

# ELECTRIC HOIST

## GeM Tender Enquiry for ELECTRIC HOIST for 4X270 MW BHADRADRI TPS -FGD

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**Package: - ELECTRIC HOIST**  
**GeM BID No....., Dtd. ....**  
**ANNEXURE –I**

**Additional clauses of NIT**

**1. Dispatch Markings: -**

Each box shall be marked with Capital Letters in “Red” indicating the PEM supply (Main Supply OR Commissioning spare) for **4 X 270 MW BHADRADRI TPS -FGD**. Each package delivered under the Contract shall be marked by Supplier and such marking must be distinct and in English Language (all previous irrelevant markings being carefully obliterated). Such marking shall show the description and quantity of contents, the name and address of consignee, the Gross weight and Net weight of the package, the name of the Supplier, PEM P.O. reference number, with a distinctive number of mark sufficient for purposes of identification. Besides above necessary, packing shall bear a special marking `TOP`, `BOTTOM`, `DO NOT TURN OVER`, “KEEP DRY”, “HANDLE WITH CARE”, etc.

**IMPORTANT**

- Two copies of respective standard manufacturer’s erection instruction/operation instruction manual shall be kept in each package / container for immediate reference by BHEL site and same shall be reflected in packing slip also
- The Packing list details for the consignment must be put inside the Box/Boxes.

**Mandatory Spares:** - The Mandatory spares shall be properly packed separately in separate box painted in Red, indicating Mandatory Spares in bold letters and each spare shall be properly tagged giving details i.e. item number of the equipment in line with the CUSTOMER approved BBU for Mandatory spares & Number per item (to match the description given in the packing slip) to facilitate their proper identification by ultimate customer TSGENCO. One Copy of Packing list must be put inside the Box along with Manufacturing drawing no. reference, Catalogue reference etc.

Note :- MDCC for mandatory Spares shall be issued only after receipt of detailed list of mandatory spares & photographs before final packing clearly showing mandatory spares with due tagging as per packing list ( to be sent over mail/CD). Separate dispatch clearance will be issued for the mandatory spares in line with availability of customer’s stores at site.

**2. Liquidated Damages: -**

- a) **Main Supply:-** Purchaser reserves the right to recover from the Seller/ Contractor, as agreed liquidated damages and not by way of penalty, a sum equivalent to half (½) percent and applicable GST thereon, of the total main supply & commissioning spares contract price excluding GST per week or part thereof, subject to a maximum of ten(10) percent of the total main supply & commissioning Spares contract price excluding GST, if the Seller/ Contractor fails to deliver any part of the ordered goods/stores within the period stipulated in the Order/ Contract.
- b) **LD on service portion** (demonstration charges, PG test, installation check, supervision of erection / commissioning charges, engineering charges, O&M, study, calibration charges, type test, AMC, etc.) where delivery for services are defined separately in the NIT. LD shall be applicable @ ½ percent and applicable GST thereon, of the total service portion contract value excluding GST per week or part thereof. However, total

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LD (main supply and services) shall be limiting to 10% of cumulative total contract value (main supply +services) excluding GST

- c) **LD on mandatory spares portion:** - LD shall be applicable @ ½ percent and applicable GST thereon, of the total mandatory spares portion contract value excluding GST per week or part thereof, limiting to 10% of total contract value of mandatory spares excluding GST.

**NOTE:**

i. In case of any amendment/ revision, LD shall be linked to the amended/ revised contract value and delivery date(s).

ii. If Order/ Contract involves two or more Units/ Sets/ Lots/ Stages, then Liquidated Damages shall be levied on order/ contract value excluding GST of the delayed Unit/ Set/ Lot/ Stage, provided delivery stipulated in the Order/ Contract is Unit/ Set/ Lot/Stage wise, however total LD amount shall be limited to 10% of total order/ amended order value excluding GST of delayed Unit/ Set/ Lot/Stage. Any subsequent lot released (not envisaged in original contract) due to increase in quantity within permissible quantity variation shall be treated as separate lot for the purpose of LD.

iii. The sum specified above is not a penalty but a genuine pre-estimate of the loss/ damage which will be suffered by purchaser on account of delay on the part of the Contractor/Seller and the said amount will be deductible without proof of actual loss or damage caused by such delay.

3. For recognition of dispatch, vendor to submit following documents to BHEL by e-mail/ fax immediately on dispatch: - GST compliant invoice, LR for Indian Vendors (indicating Invoice No., no. of boxes, PTL (if applicable) etc.) / Bill of Lading or AWB for foreign vendor, Packing List (Must be indicating No. of boxes, Packing size, Gross weight and net weight of each package, Contents of the package with cross reference to BoM item code no. or item serial no. and Quantity of each item separately), Insurance Intimation to underwriter through email/fax, Dispatch Clearance.

**B. Following ATC available in GEM shall also be part of NIT: -**

i. Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

ii. Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

iii. Data Sheet of the product(s) offered in the bid, are to be uploaded along with the bid documents. Buyers can match and verify the Data Sheet with the product specifications offered. In case of any unexplained mismatch of technical parameters, the bid is liable for rejection.

iv. The bidder is required to upload, along with the bid, all relevant certificates such as BIS license, type test certificate, approval certificates and other certificates as prescribed in the Product Specification given in the bid document.

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v. While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

**VI. OPTION CLAUSE:** The Purchaser reserves the right to increase or decrease the quantity to be ordered up to 25 percent of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.

**VII. Nominated Inspection Agency:** On behalf of the Buyer organization, any one of the following Inspection Agency would be conducting inspection of stores before acceptance:

Pre-dispatch Inspection at Seller Premises (applicable only if pre-dispatch inspection clause has been selected in ATC): BHEL TPIA

Post Receipt Inspection at consignee site before acceptance of stores: NA

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**Additional Terms and Conditions for subject Tender Enquiry to be complied by Bidders for Consideration in this tender:**

- A.** 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. In case the same is found not available, BHEL has the right to reject such document from evaluation.
- B.** “This item /package/system falls under the list of items defined in para 3 of ministry of finance guideline date 20.09.16 (procurement of items related to public safety, health, critical security operations and Equipment’s etc.) & hence criteria of prior experience /turnover shall be same for all bidders including start up /MSME”.
- C.** **Guarantee & Warrantee** shall be As per Cl. No. 10 of GTC on GeM for the bid. However, Guarantee & Warrantee time period shall be 18 months from the date of last supply in the contract for Main Supply & Mandatory spares.
- D.** Evaluation shall be on the basis of total all inclusive, landed price at consignee destination (Refer cl. No. 6 of GTC on GEM).
- E.** **Terms of Delivery:** - Terms of delivery shall be F.O.R. dispatch station. All dispatches shall be through Road Carriers on Freight Pre-Paid basis. Road Permit/E-way Bill if required will be arranged by Supplier. However, loading & Transit insurance shall be in the scope of Seller and unloading of items at delivery point shall be in the scope of BHEL. Bidder to quote prices accordingly.
- F.** Further, w.r.t. Transit Insurance supplier has to inform the details of dispatches (such as Policy No., Consignee Name, Consignment Packing details, Project Name, Purchase Order No., LR No. & date, Invoice No. & date, Dispatch Origin & destination details etc.) to policy underwriter.
- G.** Bidder has to provide the details as per TECHNICAL PQR (attached with Specifications of product catalogue) in its offer and has to note that bids of only those bidders shall be evaluated who meet the Technical Pre-Qualifying requirements'. The terms of technical PQR shall prevail in conflict (if any).
- H.** PQR criteria uploaded with Buyer uploaded Bid Specific document shall prevail Value of Experience criteria and Past performance parameter mentioned in GeM bid.
- I.** **Inspection call to be raised by bidder on BHEL CQIR portal** (details shall be shared at the of execution of order) and Inspection agency shall attend at the inspection within seven (07) days of the date on which the material is notified as being ready. In case of delay in witnessing of inspection beyond stipulated time (i.e. 7 days from the date on which the material is notified as being ready), by BHEL arising due to reasons not attributable to vendor, BHEL will extend the delivery period for such delay in carrying out inspection. If BHEL is not able to witness inspection up to 15 days then in addition to delay beyond stipulated period, extension in delivery time of 07 days for arranging fresh inspection will be given.

When the tests have been satisfactorily completed at Seller/ Contractor's works, the Inspection Agency shall issue an inspection report that effect within seven (07) days after completion of the tests, but if the tests were not witnessed by the Inspection Agency or his representative, the material acceptance report would be issued within seven (07) days after receipt of the test certificates by the Purchaser.

Purchaser will issue MDCC to the Seller/ Contractor within 7 days based on inspection report/ test certificates/Certificate of Conformance as applicable. In case of delay in issuance of MDCC beyond 7 days stipulated time (i.e. from the date of successful inspection report), by BHEL arising due to reasons not attributable to vendor, BHEL will extend the delivery period for such delay in issuing MDCC. If BHEL is not able to issue MDCC up to 15 days then in addition to delay beyond stipulated period, 7 days' additional time shall be given to vendor to facilitate the vendor for arranging logistics arrangements.

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J. All Bidders shall be required to submit applicable Freight % & GST % included in their prices during clarification stage of Tender.

**K. Performance Security:**

a) 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.

**OR**

b) 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.

c) Initial e-PBG validity shall be 26 months from PO date for Main supply (Considering delivery period of 06 months + 18 months guarantee period + 2 months claim period is already mentioned in GTC cl no. 7.ii GeM 4.0 Version 1.13). However, BG will be released only after completion of all contractual liability or guarantee period whichever is later. 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 30 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.

**Forfeiture of Performance Security:**

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) PS 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.

c) The Performance Security shall not carry any interest.

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- L) BID SECURITY/ Earnest Money Deposit (EMD):-** EMD is Not applicable.
- M) 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 PEM 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 PEM  
(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.
- N) Payment Terms:** For Supply Portion incl. Mandatory Spares: - As per clause no. 12 (i) of GTC on GeM. Supplier has to provide original+1 copy of Tax invoice, Packing List, LR/RR or AWB, CRAC, Insurance intimation, Guarantee Certificate, E-way bill (as applicable) for payment.  
For Services (**Supervision of E & C**) :- As per clause no. 12 (i) of GTC on GeM. Supplier has to provide Tax invoice, CRAC for payment.  
Offline payment mode shall be selected. Payment will be released within 90 days for Non MSME after submission of complete documents (45 days for Micro & Small Enterprises (MSEs), 60 days for Medium Enterprises.
- O) Bid reserved for Make in India products:** - Procurement under this bid is reserved for purchase from Class 1 local suppliers as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a class 1 local supplier is denoted in the bid document as **SIXTY (60)%**. All bidders must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which the bid is liable to be rejected.  
Regarding verification of local content, the local supplier at the time of tender, bidding or solicitation shall be required to provide certification (as per enclosed annexure-IV) as per para 9 of PP-MII order revision dated 16.09.2020.
- P) This is conditional tender enquiry. Financial bid opening (Part-II) of a bidder shall be subjected to following: -**  
(i) Techno-Commercial evaluation/recommendation by BHEL.  
(ii) Qualification of Technical PQR  
(iii) Offered item should mandatorily conform to PP-MII order provisions.  
**(iv)** Approval of vendor from end Customer (**TSGENCO**). shall be taken up by BHEL-PEM with customer. Bidders who are not approved from TSGENCO (end customer) should furnish the credentials as per TSGENCO (end customer) format - (Annexure -A) along with their bid.
- Q) Consignee Details** (for PRC - Provisional Receipt Certificate & CRAC - Consignee's Receipt cum Acceptance Certificate, as applicable) shall be as per Project Site official details.

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**R) Any other special major condition :-**

- (i). Bidder shall be asked to provide detailed break-up of quoted price in Ex-works, freight & Tax components.
- (ii). Bidders shall be required to submit applicable Freight % & GST % included in their prices during tender clarification stage.
- (iii). Material shall be dispatched by vendor after issuance of MDCC by BHEL only.
- (iv). Advance intimation of dispatch by bidder shall be given, to PEM and Insurance agency/Site.
- v) Evaluation shall be on the basis of total all inclusive, landed price at consignee destination (Refer cl. No. 6 of GTC on GEM)

**S) The Bidder has to 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.**

**T) Bidders to ensure the following: -**

- Ensure compliance to Ministry of Power (MoP) Order No. 11/05/2018 Coord. dt. 28/07/2020, if applicable.
- Ensure compliance of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020.
- to submit “Model Certificate for Tenders” as per Annexure-III of Ministry of Finance (MoF) Order (Public Procurement No. 1 & 2) F. No. 6/18/2019/PPD dt. 23/07/2020. Bidder to submit the following undertaking on their letter head duly signed from the highest competent authority at your end (i.e Owner, partner, CMD, Director etc.)

**“I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I hereby certify that this bidder is not from such a country and is eligible to be considered”**

Note: - This bidder is to be replaced with bidders' organizational name.

**U) Delivery Period :**

- a. Main Supply : Delivery completion for Main supply shall be 163 days from the PO date.
- b. Mandatory Spares:- Delivery completion for Mandatory spares shall be '90' days from BHEL clearance.
- c. Supervision of E&C:- Vendor to depute its service engineer for Supervision of E&C within 15 days from BHEL's intimation (for deputing service engineer).

For delay in deputing service engineer, LD on Supervision of E&C portion shall be applicable @ ½% of the total Supervision of E&C portion contract value (excluding element of taxes) per week or part thereof, with applicable GST. However, total LD (supply + Supervision of E&C) shall be limited to 10% of cumulative total contract value excluding taxes and freight (supply + Supervision of E&C).

**Other terms of delivery, Validity of contract (PO rates, terms and conditions) & Extension of contractual delivery time mentioned at Annexure –A of this ATC. Also refer tender documents for delivery schedule.**

**V) For registration in BHEL PEM- Online registration portal is operational, Non-registered Vendors who wish to apply for registration in BHEL-PEM can apply through Online Registration Portal available at [www.pem.bhel.com](http://www.pem.bhel.com) - vendor section - Online Supplier Registration. All credentials and/or documents duly signed and stamped related**

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to registration can be uploaded on the website and submit the application for registration. However, registration of suppliers is not mandatory in case of open tender

**W)** 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/sub-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 authorise 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. Bidder must proactively declare such sister/common business/management units in same/similar line of business.

**X)** Total quoted price against Supervision of E & C at site (VISIT CHARGES & MANDAYS CHARGES) should not exceed 2% of the total contract value.

**Y)** Instructions to Packing List (annexure –III) and Certification reg. Local content (annexure –IV) to be complied by bidders.

**Z) Quantity Variation:** - Nil Qty Variation.

**AA)** All the Buyer Added Bid Specific Additional Terms and Conditions shall supersede relevant terms & conditions of GeM GTC and shall prevail in case of conflict with any other terms & conditions of tender (if any).

**BB)** All other terms & conditions shall be as per selected Additional Terms & Conditions for subject bid from GeM library and GTC version 4.0 (Version 1.13) available on GeM Portal on enquiry floating date shall be applicable.

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**ANNEXURE - II**

**An undertaking regarding Model Clauses (To be provided alongwith bid)**

Refer,

|  |                                       |
|--|---------------------------------------|
| <b>PROJECT</b>                         | <b>:- 4X270 MW BHADRADRI TPS -FGD</b> |
| <b>PACKAGE</b>                         | <b>:- ELECTRIC HOIST</b>              |
| <b>Primary product category on GeM</b> | :-.....                               |
| <b>BID No. (Through GeM)</b>           | <b>:- ..... , Dtd. ....</b>           |

M/s .....

Reference:

**TO WHOM SO IT MAY CONCERN**

This is with reference to Ministry of Finance circular dated 23.07.20 reg. restriction under rule 144 (xi) of GFR.

“I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India. I hereby certify that M/s ..... is not from such a country and is eligible to be considered against GeM enquiry no: ....., **Dtd. ....**”

Sign & Signature

Date:

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**ANNEXURE - III**

**ANNEXURE -III TO INSTRUCTIONS TO PACKING LIST**

For faster verification of bills, successful bidder to submit detailed Bill of Material (BOM) at the time of drawings/ documents submission after placement of PO. Each item of the BOM to be uniquely identified with item code no. or item Sl. No. Supplier to ensure that all items which will find separate mention in the packing list are covered in this detailed BOM.

Supplier to also give the following undertaking in the BOM:

“The BOM provided herewith completes the scope (in content and intent) of material supply under PO No. .... Dated ..... Any additional material which may become necessary for the intended application of the supplied items/package will be supplied free of cost in most reasonable time.

Packing List must indicate:

- a) Packing size
- b) Gross weight and net weight of each package
- c) Contents of the package with cross reference to BOM item code no. / Sl. No.
- d) Quantity of each items separately.

The packing list must cover all the BOM items.

Supplier to give following undertaking in the packing list:

The Packing list provided herewith is as per BOM approved under PO No. ----

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**ANNEXURE IV**

**Letter head of Company**

Ref.....

Date.....

To,  
Bharat Heavy Electricals Limited  
PEM, PPEI Building, Plot No 25,  
Sector 16A, Noida (U.P) 201301

**Subject: Certification regarding local content**

Reference: Tender Enquiry No....., **Dtd.** .....

Name of Package: **ELECTRIC HOIST.**

Dear Sir,

We hereby certify that items offered by us of **ELECTRIC HOIST** for **4X270 MW BHADRADRI TPS -FGD**, M/s .....  
..... meets the requirement of minimum local content as a class – I local supplier in line with clause of NIT (GeM NIT)  
and the Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017, 28.05.2018 & 29.05.2019,  
04.06.20 & 16.09.20

We further confirm that details of location at which the local value addition is made will be our registered works  
at

.....  
...(address of the works)

Yours very truly

..... (authorized signatory of company)

..... (firm name)

authorized signatory  
of company

## **Delivery Term**

### **1. Delivery Schedule**

- a. **Main Supply** : Delivery completion for Main supply shall be **163** days from the PO date.
- b. **Mandatory Spares** :- Delivery completion for Mandatory spares shall be **'90'** days from BHEL clearance.
- c. **Supervision of E&C**:- Vendor to depute its service engineer for Supervision of E&C within **15 days from BHEL's** intimation (for deputing service engineer).

For delay in deputing service engineer, LD on Supervision of E&C portion shall be applicable @ ½% of the total Supervision of E&C portion contract value (excluding element of taxes) per week or part thereof, with applicable GST. However, total LD (supply + Supervision of E&C) shall be limited to 10% of cumulative total contract value excluding taxes and freight (supply + Supervision of E&C).

#### **Notes:**

- a. Supplier to start manufacturing/supply only after getting the applicable engineering Drgs. /docs approved from BHEL/End Customer.
- b. Drawings /documents submission/re-submission schedule shall be as indicated in revised Annexure A on next page) shall be used for progress monitoring purpose and required course correction, if any.
- c. The delivery date specified is for completion of the deliveries. Deliveries to start progressively so as to meet the completion schedule.
- d. The delivery conditions specified are for contractual purposes. However, to meet project requirement, BHEL may ask for early deliveries without any compensation thereof.

2. **Validity of contract (PO rates, terms and conditions)**: Vendor has to make supply of goods/services as per the delivery time mentioned above. However, due to unavoidable circumstances if delay happens in providing inputs/clearances (inputs, Engineering approvals, deputing inspector for inspection, issuance of MDCC and any hold imposed owing to site issues etc.) for which delivery time extension is admissible as per point no.3, in such situation it shall be obligatory at vendor part to execute the contract at PO rates, terms and conditions where inputs/ clearances has been accorded within validity of contract. Validity period for various activities shall be as defined below or as mentioned in the NIT.

#### **2.1. Validity of the contract for main supply including quantity variation.**

- Contract shall be valid for **365** days from the PO date. However, delay at vendor's end (if any) shall be added to the validity period and contract validity shall get extended by the delay period at vendor's end.

For example: Original Delivery period for main supply: **"163"** A (in days)  
if Delay at vendor's end: B (in days beyond "A" days)  
Contract validity: C (**365**) + B (in days)

#### **Notes:**

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- a. B is the Vendor delay days beyond original contractual delivery period for main supply /extended delivery period owing to time taken by BHEL at point no. 2 above.
- b. Main supply including quantity variation, **O&M Spares (Recommended Spares)** applicable in the contract released/ cleared for manufacturing within contractual validity period, to be supplied by vendor/supplier at PO rates, terms and conditions.
- c. Execution of the contract quantities released beyond contract validity period shall be decided on mutual consent basis at PO rates, terms and conditions.

**3. Delivery Extension: Extension of contractual delivery time:**

Delivery time mentioned in the NIT includes Engineering completion time (time for drawing/document submission/resubmission by the vendor and review/approval of the same by the BHEL/End customer), manufacturing, inspection, Packing and dispatch time. Due diligence is to be observed by the vendor to ensure timely completion of engineering and supply.

During the execution of the contract, time loss occurred owing to the reason attributable to BHEL besides force majeure shall be considered for delivery time extension to the vendor as given below: -

- i. Any Delay in providing comments/ approval on Primary drawing/documents beyond the stipulated time as specified in NIT.
- ii. Time Loss in approval of the drawing/document as a result of increase in the iteration not attributable to the vendor (i.e. resubmission owing to end customer comments) as certified by BHEL. Time extension equivalent to the resubmission time noted in the tech. spec and consequential increase in the approval time in lieu of increase in iteration shall be applicable. However, for incomplete re- submission time loss shall be in vendor account.
- iii. Delay in providing engineering input/material by BHEL.
- iv. Delay in deputing inspector for inspection and delay in release of MDCC in line with GCC/ GEM ATC terms.
- v. Any hold put by BHEL for whatever reasons during execution of contract (within contract validity period), time extension equivalent to hold period shall be admissible. However, in the event hold period continues for more than 30 days then, an additional fifteen days for the purposes of mobilization and demobilization of resources shall also be admissible.

**Note:** Extension in delivery period if any with or without imposition of LD shall be considered after detailed delay analysis based on provisions given above. However, no delay analysis will be applicable if supply is completed within delivery schedule as specified in Purchase order.



