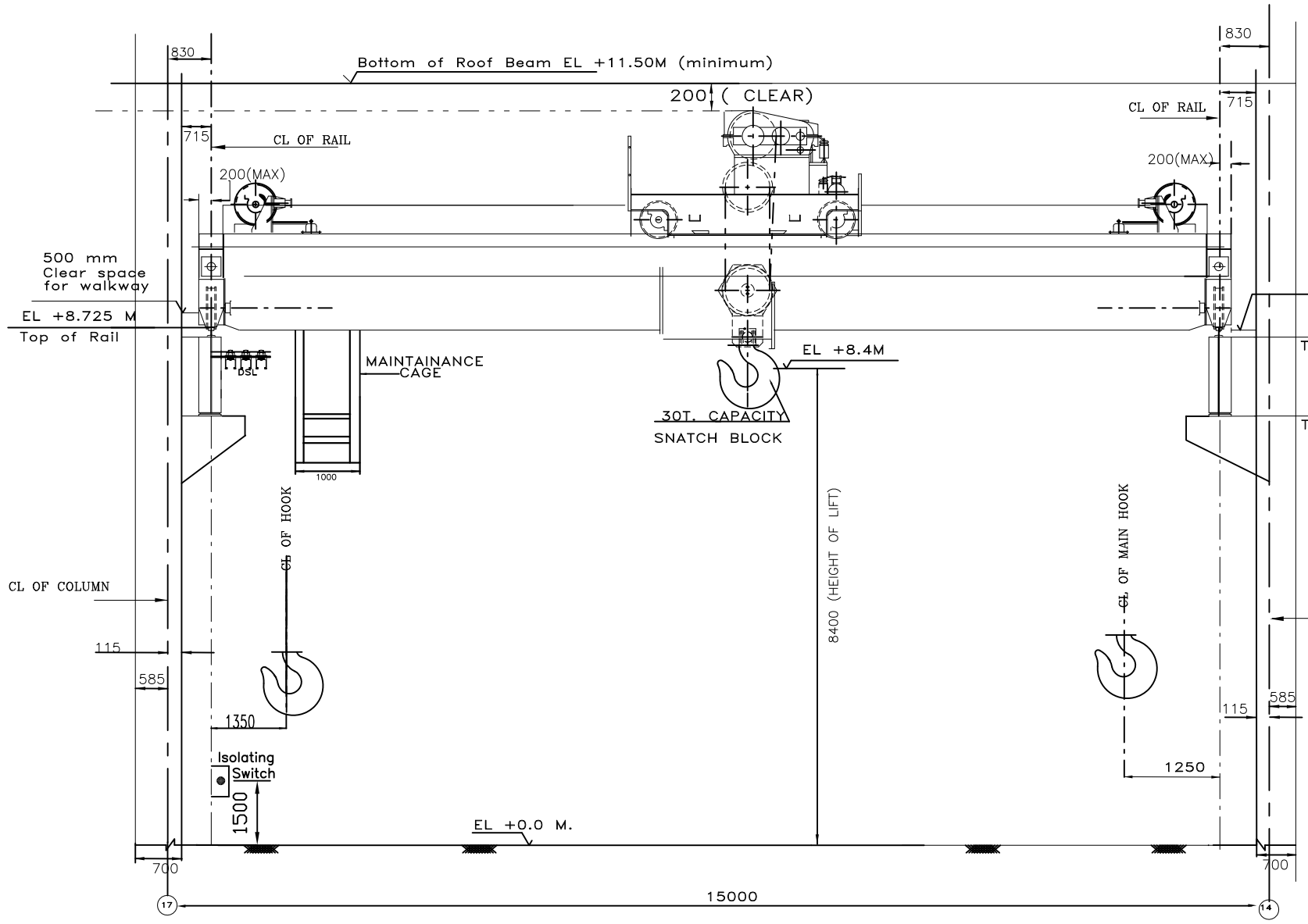
ड्राईंग संख्या / DRAWING NO.: PE−DG−497−501−A003

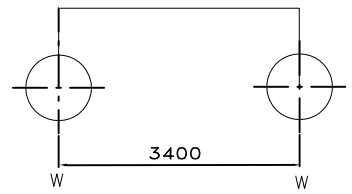
शीट SHEET 1 OF 1 | पुनरीक्षण REV. 0

फ्रार्मेट साइज़ A0
FORMAT SIZE A0

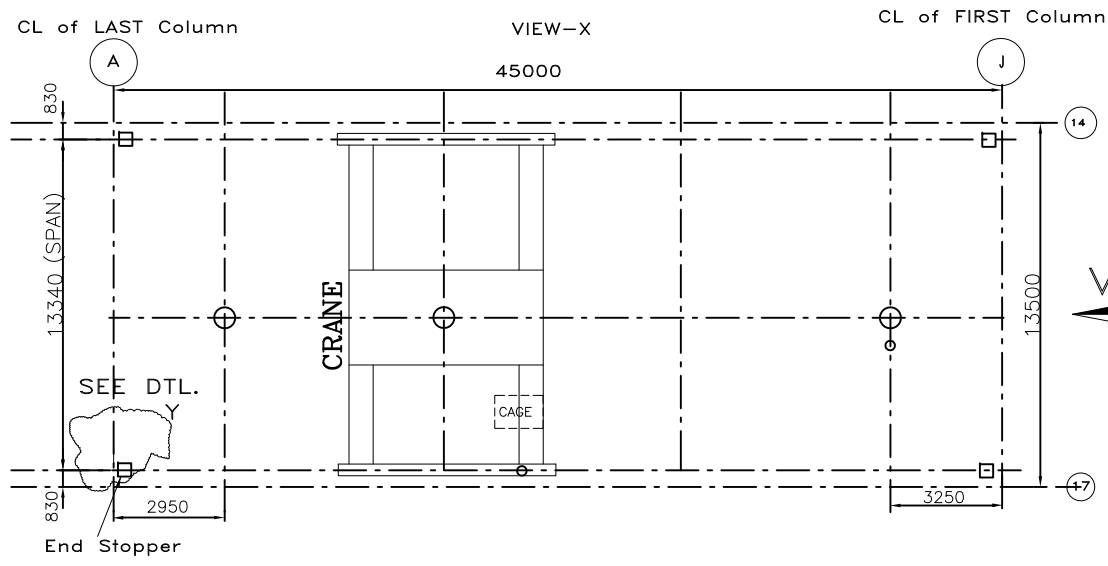
ALL DIMENSIONS ARE IN MM

FIRST ANGLE PROJECTION

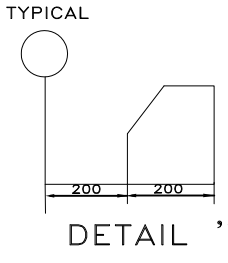




TENTATIVE LT WHEEL LOAD DIAGRAM WITHOUT IMPACT W=20T



VIEW X



DETAIL 'Y'

KEY PLAN

NOTE

1. THE DESIGN CODE FOR EOT CRANE SHALL BE IS:3177 (latest edition).
2. DRAWING IS NOT TO SCALE.

NTPC DRG NO	xxxxxxxxxxxxxxxxx
OWNER	NTPC LTD
CONTRACT	LARA STPS EXPANSION PHASE–II (2 X 800MW)
PRINT SCALE	

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE		NAME	SIGN	DATE
	DRN	RG		13.03.24
	DESN	RG		13.03.24
	CHD	PK		13.03.24
	APPD	PK		13.03.24

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD

SUB–CONTRACTOR

TITLE

CRANE CLEARANCE DIAGRAM OF O&M STORE EOT CRANE

DEPT.	SCALE	BHEL DRG NO : PE–DG–434–501–A001
SIGN / DATE		SHEET 1 OF 1 REV 0

SIZE–A2

24930412024/PS-PEM-MAX
COMPUTER FILE NAME : TAL5

BHEL	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

PERFORMANCE GUARANTEES TO BE DEMOSTRATED AT SITE

	TECHNICAL SPECIFICATION **2X800 MW LARA TPP STAGE II** **DOUBLE GIRDER EOT CRANES** **FOR UPTO 100T CAPACITY**	**PE-TS-508-501-A001** **Rev. No. 00** **Date : APRIL 2024**

PERFORMANCE GUARANTEES TO BE DEMOSTRATED AT SITE AS PER IS-3177.	
S.N.	**DESCRIPTION OF TESTS TO BE PERFORMED**
1	Speed test at rated load for hoisting, CT and LT mechanism.
2	Brakes test
3	Deflection test of bridge girder at rated load. Crane shall rest on centerline of LT wheels.
4	Overload test (running of CT and Hoisting mechanism at 125% of the rated load). Capability of crane to lift the overload from mid-air shall be demonstrated.

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

STANDARD MANUFACTURING QUALITY PLAN FOR DOUBLE GIRDER EOT CRANE

		MANUFACTURER'S NAME & ADDRESS			STANDARD MANUFACTURING QUALITY PLAN				PROJECT: 2X800 MW LARA TPP						
									PACKAGE : DOUBLE GIRDER CRANES						
					ITEM:		QP NO :		CONTRACT NO :						
							REV : 0		CONTRACTOR :						
							DATE :		VENDOR' S QAP No :						
SL.	COMPONENTS &		CHARACTERISTCS	CLASS	TYPE PF	QUANTUM	REFERENCE	ACCEPTANCE	FORMAT OF		AGENCY			REMARKS	
NO.	OPERATION				CHECK	OF CHECK	DOCUMENT	NORMS	RECORDS		M	C	N		
1	4		3	4	5	6	7	8	9	D*	**	10		11	
1	Fabricated components														
	Box Girder, End Carriage, Crab Frame, Rope Drum														
a	Material		Chemical & Physical Properties	Major	Corelation with T.C./ Check test in absence of T.C.	1/Heat/Batch	E250 Grade BR IS: 2062	E250 Grade BR IS: 2062	Mfr's T.C/ Check Test Report	√	P	V	V	Refer note: 1	
			U.T of plates.		Ultransonic	100%	ASTM A435	ASTM A435	T.C. / I.R.	√	P	V	V	U.T. ON ABOVE 20MM THICK PLATE	
b	weld setup		dimensions	Major	Measurement	100%	Components drawings	Components drawings	Vendor's inspection report		P				
1A	Seamless pipe for rope drum		Chemical & Physical Properties	major	Corelation with T.C./ Check test in absence of T.C.	100%	ASTM A106Gr B	ASTM A106Gr B	Mfr's T.C/ Check Test Report	√	P	V	V	Refer note: 1	
			NDT	Major	Macro etching & flattening	100%	ASTM A106Gr B	ASTM A106Gr B	MTC/Lab TC	√	P	V	V		
			NDT	Major	UT	100%	ASTM E-213-2007	Notch depth shall not be more than 12.5% of thickness of pipe	UT Report	√	P	V	V		
2	Welding WPS (Welding procedure specification) in line with ASME sec. IX (QW - 482) - For Box Girder, End Carriage, Crab Frame, Trolley Gear Box Casing & Rope Drum														
a	Check for welding procedure qulification, welder's performance		Welding parameters	Major	Review of documents	100%	ASME Sec-IX	ASME Sec-IX	QW-482,QW-483, QW-484 as per ASME Sec-IX	√	P	V	V	WPS/PQR/WPQ approved/ reviewd by NTPC/ NPCIL/ BVI/ LLOYES/TUV etc. shall be accpetable	
b	Back chipping		surface defect	Major	DPT	100%	ASME Sec-VIII, Div-I, Appen - 8	ASME Sec-VIII, Div-I, Appen - 8	DP Report	√	P	V	V		
c	Butt Welds		NDT	Critical	RT	100% in tension, 25% in compression, 100% in rope drum	ASME Sec-V	ASME Sec-VIII, Cl UW-51 & 52	RT Report	√	P	V	V		
				Critical	DPT	100%	ASME Sec-V	ASME Sec-VIII, Div-I, Appen - 8	DP Report	√	P	W	V	DP test of fillet weld for rope drum to be conducted. After final machining random witness by BHEL	

		MANUFACTURER'S NAME & ADDRESS			STANDARD MANUFACTURING QUALITY PLAN				PROJECT: 2X800 MW LARA TPP					
									PACKAGE : DOUBLE GIRDER CRANES					
					ITEM:		QP NO :		CONTRACT NO :					
							REV : 0		CONTRACTOR :					
							DATE :		VENDOR' S QAP No :					
SL.	COMPONENTS &		CHARACTERISTCS	CLASS	TYPE PF	QUANTUM	REFERENCE	ACCEPTANCE	FORMAT OF		AGENCY			REMARKS
NO.	OPERATION				CHECK	OF CHECK	DOCUMENT	NORMS	RECORDS		M	C	N	
1	4		3	4	5	6	7	8	9	D* **	10			11
d	fillet welds		Size and surface defects	Major	Visual	100%	Manufacturing drawing	Manufacturing drawing	Vender inspection Report	√	P	V	V	
			NDT	Major	DPT	10% RANDOM	ASME Sec-V	ASME Sec-VIII, Div-I, Appen - 8	Vender inspection Report	√	P	W	V	
e	final insection of fabricated components listed in Sr.1 above		Dimensions for Girder, end carriage rope drum etc. Camber, Verticality, bend etc	Major	Dimensional Measurement	100%	Vendor Mfg. Drg.	Vendor Mfg. Drg.	vendor inspection report	√	P	V	V	
f	Heat treatment of rope drum		Stress relieving	Major	Review of SR chart	100%	Approved drawing/relevant standard	Approved drawing/ relevant standard	SR Chart	√	P	V	V	If fabricated from M.S Plate
3	Gear box casing													
a	Material		Surface condition	Major	Visual	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report	√	P	V	V	Refer note 1
			Chemical & mech	Major	Measurement Correlation with T.C. Check test in absesnce of T.C. Correlation	100%	Manufacturing drawing/ IS: 2062	Manufacturing drawing/ IS: 2062	T.C. & I.R.	√	P	V	V	
b	Dimension		Dimensional conformity	Major	Measurement	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report		P			
c	Heat treatment		stress relieving	Major	Review of SR chart	100%	Approved drawing/relevant standard	Approved drawing/ relevant standard	SR Chart	√	P	V	V	
4	PLATFORMS		Dimensional conformity	Minor	Measurement	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report	√	P	V	V	Refer note: 1
5	L.T.FRAMES		Dimensional conformity	Minor	Measurement	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report	√	P	V	V	
6	HAND RAILINGS		Dimensional conformity	Minor	Measurement	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report	√	P	V	V	
7	CABIN (if applicable)		Dimensional conformity	Minor	Measurement	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report	√	P	V	V	
8	Current collector arms		Dimensional conformity	Minor	Measurement	100%	Mfr. Catalog	Mfr. Catalog	Vendor inspection Report	√	P	V	V	
9	DSL Guard		Dimensional conformity	Minor	Measurement	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report	√	P	V	V	

		MANUFACTURER'S NAME & ADDRESS			STANDARD MANUFACTURING QUALITY PLAN				PROJECT: 2X800 MW LARA TPP					
									PACKAGE : DOUBLE GIRDER CRANES					
					ITEM:		QP NO :		CONTRACT NO :					
							REV : 0		CONTRACTOR :					
							DATE :		VENDOR' S QAP No :					
SL.	COMPONENTS &	CHARACTERISTCS	CLASS	TYPE PF	QUANTUM	REFERENCE	ACCEPTANCE	FORMAT OF		AGENCY			REMARKS
NO.	OPERATION			CHECK	OF CHECK	DOCUMENT	NORMS	RECORDS		M	C	N	
1	4	3	4	5	6	7	8	9	D* **		10		11
10	Rails	Dimensional conformity	Minor	Measurement	100%	G.A.drg./IS : 3443 Vendore T.C./Appd.Data Sheet	G.A.drg./IS : 3443 Vendor T.C./Appd.Data Sheet	Vendor inspection Report	√	P	V	V	
		Chemical , tensile & hardness	Major	Chemical & hardness	100%	IS-3443	IS:3443	Manufacturer TC	√	P	V	V	
11	MECHANICAL COMPONENTS												
A	a) wheels												
	i) raw material	Chemicals composition and Mechanical Proporties.	Major	Corelation with Mfr's TC	100%	Mfg.drg./IS:1570 / BS - 970	Mfg.drg./IS:1570 / BS - 970	Test Certificate	√	P	V/ W#	V	Refer Note:1. # UTS required for selection of PL value as indicated in Table 6 of IS 3177 shall be witnessed by BHEL.
	ii) Machined	a) Dimensions	Major	Measurement	100%	Manufacturing drawing	Manufacturing drawing	Vendor inspection Report		P	V	V	
		b) Hardness		Mechanical	100%	Approved Data Sheet / Mfg. Drg.	Approved Data Sheet / Mfg. Drg.	Vendor inspection Report	√	P	V	V	
		c) UT		NDT	100%	ASTM A 388	ASTM A 388	Vendor inspection Report	√	P	V	V	Refer UT procedure
		d) DPT		NDT	100%	ASME Sec-VIII-App-8	ASME Sec-VIII-App-8	Vendor inspection Report	√	P	W	V	
	b) Raw material for Gears , Pinions, Shafts,Axles etc	i) Chemicals Composition & heat treatment, Physical Properties.	Major	Correlation with Mfr's TC/ Check test in absence of TC	100%	Manufacturing drawing, BS : 970 / IS : 1570 / Approved Data Sheet	Manufacturing drawing, BS : 970 / IS : 1570 / Approved Data Sheet	Mfr's T.C/ Check Test Report	√	P	V	V	
		ii) UT (after machining)	Major	check for UT (abov	100%	ASME Sec-V	Refer UT procedure	Vendor inspection Report	√	P	V	V	
		iii) Hardness	Major	check for Hardness	100%	drg. & Approved Data Sheet	Mfg. drg. & Approved Data Sheet	Vendor inspection Report	√	P	W	V	Hardness witnessing by BHEL before teeth cutting.
		iv) Dimensions	Major	Measurement	100%	Mfg. Drawing	Mfg. Drawing	Vendor inspection Report	√	P	V	V	
		V) D.P.Test on teeth	Major	NDT	100%	ASTME-165	No linear indication	Vendor inspection Report	√	P	V	V	
	c) Casting for Gears and pinions, if applicable	Chemical and Physical	Major	Chemical and Physical	100%	Approved drg/ data sheet	Approved drg/ data sheet	Mfr's T.C	√	P	V	V	
		NDT	Major	U.T.	100%	ASTM A 388	ASTM A 388	Vendor inspection	√	P	V	V	Refer UT procedure

		MANUFACTURER'S NAME & ADDRESS			STANDARD MANUFACTURING QUALITY PLAN				PROJECT: 2X800 MW LARA TPP					
									PACKAGE : DOUBLE GIRDER CRANES					
					ITEM:		QP NO :		CONTRACT NO :					
							REV : 0		CONTRACTOR :					
							DATE :		VENDOR' S QAP No :					
SL.	COMPONENTS &		CHARACTERISTCS	CLASS	TYPE PF	QUANTUM	REFERENCE	ACCEPTANCE	FORMAT OF		AGENCY			REMARKS
NO.	OPERATION				CHECK	OF CHECK	DOCUMENT	NORMS	RECORDS		M	C	N	
1	4		3	4	5	6	7	8	9	D*	**	10		11
B	Pulleys, Brake drums, coupling & other major steel castings & forging													
	i) Materials		Physical/Chemical/Hardness	Major	Corelation with mfr's TC	100%	Mfg. Drawing	Mfg. Drawing	Mfr's T.C.	√	P	V	V	
	ii) Machined		a) Dimensions	Major	Measurement	100%	Components Drawing	Components Drawing	Vendor inspection Report		P	V	V	
			b) DPT after machining.	Major	NDT	100%	ASTM E-165	No linear indication	Vendor inspection Report	√	P	V	V	
C	Gear box assy & idle running		Check for oil leakage,Noise level,vibration backlash, rise in temp. after 2 Hrs. of running, reduction ratio, backlash and contact pattern	Major	Visual & Measurement	100%	Vendor standard	Smooth running no oil leakage, Noise 85 db at 1 Mtr. Max. Temp. rise 30°C above amb temp.	Vendor inspection Report	√	P	V	V	
D	a) Top block, bottom block		dimensional conformity	Major	Masurement	100%	Assembly drawing	Assembly drawing	Vendor inspection Report		P	V	V	
	b) Hook		i) Chemical composition, Heat treatment, Mechanical properties on integeral test bar	Major	Chemical, heat treatment & Tensile , % elongation	100%	IS:1875		Test Certifacte , HT chart & Insp. Report	√	P	V	V	
			ii) UT on raw material of hook	Major	UT	100%	ASME sec--v	Annex-1 (Attached)		√	P	V	V	
			iii) Forging operation of hook	Major	Visual	100%	IS:5749 /IS:15560	IS:5749 /IS:15560		√	P	V	V	
			iv) Proof load test	Major	Mechanical	100%	IS:5749 /IS:15560	IS:5749 /IS:15560		√	P	W	V	
			v) UT & MPI after proof load test	Major	UT & MPI	100%	ASME sec - v & ASTM E709-2007	Annex-1 for UT & No crack & linear indication (For MPI as per ASME Sec VIII Appen 6)		√	P	W	V	
			Identification Punch (By BHEL &/or customer, after proof load & NDT witness)	Major	Visual	100%	-----	-----	-----	-	P			CHP - Customer Hold Point
E	Rope drum assembly		Diemnsion	Major	Measurement	100%	Mfg. Drawing	Tolerance as per drg	Vendor insp Report		P	V	V	

		MANUFACTURER'S NAME & ADDRESS			STANDARD MANUFACTURING QUALITY PLAN				PROJECT: 2X800 MW LARA TPP					
									PACKAGE : DOUBLE GIRDER CRANES					
					ITEM:		QP NO :		CONTRACT NO :					
							REV : 0		CONTRACTOR :					
							DATE :		VENDOR' S QAP No :					
SL.	COMPONENTS &	CHARACTERISTCS	CLASS	TYPE PF	QUANTUM	REFERENCE	ACCEPTANCE	FORMAT OF		AGENCY			REMARKS
NO.	OPERATION			CHECK	OF CHECK	DOCUMENT	NORMS	RECORDS		M	C	N	
1	4	3	4	5	6	7	8	9	D*	**	10		11
12	Electrical components												
a)	Motors (=< 100 KW)	make , type , rating, Routine test	Major	Review mfr's TC	100%	IS:325	IS 325/Mfr's T.C.	Mfr's T.C.	√	P	V	V	Refer Note for motor upto 100 KW.For motor above 100KW separate QP shall be applicable
b)	Brakes	Make , type , rating , dia , Functional test /Routine test	Major	Review mfr's TC	100%	Appd drgs	Appd drgs	Mfr's T.C.	√	P	V	V	
c)	Control panel	Interlocking fuctional, IR, HV, Sheet thikness, cable laying, dressing , ferulling Overall diemsnions , painting shade, Panel surface finish, Paint Thickness, adhesive test, Component fixing, Degree of protection by paper inserting	CR	Test for HV, IR, functional check	100%	IS : 3177 / App. Panel Drg. & BOM/ Data sheet	IS : 3177 / App. Panel Drg. & BOM/ Data sheet	Vendor insp Report	√	P	W	V	Refer Note No. 4 VVVFD Test Cerificate to be submitted from app. Vendor for verification.
d)	Radio remote, Master controlle	HV, IR,Functional	Major	Verfication	100%	BOM/ Mfr. Catalogue	BOM/ Mfr. Catalogue	Mfr's T.C.	√	P	V	V	Refer Note No. 4
e)	Limit switches	Functional	Major	Verfication	100%	Approved drawings	Approved drawings	Mfr's T.C.	√	P	V	V	
f)	Trailing cable, Power Control Cable & DSL	Make , type , rating ,Routine & aceptance test insulation resistance values	Major	Verfication	100%	IS: 9968, IS 1554-Part-1	IS: 9968, IS 1554-Part-1	Mfr's T.C.	√	P	V	V	
g)	Transformer	make rating , routine test	Major	visual	100%	Appd drg	Appd drg	Mfr's T.C.	√	P	V	V	
h)	SFU, MCCB,MCB, Contactors, DSL, relays, fuses, resitance bank	make, t ype , rating size, functional, continuity check	Major	visual	100%	Appd drg	Appd drg	Mfr's T.C.		P	V	V	
i)	VVVF drives	make , type , rating, routine test	Major	visual	100%	Appd drg	Appd drg	Mfr's T.C.		P	V	V	
j)	Anti collision devices , cable gland , ,lugs ,r ectifier, indicating lamps, terminal blocks, load cell.	make , type	Major	visual	100%	Appd drg	Appd drg	Mfr's T.C.		P	V	V	
13	Bought out items												
a)	Wire rope	Visual , tensile	Major	Type, grade, dia b	100%	IS:2266	IS:2266	Mfr's T.C.	√	P	V	V	
b)	Bearing	Type & Size	Major	Verfication	100%	Appd drg/Mfr's catalogue	Appd drg/Mfr's catalogue	Mfr's T.C.	√	P	V	V	
14	Assembly of cranes												
a)	Bridge with LT	Dimesions, wheel level alignment	Major	Measurement	100%	GA drg/IS:3177	GA drg/IS:3177	Insp. Report	√	P	W	V	
b)	Crab assembly	Dimesions, wheel level alignment	Major	Measurement/ Vis	100%	GA drg/IS:3177	GA drg/IS:3177	Insp. Report	√	P	W	V	