**TECHNCIAL SPECIFICATION NO.**

**PE-TS-440-563-A002**

**ANNEXURE-V**

**A: DRAWINGS/ DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT**

The successful bidder shall submit the following drawings / documents during detail engineering for customer's approval /information:

| Sl. No. | BHEL DRG.NO        | DRAWING TITLE  | SUBMISSION SCHEDULE   |
|---------|--------------------|--|---|
| 1       | PE-V0-440-563-A202 | GA Drawing for Electric Hoist, DSL arrangement and painting details  | REV-0 WITHIN 30 DAYS FROM PO. BHEL WILL COMMENT ON R0 WITHIN 18 DAYS FROM RECEIPT. REV-1 TO BE SUBMITTED BY VENDOR WITHIN 7 DAYS. BHEL WILL FURNISH APPROVAL IN 18 DAYS FROM RECEIPT. |
| 2       | PE-V0-440-563-A210 | Mechanism Sizing Calculation   |   |
| 3       | PE-V0-440-563-A219 | Schematic Circuit Diagram including cable schedule and panel diagram |   |

Following documents shall be submitted by vendor for information –

| Sl. No. | BHEL DRG.NO        | DRAWING TITLE      |
|---------|--------------------|--------------------|
| 1       | PE-V0-440-563-A206 | O & M Manual       |
| 2       | PE-V0-440-563-A207 | Packing list       |
| 3       | PE-V0-440-563-A208 | Erection procedure |

Note:

1. MANDATORY SPARES SHALL BE IN FORM OF BBU
2. INCOMPLETE DRAWINGS/DOCUMENTS SHALL NOT BE TREATED AS SUBMITTED.
3. SQP ATTACHED IN SPECIFICATION TO BE FOLLOWED. VENDOR SHALL SUBMIT SIGNED & STAMPED COPY OF THE SAME.
4. MAKE OF BOIS SHALL BE FURNISHED BY VENDOR SHALL BE REVIEWED.

**B.0 DOCUMENT MANAGEMENT SYSTEM**

1.0 Bidder to note that BHEL reserves the right for drawing/document submission through web based Document Management System. Bidder would be provided access to the DMS for drawing/document approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7.
- Internet speed – 2 mbps (Minimum preferred).
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked.
- Vendor's Internal proxy setting should not block DMS application's link (<http://124.124.36.198/wrenchwebaccess/login.aspx>)

|                                    |   |
|------------------------------------|---|
| <b>CUSTOMER/<br/>BHEL<br/>LOGO</b> | <b>VENDOR CREDENTIALS SUMMARY SHEET<br/>(TO BE FILLED BY BIDDER AND SUBMITTED WITH BID)</b> |
|------------------------------------|---|

|                     |  |  |                |                      |                |
|---------------------|--|--|----------------|----------------------|----------------|
| i.                  | Item/Scope   |  |                |                      |                |
| ii.                 | Address of the registered office   | Details of Contact Person<br>(Name, Designation, Mobile, Email)  |                |                      |                |
| iii.                | Name and Address of the proposed vendor's works where item is being manufactured   | Details of Contact Person:<br>(Name, Designation, Mobile, Email)   |                |                      |                |
| iv.                 | Annual Production Capacity for proposed item   |  |                |                      |                |
| v.                  | Annual production for last 3 years for proposed item   |  |                |                      |                |
| vi.                 | Details of proposed works  |  |                |                      |                |
| 1.                  | Year of establishment  |  |                |                      |                |
| 2.                  | Factory Registration Certificate   | Details attached at Annexure – F2.1 (Page No....)  |                |                      |                |
| 3.                  | Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc.)   | Details attached at Annexure – F2.2 (Page No....)  |                |                      |                |
| 4.                  | After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)  | Applicable / Not applicable<br>Details attached at Annexure – F2.3 (Page No....)                                 |                |                      |                |
| 5.                  | Sources of Raw Material/Major Bought Out Item  | Details attached at Annexure – F2.4 (Page No....)  |                |                      |                |
| 6.                  | Quality Control exercised during receipt of raw material/BOI, in-process, Final Testing, packing   | Details attached at Annexure – F2.5 (Page No....)  |                |                      |                |
| 7.                  | Manufacturing facilities (List of machines, special process facilities, material handling etc.)  | Details attached at Annexure – F2.6 (Page No....)  |                |                      |                |
| 8.                  | Testing facilities (List of testing equipment)   | Details attached at Annexure – F2.7 (Page No....)  |                |                      |                |
| 9.                  | Supply reference list including recent supplies (Preferably of reputed, well known clients to whom the vendor has supplied the material and are of quantum of item/scope at point (i) above) | Reputed client name (s).....<br>Details attached at Annexure – F2.8 (as per format given below)<br>(Page No....) |                |                      |                |
| Project/<br>package | Customer<br>Name   | Supplied Item<br>(Type/Rating/Model<br>/Capacity/Size etc)   | PO ref no/date | Supplied<br>Quantity | Date of Supply |

|                                    |   |
|------------------------------------|---|
| <b>CUSTOMER/<br/>BHEL<br/>LOGO</b> | <b>VENDOR CREDENTIALS SUMMARY SHEET<br/>(TO BE FILLED BY BIDDER AND SUBMITTED WITH BID)</b> |
|------------------------------------|---|

|             |   |  |  |              |                  |
|-------------|---|--|--|--------------|------------------|
|             |   |  |  |              |                  |
| 10.         | Product satisfactory performance feedback letter/certificates/End User Feedback   | Attached at annexure - F2.9 (Page No....)  |  |              |                  |
| 11.         | Average annual turnover for last three years with documentary proof.  |  |  |              |                  |
| 12.         | Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating) Note:- Reports need not to be submitted | <b>Applicable / Not applicable</b><br><br>Details attached at Annexure – F2.10 (if applicable) (Page No....) |  |              |                  |
| 13.         | Copy of ISO 9001 certificate (if available)   | Attached at Annexure – F2.11 (Page No....)   |  |              |                  |
| 14.         | Product technical catalogues for proposed item (if available)   | Details attached at Annexure – F2.12 (Page No....)   |  |              |                  |
|             |   |  |  |              |                  |
| <b>Name</b> |   | <b>Desig</b>   |  | <b>Sign:</b> |                  |
|             |   |  |  |              | <b>Date</b><br>: |
|             |   |  |  |              |                  |

**Company's Seal/Stamp:-**

| SUGGESTED PRICE FORMAT   |   | Doc No:                             | PE-PF-440-563-A002A |                     |  |
|--|---|-------------------------------------|---------------------|---------------------|--|
|  |   | Rev No:                             | 0                   |                     |  |
|  |   | Date of issue                       | 12-12-2023          |                     |  |
| NAME OF PROJECT:   |   | 4X270 MW BHADRADRI TPP (FGD System) |                     |                     |  |
| NAME OF PACKAGE:   |   | ELECTRIC HOIST                      |                     |                     |  |
| TECHNICAL SPECIFICATION:   |   | PE-TS-440-563-A002                  |                     |                     |  |
| S. No.   | DESCRIPTION   | UNIT                                | QTY                 | AMOUNT (Ex-Works)   |  |
| 1  | Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for <b>SUPPLY PART &amp; MANDATORY SPARES</b> comprising of design (i.e. preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles, fill of lubricants & consumables, supervision of E&C, mandatory spares alongwith spares for erection, startup and commissioning as required, forwarding, proper packing, shipment and delivery at site for project and package specified above complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification, amendment & agreements till placement of order.        | Lot                                 | 1                   |                     |  |
| <b>2.0</b>   | <b>MAJOR BREAK-UP OF PRICES GIVEN IN 1.0 ABOVE.</b>   |                                     |                     |                     |  |
| 2.1  | Prices inclusive of all prevailing taxes, duties and other levies for <b>SUPPLY</b> part comprising of design (i.e.preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles, fill of lubricants & consumables, supervision of E&C, alongwith spares for erection, startup and commissioning as required, forwarding, proper packing, shipment and delivery at site, for project and package specified above complete with all accessories for following items for the total scope defined as per BHEL NIT & tender technical specification, amendment & agreements till placement of order. <b>(Break-up of prices as per Annexure I)</b> | Lot                                 | 1                   |                     |  |
| 2.2  | Total lumpsum firm price inclusive of all prevailing taxes, duties and other levies for <b>Mandatory spares</b> comprising of manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, forwarding, proper packing, shipment, delivery at site & guarantee as per tender technical specification above, amendment & agreements till placement of order. (Price break up of mandatory spares is to be furnished as per Annexure- II).   | Lot                                 | 1                   |                     |  |
| Note:<br>1.) PG to consider and suitably incorporate taxes, duties and other commercial aspects.<br>2) Bidder to quote the Prices in 'figures' along with corresponding 'words'. |   |                                     |                     |                     |  |
| <b>Particulars of bidder / authorised representative</b>   |   |                                     |                     |                     |  |
|  |   |                                     |                     |                     |  |
| <b>Name</b>  | <b>Designation</b>  | <b>Signature</b>                    | <b>Date</b>         | <b>Company Seal</b> |  |

**SUGGESTED PRICE FORMAT  
ANNEXURE-I**

|                      |                     |
|----------------------|---------------------|
| <b>Doc No:</b>       | PE-PF-440-563-A002A |
| <b>Rev No:</b>       | 0                   |
| <b>Date of issue</b> | 12-12-2023          |

|                                 |                                     |
|---------------------------------|-------------------------------------|
| <b>NAME OF PROJECT:</b>         | 4X270 MW BHADRADRI TPP (FGD System) |
| <b>NAME OF PACKAGE:</b>         | ELECTRIC HOIST                      |
| <b>TECHNICAL SPECIFICATION:</b> | PE-TS-440-563-A002                  |

| S. No.           | DESCRIPTION  | UNIT                       | QTY | AMOUNT<br>(Ex-Works) |
|------------------|--|----------------------------|-----|----------------------|
| <b>2.0</b>       | <b>BREAK-UP OF SUPPLY PRICES GIVEN IN 2.1 OF MAIN SHEET.</b>   |                            |     |                      |
| <b>2.1</b>       | Breakup of Prices inclusive of all prevailing taxes, duties and other levies for <b>SUPPLY</b> part comprising of design (i.e.preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles, fill of lubricants & consumables, supervision of E&C, alongwith spares for erection, startup and commissioning as required, forwarding, proper packing, shipment and delivery at site, for project and package specified above complete with all accessories for following items for the total scope defined as per BHEL NIT & tender technical specification, amendment & agreements till placement of order. | Lot                        | 1   |                      |
| <b>2.1.1 (a)</b> | For <b>FGD Control Room</b><br>Capacity: 10 T with movable type pendent<br>Lift: 12 M<br>Travel path (Straight): 6 M   | No.                        | 1   |                      |
| <b>2.1.1 (b)</b> | PVC Shrouded bus bar (GI) type DSL complete with all accessories.  | Mtr                        | 6   |                      |
| <b>2.1.2 (a)</b> | For <b>ACW/ECW pump motor handling</b><br>Capacity: 2 T (suitable for curved path)<br>Lift: 4 M<br>Travel path (Curved): 45 M  | No.                        | 1   |                      |
| <b>2.1.2 (b)</b> | PVC Shrouded bus bar (GI) type DSL complete with all accessories. (curved path)  | Mtr                        | 45  |                      |
| <b>2.1.3</b>     | <b>Maintenance tools and tackles</b>   | set                        | 1   |                      |
| <b>2.1.4</b>     | <b>Commisioning spares</b>   | set                        | 1   |                      |
| <b>2.1.6 (a)</b> | <b>Supervision of E&amp;C (1 set)</b>  | <b>Charges per visit</b>   | No. | 1                    |
| <b>2.1.6 (b)</b> |  | <b>Charges per man-day</b> | No. | 1                    |

Note:

- 1) PG to incorporate taxes, duties and other commercial aspects.
- 2) Bidder to quote the Prices in 'figures' along with corresponding 'words'.
- 3) The requirement for visit &/or supervision at site as indicated at sl no. 2.1.6 (a) & 2.1.6 (b) shall vary as per requirement of site. Any variation shall be adjusted as per Unit rate mentioned above.
- 4) Any variation in length of DSL due to change in bay length will be adjusted based on unit rates arrived from 2.1.1 (b) & 2.1.2 (b)above.


**Particulars of bidder / authorised representative**

| Name | Designation | Signature | Date | Company Seal |
|------|-------------|-----------|------|--------------|
|      |             |           |      |              |

| <b>SUGGESTED PRICE FORMAT<br/>ANNEXURE-II<br/>LIST OF MANDATORY SPARES</b> |  | Doc No:  | PE-PF-440-563-A002A  |
|--|--|--|----------------------|
|  |  | Rev No:  | 0                    |
|  |  | Date of issue                                      | 12-12-2023           |
| <b>NAME OF PROJECT:</b>  |  | <b>4X270 MW BHADRADRI TPP (FGD System)</b>         |                      |
| <b>NAME OF PACKAGE:</b>  |  | <b>ELECTRIC HOIST</b>                              |                      |
| <b>TECHNICAL SPECIFICATION:</b>  |  | <b>PE-TS-440-563-A002</b>                          |                      |
| Sl. No.  | DESCRIPTION  | TOTAL QNTY   | AMOUNT<br>(Ex-Works) |
| <b>2.2</b>   | <b>BREAK-UP OF SUPPLY PRICES GIVEN IN 2.2 OF MAIN SHEET.</b>   |  |                      |
| <b>A</b>   | <b>MANDATORY SPARES FOR ELECTRIC HOISTS (FOR 10T HOIST)- FGD control room (for each type and rating, hoists)</b>           |  |                      |
| 1.1  | Bearings for travel wheels   | 4 set  |                      |
| 1.2  | Bearings for gear boxes for each type of hoist   | 4 set  |                      |
| 1.3  | Break liners for all the brakes  | 200% of total population of each type & size       |                      |
| 1.4  | Oil seals  | 200% of total population of each type, size rating |                      |
| 1.5  | Brake springs for all brakes   | 200% of total population of each type, size rating |                      |
| 1.6  | Wire ropes for hooks   | 200% installed on each crane and hoist             |                      |
| 1.7  | Solenoid coils for brakes  | 4 set  |                      |
| 1.8  | Overload relay for motors  | 4 Nos.   |                      |
| 1.9  | Limit switches for hoists and travel mechanisms  | 4 set  |                      |
| 1.10   | (i) Spare motors for hoist motion  | 2 Nos.   |                      |
|  | (ii) Spare motors for travel motion  | 2 Nos.   |                      |
| 1.11   | Travel machinery   |  |                      |
|  | i. Gear wheel  | 2 set  |                      |
|  | ii. Internal clip  | 4 Nos.   |                      |
|  | iii. Pinion  | 2 No.  |                      |
| <b>B</b>   | <b>MANDATORY SPARES FOR ELECTRIC HOISTS (FOR 2T HOIST)- ACW/ECW pump motor handling (for each type and rating, hoists)</b> |  |                      |
| 1.1  | Bearings for travel wheels   | 4 set  |                      |
| 1.2  | Bearings for gear boxes for each type of hoist   | 4 set  |                      |
| 1.3  | Break liners for all the brakes  | 200% of total population of each type & size       |                      |
| 1.4  | Oil seals  | 200% of total population of each type, size rating |                      |
| 1.5  | Brake springs for all brakes   | 200% of total population of each type, size rating |                      |
| 1.6  | Wire ropes for hooks   | 200% installed on each crane and hoist             |                      |
| 1.7  | Solenoid coils for brakes  | 4 set  |                      |
| 1.8  | Overload relay for motors  | 4 Nos.   |                      |
| 1.9  | Limit switches for hoists and travel mechanisms  | 4 set  |                      |
| 1.10   | (i) Spare motors for hoist motion  | 2 Nos.   |                      |
|  | (ii) Spare motors for travel motion  | 2 Nos.   |                      |
| 1.11   | Travel machinery   |  |                      |
|  | i. Gear wheel  | 2 set  |                      |
|  | ii. Internal clip  | 4 Nos.   |                      |
|  | iii. Pinion  | 2 No.  |                      |

| <b>C</b> | <b>Electrical Items (common for all hoists)</b>                                 |   |  |
|----------|---|---|--|
| 1        | 415 Volt Motor (Upto 30 KW Rating)  |   |  |
| a        | Driving End & Non-Driving End Bearing   | 4 Set for each type and rating of Motor   |  |
| b        | Cooling Fan   | 4 Nos. for each type and rating of Motor  |  |
| c        | Motor Terminal Block  | 10 Nos. for each type and rating of Motor |  |
| d        | Complete Set of Coupling  | 2 Set of each application                 |  |
| 2        | C&I Items   |   |  |
| a        | Back-up panel mounted devices (Selector switches/ Push buttons/ Indicators etc. | 10% of installed capacity                 |  |
| b        | Lamps/ LEDs   | 200% of the total quantity                |  |
| c        | MCBs  | 20% of each type & rating                 |  |
| d        | Fuses/ Fuse holder  | 200% of each type & rating                |  |

Note: Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender specification apart from specified above, same shall be deemed to have been covered in bidders scope of supply.

|   |   |                    |          |
|---|---|--------------------|----------|
|  | <b>PRE-QUALIFICATION REQUIREMENT</b><br><b>(TECHNICAL)</b><br><b>PROJECT: BHADRADRI FGD</b><br><b>PACKAGE : - ELECTRIC HOISTS</b> | PE-PQ-440-563-A002 |          |
|   |   | DATE               | 08.12.23 |
|   |   | REV NO             | 00       |

|     |  |
|-----|--|
| 1.0 | Bidder should have capabilities for design, manufacture and having testing facility for Electric hoist of minimum 3T capacity.   |
| 2.0 | <p>The Bidder has to submit following supporting documents meeting above mentioned pre-qualifying requirement:</p> <p>a. 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 prequalifying requirement.<br/>OR</p> <p>b. Minimum two PO/ LOI/ LOA/ WO placed with a minimum gap of six (6) months from same purchaser meeting the minimum pre-qualifying requirement.<br/>OR</p> <p>c. Minimum one PO/ LOI/ LOA/ WO after commissioning of first order from same purchaser meeting the minimum pre-qualifying requirement.<br/>OR</p> <p>d. Minimum three customer's /third party's inspection reports / test certificates meeting the minimum pre-qualifying requirement.</p> |
| 3.0 | Bidder shall submit design documents to substantiate technical parameters specified in PQR, if the same is not mentioned in performance certificate/purchase order.  |
| 4.0 | 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.   |
| 5.0 | 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.   |
| 6.0 | 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.  |
| 7.0 | Consideration of offer shall be subject to customer's approval of bidders, if applicable.  |
| 8.0 | 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.   |

**TELANGANA STATE POWER GENERATION  
CORPORATION LTD.**

4 X 270MW BHADRADRI TPS AT MANUGURU,  
KHAMMAM, TS  
FGD PACKAGE

TECHNICAL SPECIFICATION  
FOR  
ELECTRIC HOIST

SPECIFICATION NO.: PE-TS-440-563-A002



**BHARAT HEAVY ELECTRICALS LTD**

**POWER SECTOR PROJECT ENGINEERING MANAGEMENT  
PPEI, NOIDA-INDIA**



**TECHNICAL SPECIFICATION FOR  
ELECTRIC HOIST  
4X270 MW BHADRADRI TPS**

SPECIFICATION NO. PE-TS-440-563-A002

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REV 00

DATE MAY 2023

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**TECHNICAL SPECIFICATION FOR**  
**ELECTRIC HOIST**  
**4X270 MW BHADRADRI TPS- FGD**

SPECIFICATION NO. PE-TS-440-563-A002

VOLUME II - B

SECTION -I

REV 00

DATE MAY 2023

**SECTION-I**

**SPECIFIC TECHNICAL REQUIREMENT**

**SUB-SECTION IA**  
**SUB-SECTION IB**  
**SUB-SECTION IC**

**SPECIFIC TECHNICAL REQUIREMENT (MECHANICAL)**  
**SPECIFIC TECHNICAL REQUIREMENT (ELECTRICAL)**  
**DATA SHEET A**



**TECHNICAL SPECIFICATION FOR**  
**ELECTRIC HOIST**  
**4X270 MW BHADRADRI TPS- FGD**

SPECIFICATION NO. PE-TS-440-563-A002

VOLUME II - B

SECTION -I

REV 00

DATE MAY 2023

**SUB-SECTION IA**

**SPECIFIC TECHNICAL REQUIREMENT (MECHANICAL)**



**TECHNICAL SPECIFICATION FOR  
ELECTRIC HOIST  
4X270 MW BHADRADRI TPS- FGD**

SPECIFICATION NO. PE-TS-440-563-A002

VOLUME II - B

SECTION -I

REV 00

DATE MAY 2023

### SCOPE OF ENQUIRY

- 1.1 The specification is intended to cover design (i.e. preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles, fill of lubricants & consumables, mandatory spares along with spares for erection, start-up and commissioning as required, forwarding, proper packing, shipment and delivery at site, along with Supervision of Erection and Commissioning at site for project and package specified complete with all accessories for the total scope defined for **ELECTRIC HOIST**
- 1.2 The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. **Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve the contractor of the responsibility of providing such facilities to complete the supply of ELECTRIC HOIST.**
- 1.3 It is not the intent to specify herein all the details of design and manufacture. However, 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.
- 1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.
- 1.5 The general term and conditions, instructions to tenderer and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification is subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.
- 1.6 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information , ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Vol-III of the specification **within 10 days of receipt of tender documents.** In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by



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Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

- 1.7 The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.
- 1.8 Deviations, if any, should be very clearly brought out clause by clause in the enclosed deviation schedule along with cost of withdrawal; otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification. If no cost of withdrawal is given against the deviation, it will be presumed that deviation can be withdrawn without any cost to BHEL/its customer.
- 1.9 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.
- 1.10 Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder /vendor and Customer/ Purchaser/Employer will mean BHEL and /or TSGENCO including their consultant as interpreted by BHEL in the relevant context. For details refer the relevant clause in GCC.

**Note:**

Bidder to note that BHEL reserves the right for drawing/document submission through web based Document Management System. Bidder would be provided access to the DMS for drawing/document approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7.
- Internet speed – 2 mbps (Minimum preferred).
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked.
- Vendor's Internal proxy setting should not block DMS application's link (<https://www.bhelpem.com/WrenchWeb>).



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**1.0.0 SCOPE OF WORK****1.1.0 SUPPLIES**

1.1.1 Equipment and services to be furnished by the bidder for the **WIRE ROPE ELECTRIC HOIST** with accessories as per the details given in data sheet-A. Any equipment / accessories not specified in the specification but required to make the hoist units complete and efficient shall also be under the bidder's scope of work.

Each hoist shall include all necessary items but shall not be limited to the following: -

1. Travelling Trolley with drive arrangement.
2. Hoisting mechanism (motor and gear box, wire rope, load hook and hook block)
3. Electrical equipment (control panel, motor, limit switches, DSL current collector etc)
4. Cable for motor, brake, limit switches, etc.
5. Painting of hoist.
6. Power supply thru' DSL along with fixing brackets
7. Testing of hoist at manufacturers works.
8. Main isolating switch with earth fault protection and power cable from 1.5M above ground / operating floor upto DSL/junction box/terminal box.
9. Pendent push button with fixed type cabling
10. Initial fill of lubricants, grease etc.
11. Earthing arrangement
12. Any equipment / accessories not specified here but required to make the equipment complete and efficient shall be under bidder's scope of work.