		MANUFACTURER'S NAME & ADDRESS			STANDARD MANUFACTURING QUALITY PLAN				PROJECT: 2X800 MW LARA TPP					
									PACKAGE : DOUBLE GIRDER CRANES					
					ITEM:		QP NO :		CONTRACT NO :					
							REV : 0		CONTRACTOR :					
							DATE :		VENDOR' S QAP No :					
SL.	COMPONENTS &		CHARACTERISTCS	CLASS	TYPE PF	QUANTUM	REFERENCE	ACCEPTANCE	FORMAT OF		AGENCY			REMARKS
NO.	OPERATION				CHECK	OF CHECK	DOCUMENT	NORMS	RECORDS		M	C	N	
1	4		3	4	5	6	7	8	9	D*	**	10		11
c)	Final Inspection (at works) with actual panel and pendent		Overall dimension: Span, Diagonal dimension check, Wheel base & gauge, overhang, LT Stopper, headroom, lift , Eqp. Layout on bridge platform, , elevations /levels etc	Major	Measurement	100%	Approved drgs./IS :3177	Approved drgs./IS: 3177	Insp. Report	√	P	W	W	
			No Load & Load Tests											
			a) No load: Hoists,CT & current measurement, No Load running of LT machinery for direction and speed with VVVFD	Major	Measurement	100%	Approved drgs	Approved drgs	Insp. Report	√	P	W	W	
			b) SWL: Hoists, CT speed, current & Deflection measurement	Major	Operational Check & Measurement	100%	GA drg/ IS:3177/ Approved Drawing	GA drg/ IS:3177/ Approved Drawing	Insp. Report	√	P	W	W	
			c) Overload: Hoisting, CT movement & current measurment (at 125% SWL)	Major	Operational Check & Measurement	100%	GA drg/ IS:3177/ Approved Drawing	GA drg/ IS:3177/ Approved Drawing	Insp. Report	√	P	W	W	
			d) Operation check of brakes and limit switches .	Major	Operational Check	100%	GA drg/ IS:3177/ Approved Drawing	GA drg/ IS:3177/ Approved Drawing	Insp. Report	√	P	W	W	
15	Painting		Surface preparetion & Painting. DFT	Major	Visual	100%	Approved drgs/doc	Approved drgs/doc	Vendor's Report		P	V		
Note 1 :	Original TCs / Photocopies certified in original by mill shall be furnished for review. Test In absence of correlated TCs Check test to be witnessed by BHEL shall be carried out from each plate/ bar for above 10 mm thk., certificates shall be offered for review at the time of stage inspection of components / assembly. Supplier shall ensure that pitted material is not used.													
Note 2 :	X-Ray to be taken for thickness upto 19 mm and Gamma Ray for thickness above 19 mm. If Gamma Ray is used for lower thickness slow speed film like D2 or equvalent which gives enough readable and interpretable film quality to be used for clarity. All NDT shall be carried out by Qualified Level II personnel.													

		MANUFACTURER'S NAME & ADDRESS			STANDARD MANUFACTURING QUALITY PLAN				PROJECT: 2X800 MW LARA TPP					
									PACKAGE : DOUBLE GIRDER CRANES					
					ITEM:		QP NO :		CONTRACT NO :					
							REV : 0		CONTRACTOR :					
							DATE :		VENDOR' S QAP No :					
SL.		COMPONENTS &	CHARACTERISTCS	CLASS	TYPE PF	QUANTUM	REFERENCE	ACCEPTANCE	FORMAT OF		AGENCY			REMARKS
NO.		OPERATION			CHECK	OF CHECK	DOCUMENT	NORMS	RECORDS		M	C	N	
1		4	3	4	5	6	7	8	9	D*	**	10		11
Note 3 :	LT motors shall be of type tested quality. For each type & rating of LT motors rated above 100 KW, the bidder shall submit for Owner's approval the reports of all the type tests as per relevant standards and carried out within last ten years from the date of bid opening. These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. In case the Bidder is not able to submit report of the type test(s) conducted within last ten yearsfrom the date of bid opening, or in case the type test report(s) are not found to be meeting the specification requirements, the Bidder shall conduct all such tests under this contract free of cost to the Owner and submit the reports for approval. LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED The following type test reports shall be submitted for each type and rating of LT motor of above 100 KW only 1. Measurement of resistance of windings of stator and wound rotor. 2. No load test at rated voltage to determine input current power and speed 3. Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors) 4. Full load test to determine efficiency power factor and slip . 5. Temperature rise test . 6. Momentary excess torque test. 7. High voltage test . 8. Test for vibration severity of motor. 9. Test for noise levels of motor 10. Test for degree of protection and 11. Over speed test. <u>LESS THAN 30KW</u>: ACCEPTANCE OF MOTOR LESS THAN 30 KW IS BASED ON COC OF THE MANUFACTURER & THE CONTRACTOR CONFIRMING AS FOLLOWS: IT IS HEREBY CONFIRMED THAT THE ABOVE MENTIONED MOTOR /MOTORS WAS/ WERE MANUFACTURED TAKING CARE OF CUSTOMER SPECIFIC REQUIREMENTS REGARDING AMBIENT TEMP., VOLTAGE & FREQUENCY VARIATION, HOT STARTS, PULL OUT TORQUE, STARTING KVA/KW, TEMP. RISE, DISTANCE BETWEEN CENTRE OF STUD & GLAND PLATE AND TESTED IN ACCORDANCE WITH APPROVED DRAWING /DATA SHEETS. <u>30 KW TO BELOW 100 KW:</u>ACCEPTANCE OF MOTOR RATING BETWEEN 30 KW & 50 KW IS BASED ON NTPC REVIEW OF ROUTINE TEST INSPECTION REPORT AS PER IS 325 ALONG WITH COC OF THE MANUFACTURER & THE CONTRACTOR CONFIRMING AS FOLLOWS:IT IS HEREBY CONFIRMED THAT THE ABOVE MENTIONED MOTOR /MOTORS WAS/ WERE MANUFACTURED TAKING CARE OF NTPC SPECIFIC REQUIREMENTS REGARDING AMBIENT TEMP., VOLTAGE & FREQUENCY VARIATION, HOT STARTS, PULL OUT TORQUE, STARTING KVA/KW, TEMP. RISE, DISTANCE BETWEEN CENTRE OF STUD & GLAND PLATE, SPACE HEATER AND													
Note 4 :	Performance of electrical & control devices along with the interlocks, protection & sequence to be checked during crane assembly and parked at works.													
Note 5 :	All material of construction shall be as per approved drg. / data sheet / specifications													
LEGEND :														
D: RECORDS INDETIFIED WITH 'TICK'(√) SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION														
M : MANUFACTURER/SUBCONTRACTOR														
C: BHEL-CQS/THIRD PARTY														
N : CUSTOMER														
INDICATE "P" PERFORM "W" WITNESS AND "V" DOCUMENT REVIEW														
MANAFACTURER/		CONTRACTOR												
SUBCONTRACTOR														
SIGNATURE								REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY & SEAL					

BHEL	**TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY**	**PE-TS-508-501-A001** **Rev. No. 00** **Date : APRIL 2024**

SUB VENDOR LIST

SR. NO.	ITEM	SUPPLIERS	REMARKS
1.	STEEL	SAIL	
		TISCO	
		JINDAL	
		RINL	
		ESSAR	
2.	HOOKS	STEEL FORGING & ENGG. CO.,	
		SIMRITI FORGING	
		KARACHIWALA	UP TO 25T CAPACITY
3.	GEAR COUPLINGS	ALLIANCE	
		FLEX-TRANS (formerly known as HICLIFF)	
		SAHARA	
		NUTECH	
		OEM	
4.	WIRE ROPE	USHA MARTIN	
		FORT WILLIAMS	
		B OMBAY WIRE ROPES	
		BHARAT WIRE ROPES	
5.	BEARINGS	SKF	
		FAG	
		TATA	
		NBC	
6.	MOTORS	SIEMENS	
		NGEF (up to 15KW)	
		CROMPTON	
		KIRLOSKAR	
		BHARAT BIJLI	
		MARATHON	
		ABB	
7.	BRAKES	ELECTROMAG	
		SPEED-O- CONTROL	
		BCH	FOR DCEM BRAKES ONLY
		KAKKU	
		PATHE	
8.	CONTACTOR	SIEMENS	
		L&T	
		SCHNEIDER (Earlier TELE MECHANIQUE)	
		ABB	

		BCH	
9.	OVER LOAD RELAYS	SIEMENS	
		L&T	
		ABB	
		SCHNEIDER (Earlier TELE MACHANIQUE)	
10.	HRC FUSES	SIEMENS	
		L&T	
		ENGLISH ELECTRIC	
		GE POWER	
		EATON (BUSSMANN)	
		ABB	
11.	ISOLATING SWITCH	SIEMENS	
		L&T	
		CONTROL & SWITCH GEAR	
		ABB	
12.	SWITCH FUSE UNITS	SIEMENS	
		L&T	
		SCHNEIDER	
		CONTROL & SWITCH GEAR	
		ABB	
13.	TIME DELAY RELAYS	SIEMENS	
		L&T	
		ABB	
		BCH	
		SCHNEIDER (Earlier TELE MACHANIQUE)	
14.	TRANSFORMERS	INDCOIL	
		LOGICSTAT	
		KAPPA	
		AUTOMATIC ELECTRIC	
		PRECISE ELECTRICALS	
		SILKAAN ELECTRIC MFG. CO. LTD.	
		SOUTHERN ELECTRIC	
		NEC	
15.	BULB & FLOURESCENT TUBES/FITTINGS	PHILIPS	
		PHILIPS	
		CROMPTON	
16.	CABLE LUGS (HEAVY DUTY)	DOWELLS	
		UML ENGINEERS	
		CHETNA	
		BILLET	
		BRACO	

		JAINSON	
17.	HOOTERS	BEACON	
		OSC	
		TARGET	
		KHERAJ	
18.	LIGHTING SWITCHES	ANCHOR	
		ELLORA	
		GE	
		CROPMTON	
		BAJAJ	
		PHILIPS	
19.	PVC POWER CABLES	APAR INDUSTRIES LTD.	
		CORDS CABLE INDUSTRIES LTD.	
		DIAMOND POWER INFRASTRUCTURE LTD	
		GOYOLENE FIBRES (INDIA) PVT.LTD	
		GOVIND CABLE INDUSTRIES	
		GUPTA POWER INFRASTRUCTURE LIMITED	
		HAVELLS INDIA LIMITED	
		KEI INDUSTRIES LTD.	
		KRISHNA ELECTRICAL INDUSTRIES LTD	
		KEC INTERNATIONAL LIMITED	
		MANSFIELD CABLES COMPANY LTD.	
		NICCO CORPORATION LTD.	
		PARAMOUNT COMMUNICATIONS LTD.	
		POLYCAB WIRES PVT. LTD.	
		RADIANT CORPORATION PRIVATE LIMITED	
		RAVIN CABLES LIMITED	
		SUYOG ELECTRICALS LTD.	
		SRIRAM CABLES PVT. LTD.	
		SCOT INNOVATION WIRES AND CABLES PVT. LTD.	
		SAM CABLES & CONDUCTORS (P) LTD	
		THERMO CABLES LTD	
		ADVANCE CABLE TECHNOLOGIES (P) LTD	
		APAR INDUSTRIES LTD., CMI LTD	
		CMI LIMITED	
		CORDS CABLE INDUSTRIES LTD	
		CRYSTAL CABLE INDUSTRIES LTD	
		DELTON CABLES LTD	
		DIAMOND POWER INFRASTRUCTURE LTD	
		ELKAY TELELINKS LTD	
		GEMSCAB INDUSTRIES LTD	
		GOVIND CABLE INDUSTRIES	
		GUPTA POWER INFRASTRUCTURE LIMITED	

20.	PVC CONTROL CABLES	HAVELLS INDIA LIMITED	
		INCOM CABLES (P) LTD	
		KEI INDUSTRIES LTD	
		KRISHNA ELECTRICAL INDUSTRIES LTD	
		KEC INTERNATIONAL LIMITED	
		MANSFIELD CABLES COMPANY LTD	
		NICCO CORPORATION LTD	
		PARAMOUNT COMMUNICATIONS LTD	
		POLYCAB WIRES PVT. LTD	
		RAVIN CABLES LIMITED	
		SUYOG ELECTRICALS LTD	
		SPECIAL CABLES PVT. LTD	
		SCOT INNOVATION WIRES AND CABLES PVT. LTD	
		SAM CABLES & CONDUCTORS (P) LTD	
		SPM POWER & TELECOM PVT. LTD	
		TORRENT CABLES LTD	
		THERMO CABLES LTD	
		TIRUPATI PLASTOMATICS PVT. LTD	
		UNIVERSAL CABLES LTD	
21.	TRAILING CABLES	NICCO	
		UNIVERSAL	
		INCAB	
		ICL	
		APAR INDUSTRIES LTD	
		CMI LTD	
		KEI INDUSTRIES LTD	
		SUYOG ELECTRICALS LTD	
22.	XLPE POWER CABLES	APAR INDUSTRIES LTD	
		CORDS CABLE INDUSTRIES LTD	
		CRYSTAL CABLE INDUSTRIES LTD	
		DIAMOND POWER INFRASTRUCTURE LTD	
		GEMSCAB INDUSTRIES LTD	
		GOVIND CABLE INDUSTRIES	
		GUPTA POWER INFRASTRUCTURE LIMITED	
		HAVELLS INDIA LIMITED	
		KEI INDUSTRIES LTD	
		KRISHNA ELECTRICAL INDUSTRIES LTD	
		KEC INTERNATIONAL LIMITED	
		MANSFIELD CABLES COMPANY LTD	
		PARAMOUNT COMMUNICATIONS LTD	
		POLYCAB WIRES PVT. LTD	
		RAVIN CABLES LIMITED	
		SUYOG ELECTRICALS LTD	