**1.1.2 Maintenance Tools and Tackles**

One (1) complete unused new set of special purpose tools, tackles and accessories along with detailed instructions and maintenance manual shall be supplied. Each tool and wrench shall be stamped so as to be identified easy for its use. The tools shall be supplied in steel toolbox and with a copy of instruction manual. The items supplied shall be of the best quality, specially protected against rusting in tropical climate. The following shall be provided as minimum requirement:

| <b>S-No.</b> | <b>Description</b>  | <b>Qty.</b> |
|--------------|---|-------------|
| 1            | Complete set of ring spanners<br>(Indicate the sizes offered) | 1 Set**     |
| 2            | Complete set of screwdrivers<br>(Indicate the sizes)          | 1 Set**     |
| 3.           | Adjustable Spanner  | 1 No.       |



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- |    |                 |       |
|----|-----------------|-------|
| 4. | Insulated plier | 1 No. |
| 5. | Grease gun      | 1 No. |
| 6. | Oil gun         | 1 No. |
| 7. | Line tester     | 1 No. |

(\*\*) – Set shall comprise of complete range of spanners suiting requirement for various capacities of electric hoists.

**Note:** - Bidder shall ensure that the tools & tackles mentioned in above list are sufficient to handle all sizes/capacities of hoists & in case any other /additional tool is required for handling/maintenance any size/capacity of hoist the same shall be included in this list.

### 1.1.3 Erection and commissioning spares.

Erection and commissioning spares, as deemed necessary by the bidder shall be supplied along with each Equipment. List of these commissioning spares shall be furnished by the bidder along with their offer. Any item not quoted by the bidder but found necessary during erection and commissioning shall have to be supplied by the bidder without any cost implication.

| Sl no. | Description of equipment/item                 | Quantity                  |
|--------|---|---------------------------|
| 1      | Overload Relay                                | 1 set for each type of EH |
| 2      | Limit Switch                                  | 1 set for each type of EH |
| 3      | Fuse Link                                     | 1 set for each type of EH |
| 4      | Any other as per manufacture's recommendation |                           |

N:B: One set shall mean 100% requirement for one electric hoist

### 1.1.4 Mandatory Spares -

A complete unused and new set of Mandatory Spare parts shall be supplied. Each part shall be stamped so as to be identified, easy for it use. The items supplied shall be of the best quality and specially protected against rusting in tropical climate. The minimum requirement of mandatory spare parts is listed in Annexure –II, Section IA of this specification.

### 1.2.0 Services to be provided by the bidder

**1.2.1.** Scope of work for delivery & transportation etc shall be as per commercial terms and conditions of NIT.

**1.2.2.** 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



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to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement. 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

**1.2.3.** Any other service mentioned in GCC & SCC as relevant to the package.

**1.3.0 Inspection and Testing**

Shall be as per manufacturing quality plan, drawings /documents approved during detail engineering and relevant IS codes. The standard manufacturing quality plan is included in this specification to enable the bidder to understand the extent of inspection and testing requirements to execute the job. Procedure is indicated at Annexure IV, Volume IIB. The successful bidder has to follow the requirement in the above documents along with the relevant standards.

**1.4.0 Drawing / design document for submission after award of contract**

Drawing/ design documents to be submitted as per list & submission schedule attached as Annexure-V, section-II, volume II-B of this specification.

Any other design document/ drawing as required by customer/ BHEL shall be submitted by bidder during detail engineering without any implication.

**1.5.0 Number of drawing and documents for submission**

The number of prints / copies required for various drawing and documents are listed in Annexure –V, of GTR

**1.6.0 Supervision of erection & commissioning:** Bidders shall also be required to extend supervision of erection and commissioning of equipment's under the scope of supply of this specification on project to project basis (as per requirement). Rate on per visit and per man day basis shall be quoted in the price schedule. The actual no of days shall be informed on project to project basis, as and when required. Scope for charges per visit including service at site as per price schedule: Total lump sum price for visits should include travel expenses to & fro site, insurance (if applicable) & boarding and lodging etc for one day of stay at site including supervision charges for erection, commissioning, load testing or any other service at site. . Scope for charges for subsequent stay at site as per price schedule: shall include charges for supervision of erection, commissioning, load testing or any other service at site including boarding & lodging for subsequent stay at site. This shall be from the day of actual commencement of supervision at site/ availability at site for supervision activity, excluding travel time to & from site. These charges shall commence if the representative of vendor has to provide service at site beyond one day.



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Note: Bidder shall be informed at least 10 days in advance for the requirement of visit at site. Visiting team shall consist of one or two expert as deemed necessary by the bidder.

**1.7.0 Surface Preparation, Painting & Colour Scheme**

Detailed painting procedure has been attached as Annexure III, Section IA, Volume IIB. Bidder shall follow the same.

**2.0.0. Works Excluded**

2.1.0 Supply of ISMB monorail for electric hoist travel

2.2.0 Erection and Commissioning of electric hoists.

2.3.0 Purchaser shall provide single point 415V, 3 phase, and 50Hz power feeder at any point of the bay or in the middle of the bay. Vendor shall provide main isolating switch at 1.5 M above the ground / operating floor level and cable required from isolating switch to DSL. Any other supply required by the bidder shall be arranged by the bidder himself, using suitable transformer as per the specification.

**3.0.0. Deviations**

If the bid submitted has got any deviation from the technical stipulations in the tender document, bidder shall tabulate the same in the appropriate "Schedule of Deviations", given in General Condition of Contract ( GCC), furnishing full particular of such deviations along with cost of withdrawal of deviation. Priced copy shall be submitted along with price schedule. Unpriced schedule shall be submitted along with technical offer. Unpriced format should contain "QUOTED" / "NIL" / "NA" against each deviation. Deviations are to be furnished with mention to specific clause number. Reasons / explanations for such deviations shall be furnished. If there are no deviations from the tender document, bidder shall furnish NO DEVIATION CERTIFICATE regarding the same.

**4.0.0. Demonstration Guarantee**

Hoist along with its drives, controls and other accessories shall be demonstrated for the rated capacity against the rated speed of motions and for the service conditions specified as specified in QAP and as per IS 3938.

The bidder shall have the full responsibility for the safe and efficient operation of the hoist with associated accessories as a single unit.

If the shop performance tests indicate the failure of any of the components to achieve the guaranteed performance, the deficiency shall be made good at bidder's cost.

Demonstration tests shall be carried out each time after the rectification /modification is carried out.

**5.0.0. Make of Sub - Vendor items**



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Make of bought out items will be as per Annexure-I, section IA, volume II-B of the specification. No other make will be acceptable, until and unless specifically got approved by BHEL/Customer during detail engineering. Acceptance/non acceptance of same shall not have any impact on manufacturing & delivery schedule and on cost of crane.

**6.0.0 Packing**

Refer General Technical Requirement.

**7.0.0 INFORMATION TO BE FURNISHED BY BIDDER ALONG WITH THE OFFER**

As detailed in "List of documents to be submitted with bid", Section III

**8.0.0 OTHER REQUIREMENTS**

Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract along with supply of concerned equipment / component.

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.

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.

**Annexure A:**

| S No. | Area/Equipment Description       | Qty (Nos.) | Capacity (T) | Lift (m) | Travel (m) |
|-------|----------------------------------|------------|--------------|----------|------------|
| 1     | FGD Control Room                 | 1          | 10 T         | 12       | 6          |
| 2     | ACW/ECW PH for FGD (curved path) | 1          | 2T           | 4        | 45         |



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**QUALITY ASSURANCE PLAN**


|   |                                   |   |              |                      |                         |            |                           |                         |                         |          |               |          |                |
|---|-----------------------------------|---|--------------|----------------------|-------------------------|------------|---------------------------|-------------------------|-------------------------|----------|---------------|----------|----------------|
| <b>Manufacturer's Name &amp; Address:</b> |                                   | <b>STANDARD QUALITY PLAN</b>                            |              |                      |                         |            | <b>CUSTOMER :</b>         |                         |                         |          |               |          |                |
|   |                                   | <b>ITEM: WIRE ROPE TYPE ELECTRICAL HOISTS UP TO 15T</b> |              |                      | <b>SQP NO:</b>          |            |                           | <b>PROJECT :</b>        |                         |          |               |          |                |
|   |                                   |   |              |                      | <b>REVISION</b>         |            | <b>00</b>                 | <b>PACKAGE :</b>        |                         |          |               |          |                |
|   |                                   |   |              |                      | <b>DATE</b>             |            | <b>June 2023</b>          | <b>CONTRACTOR :</b>     |                         |          |               |          |                |
| <b>SL. NO.</b>                            | <b>COMPONENT &amp; OPERATIONS</b> | <b>CHARACTERISTICS</b>                                  | <b>CLASS</b> | <b>TYPE OF CHECK</b> | <b>QUANTUM OF CHECK</b> |            | <b>REFERENCE DOCUMENT</b> | <b>ACCEPTANCE NORMS</b> | <b>Format of RECORD</b> |          | <b>AGENCY</b> |          | <b>REMARKS</b> |
|   |                                   |   |              |                      | <b>M</b>                | <b>C/N</b> |                           |                         |                         | <b>M</b> | <b>C</b>      | <b>N</b> |                |
| <b>1.</b>                                 | <b>2.</b>                         | <b>3.</b>   | <b>4.</b>    | <b>5.</b>            | <b>6.</b>               |            | <b>7.</b>                 | <b>8.</b>               | <b>9.</b>               | <b>D</b> | <b>10.</b>    |          | <b>11.</b>     |

| <b>A. RAW MATERIAL</b>     |  |  |          |                       |                      |      |  |                               |                        |   |   |   |   |   |
|----------------------------|--|--|----------|-----------------------|----------------------|------|--|-------------------------------|------------------------|---|---|---|---|---|
| A.1                        | <b>MS PLATES FOR HOIST STRUCTURE, GEAR BOX, &amp; ROPE DRUM (IF FABRICATED )</b> | CHEMICAL & MECHANICAL PROPERTIES                 | MAJOR    | CHEMICAL & MECHANICAL | 1 SAMPLE / HEAT      |      | IS 2062 E250 GR- A/ BR APPROVED DRAWING/DATA SHEET |                               | MTC/ LAB TEST REPORT   | √ | P | V | V | In the absence of correlated TC Lab testing shall be done.  |
|                            |  | ULTRASONIC TEST OF PLATES (For Thk>25mm)         | MAJOR    | NDT                   | 100%                 | 100% | ASTM A 435   | ASTM A 435                    | IR                     | √ | P | V | V |   |
| A.2                        | <b>PIPE FOR ROPE DRUM (IF SEAM LESS PIPE IS USED)</b>                            | CHEMICAL & MECHANICAL PROPERTIES & ACID ETCHING  | MAJOR    | CHEMICAL & MECHANICAL | 1 SAMPLE / HEAT/SIZE |      | ASTM A106 GR A/B APPROVED DRAWING/DATA SHEET       |                               | MTC/IR/ LAB TEST REPOT | √ | P | V | V | In the absence of correlated TC Lab testing shall be done.. |
|                            |  | ULTRASONIC TEST FOR SEAMLESS PIPE (For Thk>25mm) | MAJOR    | UT                    | 100%                 | 100% | ASTM E-213   | ASTM E-213                    | IR                     | √ | P | V | V |   |
| A.3                        | <b>FORGINGS / ROLLED BARS FOR GEARS, PINIONS &amp; WHEELS</b>                    | CHEMICAL & MECHANICAL PROPERTIES                 | MAJOR    | CHEMICAL & MECHANICAL | 1 SAMPLE / HEAT/SIZE |      | APPROVED DRAWING/DATA SHEET.                       |                               | MTC/ LAB TEST REPORT   | √ | P | V | V | In the absence of correlated TC Lab testing shall be done.  |
|                            |  | ULTRASONIC TEST                                  | MAJOR    | NDT                   | 100%                 | 100% | ASTM A 388   | REFER NOTE-1                  | IR                     | √ | P | V | V | ONLY FOR DIA/THICKNESS 40 MM & ABOVE                        |
| <b>B. BOUGHT OUT ITEMS</b> |  |  |          |                       |                      |      |  |                               |                        |   |   |   |   |   |
| B.1                        | <b>HOOKS</b>   | MAKE & DIMENSIONS                                | MAJOR    | VISUAL                | 100%                 | 100% | IS 15560/ AS PER APPROVED BOI LIST                 |                               | TC                     | √ | P | V | V |   |
|                            |  | CHEMICAL & MECHANICAL                            | MAJOR    | CHEMICAL & MECHANICAL | 1 SAMPLE / HEAT/SIZE |      | IS 1875/APPROVED DATA SHEETS /DRAWINGS.            |                               | IR                     | √ | P | V | V |   |
|                            |  | PROOF LOAD TEST                                  | MAJOR    | MECHANICAL            | 100%                 | 100% | IS-15560/IS 3815/APP. DRG./DS                      | IS-15560/IS 3815/APP. DRG./DS | IR                     | √ | P | V | V |   |
|                            |  | UT FOR INNER DEFECTS                             | CRITICAL | NDT                   | 100%                 | 100% | ASTM A 388   | REFER NOTE-1                  | IR                     | √ | P | V | V | On shank portion only                                       |

|                                    |   |  |  |
|------------------------------------|---|--|--|
| <b>MANUFACTURE/ SUB-CONTRACOTR</b> | <b>BHEL</b>   | <b>LEGEND :</b>  | <b>CUSTOMER</b>  |
| <b>STAMP &amp; SIGNATURE</b>       |  | <b>'D' : RECORDS IDENTIFIED WITH TICK (√) SHALL BE ESSENTIALLY INCLUDED BY MANUFACTURER IN QA DOCUMENTATION</b><br><b>'M': MANUFACTURER/ SUBCONTRACTOR</b><br><b>'B': BHEL/ THIRD PARTY</b><br><b>'C': CUSTOMER</b><br><b>INDICATE 'P' PERFORM 'W' WITNESS AND 'V' DOCUMENT REVIEW</b> | <b>NAME &amp; SIGN OF APPROVING AUTHORITY &amp; SEAL</b> |


|   |                                   |   |              |                      |                         |                  |                           |                         |                         |          |               |          |                |
|---|-----------------------------------|---|--------------|----------------------|-------------------------|------------------|---------------------------|-------------------------|-------------------------|----------|---------------|----------|----------------|
| <b>Manufacturer's Name &amp; Address:</b> |                                   | <b>STANDARD QUALITY PLAN</b>                            |              |                      |                         |                  | <b>CUSTOMER :</b>         |                         |                         |          |               |          |                |
|   |                                   | <b>ITEM: WIRE ROPE TYPE ELECTRICAL HOISTS UP TO 15T</b> |              |                      | <b>SQP NO:</b>          |                  | <b>PROJECT :</b>          |                         |                         |          |               |          |                |
|   |                                   |   |              |                      | <b>REVISION</b>         | <b>00</b>        | <b>PACKAGE :</b>          |                         |                         |          |               |          |                |
|   |                                   |   |              |                      | <b>DATE</b>             | <b>June 2023</b> | <b>CONTRACTOR :</b>       |                         |                         |          |               |          |                |
| <b>SL. NO.</b>                            | <b>COMPONENT &amp; OPERATIONS</b> | <b>CHARACTERISTICS</b>                                  | <b>CLASS</b> | <b>TYPE OF CHECK</b> | <b>QUANTUM OF CHECK</b> |                  | <b>REFERENCE DOCUMENT</b> | <b>ACCEPTANCE NORMS</b> | <b>Format of RECORD</b> |          | <b>AGENCY</b> |          | <b>REMARKS</b> |
|   |                                   |   |              |                      | <b>M</b>                | <b>C/N</b>       |                           |                         |                         | <b>M</b> | <b>C</b>      | <b>N</b> |                |
| <b>1.</b>                                 | <b>2.</b>                         | <b>3.</b>   | <b>4.</b>    | <b>5.</b>            | <b>6.</b>               |                  | <b>7.</b>                 | <b>8.</b>               | <b>9.</b>               | <b>D</b> | <b>10.</b>    |          | <b>11.</b>     |

|     |   |   |          |                         |      |      |  |            |                   |   |     |   |   |  |
|-----|---|---|----------|-------------------------|------|------|--|------------|-------------------|---|-----|---|---|--|
|     |   | DPT TEST BEFORE & AFTER PROOF LOAD TEST                           | CRITICAL | NDT ON MACHINED SURFACE | 100% | 100% | ASTM E-165   | NO DEFECTS | IR                | √ | P   | V | V |  |
| B.2 | WIRE ROPES  | MAKE ,TYPE & IDENTIFICATION                                       | MAJOR    | VISUAL                  | 100% | 100% | AS PER APPROVED BOI LIST   |            | MTC               | √ | P   | V | V |  |
|     |   | DIMENSION, BRAKING STRENGTH, CONST.                               | MAJOR    | REVIEW                  | 100% | 100% | IS-2266 / APPROVED DRAWING/DATA SHEET  |            | MTC               | √ | P   | V | V |  |
| B.3 | PULLEY/SHEAVE   | CHEMICAL, MECHANICAL VISUAL DIMENSION                             | MAJOR    | REVIEW                  | 100% | 100% | APPROVED DRAWING/DATA SHEET/MFG STD  |            | MTC/IR/LAB REPORT | √ | P   | V | V | In the absence of correlated TC Lab testing shall be done. |
| B.4 | MOTOR<30 KW   | MAKE/TYPE/RATING, ROUTINE TEST                                    | MAJOR    | VISUAL, REVIEW          | 100% | 100% | APPROVED DRAWING/DATA SHEET/ AS PER APPROVED BOI LIST  |            | MTC               | √ | P   | V | V |  |
| B.5 | GEAR BOX  | MAKE / TYPE / RATING / REDUCTION RATIO/ BACKLASH & TOOTH CONTACT  | MAJOR    | VISUAL                  | 100% | 100% | APPROVED DRAWING/DATA SHEET/ AS PER APPROVED BOI LIST/ MFG STD                               |            | IR                | √ | P   | V | V |  |
|     |   | NO LOAD RUN TEST (NOISE LEVEL, TEMP.RISE, OIL LEAKAGE, VIBRATION) | MAJOR    | VISUAL                  | 100% | 100% | NOISE LEVEL < 85 db<br>TEMP. RISE= AMB+20 °C<br>NO OIL LEAKGE<br>APPROVED DRAWING/DATA SHEET |            | IR                | √ | P/V | V | V |  |
| B.6 | BRAKE   | MAKE / TYPE / RATING  | MAJOR    | VISUAL                  | 100% | 100% | APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST                                     |            | MTC/IR            | √ | P   | V | V |  |
|     |   | ROUTINE TEST  | MAJOR    | REVIEW                  | 100% | 100% |  |            | MTC               | √ | P   | V | V |  |
| B.7 | LIMIT SWITCH, RELAY, CONTACTOR, TRANSFORMER/ PUSH BUTTON /TERMINAL BLOCK, SELECTOR SWITCH, INDICATION LAMP /SFU | MAKE/TYPE/RATING  | MAJOR    | VISUAL                  | 100% | 100% | APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST                                     |            | IR                | √ | P   | V | V |  |
| B.8 | CABLES - LT POWER / CONTROL   | MAKE / TYPE / RATING  | MAJOR    | VISUAL                  | 100% | 100% | APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST                                     |            | MTC/IR            | √ | P   | V | V |  |
|     |   | ROUTINE TEST  | MAJOR    | REVIEW                  | 100% | 100% |  |            | MTC               | √ | V   | V | V |  |
| B.9 | VVVF DRIVE (AS APPLICABLE)  | MAKE / TYPE / RATING  | MAJOR    | VISUAL                  | 100% | 100% | APPROVED DRAWING / DATA SHEET /  |            | MTC/IR            | √ | P   | V | V |  |

|                                    |   |  |                 |
|------------------------------------|---|--|-----------------|
| <b>MANUFACTURE/ SUB-CONTRACOTR</b> | <b>BHEL</b>   | <b>LEGEND :</b>  | <b>CUSTOMER</b> |
|                                    |  | <b>'D' : RECORDS IDENTIFIED WITH TICK (√) SHALL BE ESSENTIALLY INCLUDED BY MANUFACTURER IN QA DOCUMENTATION</b><br><b>'M': MANUFACTURER/ SUBCONTRACTOR</b><br><b>'B': BHEL/ THIRD PARTY</b><br><b>'C': CUSTOMER</b><br><b>INDICATE 'P' PERFORM 'W' WITNESS AND 'V' DOCUMENT REVIEW</b> |                 |
| <b>STAMP &amp; SIGNATURE</b>       |   |  |                 |


|   |                                   |   |              |                      |                         |            |                           |                         |                         |          |               |                     |          |                |  |  |
|---|-----------------------------------|---|--------------|----------------------|-------------------------|------------|---------------------------|-------------------------|-------------------------|----------|---------------|---------------------|----------|----------------|--|--|
| <b>Manufacturer's Name &amp; Address:</b> |                                   | <b>STANDARD QUALITY PLAN</b>                            |              |                      |                         |            | <b>CUSTOMER :</b>         |                         |                         |          |               |                     |          |                |  |  |
|   |                                   | <b>ITEM: WIRE ROPE TYPE ELECTRICAL HOISTS UP TO 15T</b> |              |                      |                         |            | <b>SQP NO:</b>            |                         |                         |          |               | <b>PROJECT :</b>    |          |                |  |  |
|   |                                   |   |              |                      |                         |            | <b>REVISION</b>           |                         | <b>00</b>               |          |               | <b>PACKAGE :</b>    |          |                |  |  |
|   |                                   |   |              |                      |                         |            | <b>DATE</b>               |                         | <b>June 2023</b>        |          |               | <b>CONTRACTOR :</b> |          |                |  |  |
| <b>SL. NO.</b>                            | <b>COMPONENT &amp; OPERATIONS</b> | <b>CHARACTERISTICS</b>                                  | <b>CLASS</b> | <b>TYPE OF CHECK</b> | <b>QUANTUM OF CHECK</b> |            | <b>REFERENCE DOCUMENT</b> | <b>ACCEPTANCE NORMS</b> | <b>Format of RECORD</b> |          | <b>AGENCY</b> |                     |          | <b>REMARKS</b> |  |  |
|   |                                   |   |              |                      | <b>M</b>                | <b>C/N</b> |                           |                         |                         |          | <b>M</b>      | <b>C</b>            | <b>N</b> |                |  |  |
| <b>1.</b>                                 | <b>2.</b>                         | <b>3.</b>   | <b>4.</b>    | <b>5.</b>            | <b>6.</b>               |            | <b>7.</b>                 | <b>8.</b>               | <b>9.</b>               | <b>D</b> | <b>10.</b>    |                     |          | <b>11.</b>     |  |  |

|                                |   |  |          |                            |      |      |  |  |           |   |   |   |   |  |
|--------------------------------|---|--|----------|----------------------------|------|------|--|--|-----------|---|---|---|---|--|
| B.10                           | CONTROL PANEL & PANDENT STATION BOX                     | ROUTINE TEST   | MAJOR    | REVIEW                     | 100% | 100% | AS PER APPROVED BOI LIST                                 |  |           | √ | P | V | V |  |
|                                |   | MAKE/TYPE/RATING   | MAJOR    | VISUAL                     | 100% | 100% | APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST |  | IR        | √ | P | V | V |  |
|                                |   | SHEET /GLAND PLATE THICKNESS, PAINT SHADE, DFT, ADHESION | MAJOR    | VISUAL                     | 100% | 100% |  |  | IR        | √ | P | V | V |  |
| <b>C IN PROCESS INSPECTION</b> |   |  |          |                            |      |      |  |  |           |   |   |   |   |  |
| C.1                            | ROLLING & WELDING OF ROPE DRUM(IF FABRICATED)           | WPS, PQR & WPQ   | MAJOR    | REVIEW                     | 100% | 100% | AS PER ASME SEC-IX                                       |  | QW 481-84 | √ | P | V | V | REFER NOTE -2                                      |
|                                |   | ROLLING & WELD PREPARATION                               | MAJOR    | VISUAL & MEASURE           | 100% | 100% | AS PER DRAWING.  |  | IR        | √ | P | V | V |  |
|                                |   | NDT TEST ON WELD   | MAJOR    | DPT                        | 100% | 10%  | ASTM E 165   | ASME SECTION VIII DIV-1 APPENDIX-8 CL.NO.8.4 | IR        | √ | P | V | V |  |
|                                |   | RT OF BUTT WELD JOINTS(IF APPLICABLE)                    | CRITICAL | RT                         | 100% | 100% | ASME SEC-V   | ASME SEC-VIII, DIV-1                         | IR        | √ | P | V | V | RT FILM REVIEWED BY CLIENT DURING FINAL INSPECTION |
| C.2                            | ROPE DRUM , PULLEY & HOOK SHANK (AFTER FINAL MACHINING) | VISUAL & DIMENSION                                       | MAJOR    | VISUAL & MEASURE           | 100% | 100% | MANUFACTURE DRAWING                                      |  | IR        | √ | P | V | V |  |
|                                |   | NDT ON MACHINE SURFACE                                   | MAJOR    | DPT                        | 100% | 100% | ASTM E 165   | ASME SECTION VIII DIV-1 APPENDIX-8 CL.NO.8.4 | IR        | √ | P | V | V |  |
| C.3                            | TROLLEY STRUCTURE                                       | WELD SOUNDNESS DIMENSIONS                                | MAJOR    | DPT & VISUAL & MEASUREMENT | 100% | 100% | ASTM E 165   | ASME SECTION VIII DIV-1 APPENDIX-8 CL.NO.8.4 | IR        | √ | P | V | V |  |
| C.4                            | GEAR & PINIONS, WHEELS (AFTER FINAL MACHINING)          | NDT ON MACHINE SURFACE                                   | MAJOR    | DPT                        | 100% | 100% | ASTM E 165   | ASME SEC-VIII, DIV-1 APPEND.8 CL. 8.4        | IR        | √ | P | V | V |  |
| C.5                            | STRESS REVIEVING OF GEAR BOXES (IF FABRICATED)          | SR OF GEAR BOX CASING                                    | MAJOR    | SR>25mm Thick              | 100% | 100% | ASME SEC. VIII DIV I UCS 56                              | ASME SEC. VIII DIV I UCS 56                  | SR REPORT | √ | P | V | V |  |

|                                    |   |   |  |
|------------------------------------|---|---|--|
| <b>MANUFACTURE/ SUB-CONTRACOTR</b> | <b>BHEL</b>   | <b>LEGEND :</b>   | <b>CUSTOMER</b>  |
|                                    |  | <b>'D' : RECORDS IDENTIFIED WITH TICK (√) SHALL BE ESSENTIALLY INCLUDED BY MANUFACTURER IN QA DOCUMENTATION</b><br><b>'M' : MANUFACTURER/ SUBCONTRACTOR</b><br><b>'B' : BHEL/ THIRD PARTY</b><br><b>'C' : CUSTOMER</b><br><b>INDICATE 'P' PERFORM 'W' WITNESS AND 'V' DOCUMENT REVIEW</b> |  |
| <b>STAMP &amp; SIGNATURE</b>       |   |   | <b>NAME &amp; SIGN OF APPROVING AUTHORITY &amp; SEAL</b> |


| <b>Manufacturer's Name &amp; Address:</b> |                        | <b>STANDARD QUALITY PLAN</b>                            |       |               |                  |     | <b>CUSTOMER :</b>  |                  |                  |   |        |                     |   |         |  |  |
|---|------------------------|---|-------|---------------|------------------|-----|--------------------|------------------|------------------|---|--------|---------------------|---|---------|--|--|
|   |                        | <b>ITEM: WIRE ROPE TYPE ELECTRICAL HOISTS UP TO 15T</b> |       |               |                  |     | <b>SQP NO:</b>     |                  |                  |   |        | <b>PROJECT :</b>    |   |         |  |  |
|   |                        |   |       |               |                  |     | <b>REVISION</b>    |                  | <b>00</b>        |   |        | <b>PACKAGE :</b>    |   |         |  |  |
|   |                        |   |       |               |                  |     | <b>DATE</b>        |                  | <b>June 2023</b> |   |        | <b>CONTRACTOR :</b> |   |         |  |  |
| SL. NO.                                   | COMPONENT & OPERATIONS | CHARACTERISTICS   | CLASS | TYPE OF CHECK | QUANTUM OF CHECK |     | REFERENCE DOCUMENT | ACCEPTANCE NORMS | Format of RECORD |   | AGENCY |                     |   | REMARKS |  |  |
|   |                        |   |       |               | M                | C/N |                    |                  |                  | D | M      | C                   | N |         |  |  |
| 1.  | 2.                     | 3.  | 4.    | 5.            | 6.               |     | 7.                 | 8.               | 9.               | D | 10.    |                     |   | 11.     |  |  |

| D             | FINAL INSPECTION   |  |       |                      |      |      |  |    |   |   |   |   |               |  |
|---------------|--|--|-------|----------------------|------|------|--|----|---|---|---|---|---------------|--|
| D.1           | COMPLETE ASSEMBLED HOIST ALONG WITH ACTUAL CONTROL PANEL, VVFD & PUSH BUTTON (AS APPLICABLE)   | VISUAL & DIMENSION   | MAJOR | VISUAL & MEASURE     | 100% | 100% | IS:3938/ APPROVED DRAWING / DATA SHEET   | IR | √ | P | W | V |               |  |
|               | NO LOAD TEST & FULL LOAD TEST  | CURRENT DRAWN, SPEED OF HOIST ENCHING OPERATION, INTERLOCKING SEQUENCE OPEARTION | MAJOR | VISUAL & MEASURE     | 100% | 100% | IS:3938/ APPROVED DRAWING / DATA SHEET   | IR | √ | P | W | V |               |  |
|               | OVERLOAD TEST AT 125%  | HOLDING CAPACITY OF BRAKES   | MAJOR | VISUAL               | 100% | 100% | IS:3938/ APPROVED DRAWING / DATA SHEET   | IR | √ | P | W | V |               |  |
| D.2           | CONTROL PANEL  | VISUAL, MAKE, VERIFICATION & DIMENSION   | MAJOR | VISUAL & MEASURE     | 100% | 100% | IS:3938/ APPROVED DRAWING / DATA SHEET   | IR | √ | P | W | V |               |  |
|               |  | INGRESS PROTECTION BY PAPER INSERTION METHOD                                     | MAJOR | VISUAL               | 100% | 100% | IS:3938/ APPROVED DRAWING / DATA SHEET   | IR | √ | P | W | V |               |  |
|               |  | HV/IR  | MAJOR | MEASURE              | 100% | 100% | IS:3938/ APPROVED DRAWING / DATA SHEET   | IR | √ | P | W | V | REFER NOTE -4 |  |
|               |  | PAINT SHADE, DFT   | MAJOR | VISUAL & MEASURE     | 100% | 100% | IS:3938/ APPROVED DRAWING / DATA SHEET   | IR | √ | P | W | V |               |  |
| D.3           | PAINTING OF HOIST  | VISUAL,DFT, MEASUREMENT & PAINT SHADE  | MAJOR | VISUAL & MEASUREMENT | 100% | 100% | APPROVED DRAWING / DATA SHEET            | IR | √ | P | V | V |               |  |
| D.4           | PACKING  | PACKING SOUNDNESS  | MAJOR | VISUAL               | 100% | 100% | APPROVED DOCUMENT/ PACKING SPECIFICATION | IR | √ | P | V | V |               |  |
| <b>NOTES:</b> |  |  |       |                      |      |      |  |    |   |   |   |   |               |  |
| 1.            | BACK WALL ECHO SHALL BE SET AT 100% OF FULL SCREEN HEIGHT AT THE BAR USING NORMAL PROBE OF 2MHZ TO 4 MHZ. AT THIS SENSITIVITY LEVEL A DEFECT ECHO >20% FSH IS NOT ACCEPTABLE. ALSO LOSS OF BWE >20% IS NOT ACCEPTABLE. |  |       |                      |      |      |  |    |   |   |   |   |               |  |
| 2             | WPS, PQR & WELDER QUALIFIED BY BHEL/ CUSTOMER/ APPROVED TPIA ARE ACCEPTABLE.   |  |       |                      |      |      |  |    |   |   |   |   |               |  |

|                                    |   |  |                 |
|------------------------------------|---|--|-----------------|
| <b>MANUFACTURE/ SUB-CONTRACOTR</b> | <b>BHEL</b>   | <b>LEGEND :</b>  | <b>CUSTOMER</b> |
|                                    |  | <b>'D' : RECORDS IDENTIFIED WITH TICK (√) SHALL BE ESSENTIALLY INCLUDED BY MANUFACTURER IN QA DOCUMENTATION</b><br><b>'M': MANUFACTURER/ SUBCONTRACTOR</b><br><b>'B': BHEL/ THIRD PARTY</b><br><b>'C': CUSTOMER</b><br><b>INDICATE 'P' PERFORM 'W' WITNESS AND 'V' DOCUMENT REVIEW</b> |                 |
| <b>STAMP &amp; SIGNATURE</b>       |   |  |                 |

| <b>Manufacturer's Name &amp; Address:</b> |                        | <b>STANDARD QUALITY PLAN</b>                            |       |               |                  |           | <b>CUSTOMER :</b>  |                  |                  |   |        |   |   |         |
|---|------------------------|---|-------|---------------|------------------|-----------|--------------------|------------------|------------------|---|--------|---|---|---------|
|   |                        | <b>ITEM: WIRE ROPE TYPE ELECTRICAL HOISTS UP TO 15T</b> |       |               | SQP NO:          |           | PROJECT :          |                  |                  |   |        |   |   |         |
|   |                        |   |       |               | REVISION         | 00        | PACKAGE :          |                  |                  |   |        |   |   |         |
|   |                        |   |       |               | DATE             | June 2023 | CONTRACTOR :       |                  |                  |   |        |   |   |         |
| SL. NO.                                   | COMPONENT & OPERATIONS | CHARACTERISTICS   | CLASS | TYPE OF CHECK | QUANTUM OF CHECK |           | REFERENCE DOCUMENT | ACCEPTANCE NORMS | Format of RECORD |   | AGENCY |   |   | REMARKS |
|   |                        |   |       |               | M                | C/N       |                    |                  |                  | D | M      | C | N |         |
| 1.  | 2.                     | 3.  | 4.    | 5.            | 6.               |           | 7.                 | 8.               | 9.               | D | 10.    |   |   | 11.     |

|    |   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----|---|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 3. | <b>MOTOR POWER RATING LESS THAN 30KW:</b><br>ACCEPTANCE OF MOTOR LESS THAN 30KW 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 (IF SPECIFIED) REGARDING AMBIENT TEMPERATURE, 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." |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4. | HV TEST ON CONTROL PANELS WILL BE DONE ISOLATING VVVF DRIVE AND OTHER ELECTRONIC PARTS. HV TEST AT 2 KV FOR POWER & 1.5 KV FOR CONTROL CIRCUIT.   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5. | NDT (AS APLICABLE) AS PER CUSTOMER APPROVED MQP.  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6. | VENDOR TO FOLLOW STANDARD BOI LIST (doc no. PE-VL-MAX-563-A002) ENCLOSED IN SEPARATE SHEETS   |  |  |  |  |  |  |  |  |  |  |  |  |  |

|                                    |   |  |                 |
|------------------------------------|---|--|-----------------|
| <b>MANUFACTURE/ SUB-CONTRACTOR</b> | <b>BHEL</b>   | <b>LEGEND :</b>  | <b>CUSTOMER</b> |
|                                    |  | <b>'D' : RECORDS IDENTIFIED WITH TICK (✓) SHALL BE ESSENTIALLY INCLUDED BY MANUFACTURER IN QA DOCUMENTATION</b><br><b>'M': MANUFACTURER/ SUBCONTRACTOR</b><br><b>'B': BHEL/ THIRD PARTY</b><br><b>'C': CUSTOMER</b><br><b>INDICATE 'P' PERFORM 'W' WITNESS AND 'V' DOCUMENT REVIEW</b> |                 |
| <b>STAMP &amp; SIGNATURE</b>       |   |  |                 |



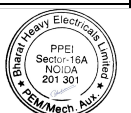
**ELECTRIC HOIST**  
**MAKES OF SUB VENDORS ITEMS**

SPECIFICATION NO. PE-VL-MAX-563-A002

Rev-0

June 2023

| SR. NO. | ITEM             | SUPPLIERS                                 | PLACE   | REMARKS              |
|---------|------------------|---|---------|----------------------|
| 1.      | STEEL            | SAIL                                      |         |                      |
|         |                  | TATA STEEL                                |         |                      |
|         |                  | JINDAL                                    |         |                      |
|         |                  | ARCELOR MITTAL NIPPON STEEL INDIA (ESSAR) |         |                      |
| 2.      | HOOKS            | STEEL FORGING & ENGG. CO.,                | KOLKATA |                      |
|         |                  | SMRITI FORGING                            | KOLKATA |                      |
|         |                  | 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                             |         |                      |
|         |                  | BHARAT WIRE ROPES                         |         |                      |
| 5.      | BEARINGS         | SKF                                       |         |                      |
|         |                  | FAG                                       |         |                      |
|         |                  | TATA                                      |         |                      |
|         |                  | NBC                                       |         |                      |
| 6.      | MOTORS           | SIEMENS                                   |         |                      |
|         |                  | NGEF (up to 15KW)                         |         |                      |
|         |                  | CROMPTON                                  |         |                      |
|         |                  | KIRLOSKAR                                 |         |                      |
|         |                  | BHARAT BIJLI                              |         |                      |
|         |                  | MARATHON                                  |         |                      |
|         |                  | ABB                                       |         |                      |
|         |                  | LHP                                       |         |                      |
| 7.      | BRAKES           | ELECTROMAG                                |         |                      |
|         |                  | SPEED-O- CONTROL                          |         |                      |
|         |                  | BCH                                       |         | FOR DCEM BRAKES ONLY |
|         |                  | KAKKU                                     |         |                      |
|         |                  | PETHE                                     |         |                      |
| 8.      | CONTACTOR        | SIEMENS                                   |         |                      |
|         |                  | L&T                                       |         |                      |
|         |                  | SCHNEIDER (Earlier TELE MECHANIQUE)       |         |                      |
|         |                  | BCH                                       |         |                      |
| 9.      | OVER LOAD RELAYS | SIEMENS                                   |         |                      |





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| SR. NO. | ITEM                    | SUPPLIERS                            | PLACE     | REMARKS |
|---------|-------------------------|--------------------------------------|-----------|---------|
|         |                         | 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                                  |           |         |
|         |                         | 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.     | CABLE LUGS (HEAVY DUTY) | DOWELLS                              |           |         |
|         |                         | UML ENGINEERS                        | KOLKATA   |         |
|         |                         | JAINSON                              |           |         |
| 16.     | PVC POWER CABLES        | APAR INDUSTRIES LTD.                 | MUMBAI    |         |
|         |                         | CORDS CABLE INDUSTRIES LTD.          | NEW DELHI |         |
|         |                         | DIAMOND POWER INFRASTRUCTURE LTD     | VADODARA  |         |
|         |                         | GOYOLENE FIBRES (INDIA) PVT.LTD      | MUMBAI    |         |





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| SR. NO. | ITEM               | SUPPLIERS                                  | PLACE             | REMARKS |
|---------|--------------------|--|-------------------|---------|
|         |                    | GOVIND CABLE INDUSTRIES                    | KOLKATA           |         |
|         |                    | GUPTA POWER INFRASTRUCTURE LIMITED         | BHUBNESWAR        |         |
|         |                    | HAVELLS INDIA LIMITED                      | NOIDA             |         |
|         |                    | KEI INDUSTRIES LTD.                        | NEW DELHI         |         |
|         |                    | KRISHNA ELECTRICAL INDUSTRIES LTD          | GWALIOR           |         |
|         |                    | KEC INTERNATIONAL LIMITED                  | MUMBAI            |         |
|         |                    | MANSFIELD CABLES COMPANY LTD.              | NOIDA             |         |
|         |                    | NICCO CORPORATION LTD.                     | KOLKATA           |         |
|         |                    | PARAMOUNT COMMUNICATIONS LTD.              | NEW DELHI         |         |
|         |                    | POLYCAB WIRES PVT. LTD.                    | MUMBAI            |         |
|         |                    | RADIANT CORPORATION PRIVATE LIMITED        | HYDERABAD         |         |
|         |                    | RAVIN CABLES LIMITED                       | MUMBAI            |         |
|         |                    | SUYOG ELECTRICALS LTD.                     | VADODARA          |         |
|         |                    | SRIRAM CABLES PVT. LTD.                    | NEW DELHI         |         |
|         |                    | SCOT INNOVATION WIRES AND CABLES PVT. LTD. | SOLAN             |         |
|         |                    | SAM CABLES & CONDUCTORS (P) LTD            | UDHAM SINGH NAGAR |         |
|         |                    | THERMO CABLES LTD                          | HYDERABAD         |         |
| 17.     | PVC CONTROL CABLES | ADVANCE CABLE TECHNOLOGIES (P) LTD         | BANGALORE         |         |
|         |                    | APAR INDUSTRIES LTD., CMI LTD              | MUMBAI            |         |
|         |                    | CMI LIMITED                                | FARIDABAD         |         |
|         |                    | CORDS CABLE INDUSTRIES LTD                 | NEW DELHI         |         |
|         |                    | CRYSTAL CABLE INDUSTRIES LTD               | KOLKATA           |         |
|         |                    | DELTON CABLES LTD                          | NEW DELHI         |         |
|         |                    | DIAMOND POWER INFRASTRUCTURE LTD           | VADODARA          |         |
|         |                    | ELKAY TELELINKS LTD                        | NEW DELHI         |         |
|         |                    | GEMSCAB INDUSTRIES LTD                     | NEW DELHI         |         |
|         |                    | GOVIND CABLE INDUSTRIES                    | KOLKATA           |         |
|         |                    | GUPTA POWER INFRASTRUCTURE LIMITED         | BHUBNESWAR        |         |
|         |                    | HAVELLS INDIA LIMITED                      | NOIDA             |         |





**ELECTRIC HOIST**  
**MAKES OF SUB VENDORS ITEMS**

SPECIFICATION NO. PE-VL-MAX-563-A002

Rev-0

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| SR. NO.              | ITEM              | SUPPLIERS                                 | PLACE             | REMARKS |
|----------------------|-------------------|---|-------------------|---------|
|                      |                   | INCOM CABLES (P) LTD                      | NEW DELHI         |         |
|                      |                   | KEI INDUSTRIES LTD                        | NEW DELHI         |         |
|                      |                   | KRISHNA ELECTRICAL INDUSTRIES LTD         | GWALIOR           |         |
|                      |                   | KEC INTERNATIONAL LIMITED                 | MUMBAI            |         |
|                      |                   | MANSFIELD CABLES COMPANY LTD              | NOIDA             |         |
|                      |                   | NICCO CORPORATION LTD                     | KOLKATA           |         |
|                      |                   | PARAMOUNT COMMUNICATIONS LTD              | NEW DELHI         |         |
|                      |                   | POLYCAB WIRES PVT. LTD                    | MUMBAI            |         |
|                      |                   | RAVIN CABLES LIMITED                      | MUMBAI            |         |
|                      |                   | SUYOG ELECTRICALS LTD                     | VADODARA          |         |
|                      |                   | SPECIAL CABLES PVT. LTD                   | NEW DELHI         |         |
|                      |                   | SCOT INNOVATION WIRES AND CABLES PVT. LTD | SOLAN             |         |
|                      |                   | SAM CABLES & CONDUCTORS (P) LTD           | UDHAM SINGH NAGAR |         |
|                      |                   | SPM POWER & TELECOM PVT. LTD              | HYDERABAD         |         |
|                      |                   | TORRENT CABLES LTD                        | AHMEDABAD         |         |
|                      |                   | THERMO CABLES LTD                         | HYDERABAD         |         |
|                      |                   | TIRUPATI PLASTOMATICS PVT. LTD            | JAIPUR            |         |
| UNIVERSAL CABLES LTD | SATNA             |   |                   |         |
| 18.                  | TRAILING CABLES   | NICCO                                     | KOLKATA           |         |
|                      |                   | UNIVERSAL                                 | SATNA             |         |
|                      |                   | INCAB                                     |                   |         |
|                      |                   | ICL                                       | NEW DELHI         |         |
|                      |                   | APAR INDUSTRIES LTD                       | MUMBAI            |         |
|                      |                   | CMI LTD                                   | FARIDABAD         |         |
|                      |                   | KEI INDUSTRIES LTD                        | NEW DELHI         |         |
|                      |                   | SUYOG ELECTRICALS LTD                     | VADODARA          |         |
| 19.                  | XLPE POWER CABLES | APAR INDUSTRIES LTD                       | MUMBAI            |         |
|                      |                   | CORDS CABLE INDUSTRIES LTD                | NEW DELHI         |         |
|                      |                   | CRYSTAL CABLE INDUSTRIES LTD              | KOLKATA           |         |
|                      |                   | DIAMOND POWER INFRASTRUCTURE LTD          | VADODARA          |         |
|                      |                   | GEMSCAB INDUSTRIES LTD                    | NEW DELHI         |         |
|                      |                   | GOVIND CABLE INDUSTRIES                   | KOLKATA           |         |