		SPECIAL CABLES PVT. LTD	
		SCOT INNOVATION WIRES AND CABLES PVT. LTD	
		SRIRAM CABLES PVT. LTD	
		TORRENT CABLES LTD	
		THERMO CABLES LTD	
		TIRUPATI PLASTOMATICS PVT. LTD	
23.	**XLPE CONTROL CABLES**	APAR INDUSTRIES LTD	
		CABLE CORPORATION OF INDIA LTD	
		CRYSTAL CABLE INDUSTRIES LTD	
		DIAMOND POWER INFRASTRUCTURE LTD	
		GEMSCAB INDUSTRIES LTD	
		HAVELLS INDIA LIMITED	
		KEI INDUSTRIES LTD	
		KRISHNA ELECTRICAL INDUSTRIES LTD	
		KEC INTERNATIONAL LIMITED	
		PARAMOUNT COMMUNICATIONS LTD	
		POLYCAB WIRES PVT. LTD	
		RADIANT CORPORATION PRIVATE LIMITED	
		RAVIN CABLES LIMITED	
		SUYOG ELECTRICALS LTD	
		SRIRAM CABLES PVT. LTD	
		TORRENT CABLES LTD	
		UNIVERSAL CABLES LTD	
24.	**CABLE GLAND**	COMMET	
		SUNIL&CO	
		ARUP ENGINEERING	
		JAINSON	
		DOWELL	
25.	**PUSH BUTTONS**	SIEMENS	
		L&T	
		BCH	
		SCHNEIDER	
26.	**LIMIT SWITCHES**	SPEED-O-CONTROL	
		ELECTROMAG	
27.	**MASTER CONTROLLER**	SPEED-O-CONTROL	
		ELECTROMAG	
28.	**SAFETY SWITCHES**	ALSTOM	
		L&T	
		SCHNEIDER	
		ABB	
		SIEMENS	

29.	**PENDENT PUSH BUTTON STATION**	OEM	
30.	**INDICATING LAMPS**	TECKNIC	
		BCH	
		SIEMENS	
		STANDARD	
31.	**MCB**	MDS	
		INDO COPP	
		STANDARD	
		SIEMENS	
		L&T	
		ABB	
		SCHNEIDER	
32.	**PANELS**	OEM	
		RITTAL	
		BCH	
		PYROTECH	
33.	**RESISTANCE BOXES**	ENAPROS	
		SOC	
		EMM	
		OEM	
34.	**FIRE EXTINGUISHERS**	ASKA EQUIPMENTS LTD.	
		ASHOKA ENGINEERING COMPANY	
		KANADIA FYR FYTER PVT. LTD	
		NITIN FIRE PROTECTION INDUSTRIES LTD	
		NEW ENGINEERING CORPORATION	
		SAFEX FIRE SERVICES LTD	
		UNITED FIRE EQUIPMENTS PVT. LTD	
		ZENITH FIRE SERVICES (INDIA) PVT LTD	
		BIS APPROVED SOURCE WITH VALID LICENSE	
35.	**VVVF**	L&T -YASKAWA	
		ABB	
		SIEMENS	
		SCHNIEDER	
		FUJI ELECTRIC	
		ROCKWELL	
		VACON	
		MITSUBISHI ELECTRIC	

36.	**SHROUDED DSL**	SUSHEEL	
		STROMAG	
37.	**ANTI COLLISION DEVICE**	SICK	
		IFM	
		ELECTRONIC SWITCHES INDIA	
38.	**LOAD CELL**	IPA	
		METTLER TOLEDO	
		SARTORIUS	
39.	**RRC**	ACROPOLIS ENGINEERING	
		HBC	
		SOC	
		SNT CONTROLS	
40.	**GEAR BOX**	OEM	* = Applicable for Geared Motors only
		ELECON ENGINEERS	
		SHANTI GEARS	
		PBL*	
		NAW*	
		NORD*	
		SEW*	
		BONGFILIOLI*	
41.	**RAIL**	JSPL	
		SAIL	
42	**CENTRALIZED LUBRICATION / HYDRAULIC POWER PACK**	LUBCON, PUNE	CRANE OEM MAKE POWERPACK IS NOT ALLOWED.
		PRAKASH LUBRICANT, KOLKATA	
		AFMC, KOLKATA	
		SKF ENGG AND LUBRICATION (LINCOLN HELIOS)	
		VIJAY ENGINEERS	
		INDO HYDRAULIC BOMBAY PVT LTD	
		MEHATA HYDRAULIC EQUIPMENT	
		CLAYSYS	
		VEDNAT ENGINEERING SERVICES	
		ELECTROPNEUMATICS AND HYDRAULIC PVT LTD	
		SN HYDRAULIC	
43	**MCCB/MPCB**	L&T	
		ABB	
		SIEMENS	
		SCHNIEDER	
44	**SINGLE PHASE PREVENTOR**	MINILEC	
		L&T	
		SIEMENS	

Note:

1	THE SUB VENDOR LIST ABOVE IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND NTPC APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL
2	BIDDER TO PROPOSE SUB VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.
3	THE INSPECTION CATEGORY WILL BE INTIMATED AFTER AWARD OF CONTRACT BY BHEL/CUSTOMER. HOWEVER THE SAME WILL BE ADHERED BY THE BIDDER WITHOUT ANY COMMERCIAL AND DELIVERY IMPLICATION TO BHEL/ NTPC.

BHEL	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

PAINTING REQUIREMENT

Crane	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (in Microns)	Intermediate Coat (in Microns)	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT
BC BAY BFP HANDLING DOUBLE GIRDER EOT CRANE	STEEL STRUCTURE	Surface preparation: Shot blast cleaning/ abrasive blast cleaning to SA21/2 (near white metal) 35-50 microns.	Inorganic Ethyl Zinc Silicate.	1	35 µm per coat.	Epoxy base Tio2 pigmented coat	1 coat	35 µm per coat	Epoxy base paint - 2 coats, DFT 25 µm per coat. Final coat of paint: Aliphatic Acrylic Polyurethane CDE134, %V=40.0(min.) 1 coat, DFT 30µm. per coat	2 +1 coat	2 x 25 + 1 x 30 µm = 80µm	150µ
CWPH DOUBLE GIRDER EOT CRANE AND HEAVY MATERIAL STORE CRANE	STEEL STRUCTURE	Surface preparation: Shot blast cleaning/ abrasive blast cleaning to SA21/2 (near white metal) 35-50 microns.	Inorganic Ethyl Zinc Silicate.	1	75 µm per coat.	Epoxy base Tio2 pigmented coat	1 coat	75 µm per coat	Epoxy base paint - 2 coats, DFT 35 µm per coat. Final coat of paint : Aliphatic Acrylic Polyurethane CDE134, %V=40.0(min.) : 1 coat, DFT 30 µm. per coat	2 +1 coat	2 x 35 + 1 x 30 µm = 100µm	250µ
DOUBLE GIRDER EOT CRANE	For Indoor components such as motors, electrical parts etc	Epoxy based with suitable additives. The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However in case electrostatic process of painting is offered for any electrical equipment, minimum paint thickness of 50 microns shall be acceptable for finish coat.										

COLOR SHADE

SL. No	Item Description	Color Shade	Remarks
1	Crane Structure	Golden Yellow shade 356 as per IS-5	Colour band-Black
2	Trolley and hook	Golden Yellow shade 356 as per IS-5	
3	Motors	RAL 5012 (Blue)	
4	Control Panels	Light Gray (Powder coated) as per IS-5	

BHEL	**TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY**	**PE-TS-508-501-A501** **Rev. No. 00** **Date : APRIL 2024**

PACKING REQUIREMENT

	COMMON GUIDELINES FOR PACKING
1	**GENERAL:**
1.1	The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & storage. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.
1.2	All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.
1.3	The identification marking indicating the name and address of the consignee shall be clearly marked in indelible ink on two opposite sides and top of each of the packages. In addition the Contractor shall include in the marking gross and net weight, outer dimension and cubic measurement.
1.4	Each package shall be accompanied by a packing note quoting specifically the name of the Contractor, the number and date of contract and names of the office placing the contract, nomenclature of contents and Bill of Material.

2.	**TYPES OF PACKING:**
	The following 5 types of packing have been standardized for packing of General Components/ Assemblies.
a	**OP**' - Open Type.
b	**PP**' - Partially Packed.
c	**CP**' – Crate/Box Packing - Components/Equipment requiring physical protection.
d	'**CQ**' - Case Packing – Machined components-Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.
e	**'CR'** - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc…

3.	**DESCRIPTION OF TYPES OF PACKING:**
	The various types of packing, as standardized above, are described below.

3.1	**'OP' - Open Type**					
	In case, of components which are not affected by water & dust and do not require special protection, are generally not machined, shall be sent as open packages. However, these components may be sent in crates, wherever necessary.					

3.2	**PP' - Partially Packed**
3.2.1	Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene
3.2.2	Film. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film.

3.3	**'CP' - Crate Packing**	
	Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.	

3.4	**'CQ' - Case Packing -** Machined Components/Assemblies/Equipment
3.4.1	Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of silica gel or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces.
3.4.2	For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.

3.5	**CR' - Case Packing** - Electrical & Electronic Components/Assemblies
	Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel.

BHEL	**TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY**	**PE-TS-508-501-A501** **Rev. No. 00** **Date : APRIL 2024**

4	**PREPARATION OF PACKING CASES**
4.1	**DIMENSIONS:**
a)	Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units/manufacturers.
b)	Width of all planks including the tongue shall be more than 125mm and after plaining it shall be minimum 100mm.
c)	Minimum number of planks shall be used for a shook.
d)	Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel.
e)	Width of binding planks shall be minimum 100mm.
f)	Distance between any 2 binding planks shall be less than 750mm.
g)	diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm
h)	Distance of the outer edges of these planks from the edge of case shall be less than 250mm.
i)	Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

4.2	**HOOP IRON STRIPS**
	These are used for strapping the boxes. The width of the strips shall be 19+1mm and thickness 0.6+0.01mm. The material shall be free from rust. If sufficient nailing is done for bigger boxes, strapping need not be done.

4.3	**BRACKETS**
	These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of thickness min 2mm and width 25+1mm. The brackets shall be of “L" shape, the length of each side being 100+2mm. Two holes shall be provided towards the end of each side for screwing /nailing.

4.4	**MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM**
	100GSM (Colourless) Multi Layered Cross Laminated Polythelene Film are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

4.5	**RUBBERISED COIR:**
	The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

5	**MULTI LAYER CROSS LAMINATED POLY FILM WHILE PACKING OF CUBICLES/CASING**
5.1	The inner surface of 4 sides of shook's shall be nailed with Multi-layer cross laminated poly film (as per 4.4) using blue nails wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.
5.2	The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film. This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.
5.3	The cubicles shall be covered with Multi-layer cross laminated poly film.

6	**PACKING OF LOOSE ITEMS/SPARES**
6.1	Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 5.4) using blue nails.
6.2	Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
6.3	Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
6.4	Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
6.5	Silica gel held in cotton bags shall be kept at proper places in the box.
6.6	Packing slip kept in polyethylene bag shall be placed in the box.
6.7	Two numbers of hoop iron strips shall be strapped tightly on the case using clips.
6.8	Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.
6.9	Loose items to be kept inside the cubicle/casing
	- Other items which are given loose in addition to cubicle shall be packed in separate boxes.