**ELECTRIC HOIST**  
**MAKES OF SUB VENDORS ITEMS**

SPECIFICATION NO. PE-VL-MAX-563-A002

Rev-0

June 2023

| SR. NO. | ITEM                | SUPPLIERS                                 | PLACE      | REMARKS |
|---------|---------------------|---|------------|---------|
|         |                     | GUPTA POWER INFRASTRUCTURE LIMITED        | BHUBNESWAR |         |
|         |                     | HAVELLS INDIA LIMITED                     | NOIDA      |         |
|         |                     | KEI INDUSTRIES LTD                        | NEW DELHI  |         |
|         |                     | KRISHNA ELECTRICAL INDUSTRIES LTD         | GWALIOR    |         |
|         |                     | KEC INTERNATIONAL LIMITED                 | MUMBAI     |         |
|         |                     | MANSFIELD CABLES COMPANY LTD              | NOIDA      |         |
|         |                     | PARAMOUNT COMMUNICATIONS LTD              | NEW DELHI  |         |
|         |                     | POLYCAB WIRES PVT. LTD                    | MUMBAI     |         |
|         |                     | RAVIN CABLES LIMITED                      | MUMBAI     |         |
|         |                     | SUYOG ELECTRICALS LTD                     | VADODARA   |         |
|         |                     | SPECIAL CABLES PVT. LTD                   | NEW DELHI  |         |
|         |                     | SCOT INNOVATION WIRES AND CABLES PVT. LTD | SOLAN      |         |
|         |                     | SRIRAM CABLES PVT. LTD                    | NEW DELHI  |         |
|         |                     | TORRENT CABLES LTD                        | AHMEDABAD  |         |
|         |                     | THERMO CABLES LTD                         | HYDERABAD  |         |
|         |                     | TIRUPATI PLASTOMATICS PVT. LTD            | JAIPUR     |         |
| 20.     | XLPE CONTROL CABLES | APAR INDUSTRIES LTD                       | MUMBAI     |         |
|         |                     | CABLE CORPORATION OF INDIA LTD            | MUMBAI     |         |
|         |                     | CRYSTAL CABLE INDUSTRIES LTD              | KOLKATA    |         |
|         |                     | DIAMOND POWER INFRASTRUCTURE LTD          | VADODARA   |         |
|         |                     | GEMSCAB INDUSTRIES LTD                    | NEW DELHI  |         |
|         |                     | HAVELLS INDIA LIMITED                     | NOIDA      |         |
|         |                     | KEI INDUSTRIES LTD                        | NEW DELHI  |         |
|         |                     | KRISHNA ELECTRICAL INDUSTRIES LTD         | GWALIOR    |         |
|         |                     | KEC INTERNATIONAL LIMITED                 | MUMBAI     |         |
|         |                     | PARAMOUNT COMMUNICATIONS LTD              | NEW DELHI  |         |
|         |                     | POLYCAB WIRES PVT. LTD                    | MUMBAI     |         |
|         |                     | RADIANT CORPORATION PRIVATE LIMITED       | HYDERABAD  |         |
|         |                     | RAVIN CABLES LIMITED                      | MUMBAI     |         |
|         |                     | SUYOG ELECTRICALS LTD                     | VADODARA   |         |
|         |                     | SRIRAM CABLES PVT. LTD                    | NEW DELHI  |         |





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| SR. NO. | ITEM                        | SUPPLIERS                            | PLACE     | REMARKS |
|---------|-----------------------------|--------------------------------------|-----------|---------|
|         |                             | TORRENT CABLES LTD                   | AHMEDABAD |         |
|         |                             | UNIVERSAL CABLES LTD                 | SATNA     |         |
| 21.     | CABLE GLAND                 | COMMET                               |           |         |
|         |                             | SUNIL&CO                             |           |         |
|         |                             | ARUP ENGINEERING                     |           |         |
|         |                             | JAINSON                              |           |         |
|         |                             | DOWELL                               |           |         |
| 22.     | PUSH BUTTONS                | SIEMENS                              |           |         |
|         |                             | L&T                                  |           |         |
|         |                             | BCH                                  |           |         |
|         |                             | SCHNEIDER                            |           |         |
| 23.     | LIMIT SWITCHES              | SPEED-O-CONTROL                      |           |         |
|         |                             | ELECTROMAG                           |           |         |
| 24.     | PENDENT PUSH BUTTON STATION | OEM                                  |           |         |
| 25.     | INDICATING LAMPS            | TECKNIC                              |           |         |
|         |                             | BCH                                  |           |         |
|         |                             | SIEMENS                              |           |         |
|         |                             | STANDARD                             |           |         |
| 26.     | MCB                         | MDS                                  |           |         |
|         |                             | INDO COPP                            |           |         |
|         |                             | STANDARD                             |           |         |
|         |                             | SIEMENS                              |           |         |
|         |                             | L&T                                  |           |         |
|         |                             | ABB                                  |           |         |
|         |                             | SCHNEIDER                            |           |         |
| 27.     | PANELS                      | OEM                                  |           |         |
|         |                             | RITTAL                               |           |         |
|         |                             | PYROTECH                             |           |         |
| 28.     | RESISTANCE BOXES            | ENAPROS                              |           |         |
|         |                             | OEM                                  |           |         |
|         |                             | SAFEX FIRE SERVICES LTD              |           |         |
|         |                             | UNITED FIRE EQUIPMENTS PVT. LTD      |           |         |
|         |                             | ZENITH FIRE SERVICES (INDIA) PVT LTD |           |         |
| 29.     | VVVF                        | YASKAWA                              |           |         |
|         |                             | ABB                                  |           |         |
|         |                             | SIEMENS                              |           |         |
|         |                             | SCHNIEDER                            |           |         |
|         |                             | FUJI ELECTRIC                        |           |         |
|         |                             | MITSUBISHI ELECTRIC                  |           |         |





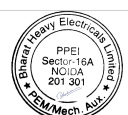
**ELECTRIC HOIST**  
**MAKES OF SUB VENDORS ITEMS**

SPECIFICATION NO. PE-VL-MAX-563-A002

Rev-0

June 2023

| SR. NO. | ITEM         | SUPPLIERS                           | PLACE | REMARKS                               |
|---------|--------------|-------------------------------------|-------|---------------------------------------|
|         |              | CG POWER & INDUSTRIAL SOLUTIONS LTD |       |                                       |
| 30.     | SHROUDED DSL | SUSHEEL                             |       |                                       |
|         |              | STROMAG                             |       |                                       |
| 31.     | LOAD CELL    | IPA                                 |       |                                       |
|         |              | SARTORIUS                           |       |                                       |
| 32.     | GEAR BOX     | OEM                                 |       | * = Applicable for Geared Motors only |
|         |              | ELECON ENGINEERS                    |       |                                       |
|         |              | SHANTI GEARS                        |       |                                       |
|         |              | PBL*                                |       |                                       |
|         |              | NAW*                                |       |                                       |
|         |              | NORD*                               |       |                                       |
|         |              | SEW*                                |       |                                       |
|         |              | BONGFILIOLI*                        |       |                                       |





**TECHNICAL SPECIFICATION FOR**  
**ELECTRIC HOIST**  
**4X270 MW BHADRADRI TPS- FGD**

SPECIFICATION NO. PE-TS-440-563-A002

VOLUME II - B

SECTION -I

REV 00

DATE MAY 2023

**CUSTOMER SPECIFICATION**

## **CONTENT**

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| 2.00.00           | RESPONSIBILITY FOR DESIGN                              |
| 3.00.00           | NAME PLATES (RATING PLATES)                            |
| 4.00.00           | SAFETY AND SECURITY                                    |
| 5.00.00           | GUARDS   |
| 6.00.00           | LOCATION AND LAYOUT REQUIREMENTS                       |
| 7.00.00           | OPERATION, MAINTENANCE AND AVAILABILITY CONSIDERATIONS |
| 8.00.00           | MATERIALS  |
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| 12.00.00          | PLANT LIFE AND MODE OF OPERATION                       |
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| 14.00.00          | PROTECTION   |
| 15.00.00          | ENVIRONMENT PROTECTION AND NOISE LEVEL REQUIREMENT     |
| 16.00.00          | INSPECTION AND TESTING                                 |
| 17.00.00          | TRAINING OF OWNER'S PERSONNEL                          |
| 18.00.00          | DEVIATIONS   |
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| ANNEXURE-I        | LIST OF STANDARDS FOR REFERENCE                        |
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## **GENERAL TECHNICAL REQUIREMENTS**

### **1.00.00 CODES AND STANDARDS**

1.01.00 Except where otherwise specified, the Plant shall comply with the appropriate Indian Standard or an agreed internationally accepted Standard Specification as listed in the annexure to this Section and mentioned in detailed specifications, each incorporating the latest revisions at the time of tendering. Where no internationally accepted standard is applicable, the Bidder shall give all particulars and details as necessary; to enable the Owner to identify all of the Plant in the same detail as would be possible had there been a Standard Specification.

1.02.00 Where the Bidder proposes alternative codes or standards he shall include in his tender one copy (in English) of each Standard Specification to which materials offered shall comply. In such case, the adopted alternative standard shall be equivalent or superior to the standards mentioned in the specification.

1.03.00 The plant will be designed in compliance with applicable National and International Codes and Standards such as ASME, ASTM, DIN, BS, IEC, IEEE, IS, etc. Wherever specified or required the Plant shall conform to various statutory regulations such as Indian Boiler Regulations, Indian Explosives Act, Indian Factories Act, Indian Electricity Act, Environmental Regulations, etc. Wherever required, approval for the plant supplied under the specification from statutory authorities shall be the responsibility of the Contractor.

1.04.00 In the event of any conflict between the codes and standards referred above, and the requirements of this specification, the requirements, which are more stringent, shall govern.

1.05.00 In case of any change of code, standards and regulations between the date of purchase order and the date the Contractor proceeds with manufacturing the Owner shall have the option to incorporate the changed requirements. It shall be the responsibility of the Contractor to advise Owner of the resulting effect.

1.06.00 Successful Bidder to furnish two (2) sets of latest of national/inter-national codes and standards to owner.

### **2.00.00 RESPONSIBILITY FOR DESIGN**

2.01.00 The Contractor shall assume full responsibility for the design of the whole and every portion of the Plant, whether or not the design work was undertaken specifically in relation to the Contract and whether or not the Contractor was directly involved in the design work.

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- 2.02.00 Notwithstanding the Owner's wish to receive the benefits of new, advanced and improved technologies, a prime requirement is that all the systems and components proposed shall have been already adequately developed and shall have demonstrated good reliability under similar, or more arduous conditions elsewhere, at least for continuous 2 years in two different power station.
- 2.03.00 The successful bidder shall have to carry out surge analysis, BFP transient analysis and other transient condition studies as may be necessary and as required by the Owner as per proven engineering practice.
- 2.04.00 The Bid shall include a detailed discussion on the development status of, and the reasons for any changes made in proposed systems or components for the Plant, as compared with similar items previously supplied in other installations cited by the bidder as reference plants.
- 2.05.00 The Bidder may also make alternate offers, provided such offers are superior in his opinion in which case adequate technical information, operating feed back, etc. are to be enclosed with the offer, to enable the Owner to assess the superiority and reliability of the alternatives offered. In case of each alternative offer, its implications on the performance, guaranteed efficiency, auxiliary power consumptions, etc. shall be clearly brought out to the Owner to make an overall assessment. In any case, the base offer shall necessarily be in line with the specifications i.e. Base offer shall be as per the technical specifications and the same will be considered for techno-commercial evaluation.
- 3.00.00 **NAME PLATES (RATING PLATES)**
- 3.01.00 Instruction plates, name plates or labels shall be permanently attached to each main and auxiliary item of plant in a conspicuous position. These plates shall be engraved with the identifying name, type and manufacturers serial number, together with the loading conditions under which the item of plant has been designed to operate.
- 3.02.00 Items such as valves, etc. which are subject to hand operation, shall be provided with nameplates so constructed as to remain clearly legible throughout the life of the plant giving due consideration to the difficult climatic conditions to be encountered. Nameplates shall be securely mounted where they will not be obscured in service by insulation, cladding, actuators or other equipment. Direction of flow is also to be engraved.
- 3.03.00 All trade nameplates and labels shall be in English language. All measurements shall be in M.K.S. Units.
- 3.04.00 The size and location of nameplates shall be subject to Approval of the Engineer.
- 4.00.00 **SAFETY AND SECURITY**
- 4.01.00 The design shall incorporate every reasonable precaution and provision for the safety of all personnel and for the safety and security of all persons and

property. The design shall comply with all appropriate statutory regulations relating to safety. All structures and equipment shall be designed and constructed to withstand every foreseeable static and dynamic loading condition, including loading under earthquake conditions, with an adequate margin of safety.

4.02.00 Ready and safe access with clear head room shall be provided to all parts of the plant for operation, inspection, cleaning and maintenance.

4.03.00 Escape routes and clear ways shall be provided to allow speedy evacuation of the plant in the event of fire or explosion, and the plant layout shall allow for ease of access to all parts of the Works by rescue and fire fighting teams. The plant layout shall be designed to localise and minimise the effects of any fire or explosion. The recommendations of NFPA, OSHA, and TAC etc. as necessary shall be followed in all respects.

4.04.00 The use of corrosive, explosive, toxic or otherwise hazardous materials shall be kept to a minimum during construction and the design of the plant shall minimise the requirement for such materials during operation and maintenance. Where such materials must be used, all necessary precautions shall be taken in the design, manufacture and layout of equipment to minimise the resulting hazard, and all equipment necessary for the protection and first-aid treatment of personnel in the event of accidents shall be provided. Particular attention is drawn to avoid the use of materials containing asbestos in any form.

5.00.00 **GUARDS**

5.01.00 Effective guards and fences must be provided to prevent injury to operators through accident or malpractice.

5.02.00 Mesh guards which allow visual inspection of equipment with the guard in place are generally preferable. The guards shall be constructed of mesh attached to a rigid framework of mild steel rod, tube, or angle and the whole galvanised to prevent loss of strength by rusting or corrosion. The guards shall be designed to facilitate removal and replacement during maintenance.

5.03.00 All drive belts, couplings, gears, sharp metallic edges and chains must be safely guarded. Any lubricating nipple requiring attention during normal running must be positioned where they can be reached without moving the guards.

5.04.00 Guards for couplings and rotating shafts shall be in accordance with BS 5304-1975 or similar approved standard. All rotating shafts and parts of shafts must be covered.

5.05.00 Suitable fencing shall be provided to enclose all openings or doorways used for the hoisting and lowering of machinery etc. This fencing must be securely fixed but quickly detachable when required. A secure hand hold must be provided on each side of the opening or doorway.

**LOCATION AND LAYOUT REQUIREMENTS**

The majority of plant and equipment (excluding steam generator and some other auxiliaries) shall all be of indoor installation. A broad list of buildings housing such equipment is given elsewhere in this specification. Layout should facilitate access for operation-maintenance and inspection of any one or more equipment/components at a time without disturbing the operation or installation of rest of the plant. Further, Bidder should comply with the criteria given under the various equipment and system specifications as well as those stipulated in Annexure-II attached to this section.

Enclosed General Layout and other tender layout drawings show the location of major installations and auxiliary buildings. The Bidder shall try to retain these locations as far as practicable. The layout of equipment within the power house as shown in the tender drawings is indicative. The Bidder may, subject to Owner's approval alter the same to suit the space requirement of the equipment offered.

Bidder may give as an alternative his own preferred layout clearly indicating the advantages and other implications, if any. Such alternative will not be considered for evaluating the bid, but may be considered with the successful Bidder if Owner/Engineer finds the proposal more attractive in terms of techno-economic consideration.

While developing the layout of buildings the following criteria shall be given effect :

- a) The minimum width of clear access corridors around equipment shall be 1.2 meter.
- b) Each building shall have an identified vacant space for equipment unloading and maintenance and preferably a separate bay altogether in buildings housing heavy equipment. Provision for handling equipment by monorail hoist and/or overhead crane shall be made as specified.
- c) The minimum clear height available between two consecutive floor slabs shall not be less than five (5) meters. A clear head room of 2.5m shall be maintained between the floor and any overhead piping/ cables or other obstruction. Adequate provision for natural ventilation and illumination shall be made as per good engineering practices.
- d) There shall be at least two (2) nos. main access doors, one on either side of each building, of which one shall be minimum 3 meters wide with rolling shutters for equipment entry. For multistoried buildings, at least two (2) nos. regular staircases diagonally opposite to each other shall be provided connecting all the floors and roof. These minimum requirements shall be augmented as required depending on the floor area, statutory requirements and TAC recommendations.
- e) All buildings shall have provision for toilet and associated effluent discharge system together with facility for drinking water. The criteria for ventilation, fire protection and illumination of building spaces specified

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elsewhere in this specification shall be complied with.

- f) All rail/road crossings for pipe/cable racks shall be done with minimum 8 meters headroom from top of rail/road to bottom of rack. Similarly top cover over underground pipes/cables shall be minimum one (1) meter. For other detail refer to Annexure-II.
- g) Cubicle for operating personnel shall be located at safe place near the equipment.
- h) Interplant cable routing will be on overhead cable trays on pipe cum cable trestle or on cable trestle except where approved by purchaser/consultant. In exceptional case, small stretch of outdoor run of interplant cable routing may be taken through cable trench only with the Employer's prior approval.
- i) Concept of various mechanical and electrical equipment location and building dimensions (including column-row spacing) as shown in Plot Plan/Floor Plan drawing are to be adhered to. Any departure from this suggestive layout is primarily not recommended.

**7.00.00 OPERATION, MAINTENANCE & AVAILABILITY CONSIDERATIONS**

7.01.00 Equipment/works offered shall be designed for high availability, high reliability, low maintenance and ease of operation & maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability, availability, operability and ease of maintenance. He shall also furnish details of availability records in plants stated in his experience list.

7.02.00 Ample space for ease of operation and maintenance including equipment removal, tube bundle/cartridge/rotor pulling etc. shall be provided. All valves, gates, dampers and other devices shall be located and oriented in such a way that they are accessible from operating floor levels. Where this cannot be adhered to, platforms and walkways with access ladders shall be provided to facilitate operation and maintenance.

7.03.0 Motorised lifting devices, i.e. hoists, chain pulleys, jacks, etc. shall be provided for handling and carrying out maintenance of any equipment and/or part having weight in excess of 2000 Kg. Suitable beams, hooks etc. for this purpose shall be provided in the buildings.

No lifting arrangement is necessary for part having weight less than 500 Kg. Hoist shall be well protected by environment. Suitable painting and coating covering hoist at outdoor shall be provided.

Lifting devices like lifting tackles, slings, etc. to be connected to hook of the hoist/crane shall be provided by the Bidder for lifting the equipment, accessories covered under this specification.

7.04.00 All similar parts of the equipment shall be made to gauge and shall be interchangeable with and shall be made of same material and workmanship as the corresponding parts of the equipment. Where feasible common

components shall be employed in different pieces of equipment in order to optimize the spares inventory and utilization.

8.00.00      **MATERIALS**

8.01.00      In selecting materials of construction of equipment, the Contractor shall pay particular attention to the atmospheric conditions existing at the Site and the nature of material/fluid handled. Wherever deviations are taken in respect of materials specified, the reasons shall be spelt out clearly in the proposal.

All materials shall be new, and shall be of the quality most suited to the proposed application.

8.02.00      In as far as is possible; materials shall be in accordance with Indian or international standard specifications and shall be used in accordance with Indian or international codes of practice. Where such standards or codes of practice are not available sufficient information shall be provided to allow the Owner to assess the suitability of the material for the particular application.

All materials used shall have performed lengthy satisfactory service in similar or more arduous conditions to those proposed by the Contractor.

8.03.00      All parts which could deteriorate or corrode under the influence of the atmospheric, meteorological or soil conditions at the Site, or under the influence of the working conditions shall be suitably and effectively protected so that such deterioration or corrosion is a minimum over the life of the plant.

9.00.00      **LUBRICATION**

9.01.00      Provision shall be made for suitable efficient lubrication where necessary to ensure smooth operation free from undue wear.

9.02.00      Non ferrous capillary tubing shall be used throughout.

9.03.00      Gear boxes and oil baths shall be provided with filling and drain plugs, both of adequate size. An approved means of oil indication including level switches and temperature indication shall be provided.

9.04.00      All high speed gears shall be oil bath lubricated. Low speed gears shall be lubricated by means of soft grease. Removable and accessible drip pans shall be provided to collect lubricant which may drop from operating parts.

9.05.00      All lubrication points shall be conveniently situated for maintenance purposes. It must be possible to carry out lubrication from a gangway or landing and without the removal of guarding or having to insert the hand into it. Where accessibility to a bearing for oiling purposes would be difficult a method of remote lubrication shall be fitted.

9.06.00      The Contractor shall supply grease gun equipment suitable to service each type of nipple fitted.

10.00.00 **LUBRICANTS AND CONTROL FLUIDS**

10.01.00 The Contractor shall provide a detailed and comprehensive specification for all lubricating oils, greases and control fluids required for the entire plant. A sufficient supply of these shall be provided by the Contractor for initial commissioning, first fill and till COD of the unit.

10.02.00 The Contractor shall supply a detailed schedule giving the lubricant testing, cleaning and replacement procedures. All equipment and facilities necessary for the testing, cleaning and changing of lubricants and control fluids shall be provided. The Contractor shall endeavor to reduce the varieties and grades of required lubricants and control fluids to a minimum, matching them where possible to those already in use in the generating station in order to simplify procurement and minimise storage requirements. All lubricants and control fluids shall be of internationally recognised standards and shall be easily obtainable from a large number of Indian suppliers. Bidder shall also indicate the equivalent Indian Standard for the above for easy procurement in future.

10.03.00 No lubricant or control fluid shall have toxic or other harmful effects on personnel or on the environment.

11.00.00 **OPERATION AND MAINTENANCE**

11.01.00 The plant shall be designed and constructed so that operation and maintenance manpower requirements are minimised.

The design and layout shall facilitate inspection, cleaning, maintenance and repair. The importance of continuity of operation is second only to that of safety.

11.02.00 Spare parts for equipment shall be interchangeable with the original components and, so far as possible, be of common design and manufacture.

11.03.00 All similar standard components/parts of similar standard equipment provided shall be interchangeable with one another. Further identical equipments shall be provided for similar duties so that the same are interchangeable with one another in totality and component wise.

11.04.00 All heavy parts (500 Kg and above) must be provided with a convenient arrangement for slinging and handling during erection and overhaul. Any item of plant normally stripped or lifted during periods of maintenance and weighing one tonne or above, shall be clearly marked with its weight.

11.05.00 On completion of commissioning, a complete set of tools for the maintenance of the entire plant shall be provided by the Contractor. This shall include all necessary spanners, special wrenches, extraction equipment and any special tools reasonably required by the Engineer. Tools used during erection and commissioning shall not be accepted except with the specific approval of the Engineer.

11.06.00 All equipment and major valves should be provided with adequate maintenance approach and facility.

12.00.00

## **PLANT LIFE AND MODE OF OPERATION**

The complete plant including all the equipment and systems individually and collectively shall be designed for continuous operation for an economic service life of thirty (30) years under the prevailing site conditions and for the type of duty intended.

The critical components of the Steam Generator, Turbine-Generator and Auxiliary equipment, the life of which is limited by time and temperature dependent mechanisms such as thermal stress, creep and low cycle fatigue, are to be designed considering expected (hot, warm and cold) start-up, shut-down and cyclic load variations.

The allowable stresses shall be reduced so that life expectancy to minimum 2,00,000 hours of operation can be achieved. The Bidder shall discuss this aspect in his technical proposal.

The unit would be operated on base load with cyclic load variation. The load variation is expected to be as per schedule depending on power demand.

The expected start-ups should be considered as minimum  
(Based on HPT metal temperature)

|   |   |              |
|---|---|--------------|
| Cold start-up ( >72 hrs. shutdown)                | : | 6 per year   |
| Warm start-up (between 10 to 72 hrs. of shutdown) | : | 40 per year  |
| Hot start-up (less than 10 hrs. shutdown)         | : | 160 per year |

13.00.00

## **PACKAGING & MARKING**

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. While packing all the materials, the limitations from the point of view of availability of railway wagon sizes in India should be taken account of. The details of various wagons normally available with Indian Railways for transportation of heavy equipment shall be considered by the Bidder. The Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.

As per the information available, the dimensions of OD consignment for transportation of the equipment by rail (if any equipment to be handled through rail transportation) are as below :

- |    |   |   |             |
|----|---|---|-------------|
| a) | Width of the Package<br>(from centre-line of rails<br>- 1.6 metres on both sides) | : | 3.2 Meters  |
| b) | Height of the package from rail top   | : | 4.47 Meters |

The above indicates the dimensions which can be normally transported on the

wagons without infringement of the "moving gauge". This is however not indicative of the consignment which can be carried out with infringement of "moving gauge" duly authorised and approved by the Indian Railways. There may be difference between the "moving gauge" and the "fixed structure gauge" and consignments infringing the "moving gauge" can be moved after investigation regarding possible infringement with the fixed structures. As the critical fixed structures in each route are different, consignments infringing moving dimensions have to be individually investigated to select a route and also determine the restrictions under which such movement is to be carried out. Such routes selected or other mode of transport envisaged is to be clearly brought out in the proposal wherever transport of over dimensional equipment is involved.

Bidder to consider unloading of material delivered through rail transportation, at near by railway station/ site unloading siding. The subsequent transportation up to project work place shall be considered by road only. All unloading and handling equipment both at railway station siding and at project site shall be arranged by the Bidder. Necessary arrangement to be organized with the railway authority for such purpose shall also be under the scope of services of the Bidder. Bidder may consider entire material delivered up to site through rail transportation only.

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. Each package shall be accompanied by a packing note (in weather proof paper) 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.

For imported equipment and material, suitable port facilities may be used in which case material may be transported from the port by tractor-trailer. Bidder may consider this aspect.

14.00.00

## **PROTECTION**

Equipment having antifriction or sleeve bearings shall be protected by weather-tight enclosures. Coated surfaces shall be protected against impact, abrasion, discoloration and other damages. Surfaces that are damaged shall be repainted.

Electrical equipment, controls and insulations shall be protected against moisture and water damages. All external gasket surfaces and flange faces, couplings, rotating equipment shafts, bearings and like items shall be thoroughly cleaned and coated with rust preventive compound as specified above and protected with suitable wood, metal or other substantial type covering to ensure their full protection. All exposed threaded parts shall be greased and protected with metallic or other substantial type protectors.

All piping, tubing and conduit connections on equipment and other equipment openings shall be closed with rough usage covers or plugs. Female threaded openings shall be closed with rough usage covers or forged steel plugs. The closures shall be taped to seal the interior of the equipment. Open ends of

pipng, tubing and conduit shall be sealed and taped.

Returnable containers and special shipping devices shall be returned by the manufacturer's field representative at the Contractor's expense.

15.00.00 **ENVIRONMENT PROTECTION AND NOISE LEVEL REQUIREMENT**

15.01.00 **Environment Protection**

The plant shall be designed for installation and operation in harmony with the surrounding environment and all measures of pollution control shall be ensured by the Bidder to restrict pollution from the liquid effluent and stack emission within the limits as given below with due consideration of Environment (Protection) Rules 1986 as amended till date.

In case the Ministry of Environment & Forest stipulate any other conditions not specified hereunder while clearing the project shall be complied with the plant by the contractor.

15.01.01 For Liquid Effluent

- a) Provision laid down in schedule-I for Thermal Power Plants and also in Schedule-VI. General Standards for discharge of Environmental pollutants Part-A : Effects of Environmental (protection) Rules 1986, as amended till date.
- b) Any specific requirement of State Pollution Authorities over and above the above stipulation.

15.01.02 For Air Emission

- a) Suspended Particulate Matter i.e. dust burden at chimney outlet - Maximum 50 mg/Nm<sup>3</sup> (with worst coal and one field out at TMCR).
- b) NO<sub>x</sub> - 365 ppm Max. or 750 mg/Nm<sup>3</sup> (Equivalent NO<sub>2</sub>).
- c) SO<sub>2</sub> - Concentration based standard 2000 mg/Nm<sup>3</sup>. Load based standard 0.2 metric tonne /MWe/day (for first 500 MW and 0.1 metric tonne/MWe/day for rest of the capacity above 500 MW)

In absence of Indian Standard for emission from power plants as on date, for certain gaseous effluents, the internationally accepted World Bank Standard is to be followed. Indian Standard for emission of power plants are under formulation. Should this standard is published before finalisation of the contract, the bidder has to comply the more stringent of the above norm or the new Indian Standard.

The bidder shall include in his scope all necessary equipment and measuring instruments to comply with above requirements. Location and accessibility of the instruments shall be properly coordinated.

15.02.00 **Noise Level Requirement**

The plant will be designed, constructed and provided with suitable acoustic measures to ensure the noise level criteria as per the following stipulations.

- a) Maximum noise level shall not exceed 85 dB (A) when measured at 1.0M away from the noise emission source.
- b) Maximum noise level from its source within the premises shall not exceed 70 dB (A) as per Environment (Protection) Rules 1986, Schedule-III, 'Ambient Air Quality Standards' in respect of noise.
- c) Any statutory changes in stipulations regarding noise limitation that may occur in future according to State Pollution Control Board or Central pollution Control Board or Ministry of Environment & Forest regulation during tenure of the contract, the contractor shall comply with the requirement.

An exception will be made for the plant at startup operations and other big pressure reducing devices operating during emergency periods and for the safety valves.

16.00.00 **INSPECTION AND TESTING**

16.01.00 **Inspection and Tests during Manufacture**

16.01.01 The method and techniques to be used by the Contractor for the control of quality during manufacture of all plant and equipment shall be agreed with the Owner prior to the Award of Contract.

16.01.02 The Owner's general requirements with respect to quality control and the required shop tests are set out elsewhere in this specification.

16.01.03 Before any item of plant or equipment leaves its place of manufacture the Owner shall be given the option of witnessing inspections and tests for compliance with the specification and related standards.

16.01.04 Advance notice shall be given to the Owner as agreed in the Contract, prior to the stage of manufacture being reached, and the piece of plant must be held at this stage until the Owner has inspected the piece, or has advised in writing that inspection is waived. If having consulted the Owner and given reasonable notice in writing of the date on which the piece of plant will be available for inspection, the Owner does not attend the Contractor may proceed with manufacture having forwarded to the Owner duly certified copies of his own inspection and test results.

The Contractor shall forthwith forward to the engineer duly certified copies of the Test Certificates in six copies (one to the Purchaser and five to the Consulting Engineer) for approval. Distribution of six (6) copies of Test Certificates for approval will be two(2) copies to owner and four(4) copies to consultant. These four(4) copies will be further distributed by consultant after approval to owner, site and bidder. One copy will be retained with the

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consultant for record purpose.

Further, nine (9) copies of Shop Test Certificates shall be bound with Instruction Manuals referred to elsewhere. Distribution of nine (9) copies of Shop Test Certificates for approval will be Two (2) copies to owner, Three (3) copies to site, Two (2) copies to consultant, Two (2) copies to owner's library / record.

16.01.05 Under no circumstances any repair or welding of castings be carried out without the consent of the Owner's Engineer. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Engineer along with Defect Map.

16.01.06 All the individual and assembled rotating parts shall be statically and dynamically balanced in the works.

Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Contractor shall allow for trial assembly prior to despatch from place of manufacture.

16.01.07 All materials used for the manufacture of equipment covered under this specification shall be of tested quality. Relevant test certificates shall be made available to the Purchaser. The certificates shall include tests for mechanical properties and chemical analysis of representative material or any other test as required by approved QAP/ Material specification.

16.01.08 All pressure parts connected to pumping main shall be subjected to hydraulic testing at a pressure of 150% of shut-off head for a period not less than one hour. Other parts shall be tested for one and half times the maximum operating pressure or as required by design code of that part, for a period not less than one hour.

16.01.09 All necessary non-destructive examinations shall be performed to meet the applicable code requirements.

16.01.10 All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination magniflux and ultrasonic testing shall be employed wherever necessary/recommended by the applicable code. At least 10% of all major butt welding joints shall be radiographed.

16.01.11 Statutory payments in respect of IBR approvals including inspection for design and manufacturer of equipment shall be made by the Bidder. All payment for erection and testing at site (i.e. under IBR jurisdiction) shall also be made by the Bidder. In such case Contractor's scope shall also be extended to preparation of all necessary documents, co-ordination and follow-up with IBR authorities for above approval.

16.02.00 **Performance Tests at Site**

## ANNEXURE-I

### LIST OF STANDARDS FOR REFERENCE

- a) International Standards Organisation (ISO).
- b) International Electro-technical Commission (IEC).
- c) American Society of Mechanical Engineers (ASME).
- d) American National Standards Institute (ANSI).
- e) American Society for Testing and Materials (ASTM).
- f) American Institute of Steel Construction (AISC).
- g) American Welding Society (AWS).
- h) Architecture Institute of Japan (AIJ).
- i) National Fire Protection Association (NFPA).
- j) National Electrical Manufacturer's Association (NEMA).
- k) Japanese Electro-technical Committee (JEC).
- l) Institute of Electrical and Electronics Engineers (IEEE).
- m) Federal Occupational Safety and Health Regulations (OSHA).
- n) Instrument Society of America (ISA).
- o) National Electric Code (NEC).
- p) Heat Exchanger Institute (HEI).
- q) Tubular Exchanger Manufacturer's Association (TEMA).
- r) Hydraulic Institute (HIS).
- s) International Electro-Technical Commission (IEC) Publications.
- t) Power Test Code for Steam Turbines (PTC).
- u) Applicable German Standards (DIN).
- v) Applicable British Standards (BS).
- w) Applicable Japanese Standards (JIS).

- x) Electric Power Research Institute (EPRI).
- y) Standards of Manufacturer's Standardization Society (MSS).
- z) Bureau of Indian Standards Institution (BIS).
- aa) Indian Electricity Rules.
- bb) Indian Boiler Regulations (IBR).
- cc) Indian Explosives Act.
- dd) Indian Factories Act.
- ee) Tariff Advisory Committee (TAC) rules.
- ff) Emission regulation of Central Pollution Control Board (CPCB).
- gg) Pollution Control regulations of Dept. of Environment, Govt. of India
- hh) Central Board of Irrigation and Power (CBIP) Publications.
- ii) The Air Prevention and Control of Pollution Act.
- jj) The Environmental Protection Act
- kk) The Public Liability Insurance Act.
- ll) The Forest Conservation Act
- mm) The Wildlife protection Act.
- nn) The EIA Notification, 1994.
- oo) IS: 14665-Specification for Electric Traction Lift
- pp) Any other statutory Codes/Standards/Regulations

# **QUALITY ASSURANCE REQUIREMENTS**

## CONTENT

| <b>CLAUSE NO.</b>  | <b>DESCRIPTION</b>                            |
|--------------------|---|
| 1.00.00            | QUALITY ASSURANCE PROGRAMME                   |
| 2.00.00            | GENERAL REQUIREMENTS QUALITY ASSURANCE        |
| 3.00.00            | QUALITY ASSURANCE DOCUMENTS                   |
| 4.00.00            | INSPECTION, TESTING & INSPECTION CERTIFICATES |
| <b>ATTACHMENTS</b> |   |
| ANNEXURE-I         | FORMAT OF QUALITY ASSURANCE PROGRAMME         |
| ANNEXURE-II        | FIELD WELDING SCHEDULE                        |

## QUALITY ASSURANCE REQUIREMENTS

### 1.00.00 QUALITY ASSURANCE PROGRAMME

1.01.00 To ensure that the equipment and services under the scope of Contract whether manufactured or performed within the Contractor's works or at his Sub-contractor's premises or at the Owner's site or at any other place or work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Owner/Authorised representative after discussions before the award of contract. A quality assurance programme of the Contractor shall generally cover the following :

- a) His organisation structure for the management and implementation of the proposed quality assurance programme.
- b) Documentation control system.
- c) Qualification data for Bidder's key personnel.
- d) The procedure for purchase of materials, parts, components and selection of Sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.
- e) System for shop manufacturing and site erection control including process controls and fabrication and assembly controls.
- f) Control of non-conforming items and system for corrective actions.
- g) Inspection and test procedure both for manufacture and all site related works.
- h) Control of calibration and testing of measuring and testing equipments.
- i) System for quality audit.
- j) System for indication and appraisal of inspection status.
- k) System for authorising release of manufactured product to the Owner.
- l) System for handling storage and delivery.
- m) System for maintenance of records.

- n) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per format enclosed at Annexure-I to this section for Owners approval
- o) Internal standards, if referred in the quality plans shall generally be compatible with National / International standards and shall be mentioned in the quality plans. Alternatively bidder shall furnish extracts of the internal standards detailing out acceptance norm for the product / material.

2.00.00 **GENERAL REQUIREMENTS - QUALITY ASSURANCE**

2.01.00 All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the Contractor for some of the major items is given in the respective technical specification. This is however, not intended to form a comprehensive programme as it is the Contractor's responsibility to draw up and implement such programme duly approved by the Owner/Consultant. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Bidder, separately in the format attached at Annexure-I and will be submitted to Owner/Authorised representative for approval. Schedule of finalisation of such quality plans will be finalised before award.

Contractor shall furnish list of Manufacturing Quality Plans of major equipments indicating proposed inspection categorisation indicating items that will be offered for Owner's inspection etc and the Field Quality Plans

2.02.00 Manufacturing Quality Plan for all the major equipment will detail out their respective important components, their in-process various tests/inspection & final inspection / tests, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's Quality Control organization. The relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing are to be comprehensibly documented by Contractor.

Manufacturing Quality Plan for all major equipments/ items will be approved by owner. In these approved quality plans, Owner / Authorised representative shall identify customer hold points (CHP), test / checks which shall be carried out in presence of the Owners Engineer or his authorised representative and beyond which the work shall not proceed without consent of Owner / Authorised representative in writing. Inspection/ Test reports are to be submitted to owner as specified in final approved Manufacturing Quality Plans.

2.03.00 Field Quality Plans / Procedures for all field activities shall be submitted to

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owner for review / approval. These Quality Plans / procedures will detail out, for all equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control organisation, during various stages of site activities from receipt of materials/ equipment at site.

- 2.04.00 The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality plans and reference documents/standards etc. will be subject to Owner's approval without which manufacture shall not proceed. These approved documents shall form a part of the contract. In these approved quality plans, Owner/Authorised representative shall identify customer hold points (CHP), test/checks which shall be carried out in presence of the Owners Engineer or his authorised representative and beyond which the work will not proceed without consent of Owner/Authorised representative in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and major deviations in the form of Non Conformity Report shall be referred to Owner/Authorised representative for approval and dispositioning.
- 2.05.00 No material shall be despatched from the manufacturer's works before the same is accepted subsequent to pre-despatch final inspection including verification of records of all previous tests/inspections by Owner's Engineer/ Authorised representative for "CHP" and "W" points marked in quality plans , and duly authorised for despatch by issuance of Material Despatch Clearance Certificate (MDCC). For items which is not under owner's inspection the contractor shall apply for despatch clearance (MDCC) from owner by submitting their internal inspection reports and quality records
- 2.06.00 All materials used or supplied shall be accompanied by valid and approved materials certificates and tests and inspection report. These certificates and reports shall indicate the sheet serial numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it.
- 2.07.00 Castings and forgings used for construction shall be of tested quality. Details of results of chemical analysis, heat treatment record, mechanical property test results shall be furnished.
- 2.08.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section - IX (latest edition) or other International equivalent standard acceptable to the Owner.

All brazers, welders etc. employed on any part of the contract at Contractor's/ Sub-Contractor's works or at site shall be qualified as per ASME Section-IX (latest edition) or equivalent international standard approved by the Owner. Such qualification tests shall be conducted in presence of Owner / his authorised representative or owner approved Third Party Inspection Agency(TPIA). Previously qualified WPS & PQR shall be acceptable if witnessed by owner's approved TPIA.

For welding of pressure parts and high pressure piping coming under IBR purview, the requirements of IBR shall also be complied with.

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2.09.00 All non-destructive examination (NDT) shall be carried out in accordance with LIST OF STANDARDS FOR REFERENCE as given below in this section.

The NDT operator shall be qualified as per SNT-TC-IA (of American Society of non-destructive examination). Results of NDT for the list major equipments / items identified for owner's inspection shall be properly recorded and submitted for review and approval. Other items not covered under owner's inspection, contractor shall review and approve the NDT results and such reports shall be submitted to owner in the final documentation of the items / equipments

2.10.00 All the sub-vendors proposed by the Contractor for procurement of major bought out items including castings, forgings, semi-finished and finished components/equipment list of which shall be drawn up by the Contractor and finalised with the Owner shall be subject to Owner's approval. Quality Plans of the successful vendors shall be discussed, finalised and approved by the Owner/Authorised representative and form part of the Purchase Order between the Contractor and the Vendor.

2.11.00 All the purchase specifications for the major bought-out items, list of which shall be drawn up by the Contractor and finalised with the Owner shall be furnished to the Owner for comments and subsequent approval before orders are placed.

Owner reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub-vendor's quality management and control activities. The Contractor shall provide all necessary assistance to enable the Owner carry out such audit and surveillance.

Quality audit/approval of the results of tests and inspection will not prejudice the right of the Owner to reject equipment not giving the desired performance after erection and shall not in no way limit the liabilities and responsibilities of the Contractor in earning satisfactory performance of equipment as per specification.

2.12.00 Quality requirements for main equipment shall equally apply for spares and replacement items.

2.13.00 Repair/rectification procedures to be adopted to make any job acceptable shall be subject to the approval of the Owner.

2.14.00 For quality assurance of all civil works refer to the specifications for civil works.

### 3.00.00 **QUALITY ASSURANCE DOCUMENTS**

3.01.00 The Contractor shall be required to submit two (2) copies and two (2) sets of microfilms / CDs of the following Quality Assurance documents within three (3) weeks after despatch of the equipment:

- a) Material mill test reports on components as specified by the specification.

- b) The inspection plan with verification, inspection plan check points, verification sketches, if used and methods used to verify that the inspection and testing points in the inspection plan were performed satisfactorily.
- c) Non-destructive examination results /reports including radiography interpretation reports.
- d) Factory tests results for testing required as per applicable codes and standards referred in the specification.
- e) Welder identification list listing welder's and welding operator's qualification procedure and welding identification symbols.
- f) Sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
- g) Stress relief time temperature charts.
- h) Inspection reports duly signed by QA personnel of the Owner and Contractor for the agreed inspection hold points. During the course of inspection, the following will also be recorded :
  - i) When some important repair work is involved to make the job acceptable.
  - ii) The repair work remains part of the accepted product quality.
- i) Letter of conformity certifying that the requirement is in compliance with finalised specification requirements.

#### 4.00.00 **INSPECTION, TESTING AND INSPECTION CERTIFICATES**

4.01.00 The Owner's Engineer, or his duly authorised representative and/or an outside inspection agency acting on behalf of the Owner shall have access inside the workshops, test labs, establishments at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Owner's Engineer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.

4.02.00 The Contractor shall give the Owner's Engineer/ Authorized Inspector twenty one (21) days written notice for "CHP" / "W" points of any material being ready for testing by owner' engineer / Authorized inspector. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Engineer/ Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date on which the equipment is notified as being ready for test/inspection. If owner's Engineer / Authorised Inspector fail to attend the inspection, next mutually convenient date for test shall be agreed with Contractor. Contractor shall, in

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no case proceed with the test without owner or his authorized inspectors, unless the witnessing is officially waived and advised Contractor to proceed with the test. Contractor shall forthwith forward duly certified completed test report and a product quality certificate in six (6) copies to owner upon completion of such test.

- 4.03.00 The Engineer or Inspector shall within fifteen (15) days from the date of Inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract / QAP or other approved quality documents. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall confirm in writing to the Engineer/Inspector giving reasons therein, that no modifications are necessary to comply with the contract / QAP or other approved quality documents.
- 4.04.00 When the factory tests have been completed at the Contractor's or sub-contractor's works, the Engineer/Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests excluding the test completion date subject to submission of all certified documents related to the test, If the tests are not witnessed by the Engineer/Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Engineer/Inspector. Failure of the owner's Engineer/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests, or the issue of the certificates shall not bind the Owner to accept the equipment should it, on further tests after erection be found not to comply with the contract / QAP or other approved quality documents.
- 4.05.00 In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the owner's Engineer/Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contract / QAP or other approved quality documents. Contractor and shall give facilities to the owner's Engineer/ Inspector or to his authorised representative to accomplish testing.
- 4.06.00 To facilitate advance planning of inspection in addition to giving inspection notice as per Clause 4.02.00, the Contractor shall furnish quarterly inspection programme indicating proposed schedule dates of inspection at customer hold point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.