BHEL	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A501 Rev. No. 00 Date : APRIL 2024

7	**TYPICAL PATTERN OF WOODEN BOX**

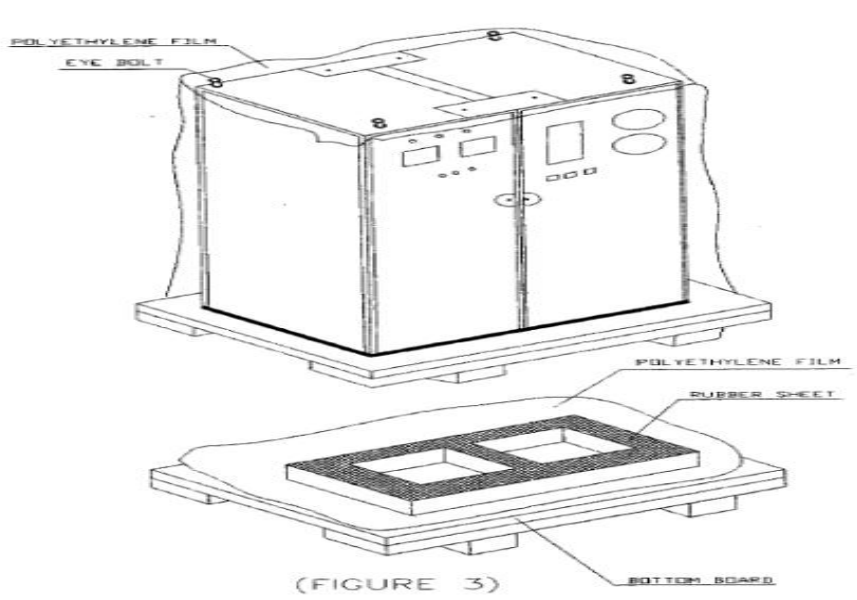


Figure 2

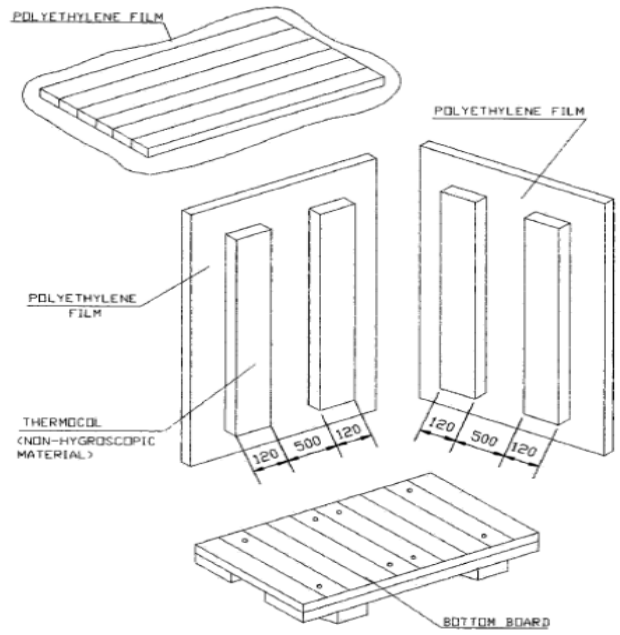


Figure 1

8	**SEALED PACKING:**
	Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and

9	**MARKINGS/STENCILINGS**
9.1	**"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".**
9.2	Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.
9.3	In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel.
9.4	Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.
9.5	Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.
9.6	In case the size of package is small for using the stencils, then hand written letters/figures shall be allowed.

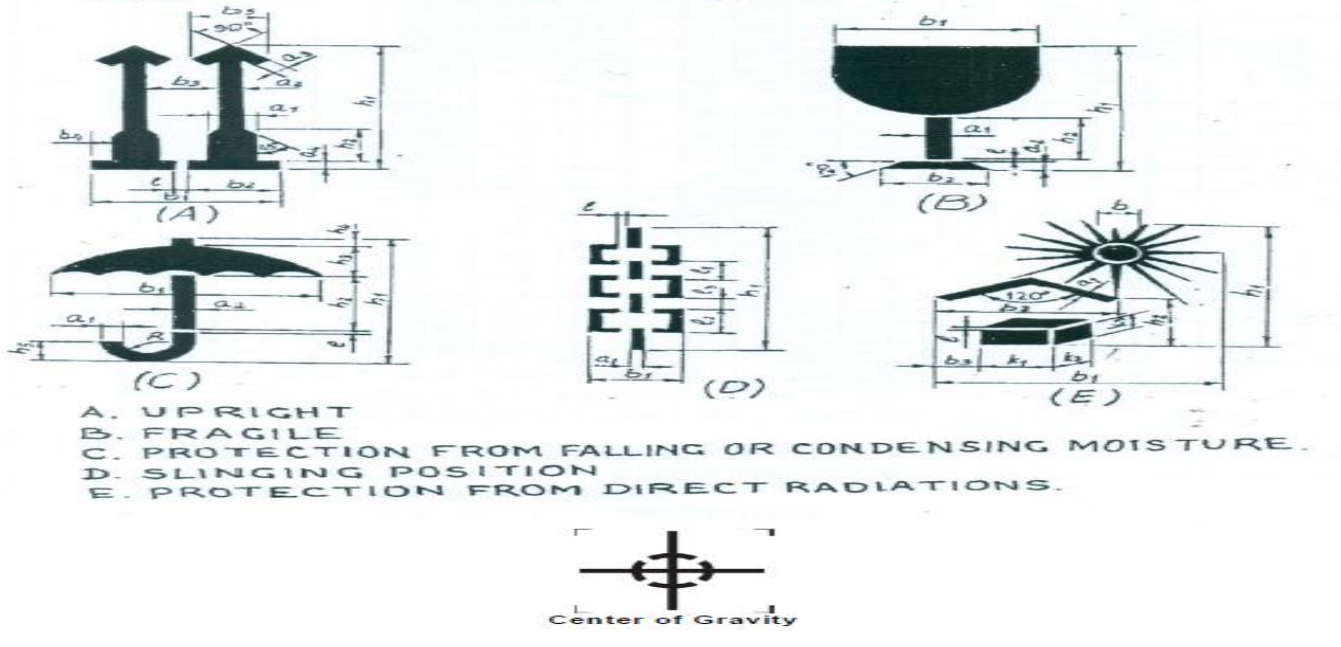


Figure 3

	BHEL – <unit> - <location> - <pin>			
CONSIGNEE				
MATERIAL				
CUSTOMER REF.		MO. NO.		
DESPATCH ADVICE NOTE NO		CASE NO		
DIMENSIONS(MM) L x B x H			NET WT –KGS	GROSS WT –KGS
SPECIAL INSTRUCTIONS	HANDLE WITH CARE - KEEP DRY DO NOT DROP - DO NOT TILT			

Figure 4 – TYPICAL MARKING PLATE (225 X 170)

Figure 5

Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:

10	STANDARD METHOD OF PACKING

Table 1 - Standard Method of Packing

S. No.	DESCRIPTION	CASE	CRATE	BUNDLE	BARE	DRUM
1	FAB STRUCTURALS, GIRDER				O	
2	FAB STRUCTURALS, GIRDER				O	
3	SUPPORTING STRUCTURALS				O	
4	STRUCTURE SUB ASSEMBLY, CRAB, END CARRIAGE, END STOPPERS, ROPE DRUM				O	
5	RAIL				O	
6	STAIR CASES				O	
7	HANDRAILS/ PLATFORMS/ LADDERS/ CAGE				O	
8	FASTENERS, RAIL CLAMPS AND FIXING ACCESSORIES	O				
9	BEARING BLOCKS	O				
10	FANS	O				
11	GASKETS	O	O			
12	FLANGES	O	O			
13	PAINT TINS		O			
14	PAINT DRUMS					O
15	MOTORS, TRANSMFORMERS, VVVFD, LIMIT SWITCHES, ELECTRIC HOIST ASSEMBLY, RELAYS, FUSES, LIGHTING FIXTURES, PENDANT, ISOLATING SWITCH, RRC, TRANSMITTERS AND OTHER ELECTRICAL ACCESORIES	O				
16	SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES, PANELS,		O			
17	INDICATORS, VIBRATOR SWITCHES	O				
18	CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL,		O			
19	OPERATIONAL SPARES , MAINTENANCE TOOLS AND TACKLES	O				
20	ALL OTHER LOOSE ITEMS	O				

Note

Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

Site Storage and Preservation Guidelines

CONTENT

1. SCOPE OF THE DOCUMENT

This guideline is prepared in intent to provide proper site storage and preservation of the Mechanical, Electrical and C & I items / equipment supplied under various bought out packages/items. This storage procedure shall be followed at different power plant sites by concerned agency for storage and preservation from the date of equipment received at site until the same are erected and handed over to the customer.

2. PURPOSE OF STORAGE & PRESERVATION

Many of the items may be required to be kept in stores for long period. It shall therefore be essential that proper methods of storage and preservation be applied so that items do not deteriorate, loose some of their properties and become unusable due to atmospheric conditions and biological elements.

3. MEASURES TO BE TAKEN FOR STORAGE, HANDLING & PRESERVATION

a) GENERAL STORAGE REQUIREMENTS

1. To the extent feasible, materials should be stored near the point of erection. The storage areas should have adequate unloading and handling facilities with adequate passage space for movement of material handling equipment such as cranes, fork lift trucks, etc. The storage of materials shall be properly planned to minimise time loss during retrieval of items required for erection.
2. The outdoor storage areas as well as semi-closed stores shall be provided with adequate drainage facilities to prevent water logging. Adequacy of these facilities shall be checked prior to monsoon.
3. The storage sheds shall be built in conformity with fire safety requirements. The stores shall be provided with adequate lights and fire extinguishers. ‘No smoking’ signs shall be placed at strategic locations. Safety precautions shall be strictly enforced.
4. Adequate lighting facility shall be provided in storage areas and storage sheds and security personnel positioned to ensure enforcement of security measures to prevent theft and loss of materials.
5. Adequate number of competent stores personnel and security staff shall be deployed to efficiently store and maintain the equipment / material.
7. The equipment shall be stored in an orderly manner, preserving their identification slips, tags and instruction booklets, etc., required during erection. The storage of materials shall be equipment-wise. Loose parts shall be stored in sheds on racks,

preserving the identification marks and tags in good condition. The group codes shall be displayed on the racks

6. At no time shall any materials be stored directly on ground. All materials shall be stored minimum 200 mm above the ground preferably on wooden sleepers

b) GENERAL PRESERVATION REQUIREMENTS

1. All special measures to prevent corrosion shall be taken like keeping material in dry condition, avoiding the equipment coming in contact with corrosive fluid like water, acid etc.
2. Materials which carry protective coating shall not be wrapped in paper, cloth, etc., as these are liable to absorb and retain moisture. The material shall be inspected and in case of signs of wear or damages to protective coating, that portion shall be cleaned with approved solution and coated with an approved protective paint. Complete record of all such observations and protective measures taken shall be maintained.
3. Generally equipment supplied at site are properly greased or rust protective oil is applied on machined/ fabricated components. However periodic inspection shall be carried out to ensure that protection offered is intact.
4. While handling the equipment, no dragging on the ground is permitted. Avoid using wire rope for lifting coated components. Use polyester slings (if possible) otherwise protective material (e.g. clothes, wood block etc.) should be used while handling the components with rope / slings
5. For Equipment supplied with finished paint, touch paint shall be done in case any surface paint gets peeled off during handling. Otherwise such surfaces shall necessarily be wrapped with polythene to avoid any corrosion. Further for equipment wherein finish coat is to be applied at site, site to ensure that equipment is received with primer coat applied.
6. It shall be ensured by periodic inspection that plastic inserts are intact in tapped holes, wherever applicable.
7. Pipes shall be blown with air periodically and it shall be ensured that there is no obstruction.
8. Silica gel or approved equivalent moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.
9. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion/jamming due to prolonged storage.

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.

11. Following preservatives/preservation methods can be used depending upon type of equipment

    a. Rust preventive fluid (RPF)

    b. Rust protective paints

    c. Tarpaulin covers, in case of outdoor storage

    d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –

    - Ingress of moisture and corrosion damages.
    - Damage to protective coating.
    - Open ends in pipes, vessels and equipment -
        - In case any open ends are noticed, same shall be capped.

2. Any damages to equipment / materials.

    - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
    - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere**. (C)

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.

ii **Semi-closed storage**. (S)

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.

iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.

The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H_2SO_4)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self-life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self-life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	**Description of the equipment**	**Type of Storage**	**Check for**	**Remarks**
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

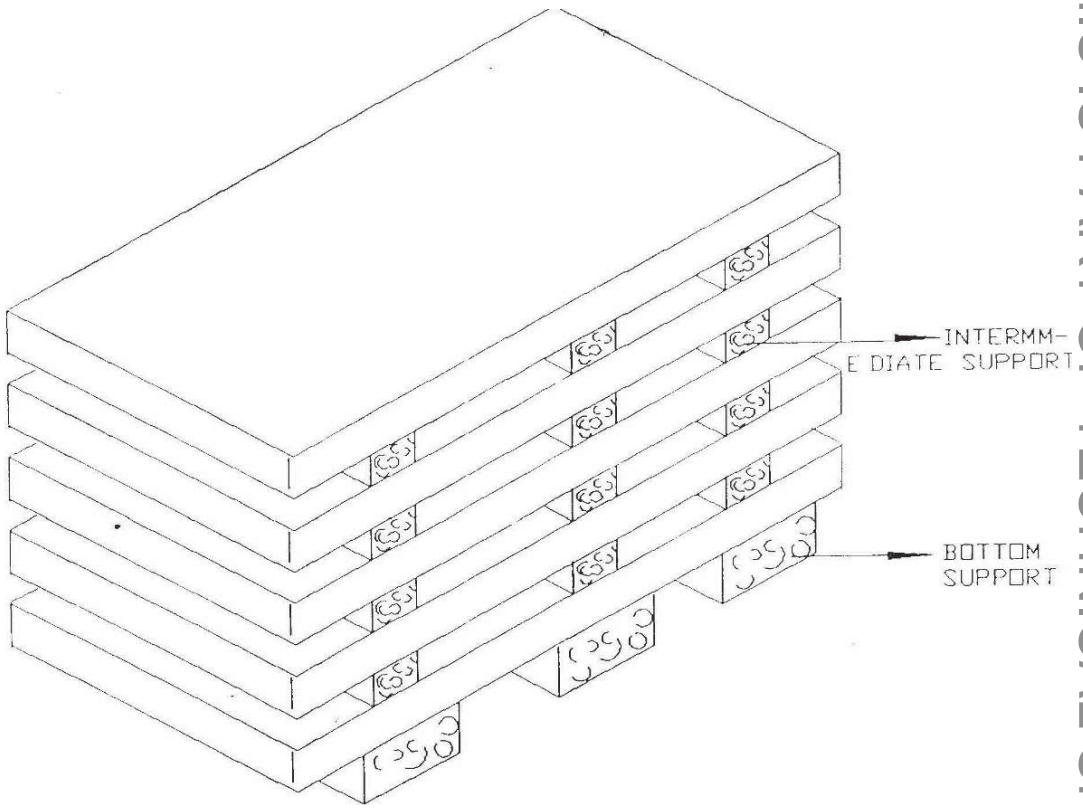


Figure – 1 – PLATE STACKING ARRANGEMENT

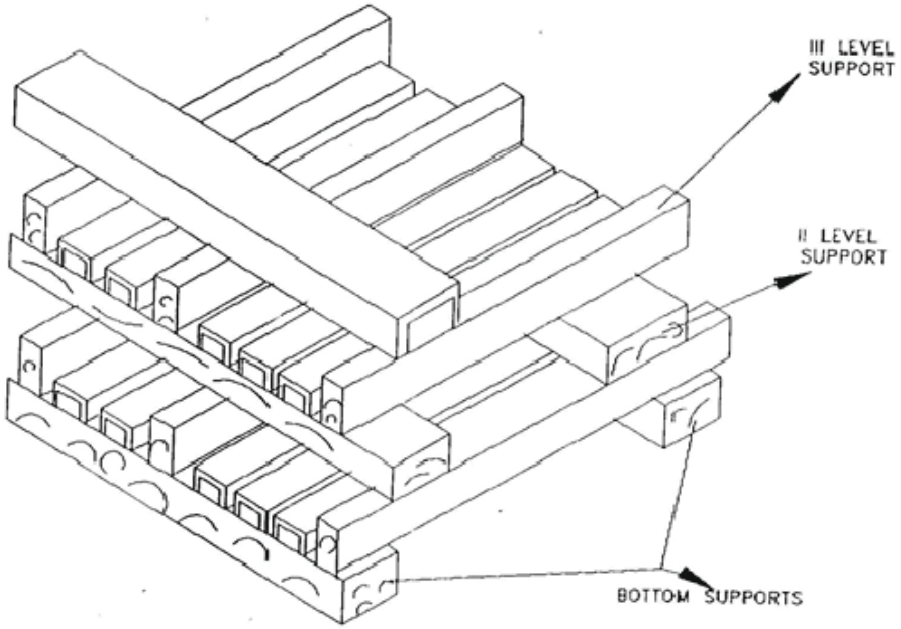


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

BILL OF QUANTITY

A SUPPLY:

S. No.	Description	75T BC Bay BFP handling Double Girder crane 1		75T BC Bay BFP handling Double Girder crane 2		70T CWPH Double Girder crane		30T Heavy material store Double Girder crane		Common for all Double Girder cranes	
		Qty	UOM	Qty	UOM	Qty	UOM	Qty	UOM	Qty	UOM
1	Bridge girders along with walkway, platform, handrails, CT stoppers etc.	2	Nos.	2	Nos.	2	Nos.	2	Nos.	----	----
2	End carriages										
a	End carriages structure with walkway, platform, handrails, LT buffers etc.	1	set	1	set	1	set	1	set	----	----
b	Long Travel Mechanism (Motor, gear box, shaft couling, wheels, brakes, bearings etc.)	1	set	1	set	1	set	1	set	----	----
3	Crab (trolley)										
a.	Crab (trolley) structure with CT rails, platform, handrails, CT buffers etc.	1	set	1	set	1	set	1	set	----	----
b	Main Hoist Mechanism (Motor, Gear box, Rope drum, Rope Upper block, Lower block, hook, couplings, shaft, brakes, bearings etc.)	1	set	1	set	1	set	1	set	----	----
c.	Aux Hoist Mechanism (Motor, Gear box, Rope drum, Rope Upper block, Lower block, hook, couplings, shaft, bearings, brakes etc.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
d.	Cross Travel Mechanism (Motor, gear box, shaft couling, wheels, brakes, bearings etc.)	1	set	1	set	1	set	1	set	----	----
4	LT End stopper	4	Nos.	4	Nos.	4	Nos.	4	Nos.	----	----
5	Storm Brake	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	LT rail along with accessories	2x42.5	m	2x42.5	m	2x48.73	m	2x45	m	----	----
7	LT PVC insulated shrouded bus bar conductor type DSL with accessories and junction boxes as required	42.5	m	42.5	m	48.73	m	45	m	----	----
8	Operator's cabin along with operator's seat, gong, fan and other accesories	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Main hoist limit switch (Rotory gar + Gravity)	1+1	Nos.	1+1	Nos.	1+1	Nos.	1+1	Nos.	----	----
10	Aux hoist limit switch (Rotory gar + Gravity)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11	CT lever type limit switch (one way/two way)	2/1	Nos./No.	2/1	Nos./No.	2/1	Nos./No.	2/1	Nos./No.	----	----
12	LT lever type limit switch (one way/two way)	2/1	Nos./No.	2/1	Nos./No.	2/1	Nos./No.	2/1	Nos./No.	----	----
13	Power cables, control cables etc. along with cable tray/conduits etc.	1	set	1	set	1	set	1	set	----	----
14	Temprory cable: 3.5 Core Power copper flexible cable of suitable size as per load calculation for commissioning, testing & operation of EOT Crane till such time the DSL is charged.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15	Main Isolating switch	1	No.	1	No.	1	No.	1	No.	----	----
16	Protective Panel along with Control tansformers, lighting transformers, 415/24 V (DC) transformer, contactors, switches, fuses relays and other accessories	1	No.	1	No.	1	No.	1	No.	----	----
17	Main Hoist Panel along with VVVFD, contactors, switches, fuses relays and other accessories	1	No.	1	No.	1	No.	1	No.	----	----
18	Aux Hoist Panel along with VVVFD, contactors, switches, fuses relays and other accessories	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
19	Cross Travel Panel along with VVVFD, contactors, switches, fuses relays and other accessories	1	No.	1	No.	1	No.	1	No.	----	----
20	Long Travel Panel along with VVVFD, contactors, switches, fuses relays and other accessories	1	No.	1	No.	1	No.	1	No.	----	----
21	Master Controller	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
22	Lighting for cranes (including illumination in cabin (if applicable), over bridge and under bridge) along with	1	set	1	set	1	set	1	set	----	----
23	Portable 40 W hand lamp with minimum half of baylengh lengh flexible cable for inspection	1	set	1	set	1	set	1	set	----	----
24	Fire extinguisher	1	No.	1	No.	1	No.	1	No.	----	----
25	Maintenance cage	1	No.	1	No.	1	No.	1	No.	----	----
26	Mechanical overload protection (Load cell) for hoist mode	1	No.	1	No.	1	No.	1	No.	----	----
27	Radio Remote control with transmitter unit, receiver unit, batterg etc.	1	set	1	set	1	set	1	set	----	----
28	Additional isolating switches for maintenance of cranes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
29	Lifting beam & its slings	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
30	Anti collission device	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
31	Centralized grease lubrication system to be provided with hand pumps located at crab and both end carriages for all grease lubricated bearings of crane.	1	set	1	set	1	set	1	set	----	----
32	DSL Phase indicating lamps (RYB)	2	Sets	2	Sets	2	Sets	2	Sets	----	----
33	Earthing strips	1	set	1	set	1	set	1	set	----	----
34	First fill of lubricants i.e. oils, grease, servo fluids, cadmium compounds etc. till one year after commissioning	1	set	1	set	1	set	1	set	----	----
35	E-Learning Package	1 set common for both BC Bay handling crane				----	----	----	----	----	----
36	Load testing sling, cradles and any other item required by the vendor during the load testing at site on returnable basis	----	----	----	----	----	----	----	----	1	set
37	**Maintenance tools & tackles**										

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

a.	Complete set of ring spanners	1	set	1	set	1	set	1	set	----	----
b.	Complete set of screwdrivers (Min. 6 Nos., Indicate the sizes)	1	set	1	set	1	set	1	set	----	----
c.	Adjustable Spanner	1	no.	1	no.	1	no.	1	no.	----	----
d.	Insulated plier	1	no.	1	no.	1	no.	1	no.	----	----
e.	Wrench spanner	1	no.	1	no.	1	no.	1	no.	----	----
f.	Grease Gun	1	no.	1	no.	1	no.	1	no.	----	----
g.	Oil Gun.	1	no.	1	no.	1	no.	1	no.	----	----
h.	Hand Lamp.	1	no.	1	no.	1	no.	1	no.	----	----
i.	Line tester	1	no.	1	no.	1	no.	1	no.	----	----
j.	O&M Manual	1	no.	1	no.	1	no.	1	no.	----	----
k.	Steel box to place above tools & manual	1	no.	1	no.	1	no.	1	no.	----	----
41	**Erection & Commissioning Spares (to be supllied as per requirement)**	1	set	1	set	1	set	1	set	----	----
42	**any other**	1	set	1	set	1	set	1	set	----	----

B	**MANDATORY SPARES:**	**Qty for both 75T BC Bay BFP handling Double Girder cranes**		**70T CWPH Double Girder crane**		**30T Heavy material store Double Girder crane**			
S. NO.	**ITEM DESCRIPTION**	**Qty**	**UOM**	**Qty**	**UOM**	**Qty**	**UOM**		
1.1	**Mechanical:**								
(a)	Bearings for long travel wheels	1 Set (Requirement for one Crane)							
(b)	Bearings for cross travel wheels	1 Set (Requirement for one Crane)							
(c)	Bearings for Gear Boxes for each type of Hoist & travel (Main and aux hoist(if applicable), LT and CT travel))	1 Set (Requirement for one Crane)							
(d)	Brake Liner for all the brakes (main and aux hoist(if applicable), LT and CT travel))	2 Sets (Requirement for two Crane)							
(e)	Hydraulic thruster for all Brakes (Main and aux hoist (if applicable), CT and LT travel)	1 Set (Requirement for one Crane)							
(f)	Oil Seals (both main and aux hoist (if applicable), CT and LT)	2 Sets (Requirement for two Crane)							
(g)	Brake springs for all brakes (both main and aux hoist (if applicable), LT and CT travel)	1 Set (Requirement for one Crane)							
(h)	Wire Rope for Aux. Hook	NA	NA						
(i)	Wire Rope for Main Hook	1	No.	----		----			
1.2	**Electrical:**								
i)	Solenoid Coils for Brakes	2	sets						
ii)	MCBs/MCCBS/Fuse links for the whole crane	1	set						
iii)	Contactors and overload Relays of each type, size & rating for Motors of the EOT	1	set						
iv)	Timers of each type, size & rating	1	set						
v)	Limit Switches for								
a	Main Hoist	1	set						
b	Aux. Hoist	NA	NA						
c	Cross Travel	1	set						
d	Long Travel	1	set						
vi)	Master Controller for Aux. Hoist	NA	NA						
vii)	Drive for MH, AH, CT & LT of each tpe and rating	1	No.						
1.3	**MECHANICAL**								
i)	Bearings for long travel wheels			1	set				
ii)	Bearings for cross travel wheels			1	set				
iii)	Brake liners for all the Brakes			1	set				
iv)	Hydraulic thrusters for Brakes			1	set				
v)	Wire rope for Crane			1	length				
vi)	Electrical Items of Crane								
a	Carbon brushes and brush holders for motors			1 set of each rating/Size					
b	Solenoid coils for all brakes			1 set of each rating/Size					
c	Contactors and Overload relays for motors			1 set of each rating/Size					
1.4	**ELECTRICAL**								
i)	Solenoid Coils for Brakes	----		2	sets	----			
ii)	MCBs/MCCBS/Fuses/Fuse links for the whole crane			1	set				
iii)	Motors of the EOT			1 set of each type, size & rating					
iv)	Timers of each type, size & rating			1	set				
v)	Limit Switches for								
a	Main Hoist			1	set				
b	Aux. Hoist			NA					
c	Cross Traverse			1	set				
d	Long Travel			1	set				

		TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY							PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024	
	vi)	Carbon brushes & brush holders					1	set		
	vii)	Master Controller for Aux. Hoist,					NA			
	viii)	Resistance Box					1 No of each type.			
C	**SERVICES**		**75T BC Bay BFP handling Double Girder crane 1**		**75T BC Bay BFP handling Double Girder crane 2**		**70T CWPH Double Girder crane**		**30T Heavy material store Double Girder crane**	
	i)	Unloading, handling, transportation to site.	1	No.	1	No.	1	No.	1	No.
	ii)	Assembly, erection & commissioning including Performance guarantee tests at site.	1	No.	1	No.	1	No.	1	No.
	iii)	Final handing over to Customer	1	No.	1	No.	1	No.	1	No.