## LIST OF STANDARDS FOR REFERENCE

- a) International Standards Organisation (ISO).
- b) International Electro-technical Commission (IEC).
- c) American Society of Mechanical Engineers(ASME)
- d) American National Standards Institute (ANSI).
- e) American Society for Testing and Materials (ASTM).
- f) American Institute of Steel Construction (AISC).
- g) American Welding Society (AWS).
- h) Architecture Institute of Japan (AIJ).
- i) National Fire Protection Association (NFPA).
- j) National Electrical Manufacturer's Association (NEMA).
- k) Japanese Electro-technical Committee (JEC).
- l) Institute of Electrical and Electronics Engineers (IEEE).
- m) Federal Occupational Safety and Health Regulations (OSHA).
- n) Instrument Society of America (ISA).
- o) National Electric Code (NEC).
- p) Heat Exchanger Institute (HEI).
- q) Tubular Exchanger Manufacturer's Association (TEMA).
- r) Hydraulic Institute (HIS).
- s) International Electro-Technical Commission Publications.
- t) Power Test Code for Steam Turbines (PTC).
- u) Applicable German Standards (DIN).
- v) Applicable British Standards (BS).
- w) Applicable Japanese Standards (JIS).
- x) Electric Power Research Institute (EPRI).
- y) Standards of Manufacturer's Standardization Society (MSS)

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- z) Bureau of Indian Standards Institution (BIS).
  - aa) Indian Electricity Rules.
  - bb) Indian Boiler Regulations (IBR).
  - cc) Indian Explosives Act.
  - dd) Indian Factories Act.
  - ee) Tariff Advisory Committee (TAC) rules.
  - ff) Emission regulation of Central Pollution Control Board (CPCB).
  - gg) Pollution Control regulations of Dept. of Environment, Govt. of India
  - hh) Central Board of Irrigation and Power (CBIP) Publications

**ANNEXURE-I  
FORMAT OF QUALITY ASSURANCE PROGRAMME**

|   |   |  |    |    |  |
|---|---|--|----|----|--|
| <b>VENDOR'S LOGO , NAME &amp; ADDRESS</b>   | <b>MANUFACTURING QUALITY ASSURANCE PLAN</b>   |  |    |    | <b>DOC NO:</b><br>XXXXX-CAL-QAP-M-0001 |
| <b>CLIENT :</b>   | <b>ITEM :</b>   |  |    |    | <b>REV NO :</b><br>0 1 2 3 4           |
| <b>PROJECT :</b>  | <b>LOCATION :</b>   |  |    |    | <b>DATE :</b>                          |
| <b>VENDOR :</b>   | <b>REFERENCE PURCHASE ORDER NO. &amp; DT :</b>  |  |    |    |  |
| <b>SUB VENDOR :</b>   | <b>REFERENCE APPROVED DATA SHEET :</b>  |  |    |    |  |
| <b>ABBREVIATIONS :</b>  | <b>REFERENCE APPROVED DRAWING. NO. :</b>  |  |    |    |  |
| <b>QAP - QUALITY ASSURANCE PLAN,</b>  | <b>AGENCY :</b>   |  |    |    |  |
| <b>CR - CRITICAL,</b>   | <b>MATL - MATERIAL,</b>   | <b>1 - PROJECT AUTHORITY</b>             |    |    |  |
| <b>MA - MAJOR,</b>  | <b>APP - APPROVED,</b>  | <b>2 - SUPPLIER</b>                      |    |    |  |
| <b>MI - MINOR</b>   | <b>DWG - DRAWING,</b>   | <b>3 - SUB-SUPPLIER</b>                  |    |    |  |
| <b>SPEC - SPECIFICATION,</b>  | <b>SUPL - SUPPLIER,</b>   | <b>4 - MANUFACTURER</b>                  |    |    |  |
| <b>TC - TEST CERTIFICATES</b>   | <b>PROC - PROCEDURE</b>   | <b>5 - THIRD PARTY INSPECTION AGENCY</b> |    |    |  |
| <b>P - PERFORM</b>  |   |  |    |    |  |
| <b>w - WITNESS</b>  |   |  |    |    |  |
| <b>V - VERIFY</b>   |   |  |    |    |  |
| <b>CHP - CUSTOMER HOLD POINT</b>  |   |  |    |    |  |
| <b>NOTES:</b>   | <b>GENERAL REMARKS</b>  |  |    |    |  |
| 1. EXACT MATERIAL / PROCESS / INSPECTION / TESTS FOLLOWED BY THE MANUFACTURER SHALL BE SPECIFIED          | 1 THE ITEMS WHICH ARE FALLING UNDER ANY STATUTORY AUTHORITY'S (LIKE I.B.R. ETC.) SCOPE SHALL BE SUBJECTED TO THAT STATUTORY AUTHORITY'S INSPECTION CLEARANCE. |  |    |    |  |
| 2. EXACT REFERENCE DOCUMENT/ACCEPTANCE STANDARD SHALL BE SPECIFIED  |   |  |    |    |  |
| 3. IN CASE SPECIFIED ACCEPTANCE STANDARD / NORMS IS OTHER THAN NATIONAL / INTERNATIONAL STANDARDS         |   |  |    |    |  |
| STANDARD / COPY OF THE ACCEPTANCE NORMS FOLLOWED BY THE MANUFACTURER SHALL BE SUBMITTED FOR REVIEW RECORD |   |  |    |    |  |
| 4 FINAL INSPECTION DOSSIER SHALL BE PREPARED BY MANUFACTURER & SHALL BE ENDORSED BY INSPECTION AGENCY     |   |  |    |    |  |
| <b>Prepared by</b>  | <b>Checked by</b>   | <b>Approved By</b>                       |    |    |  |
| Revision R0   | R1  | R2                                       | R0 | R1 | R2                                     |
| DATE  |   |  |    |    |  |

PART OF TECHNICAL SPECIFICATION PETS 41 C 51 HA00G



**ANNEXURE-II**

**FIELD WELDING SCHEDULE**

PROJECT : FWS NO :

CONTRACTOR : REV NO. :

PACKAGE : FIELD WELDING CODE :

SYSTEM : PAGE NO. :

| SI No. | Drawing No. for Weld Locations & Identification mark | Description of parts to be welded | Material specification | Dimensions | Process of Welding | Type of Weld | Electrode Filler Specification | WPS No. | Minimum Pre-heat Temperature | Heat Treatment Temperature [Holding Time in secs] | NDT Method Quantum | NDT Specification Number | Acceptance Norm Ref. | Remarks |
|--------|--|-----------------------------------|------------------------|------------|--------------------|--------------|--------------------------------|---------|------------------------------|---|--------------------|--------------------------|----------------------|---------|
|        |  |                                   |                        |            |                    |              |                                |         |                              |   |                    |                          |                      |         |

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The Field Welding Schedule should be submitted for :

- Pressure Parts
- Tanks/Vessels
- Piping
- Heavy/Important Structural Steel
- Heat Exchangers
- Bus Ducts

**REQUIREMENTS OF SPARES, TOOLS & TACKLE,  
LUBRICANTS/OIL/CONSUMABLES**

## CONTENT

| <b>CLAUSE NO.</b> | <b>DESCRIPTION</b>   |
|-------------------|----------------------|
| 1.00.00           | TOOLS AND TACKLE     |
| 2.00.00           | SPARES               |
|                   | <b>ATTACHMENT</b>    |
| ANNEXURE-I        | MANDATORY SPARE LIST |

**REQUIREMENTS OF SPARES, TOOLS & TACKLE,  
LUBRICANTS/OIL/CONSUMABLES**

**1.00.00 TOOLS & TACKLE**

The Contractor shall supply with the equipment one complete set of special tools and tackle as required for the erection, assembly, dismantling & maintenance of the equipment. These special tools will also include special material handling equipment, jigs & fixtures for maintenance and calibration/readjustment, checking & measurement aids etc. A list of such tools & tackle shall be submitted by the Bidder along with the offer. Detailed description of each tools/tackle, its function along with the equipment/part for which it is meant for and the price of each tools/tackle shall also be indicated in the offer. These tools & tackle shall be separately packed and sent to site before the first unit commissioning. The Bidder shall also ensure that these tools are not used for erection purpose.

**2.00.00 SPARES**

**2.01.00 General**

The Bidder shall indicate and include in his scope of supply all the necessary start-up, commissioning and recommended spares in addition to mandatory spares as specified elsewhere in the specification. The Owner reserves the right to buy any or all mandatory and recommended spares. The Contractor shall also state for each item of spares both mandatory and recommended, the normal expected service life.

2.01.01 All spares supplied under this contract shall be strictly interchangeable with the parts for which they are intended to replace. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site, e.g. small items shall be packed in sealed transparent plastic bags with dessicator packs as necessary.

2.01.02 Each spare part shall be clearly marked or labelled on the outside of the packing with the description. When more than one spare part is packed in a single case, a general description of the contents shall be shown on the outside and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purposes of identification.

2.01.03 All cases, containers or other packages are liable to be opened for examination as may be considered necessary by the Engineer.

2.01.04 All mandatory spares shall be delivered to site within one to three months prior to the scheduled date of the trial operation of the plant. However, they shall not be despatched before the despatch of the associated main equipment.

2.01.05 The Bidder shall also guarantee supply of spare parts, which will be made, based on manufacturer's drawings on special order from the Purchaser for 30 years after commissioning of the plant.

2.02.00 **Recommended Spares**

2.02.01 The Contractor shall provide a list of recommended spares giving unit prices and total prices for 2 years of normal operation of the plant for spares of indigenous origin, and for 5 years of normal operation for spares of non-indigenous origin. This list shall take into consideration the mandatory spares specified elsewhere in the specification and should be a separate list.

2.02.02 The price of recommended spares will not be used for the evaluation of bids. The price of these spares shall remain valid for a period as specified elsewhere in the specification from the date of Award of the Contract. Where the recommended spares are the same as mandatory spares, the prices shall be the same. The prices of any recommended spares, which are not common with mandatory spares, shall be subject to review by the Owner, and shall be finalised after mutual discussion.

2.03.00 **Start-up Commissioning Spares**

2.03.01 Start-up commissioning spares are those spares which may be required during the start-up and commissioning of the equipment/system. All spares used until the plant is handed over to the Owner shall come under this category. Said spares, properly marked, shall be supplied together with the main equipment and shall be used by the Contractor, if needed, during erection & commissioning stage. All such spares which remain unused till issuance of Taking Over Certificate by the Owner, along with an equipment-wise quantitative consumption report shall be returned to the Owner during time of handover. The list of commissioning spares to be brought by the Contractor to ensure smooth commissioning of the plant shall be subject to the Engineer's approval.

2.03.02 The Contractor shall submit a complete BBU list inclusive of recommended, mandatory, initial start-up and commissioning spares. Costs of the above spares, which are consumed before the handing-over of the plant, shall be deemed to have been included in the lump sum proposal price of the package, and the Contractor shall have no claim on this account to the Owner.

2.04.00 **Mandatory Spare Parts**

2.04.01 The Owner considers some of the spares are essential for running the equipment irrespective of whether they are included in the list of recommended spares by the Bidder as mentioned above.

Since the components involved can not be foreseen at the bidding stage, only

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broad requirements of the Owner in this respect are outlined hereinafter. The bidder shall include his proposal, on the basis of this guideline, an item-wise list of all components and the quantity, unit prices & total price thereof, offered as mandatory spares for each and every equipment. This list shall be separate from the list of recommended spares and shall be used for bid evaluation purposes. Any clarification in this respect may be obtained by the Bidder at the pre-bidding stage.

2.04.02 The mandatory spares should be supplied to the Owner at least one month before the trial run. The despatch programme is subject to approval of the Owner/Consultant after award of contract.



**TECHNICAL SPECIFICATION FOR**  
**ELECTRIC HOIST**  
**4X270 MW BHADRADRI TPS- FGD**

SPECIFICATION NO. PE-TS-440-563-A002

VOLUME II - B

SECTION -I

REV 00

DATE MAY 2023

**SUB-SECTION IB**

**SPECIFIC TECHNICAL REQUIREMENT (ELECTRICAL)**

## STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGE: ELECTRIC HOIST  
 PROJECT : 4 X 270 MW BHADRADRI TPS-FGD  
 SCOPE OF VENDOR: SUPPLY

| <u>S. NO</u> | <u>DETAILS</u>   | <u>SCOPE SUPPLY</u>        | <u>SCOPE E&amp;C</u> | <u>REMARKS</u>  |
|--------------|--|----------------------------|----------------------|---|
| 1            | Isolating Switch   | Vendor                     | BHEL                 | BHEL will provide one number 415 V(3ph, 4W) supply feeder only up to isolating switches for cranes/hoists. Any other voltage level (AC/DC) required will be derived by the vendor. Motor starter shall be part of crane/ hoist control panel. |
| 2            | Power cables, control cables, screened control cables and any special cables (if required) between equipment supplied by vendor. | Vendor                     | BHEL                 | Cable from supply feeder to isolating switch shall be in BHEL scope.  |
| 3            | Cabling material (cable trays, accessories, cable tray supporting system, conduits etc).   | Vendor                     | BHEL                 |   |
| 4            | Equipment Earthing   | BHEL                       | BHEL                 | All equipment metallic enclosures / frames, metal structure etc. shall be grounded at two points each to the nearest grounding points / risers provided by BHEL   |
| 5            | Motors   | Vendor                     | BHEL                 |   |
| 6            | Cable glands and lugs for equipment supplied by vendor   | Vendor                     | BHEL                 | 1. Double compression Ni-Cr plated brass cable glands<br>2. Solder less crimping type heavy duty tinned copper lugs for power & control cables.   |
| 7            | a) Input cable schedules (C & I)<br>b) Cable interconnection details for above<br>c) Cable block diagram                         | Vendor<br>Vendor<br>Vendor | -<br>-<br>-          | Cable listing for Control and Instrumentation Cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.  |
| 8            | Equipment layout drawings  | Vendor                     | -                    |   |
| 9            | Electrical Equipment GA drawing  | Vendor                     | -                    | For necessary interface review.   |



**ELECTRICAL EQUIPMENT SPECIFICATION  
FOR  
ELECTRIC HOIST  
  
4X270MW BHADRADRI TPS**

|                            |
|----------------------------|
| SPECIFICATION NO.          |
| VOLUME NO. : <b>II-B</b>   |
| SECTION : <b>C</b>         |
| REV NO. : <b>00</b> DATE : |
|                            |

**1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:**

- a) Services and equipment as per “Electrical Scope between BHEL and Vendor”.
- b) Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The same shall be provided by the bidder without any extra charge.
- c) Supply of mandatory spares as specified in the specifications of mechanical equipments.
- d) Electrical load requirement for ELECTRIC HOIST
- e) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information.
- f) Bidder to furnish list of makes for each equipment at contract stage, which shall be subject to customer/BHEL approval without any commercial and delivery implications to BHEL
- g) Various drawings, data sheets as per required format, Quality plans, calculations, test reports, test certificates, operation and maintenance manuals etc shall be furnished as specified at contract stage. All documents shall be subject to customer/BHEL approval without any commercial implication to BHEL.
- h) Motor shall meet minimum requirement of motor specification.
- i) Vendor to clearly indicate equipment locations and local routing lengths in their cable listing furnished to BHEL.
- j) Cable BOQ worked out based on routing of cable listing provided by the vendor for “ both end equipment in vendor’s scope”shall be binding to the vendor with +10 % margin to take care of slight variation in routing length & wastages.

**2.0 EQUIPMENT & SERVICES TO BE PROVIDED BY PURCHASER FOR ELECTRICAL & TERMINAL POINTS:**

Refer “Electrical Scope between BHEL and Vendor”.

**3.0 DOCUMENTS TO BE SUBMITTED ALONG WITH BID**

- 3.1 The electrical specification without any deviation from the technical/quality assurance requirements stipulated shall be deemed to be complied by the bidder in case bidder furnishes the overall compliance of package technical specification in the form of compliance certificate/No deviation certificate.
- 3.2 No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc, is required during tender stage. Any such submission even if made, shall not be considered as part of offer.

**4.0 List of enclosures :**

- a) Electrical scope between BHEL & vendor (Annexure –I)
- b) Standard BHEL specification for motors.
- c) Datasheets(A&C) & quality plan for motors.
- d) Electrical Load data format (Annexure –II)
- e) BHEL cable listing format (Annexure –III)
- f) Explanatory notes for cable routing



|   |   |
|---|---|
| <b>GENERAL TECHNICAL REQUIREMENTS</b><br><br><b>FOR</b><br><br><b>LV MOTORS</b> | SPECIFICATION NO.<br>PE-SS-999-506-E101 |
|   | VOLUME NO. : <b>II-B</b>                |
|   | SECTION : <b>D</b>                      |
|   | REV NO. : <b>00</b> DATE : 28.01.10     |
|   | SHEET : 1 OF 1                          |

**GENERAL TECHNICAL REQUIREMENTS**

**FOR**

**LV MOTORS**

**SPECIFICATION NO.: PE-SS-999-506-E101 Rev 00**

|   |  |
|---|--|
| <b>TITLE :</b><br><b>GENERAL TECHNICAL REQUIREMENTS</b><br><br><b>FOR</b><br><br><b>LV MOTORS</b> | <b>SPECIFICATION NO.</b><br>PE-SS-999-506-E101 |
|   | <b>VOLUME NO. :</b> <b>II-B</b>                |
|   | <b>SECTION :</b> <b>D</b>                      |
|   | <b>REV NO. : 00</b> <b>DATE : 28.01.10</b>     |
|   | <b>SHEET : 1 OF 4</b>                          |

**1.0 INTENT OF SPECIFICATION**

The specification covers the design, materials, constructional features, manufacture, inspection and testing at manufacturer's work, and packing of Low voltage (LV) squirrel cage induction motors along with all accessories for driving auxiliaries in thermal power station.

Motors having a voltage rating of below 1000V are referred to as low voltage (LV) motors.

**2.0 CODES AND STANDARDS**

Motors shall fully comply with latest edition, including all amendments and revision, of following codes and standards:

- |           |  |
|-----------|--|
| IS:325    | Three phase Induction motors   |
| IS : 900  | Code of practice for installation and maintenance of induction motors  |
| IS: 996   | Single phase small AC and universal motors   |
| IS: 4722  | Rotating Electrical machines   |
| IS: 4691  | Degree of Protection provided by enclosures for rotating electrical machines                                 |
| IS: 4728  | Terminal marking and direction of rotation rotating electrical machines                                      |
| IS: 1231  | Dimensions of three phase foot mounted induction motors  |
| IS: 8789  | Values of performance characteristics for three phase induction motors                                       |
| IS: 13555 | Guide for selection and application of 3-phase A.C. induction motors for different types of driven equipment |
| IS: 2148  | Flame proof enclosures for electrical appliance  |
| IS: 5571  | Guide for selection of electrical equipment for hazardous areas  |
| IS: 12824 | Type of duty and classes of rating assigned  |
| IS: 12802 | Temperature rise measurement of rotating electrical machines   |
| IS: 12065 | Permissible limits of noise level for rotating electrical machines   |
| IS: 12075 | Mechanical vibration of rotating electrical machines   |

In case of imported motors, motors as per IEC-34 shall also be acceptable.

**3.0 DESIGN REQUIREMENTS**

3.1 Motors and accessories shall be designed to operate satisfactorily under conditions specified in data sheet-A and Project Information, including voltage & frequency variation of supply system as defined in Data sheet-A

3.2 Motors shall be continuously rated at the design ambient temperature specified in Data Sheet-A and other site conditions specified under Project Information  
 Motor ratings shall have at least a 15% margin over the continuous maximum demand of the driven equipment, under entire operating range including voltage & frequency variation specified above.

**3.3 Starting Requirements**

3.3.1 Motor characteristics such as speed, starting torque, break away torque and starting time shall be properly co-ordinated with the requirements of driven equipment. The accelerating torque at any speed with the minimum starting voltage shall be at least 10% higher than that of the driven equipment.

3.3.2 Motors shall be capable of starting and accelerating the load with direct on line starting without exceeding acceptable winding temperature.

|   |  |
|---|--|
| <b>TITLE :</b><br><b>GENERAL TECHNICAL REQUIREMENTS</b><br><br><b>FOR</b><br><br><b>LV MOTORS</b> | <b>SPECIFICATION NO.</b><br>PE-SS-999-506-E101 |
|   | <b>VOLUME NO. :</b> <b>II-B</b>                |
|   | <b>SECTION :</b> <b>D</b>                      |
|   | <b>REV NO. : 00</b> <b>DATE : 28.01.10</b>     |
|   | <b>SHEET : 2 OF 4</b>                          |

The limiting value of voltage at rated frequency under which a motor will successfully start and accelerate to rated speed with load shall be taken to be a constant value as per Data Sheet - A during the starting period of motors.

3.3.3 The following frequency of starts shall apply

- i) Two starts in succession with the motor being initially at a temperature not exceeding the rated load temperature.
- ii) Three equally spread starts in an hour the motor being initially at a temperature not exceeding the rated load operating temperature. (not to be repeated in the second successive hour)
- iii) Motors for coal conveyor and coal crusher application shall be suitable for three consecutive hot starts followed by one hour interval with maximum twenty starts per day and shall be suitable for minimum 20,000 starts during the life time of the motor

3.4 **Running Requirements**

3.4.1 Motors shall run satisfactorily at a supply voltage of 75% of rated voltage for 5 minutes with full load without injurious heating to the motor.

3.4.2 Motor shall not stall due to voltage dip in the system causing momentary drop in voltage upto 70% of the rated voltage for duration of 2 secs.

3.5 **Stress During bus Transfer**

3.5.1 Motors shall withstand the voltage, heavy inrush transient current, mechanical and torque stress developed due to the application of 150% of the rated voltage for at least 1 sec. caused due to vector difference between the motor residual voltage and the incoming supply voltage during occasional auto bus transfer.

3.5.2 Motor and driven equipment shafts shall be adequately sized to satisfactorily withstand transient torque under above condition.

3.6 Maximum noise level measured at distance of 1.0 metres from the outline of motor shall not exceed the values specified in IS 12065.

3.7 The max. vibration velocity or double amplitude of motors vibration as measured at motor bearings shall be within the limits specified in IS: 12075.

4.0 **CONSTRUCTIONAL FEATURES**

4.1 Indoor motors shall conform to degree of protection IP: 54 as per IS: 4691. Outdoor or semi-indoor motors shall conform to degree of protection IP: 55 as per IS: 4691 and shall be of weather-proof construction. Outdoor motors shall be installed under a suitable canopy

4.2 Motors upto 160KW shall have Totally Enclosed Fan Cooled (TEFC) enclosures, the method of cooling conforming to IC-0141 or IC-0151 of IS: 6362.

Motors rated above 160 KW shall be Closed Air Circuit Air (CACA) cooled

4.3 Motors shall be designed with cooling fans suitable for both directions of rotation.

|   |  |
|---|--|
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|   | <b>VOLUME NO. : II-B</b>                       |
|   | <b>SECTION : D</b>                             |
|   | <b>REV NO. : 00 DATE : 28.01.10</b>            |
|   | <b>SHEET : 3 OF 4</b>                          |

- 4.4. Motors shall not be provided with any electric or pneumatic operated external fan for cooling the motors.
- 4.5. Frames shall be designed to avoid collection of moisture and all enclosures shall be provided with facility for drainage at the lowest point.
- 4.6. In case Class 'F' insulation is provided for LV motors, temperature rise shall be limited to the limits applicable to Class 'B' insulation.  
In case of continuous operation at extreme voltage limits the temperature limits specified in table-1 of IS:325 shall not exceed by more than 10°C.
- 4.7. **Terminals and Terminal Boxes**
- 4.7.1 Terminals, terminal leads, terminal boxes, windings tails and associated equipment shall be suitable for connection to a supply system having a short circuit level, specified in the Data Sheet-A.  
  