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID

Sl. No.	DOCUMENT TITLE
1	PQR CREDENTIALS
2	COMPLIANCE SHEET
3	"NO DEVIATION" CERTIFICATE DULY STAMPED AND SIGNED.

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE

S.N.	BHEL drawing No.	Title	Approval category	Schedule date of submission (with in given weeks from date of LOI)
1	PE-V0-508-501-A401*	Manufacturing Quality Plan with sub vendor list For Double Girder EOT cranes upto 100T	A	2
2	PE-V0-508-501-A403	Data sheet of motors for Double Girder EOT cranes upto 100T	I	5
3	PE-V0-508-501-A404*	Mechanism Sizing Calculation Including storm brake calculation for Double Girder EOT cranes upto 100T	A	2
4	PE-V0-508-501-A405*	General arrangement for Double Girder EOT cranes upto 100T with CT DSL details	A	2
5	PE-V0-508-501-A406	Crab sub assembly for Double Girder EOT cranes upto 100T with CT wheel assembly	I	3
6	PE-V0-508-501-A408	General arrangement for PVC shrouded DSL for Double Girder EOT cranes upto 100T	I	3
7	PE-V0-508-501-A409	Main and Auxiliary hook block assembly with details of hook, nut and check plate Double Girder EOT cranes upto 100T	I	2
8	PE-V0-508-501-A410	Long travel Machinery Assembly with LT wheel assembly For Double Girder EOT cranes upto 100T	I	4
9	PE-V0-508-501-A412*	Structural calculations For Double Girder EOT cranes upto 100T (including structual calculation for crab structure)	A	3

10	PE-V0-508-501-A414	O & M Manual For Double Girder EOT cranes upto 100T	I	9
11	PE-V0-508-501-A417*	"Schematic circuit diagram of a) Protective panel, Main and lighting circuit & BOM b) Main hoist panel & BOM c) Aux. hoist panel & BOM d) Cross Traverse & BOM e) Long Traverse & BOM Including earthing diagram For Double Girder EOT cranes upto 100T"	A	5
12	PE-V0-508-501-A418	"General Arrangement of a) Protective panel b) Main hoist panel c) Aux. hoist panel d) Cross Travel panel e) Long Traverse travel f) Pendent g) Remote Radio Control For Double Girder EOT cranes upto 100T"	I	5
13	PE-V0-508-501-A419	Cable Sizing and cable schedule For Double Girder EOT cranes upto 100T	A	6
14	PE-V0-508-501-A420	Crane Operational write up For Double Girder EOT cranes upto 100T	I	5
15	PE-V0-508-501-A421	Type test certificate (for motors) For Double Girder EOT cranes upto 100T (Applicable for above 100 KW rating motors)	A	8
16	PE-V0-508-501-A423	Mandatory spare parts list For Double Girder EOT cranes upto 100T	A	8
17	PE-V0-508-501-A425	Erection procedure For Double Girder EOT cranes upto 100T	I	8
18	PE-V0-508-501-A427	Data sheet of Double Girder EOT cranes upto 100T with painting details	A	3
19	PE-V0-508-501-A430	Electrical load for Double Girder EOT cranes upto 100T	I	8
20	PE-V0-508-501-A432	Gantry Rail installation for Double Girder EOT cranes upto 100T	I	3
21	PE-V0-508-501-A450	Crane lubrication drawing For Double Girder EOT cranes upto 100T	I	6

	LEGENDS
	A= Approval category
	I= Information category
	*Marked drawing/documents are Basing engineering drawing/documents.

Notes:-

1	Bidder to follow the following the drawing submission schedule: i.1st submission of drawings from date of LOI as per the submission schedule. ii.Every revised submission incorporating comments – within 7 days.
2	Bidder to submit revised drawings complete in all respects incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT

Sl. No.	DOCUMENT TITLE	No. of prints (Sets)	No. of portable hard disk
1	APPROVED DOCUMENTS	3	2
2	AS BUILT DRAWINGS/ DOCUMENTS	3	2
3	ERECTION MANUAL	3	2
4	O&M MANUAL	3	2
5	PERFORMANCE AND FURNTIONAL GUARANTEE TEST REPORTS	3	0

बी एच ई एल BHEL	**TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY**	**PE-TS-508-501-A001** **Rev. No. 00** **Date : APRIL 2024**

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.

1	The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under exclusion.
2	Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.
3	All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
4	The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out. For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.
5	All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
6	Guarantee for plant/ equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions.
7	In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account.
8	Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
9	As built drawings shall be submitted as and when required during the project execution.
10	The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.

11	Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
12	In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

1	The Bidder should have designed, manufactured, erected and commissioned D/G EOT/Gantry/Semi-Gantry crane with min.30T capacity with span of 10M or more and having/ability to have in house facility for testing before dispatch of D/G crane with actual capacity required for the tender.
2	The Bidder has to submit following supporting documents meeting above mentioned prequalifying requirement Copy of minimum one (1) performance certificate (in English) from end user along with copy of related Purchase Order (PO) or Letter of intent (LOI) or Letter of Award (LOA) or Work Order (WO) specifying that the product/equipment is running successfully for one (1) year from date of commissioning meeting the minimum pre-qualifying requirement.
3	Bidder shall submit design documents to substantiate technical parameters specified in PQR, if the same is not mentioned in performance certificate/purchase order.
4	Minimum one (1) no. Purchase order shall be submitted which should not be more than seven (7) years old as on date of bid submission, for establishing continuity in business. This is over and above the requirement of PO mentioned of PQR clause at S. No. 2.0 above.
5	Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
6	Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
7	BHEL shall evaluate and qualify the bidders for this tender based on their performance in previously awarded jobs as per attached Annexure I.
8	Consideration of offer shall be subjected to customer's approval of bidders.
9	After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

Annexure-I

Assessment of bidder wrt performance feedback from current projects under execution by PS- Region concerned

Name of Supplier:
Reference project & Enquiry details:
Packages quoted for:
Project Name for which assessment done

Sl. No.	Area of Assessment	Particulars for evaluation	Maximum marks	Qualifying marks	Marks awarded
1	**Material supply**		**40**	**20**	**0**
1a	Package Name	Whether agency has supplied the material within given contractual period. Supply 100% - 30 marks 75% - 20 marks 50% - 15 marks	30	15	
1b		Assement of Qualitative ability of agency to follow the approved documents/ BHEL procedures / guidelines for material inspections/ inspection call/ MDCC request / Dispatch documentation.	10	5	
2	**Execution Capabilities**		**60**	**40**	**0**
2a	Package Name	Whether agency has engaged competent graduate engineer as site incharge and other supervisiors/ manpowers to handle site execution.	10	10	
2b		Agency has made at least one no. office shed/container and one no. storage shed/ container.	10	5	
2c		Vendor involvement/ behaviour/ engagement during E&C at site and intiative to resolve of interface issues.	5	2	
2d		Quality of erection drawings and BOQ availability .	5	3	
2e		Agency efforts & inclination on implementation of HSE, Safety and quality during excution of system.	10	5	
2f		Whether agency has made the system ready before corresponding project milestone requirement.	20	15	
	Grand Total		**100**	**60**	

Note: 1. Performance feedback for each project under execution of respective PS-Region will be considered for evaluation.
2. The bidder will have to qualify in each project individually.

BHEL Region representative (Projects)

BHEL Region GM/Head (Projects)

	TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II DOUBLE GIRDER EOT CRANES FOR UPTO 100T CAPACITY	PE-TS-508-501-A001 Rev. No. 00 Date : APRIL 2024

PRE QUALIFICATION REQUIREMENT (FINANCIAL)

	PRE - QUALIFYING REQUIREMENTS
PROJECT:	2X800MW NTPC LARA STPP-STAGE II EPC
PACKAGE:	DG EOT Cranes upto 100T

CRITERIA FOR EVALUATION - FINANCIAL :

	Amount (in Rs.)
Average annual financial turnover during the last Three Financial Years should not be less than Rs.One Crore Fifteen Lakh only	1,15,00,000.00

Notes:-

a) The bidder has to submit financial accounts (audited, if applicable comprising of Audit report, Balance Sheet, Profit & Loss A/c Statement and Notes/Schedules pertaining to Turnover/Sales/Revenue), for last three years (or from the date of incorporation, whichever is less) as on tender due date to review the above criteria. In case the incorporation of vendor is less than 3 years, average annual financial turnover shall be calculated based on available information as below:-

i) If the accounts are available for <= 1 Financial Year, the Average Annual Turnover shall be calculated based on available information divided by 1 (One).

ii) If the accounts are available for >1 but < = 2 Financial Years, the Average Annual Turnover shall be calculated based on available information divided by 2 (Two).

iii) If the accounts are available for >2 but <= 3 Financial Years, the Average Annual Turnover shall be calculated based on available information divided by 3 (Three).

b) Foreign bidder is to submit a latest report from reputed third party business rating agency like Dun & Bradstreet, Credit reform etc. in addition to the documents mentioned at point (a) above for review of above criteria.

c) Other Income shall not be considered for arriving at Annual Turnover/Sales.For evaluation purpose,turnover figure excluding taxes shall be considered.

d) For evaluation of foreign bidder, exchange rate (TT selling rate of SBI) as on scheduled date of tender opening (Part-I bid in case of two part bid) shall be considered.

e)Bidder who is 50% or above subsidiary of any other company including those registered outside India and does not meet any of the above Financial Criteria, such bidder may be qualified based on credentials of its holding company provided such holding company meets the above PQR criteria. In such case, the Bidder would be required to furnish a Letter of Support from its Holding Company, pledging unconditional and irrevocable financial support for the execution of the Contract by the Bidder in case of award.

f)In cases where audited results for the last financial year as on the date of Techno Commercial bid opening are not available, a Certificate would be required from CEO/CFO stating that the financial results of the Company are under audit as on the date of Techno-commercial bid opening and are not available.

BANK GUARANTEE FOR EMD

Bank Guarantee No:_____

Date:_____

To,

Name & Addresses of The Beneficiary

Dear Sirs,

Beneficiary: Noida Account no. - 39922687394 IFSC Code- SBIN0017313 Branch- CAG II New Delhi (BHEL PEM Noida) (hereinafter referred to as Beneficiary / Government) Date: ……. [Insert date of issue of BG](To be insert by issuing bank) ……. Bank Guarantee No.: …… [Insert guarantee number]……(To be insert by issuing bank)..... Bank Guarantee Amount: …….(*BG Amount)*……. Bid / RA No.: *…….(GeM Bid No.)……* EMD Applicant / Bidder: ……..*NAME AND ADDRESS OF THE VENDOR / CONTRACTOR / SUPPLIER*…… Guarantor: ……. [Insert name and address of the issuing Bank] ……..(To be insert by issuing bank)…….

Whereas Applicant / Bidder is willing to submit its bid against above referred Bid / RA by the Beneficiary on behalf of President of India/Governor of State/Chairman, CMD, Secretary, Commissioner etc. of Central/State PSUs/Departments for the supply of Goods and / or Services and as per Bid / RA conditions, Applicant is required to submit a Bank Guarantee as EMD.

At the request of the Applicant, we as Guarantor under this Guarantee, hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer without any demur, merely on your first demand any sum or sums of INR ..... *(BG AMOUNT IN FIGURES AND WORDS)*.....(in words Indian Rupees.....) without any reservation, protest, and recourse and without the beneficiary needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding INR _____*(BG AMOUNT IN FIGURES AND WORDS)*_____ _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor/Contractor/Supplier in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment hereunder and the Tenderer shall have no claim against us for making such payment.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Tenderer and notwithstanding any security or other guarantee that the Employer may have in relation to the Tenderer's liabilities.

This Guarantee shall be irrevocable and shall remain in force up to and including……(*BG AMOUNT IN FIGURES AND WORDS)*…….. and shall be extended from time to time for such period as may be desired by the Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Tenderer but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms hereof. However, unless a demand or claim under this Guarantee is made on us in writing on or before the ……*(DATE OF EXPIRY OF CLAIM PERIOD)*…….. we shall be discharged from all liabilities under this Guarantee.

We, …… Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed…… *(BG AMOUNT IN FIGURES AND WORDS)*……..
b) This Guarantee shall be valid up to ……
c) Unless the Bank is served a written claim or demand on or before ____(*DATE OF EXPIRY OF CLAIM PERIOD)*_____ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of

(Name of the Bank)

Date……..

Place of Issue……..

To be given on Letter head of Bidder

Ref: ……. Date: …….

To,

Bharat Heavy Electricals Limited

PEM, PPEI Building,

Plot No 25, Sector -16A

Noida (U.P)-201301

Reference:

Order no-F6/18/2019-PPD dated 23.07.2020 issued by Ministry of Finance.

Tender Enquiry No-……

Offer No-……..

Name of Package: …….

Dear Sir,

I have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India. I hereby certify that Company name, is not from such a country and is eligible to be considered.

Thanking You,

Yours faithfully,

(Company director seal and signature)

To be given on Letter head of Bidder

Ref: ……. Date: …….

To,

Bharat Heavy Electricals Limited

PEM, PPEI Building,

Plot No 25, Sector -16A

Noida (U.P)-201301

Reference: Tender Enquiry No-……

Name of Package: ……..

Dear Sir,

We hereby certify that items of ……..(Package name) for……(Project Name) offered by M/s ……(bidder's name) having its works/office at …… has local content of ……..%.

Further, it is also certified that the local content percentage (%) certified above is in line with definition of local content given in point no 2 of Public Procurement (Preference to Make in India), Order 2017-revision, having ref. no. P-45021/2/2017-PP(BE-II) dated 04.06.2020 & 16.09.2020 an M/s…….. qualifies as Class-I/Class-II (strike out whichever is not applicable) local supplier.

Details of the location(s) at which the local value addition-

Yours very truly

…….. (Signing Authority Name & Sign)

…… (Firm Name)

Company Stamp

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

And

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____(hereinafter referred to as "Contract"). The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint panel of Independent External Monitor(s) (IEMs), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. The Bidder(s)/ Contractor(s) commits himself to observe the following principles during participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process , terminate the contract, if already awarded, exclude from future business dealings and/ or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

4.1 If the Principal has disqualified the Bidder (s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal is entitled to terminate the Contract according to Section 3, or terminates the Contract in application of Section 3 above , the Bidder(s)/ Contractor (s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee , whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 (three) years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 6 - Equal treatment of all Bidder (s)/ Contractor (s) / Sub-contractor (s)

6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.

6.2 In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor(s) and ensure that all Sub-contractors also sign the Integrity Pact.

6.3 The Principal will disqualify from the tender process all Bidders who do not sign this Integrity Pact or violate its provisions

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 -Independent External Monitor(s)

8.1 The Principal appoints competent and credible panel of Independent External Monitor (s) (IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact.

8.2 The IEMs are not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The IEMs shall be provided access to all documents/ records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents/records/information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.

8.4 The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.

8.5 The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a Bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some Bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of Contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to the CMD, BHEL at the earliest. They may also send their report directly to the CVO, in case of suspicion of serious irregularities requiring legal/ administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs will tender their advice on the complaints within 30 days.

8.8 The CMD, BHEL shall decide the compensation to be paid to the IEMs and its terms and conditions.

8.9 IEMs should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the Principal should be looked into by the CVO of the Principal.

8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code / Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contract, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs. Issues like warranty/ guarantee etc. shall be outside the purview of IEMs.

8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.

8.13 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties till the final completion of contract for successful Bidder, and for all other Bidders 6 months after the Contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

9.2 If any claim is made/ lodged during currency of this Integrity Pact, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

10.2 Changes and supplements as well as termination notices need to be made in writing.

10.3 If the Bidder(s)/ Contractor (s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.

10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

Sumeet Sahay
Digitally signed by Sumeet Sahay
DN: cn=Sumeet Sahay, o=Bharat Heavy Electricals Ltd, ou=PS-PEM, email=sumeetsahay@bhel.in, c=IN
Date: 2022.04.28 14:57:08 +05'30'

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For & On behalf of the Principal For & On behalf of the Bidder/ Contractor

(Office Seal) (Office Seal)

Place---------------------

Date----------------------

SHARAD CHANDRA
Digitally signed by SHARAD CHANDRA
DN: c=IN, o=BHARAT HEAVY ELECTRICALS LIMITED, ou=POWER SECTOR-PROJECT ENGINEERING MANAGEMENT (PS-PEM), postalCode=201301, st=UTTAR PRADESH, 2.5.4.20=089a16018da25cac45670e8f7d15d00fb0f21f752b7d5defc65e3d0da37894fd, pseudonym=B02B948864F2CD291CB1001210178DCE309E308A, serialNumber=411989C049653E2228B6E49EC3DEC952D1A2B152E3422C98EC08B22D902EEF83, cn=SHARAD CHANDRA
Date: 2022.04.28 14:59:11 +05'30'

Witness: ____________________ Witness: ____________________

(Name & Address) ____________________ (Name & Address)____________________

एनटीपीसी NTPC	**CORPORATE QUALITY ASSURANCE/ कॉरपोरेट गुणवत्ता आश्वासन** **SUB-VENDOR QUESTIONNAIRE/ सब-वेंडर प्रश्नावली**			
i.	***Item/Scope of Sub-contracting*** **उप-संविदा(अनुबंध) का मद/ दायरा**			
ii.	***Address of the registered office*** **पंजीकृत कार्यालय का पता**	***Details of Contact Person*** **संपर्क व्यक्ति का विवरण** ***(Name, Designation, Mobile, Email)*** **(नाम, पदनाम, मोबाइल, ईमेल)**		
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured*** **प्रस्तावित उप-विक्रेता के कार्यों का नाम और पता, जहां मद का निर्माण किया जा रहा है**	***Details of Contact Person:*** **संपर्क व्यक्ति का विवरण** ***(Name, Designation, Mobile, Email)*** **(नाम, पदनाम, मोबाइल, ईमेल)**		
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting*** **उप-संविदा(अनुबंध) के प्रस्तावित मद / दायरे के लिए वार्षिक उत्पादन क्षमता**			
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting*** **उप-संविदा(अनुबंध) के प्रस्तावित मद / दायरे के लिए पिछले** 3 **वर्षों का वार्षिक उत्पादन**			
vi.	***Details of proposed works*** **प्रस्तावित कार्यों का विवरण**			
1.	***Year of establishment of present works*** **वर्तमान फैक्टरी की स्थापना का वर्ष**			
2.	***Year of commencement of manufacturing at above works*** **उपरोक्त फैक्टरी में निर्माण कार्य शुरू होने का वर्ष**			
3.	***Details of change in Works address in past (if any*** **पूर्व में फैक्टरी स्थल में परिवर्तन का विवरण (यदि कोई हो)*)***			
4.	***Total Area*** **कुल क्षेत्र**			
	Covered Area **शामिल क्षेत्र**			
5.	***Factory Registration Certificate*** **फैक्टरी पंजीकरण प्रमाण पत्र**	***Details attached at Annexure – F2.1*** **विवरण अनुलग्नक- एफ** 2.1 **पर संलग्न है**		
6.	***Design/ Research & development set-up*** **डिजाइन / अनुसंधान और विकास सेटअप** (***No. of manpower, their qualification, machines & tools employed etc.)*** **(श्रमिकों की संख्या, उनकी योग्यता, मशीन और उपलब्ध उपकरण आदि)**	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design)*** ***Details attached at Annexure – F2.2*** ***(if applicable)*** **लागू / लागू नहीं, अगर विनिर्माण मुख्य संविदाकार / खरीददार के डिजाइन के अनुसार है)** **विवरण अनुलग्नक –एफ** 2.**2 पर संलग्न है ।** **(यदि लागू हो)**		
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)*** **मैनपावर विवरण के साथ समग्र संगठन का चार्ट(डिजाइन / विनिर्माण / गुणवत्ता आदि)**	***Details attached at Annexure – F2.3*** **विवरण अनुलग्नक –** F2.**3 में संलग्न है ।**		
8.	***After sales service set up in India, in case of foreign sub-vendor(Location, Contact Person, Contact details etc.)*** **भारत में बिक्री सेवा की स्थापना के बाद, विदेशी उप-विक्रेता के मामले में(स्थल , संपर्क व्यक्ति, संपर्क विवरण आदि)**	***Applicable / Not applicable*** **लागू / लागू नहीं** ***Details attached at Annexure – F2.4*** **विवरण अनुलग्नक** -2.**4 पर संलग्न है ।**		
9.	Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any **फ्लोचार्ट सहित विनिर्माण प्रक्रिया निष्पादन योजना , जिसमें आउटसोर्स प्रक्रिया, यदि कोई हो, सहित कच्चे माल से तैयार उत्पाद तक विनिर्माण के विभिन्न चरणों को दर्शाया गया हो,**	***Details attached at Annexure – F2.5*** **विवरण अनुलग्नक** - F2.5**में संलग्न है ।**		
10.	***Sources of Raw Material/Major Bought Out Item*** **कच्चे माल के स्रोत / खरीदे हुए मुख्य मद**	Details attached at Annexure – F2.6 **विवरण अनुलग्नक** - F2.6**में संलग्न है।**		
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packin*****g कच्चे माल / खरीदे हुए मद, प्रक्रियाबद्ध, अंतिम परीक्षण, पैकिंग करते समय गुणवत्ता नियंत्रण**	Details attached at Annexure – F2.7 **विवरण अनुलग्नक** - F2.7 **पर संलग्न है**		

12.	***Manufacturing facilities*** ***(List of machines, special process facilities, material handling etc.)*** **विनिर्माण सुविधा(मशीनों की सूची , विशेष प्रक्रिया सुविधाएं, सामग्री रख-रखाव आदि)**	Details attached at Annexure – F2.8 **विवरण अनुलग्नक** - F2.8**में संलग्न है ।**
13.	***Testing facilities (List of testing equipment)*** **परीक्षण सुविधाएं(परीक्षण उपकरण की सूची**)	Details attached at Annexure – F2.9 **विवरण अनुलग्नक** – F2. 9 **में संलग्न है ।**
14.	If manufacturing process involves fabrication then- **यदि निर्माण प्रक्रिया में फेब्रिकेशन की गई है तो-**	Applicable / Not applicable **लागू / लागू नहीं**
	List of qualified Welders **पात्र वेल्डर की सूची**	Details attached at Annexure – F2.10 **विवरण अनुलग्नक -** F2.10**में संलग्न है।**
	List of qualified NDT personnel with area of specialization **विशेषज्ञता के क्षेत्र सहित पात्र एनडीटी कार्मिकों की सूची**	(if applicable) **लागू / लागू नहीं**
15.	List of out-sourced manufacturing processes with Sub-Vendors' names & addresses **सब-वेंडर द्वारा बाह्य स्रोतों (उनके नाम और पते सहित)से करवाएं गए निर्माण प्रक्रियाओं की सूची**	Applicable / Not applicable **लागू / लागू नहीं** Details attached at Annexure. –F2.11 **विवरण अनुलग्नक -** F2.10**में संलग्न है।** (if applicable) (**यदि लागू हो)**
16.	Supply reference list including recent supplies **नवीनतम आपूर्ति सहित आपूर्ति संदर्भ सूची**	Details attached at Annexure – F2.12 **विवरण अनुलग्नक -** F2.**12 में संलग्न है ।** (as per format given below) (**नीचे दिए गए प्रारूप के अनुसार**)

Project/ package **परियोजना /पैकेज**	Customer Name **ग्राहक का नाम**	Supplied Item (Type/Rating/Model /Capacity/Size etc) **आपूर्ति की गई वस्तु (प्रकार / रेटिंग / मॉडल / क्षमता / आकार आदि)**	PO ref no/date **पीओ संदर्भ सं. / तिथि**	Supplied Quantity **आपूर्ति की मात्रा**	Date of Supply **आपूर्ति की तारीख**

17.	Product satisfactory performance feedback letter/certificates/End User Feedback **उत्पाद के संतोषजनक प्रदर्शन संबंधी फीडबैक पत्र / प्रमाण पत्र / अंतिम उपयोगकर्ता फ़ीडबैक**	Attached at annexure - F2.13 **अनुलग्नक** F2. 3**पर संलग्न है**
18.	Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating) **प्रस्तावित उत्पाद (एक समान या उच्च रेटिंग वाले) के लिए टाइप टेस्ट रिपोर्ट (टाइप टेस्ट विवरण, रिपोर्ट संख्या, एजेंसी, जांच की तारीख) का सारांश** **नोट: - रिपोर्ट प्रस्तुत करने की आवश्यकता नहीं है** Note:- Reports need not to be submitted	Applicable / Not applicable **लागू / लागू नहीं** Details attached at Annexure – F2.14 **विवरण अनुलग्नक** - F2.**1** 4**में संलग्न है** (if applicable) (**यदि लागू हो)**
19.	Statutory / mandatory certification for the proposed product **प्रस्तावित उत्पाद के लिए वैधानिक / अनिवार्य प्रमाणीकरण**	Applicable / Not applicable **लागू / लागू नहीं** Details attached at Annexure – F2.15 (if applicable) (**यदि लागू हो)**
20.	Copy of ISO 9001 certificate **आईएसओ** 9001 **प्रमाण पत्र की प्रति** (if available(**यदि उपलब्ध हो)**	Attached at Annexure – F2.16 **अनुलग्नक में संलग्न** - F2.1 6 **है**
21.	Product technical catalogues for proposed item (if available) **प्रस्तावित मद के लिए उत्पाद तकनीकी कैटलॉग (यदि उपलब्ध हो)**	Details attached at Annexure – F2.17 **विवरण अनुलग्नक** - F2.1 7 **में संलग्न है**

Name : **नाम:**		Desig : **पद:**		Sign : **हस्ताक्षर:**		Date : **तिथि:**	

Company's Seal/Stamp: - **कंपनी की मुहर / मोहर: -**