Unless otherwise stated in Data Sheet-A, motors of rating 110 kW and above will be controlled by circuit breaker and below 110 kW by switch fuse-contactor. The terminal box of motors shall be designed for the fault current mentioned in data sheet "A".
- 4.7.2 Unless otherwise specified or approved, phase terminal boxes of horizontal motors shall be positioned on the left hand side of the motor when viewed from the non-driving end.
- 4.7.3 Connections shall be such that when the supply leads R, Y & B are connected to motor terminals A B & C or U, V & W respectively, motor shall rotate in an anticlockwise direction when viewed from the non-driving end. Where such motors require clockwise rotation, the supply leads R, Y, B will be connected to motor terminals A, C, B or V W & V respectively.
- 4.7.4 Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside terminal box cover giving the connection diagram for the desired direction of rotation and reverse rotation.
- 4.7.5 Motor terminals and terminal leads shall be fully insulated with no bar live parts. Adequate space shall be available inside the terminal box so that no difficulty is encountered for terminating the cable specified in Data Sheet-A.
- 4.7.6 Degree of protection for terminal boxes shall be IP 55 as per IS 4691.
- 4.7.7 Separate terminal boxes shall be provided for space heaters.. If this is not possible in case of LV motors, the space heater terminals shall be adequately segregated from the main terminals in the main terminal box. Detachable gland plates with double compression brass glands shall be provided in terminal boxes.
- 4.7.8. Phase terminal boxes shall be suitable for 360 degree of rotation in steps of 90 degree for LV motors.
- 4.7.9 Cable glands and cable lugs as per cable sizes specified in Data Sheet-A shall be included. Cable lugs shall be of tinned Copper, crimping type.
- 4.8 Two separate earthing terminals suitable for connecting G.I. or MS strip grounding conductor of size given in Data Sheet-A shall be provided on opposite sides of motor frame. Each terminal box shall have a grounding terminal.

|   |  |
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| <b>TITLE :</b><br><b>GENERAL TECHNICAL REQUIREMENTS</b><br><br><b>FOR</b><br><br><b>LV MOTORS</b> | <b>SPECIFICATION NO.</b><br>PE-SS-999-506-E101 |
|   | <b>VOLUME NO. :</b> <b>II-B</b>                |
|   | <b>SECTION :</b> <b>D</b>                      |
|   | <b>REV NO. : 00</b> <b>DATE : 28.01.10</b>     |
|   | <b>SHEET : 4 OF 4</b>                          |

**4.9 General**

- 4.9.1 Motors provided for similar drives shall be interchangeable.
- 4.9.2 Suitable foundation bolts are to be supplied alongwith the motors.
- 4.9.3 Motors shall be provided with eye bolts, or other means to facilitate safe lifting if the weight is 20Kgs. and above.
- 4.9.4 Necessary fitments and accessories shall be provided on motors in accordance with the latest Indian Electricity rules 1956.
- 4.9.5 All motors rated above 30 kW shall be provided with space heaters to maintain the motor internal air temperature above the dew point. Unless otherwise specified, space heaters shall be suitable for a supply of 240V AC, single phase, 50 Hz.
- 4.9.6 Name plate with all particulars as per IS: 325 shall be provided
- 4.9.7 Unless otherwise specified, the colour of finish shall be grey to Shade No. 631 and 632 as per IS:5 for motors installed indoor and outdoor respectively. The paint shall be epoxy based and shall be suitable for withstanding specified site conditions.

**5.0 INSPECTION AND TESTING**

- 5.1 All materials, components and equipments covered under this specification shall be procured, manufactured, as per the BHEL standard quality plan No. PED-506-00-Q-006/0 and PED-506-00-Q-007/2 enclosed with this specification and which shall be complied.
- 5.2 LV motors of type-tested design shall be provided. Valid type test reports not more than 5 year shall be furnished. In the absence of these, type tests shall have to be conducted by manufacturer without any commercial implication to purchaser.
- 5.3 All motors shall be subjected to routine tests as per IS: 325 and as per BHEL standard quality plan.
- 5.4 Motors shall also be subjected to additional tests, if any, as mentioned in Data Sheet A.

**6.0 DRAWINGS TO BE SUBMITTED AFTER AWARD OF CONTRACT**

- a) OGA drawing showing the position of terminal boxes, earthing connections etc.
- b) Arrangement drawing of terminal boxes.
- c) Characteristic curves:  
(To be given for motor above 55 kW unless otherwise specified in Data Sheet).
  - i) Current vs. time at rated voltage and minimum starting voltage.
  - ii) Speed vs. time at rated voltage and minimum starting voltage.
  - iii) Torque vs. speed at rated voltage and minimum voltage.  
For the motors with solid coupling the above curves i), ii), iii) to be furnished for the motors coupled with driven equipment. In case motor is coupled with mechanical equipment by fluid coupling, the above curves shall be furnished with and without coupling.
  - iv) Thermal withstand curve under hot and cold conditions at rated voltage and max. permissible voltage.

**Explanatory notes for filling up cable list for routing through WinPath, the cable routing program (developed by Corporate R&D) being used in PEM.**

1. For the purpose of clarity, it may please be noted that the information given in regard to the cables to be routed through WinPath as per the system elaborated below is called "Cable List", while the term "Cable Schedule" applies to the cable list with routing information added after routing has been carried out.
2. The cable list shall be entered as an MS Excel file in the format as per enclosed template EXT\_CAB\_SCH\_FORMAT.XLS. No blank lines, special characters, header, footer, lines, etc. shall be introduced in the file. No changes shall be made in the title line (first line) of the template.
3. The field properties shall be as under:
  - a. UNITCABLENO: A/N, up to sixteen (16) characters; each cable shall have its own unique, unduplicated cable number. In case this rule is violated, the cable cannot be taken up for routing.
  - b. FROM: A/N, up to sixty (60) characters; the "From" end equipment/ device description and location to be specified here. Information in excess of 60 characters will be truncated after 60 characters.
  - c. TO: A/N, up to sixty (60) characters; the "To" end equipment/ device description and location to be specified here. Information in excess of 60 characters will be truncated after 60 characters.
  - d. PURPOSE: A/N, up to sixty (60) characters; the purpose (i.e. power cable/ indication/ measurement, etc.) to be specified here. Information in excess of 60 characters will be truncated after 60 characters.
  - e. REMARKS: A/N, up to forty (40) characters; Any information pertinent to routing to be specified here (e.g., cable number of the cable redundant to the cable number being entered). Information in excess of 40 characters will be truncated after 40 characters.
  - f. CABLESIZE: A/N, 7 characters exactly as per the codes indicated below shall be specified here. The program cannot route cables described in any other way/ format.
  - g. PATHCABLENO: Field reserved for utilization by the program. User shall not enter any information here.
4. One list shall be prepared for each system/ equipment (i.e., separate and unique cable lists shall be prepared for each system).
5. The cables shall be described as per the scheme listed below:

|                    |                     |               |                         |
|--------------------|---------------------|---------------|-------------------------|
| A                  | NN                  | A             | NNN                     |
|                    |                     |               |                         |
| Cable              | No. of cores        | Cable code    | Cable size              |
| Voltage            | (e.g. 01,03,3H, 07) | (See C below) | (e.g. 035,185,2.5, 0.5) |
| Code (see B below) |                     |               |                         |

(A) SYSTEM VOLTAGE CODES:

(ac) A = 11KV, B = 6.6KV, C = 3.3KV, D = 415V, E = 240V, F = 110V  
 (dc) G = 220V, H = 110V, J = 48V, K = +24V, L = -24V

(B) CABLE VOLTAGE CODES:

A = 11KV (Power cables)

Explanatory notes for filling up cable list for routing through WinPath, the cable routing program (developed by Corporate R&D) being used in PEM.

- B = 6.6KV (Power cables)
- C = 3.3KV (Power cables)
- D = 1.1KV (LV & DC system power & control cables)
- E = 0.6KV (0.5 sq. mm. Control cables)

(C) CABLE CODES

PVC Copper

- A = Armoured FRLS
- B = Armoured Non-FRLS
- C = unarmoured FRLS
- D = Unarmoured Non-FRLS

PVC Aluminium

- E = Armoured FRLS
- F = Armoured Non-FRLS
- G = unarmoured FRLS
- H = Unarmoured Non-FRLS

XLPE Copper

- J = Armoured FRLS
- K = Armoured Non-FRLS
- L = unarmoured FRLS
- M = Unarmoured Non-FRLS

XLPE Aluminium

- N = Armoured FRLS
- P = Armoured Non-FRLS
- Q = unarmoured FRLS
- R = Unarmoured Non-FRLS

- S = FIRE SURVIVAL CABLES
- T = TOUGH RUBBER SHEATH
- U = OVERALL SCREENED
- V = PAIRED OVERALL SCREENED
- W = PAIRED INDIVIDUAL SCREENED
- Y = COMPENSATING CABLES
- I = PRE-FABRICATED CABLES
- Z = JELLY FILLED CABLES



TITLE

**LV MOTORS****DATA SHEET-A****4 X 270 MW BHADRADRI | TPS**

SPECIFICATION NO.

VOLUME II B

SECTION D

REV NO. DATE 18.03.15

SHEET 1 OF 2

|      |  |   |   |
|------|--|---|---|
| 1.0  | Design ambient temperature                                       | : | 50 °C   |
| 2.0  | Maximum acceptable kW rating of LV motor                         | : | 160KW *   |
| 3.0  | Installation (Indoors/ Outdoors)                                 | : | As required   |
| 4.0  | Details of supply system   |   |   |
| a)   | Rated voltage (with variation)                                   | : | 415V ± 10%  |
| b)   | Rated frequency (with variation)                                 | : | 50 Hz + 3 % to - 5%   |
| c)   | Combined voltage & freq. variation                               | : | 10% (sum of absolute values)  |
| d)   | System fault level at rated voltage                              | : | 50 kA for 1 sec   |
| e)   | Short time rating for terminal boxes                             |   |   |
| o    | 110 kW and above (Breaker Controlled)                            | : | 50 KA for 0.20 sec..  |
| o    | Below 110 kW (Contactor Controlled)                              | : | 50 KA protected by HRC fuse   |
| f)   | LV System grounding  | : | Solidly   |
| 5.0  | Class of insulation  | : | Class 'F', with temp rise limited to class B.   |
| 6.0  | Minimum voltage for starting<br>(As percentage of rated voltage) | : | (a) 85% below 110KW<br>(b) 80% from 110KW to 160KW<br>(c) 85% above 160KW to 1000KW<br>(d) 80% from 1001 KW to 4000KW<br>(e) 75% > 4000KW |
| 7.0  | Power cables data  | : | Shall be given during detailed engg.  |
| 8.0  | Earth Conductor Size & Material                                  | : | As per attached Datasheet of Earthing.  |
| 9.0  | Space heater supply  | : | 240 V, 1ϕ, 50 Hz (for motors above 30 Kw)   |
| 10.0 | Rating up to which Single phase motor                            | : | Acceptable below 0.20 kW  |
| 11.0 | Locked rotor current   |   |   |
| a)   | Limit as percentage of FLC                                       | : | As per IS 12615*  |
| 12.0 | Flame-proof motor  |   |   |
| a)   | Enclosure suitable (As per IS: 2148)                             | : | As per requirement  |
| b)   | Classification of Hazardous area<br>(As per IS: 5572 part-I)     | : | As per requirement  |
| 13.0 | Makes  | : | BHEL/ Customer approval   |
| 14.0 | Paint shade  | : | Shall be given during detailed engg   |
| 15.0 | Degree Of protection for motor/ terminal box                     | : | IP 54/ IP 55  |



TITLE

**LV MOTORS****DATA SHEET-A****4 X 270 MW BHADRADRI****TPS**

SPECIFICATION NO.

VOLUME II B

SECTION D

REV NO. DATE 18.03.15

SHEET 1 OF 2

\* Continuous duty LT motors up to 160 KW Output rating (at 50 deg.C ambient temperature), shall be High efficiency (IE2) as per IEC: 60034-30/ IS:12615

**16.0 TESTING****16.1 Type Tests**

For LT Motors above 55kW, type test reports for type tests as per IS: 325/ IS: 12615 conducted on equipment similar to those proposed to be supplied and carried out within last five years from the date of bid opening shall be submitted. However, if such reports are not available, one motor of each type shall be subjected to type tests for free of cost.

**16.2 Routine Tests**

All motors shall be subjected to routine tests as per IS: 325/ IS: 12615 in the presence of customer or customer representative.

|   |                                 |
|---|---------------------------------|
| <b>TITLE</b><br><br><b>MOTOR</b><br><br><b>DATA SHEET - C</b> | <b>SPECIFICATION NO.</b>        |
|   | <b>VOLUME II B</b>              |
|   | <b>SECTION D</b>                |
|   | <b>REV NO. 00 DATE 18.03.15</b> |
|   | <b>SHEET 1 OF 2</b>             |


| S. No.    | Description  | Data to be filled by successful bidder |
|-----------|--|--|
| <b>A.</b> | <b>General</b>   |  |
| 1         | Manufacturer & country of origin                                   |  |
| 2         | Motor type   |  |
| 3         | Type of starting   |  |
| 4         | Name of the equipment driven by motor & Quantity                   |  |
| 5         | Maximum Power requirement of driven equipment                      |  |
| 6         | Rated speed of Driven Equipment                                    |  |
| 7         | Design ambient temperature   |  |
| <b>B.</b> | <b>Design and Performance Data</b>                                 |  |
| 1         | Frame size & type designation                                      |  |
| 2         | Type of duty   |  |
| 3         | Rated Voltage  |  |
| 4         | Permissible variation for  |  |
| 5         | a) Voltage   |  |
| 6         | b) Frequency   |  |
| 7         | c) Combined voltage & frequency                                    |  |
| 8         | Rated output at design ambient temp (by resistance method)         |  |
| 9         | Synchronous speed & Rated slip                                     |  |
| 10        | Minimum permissible starting voltage                               |  |
| 11        | Starting time in sec with mechanism coupled                        |  |
| 12        | a) At rated voltage  |  |
| 13        | b) At min starting voltage   |  |
| 14        | Locked rotor current as percentage of FLC (including IS tolerance) |  |
| 15        | Torque   |  |
|           | a) Starting  |  |
|           | b) Maximum   |  |
| 16        | Permissible temp rise at rated output over ambient temp & method   |  |
| 17        | Noise level at 1.0 m (dB)  |  |
| 18        | Amplitude of vibration   |  |
| 19        | Efficiency & P.F. at rated voltage & frequency                     |  |
|           | a) At 100% load  |  |
|           | c) At 75% load   |  |


|                |           |      |      |      |  |
|----------------|-----------|------|------|------|--|
| NAME OF VENDOR |           |      | SEAL | REV. |  |
| NAME           | SIGNATURE | DATE |      |      |  |
|                |           |      |      |      |  |

|                                 |       |                          |
|---------------------------------|-------|--------------------------|
| <b>MOTOR<br/>DATA SHEET - C</b> | TITLE | SPECIFICATION NO.        |
|                                 |       | VOLUME II B              |
|                                 |       | SECTION D                |
|                                 |       | REV NO. 00 DATE 18.03.15 |
|                                 |       | SHEET 2 OF 2             |

| S. No.    | Description  | Data to be filled by successful bidder |
|-----------|--|--|
|           | c) At starting   |  |
| <b>C.</b> | <b>Constructional Features</b>   |  |
| 1         | Method of connection of motor driven equipment   |  |
| 2         | Applicable Standard  |  |
| 3         | DOP of Enclosure   |  |
| 4         | Method of cooling  |  |
| 5         | Class of insulation  |  |
| 6         | Main terminal box  |  |
|           | a) Type  |  |
|           | b) Power Cable details (Conductor, size, armour/unarmour)                                    |  |
|           | c) Cable Gland & lugs details (Size, type & material)  |  |
|           | d) Permissible Fault level ( kArms & duration in sec)  |  |
| 7         | Space heater details (Voltage & watts)   |  |
| 8         | Flame proof motor details (if applicable)  |  |
|           | a) Enclosure   |  |
|           | b) suitability for hazardous area  |  |
|           | i Zone   | O / I / II                             |
|           | ii Group   | IIA / IIB / IIC                        |
| 9         | No. of Stator winding  |  |
| 10        | Winding connection   |  |
| 11        | Kind of rotor winding  |  |
| 12        | Kind of bearings   |  |
| 13        | Direction of rotation when viewed from NDE   |  |
| 14        | Paint Shade & type   |  |
| 15        | Net weight of motor  |  |
| 16        | Outline mounting drawing No (To be enclosed as annexure)                                     |  |
| <b>D.</b> | <b>Characteristic curves/ drawings</b><br>(To be enclosed for motors of rating $\geq 55KW$ ) |  |
|           | a) Torque speed characteristic   |  |
|           | b) Thermal withstand characteristic  |  |
|           | c) Current vs time   |  |
|           | d) Speed vs time   |  |

|                |           |      |      |      |  |
|----------------|-----------|------|------|------|--|
| NAME OF VENDOR |           |      | SEAL | REV. |  |
| NAME           | SIGNATURE | DATE |      |      |  |
|                |           |      |      |      |  |

|  |   | CUSTOMER : TSGENCO |                      |                 |   | PROJECT                                |                        | SPECIFICATION : |                    |    |  |
|---|---|--------------------|----------------------|-----------------|---|--|------------------------|-----------------|--------------------|----|--|
|   |   | QUALITY PLAN       |                      | TITLE           |   | 4X270MW BHADRADRI TPS                  |                        | NUMBER :        |                    |    |  |
| SHEET 1 OF 2  |   | BIDDER/ VENDOR     |                      | QUALITY PLAN    |   | SPECIFICATION                          |                        | TITLE           |                    |    |  |
| SL. NO.   | COMPONENT/OPERATION CHARACTERISTICS CHECK | SYSTEM CAT.        | TYPE/METHOD OF CHECK | EXTENT OF CHECK | REFERENCE DOCUMENT                          | ACCEPTANCE NORM                        | FORMAT OF RECORD       | SECTION AGENCY  | VOLUME III REMARKS |    |  |
| 1   | 2   | 3                  | 4                    | 5               | 6   | 7                                      | 8                      | 9               | 10                 | 11 |  |
| 1.0   | ASSEMBLY                                  | MA                 | VISUAL               | 100%            | MANUF'S SPEC                                | MANUF'S SPEC                           | MANUF'S SPEC           | -DO-            | 2                  | -  |  |
|   |   | MA                 | -DO-                 | -DO-            | MFG. DRG./ MFG. SPEC.                       | MFG. DRG./ MFG. SPEC.                  | MFG. DRG./ MFG. SPEC.  | -DO-            | 2                  | -  |  |
|   |   | MA                 | VISUAL               | 100%            | MFG.SPEC./ RELEVANT IS                      | MFG.SPEC./ RELEVANT IS                 | MFG.SPEC./ RELEVANT IS | -DO-            | 2                  | -  |  |
| 2.0   | PAINTING                                  | MA                 | VISUAL               | SAMPLE          | MANUF'R'S SPEC/BHEL SPEC./RELEVANT STANDARD | BHEL SPEC. SAME AS COL.7               | LOG BOOK               |                 | 2                  | -  |  |
| 3.0   | TESTS                                     | MA                 | -DO-                 | 100%            | IS-325/ BHEL SPEC./ DATA SHEET              | SAME AS COL.7                          | TEST REPORT            |                 | 2                  | 1  |  |
|   |   | MA                 | MEASUREMENT & VISUAL | 100%            | APPROVED DRG./DATA SHEET                    | APPROVED DRG./DATA SHEET & RELEVANT IS | INSPN. REPORT          |                 | 2                  | 1  |  |
|   |   |                    |                      |                 |   |  |                        |                 |                    |    |  |
| BHEL  |   | PARTICULARS        |                      | BIDDER/VENDOR   |   |  |                        |                 |                    |    |  |
|   |   | NAME               |                      |                 |   |  |                        |                 |                    |    |  |
|   |   | SIGNATURE          |                      |                 |   |  |                        |                 |                    |    |  |

|  |   | CUSTOMER : TSGENCO  |                      |                 | PROJECT             |                     |                  | SPECIFICATION : |        |            |                               |  |
|---|---|---|----------------------|-----------------|---------------------|---------------------|------------------|-----------------|--------|------------|-------------------------------|--|
| QUALITY PLAN  |   | BIDDER/ VENDOR SYSTEM   |                      |                 | TITLE               |                     |                  | NUMBER :        |        |            |                               |  |
| SHEET 2 OF 2  |   | VENDOR SYSTEM   |                      |                 | QUALITY PLAN        |                     |                  | SPECIFICATION : |        |            |                               |  |
| SL. NO.   | COMPONENT/OPERATION CHARACTERISTICS CHECK | CAT.  | TYPE/METHOD OF CHECK | EXTENT OF CHECK | REFERENCE DOCUMENT  | ACCEPTANCE NORM     | FORMAT OF RECORD | SECTION         | AGENCY | VOLUME III | REMARKS                       |  |
|   |   |   |                      |                 |                     |                     |                  | P               | W      | V          |                               |  |
| 1   | 2   | 3   | 4                    | 5               | 6                   | 7                   | 8                | 9               | 10     | 11         |                               |  |
|   | 3.NAMEPLATE DETAILS                       | MA  | VISUAL               | 100%            | IS-325 & DATA SHEET | IS-325 & DATA SHEET | INSPN. REPORT    |                 | 2      | 1          | -                             |  |
|   | NOTES:                                    | <p>1 ROUTINE TESTS ON 100% MOTORS SHALL BE DONE BY THE VENDOR. HOWEVER, BHEL SHALL WITNESS ROUTINE TESTS ON RANDOM SAMPLES. THE SAMPLING PLAN SHALL BE MUTUALLY AGREED UPON</p> <p>2 WHERE EVER CUSTOMER IS INVOLVED IN INSPECTION, (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER.</p> <p>3 FOR EXHAUST/VENTILATION FAN MOTORS OF RATING UPTO 1.5KW , ONLY ROUTINE TEST CERTIFICATES SHALL BE FURNISHED FOR SCRUTINY.</p> |                      |                 |                     |                     |                  |                 |        |            |                               |  |
|   | Legends for Inspection agency             | <p>1. BHEL/CUSTOMER</p> <p>2. VENDOR (MOTOR MANUFACTURER)</p> <p>3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER)</p> <p>P. PERFORM</p> <p>W. WITNESS</p> <p>V. VERIFY</p>  |                      |                 |                     |                     |                  |                 |        |            |                               |  |
| BHEL  |   | PARTICULARS   |                      |                 | BIDDER/VENDOR       |                     |                  |                 |        |            |                               |  |
|   |   | NAME  |                      |                 |                     |                     |                  |                 |        |            |                               |  |
|   |   | SIGNATURE   |                      |                 |                     |                     |                  |                 |        |            |                               |  |
|   |   | DATE  |                      |                 |                     |                     |                  |                 |        |            |                               |  |
|   |   |   |                      |                 |                     |                     |                  |                 |        |            | BIDDER'S/VENDORS COMPANY SEAL |  |



**TECHNICAL SPECIFICATION FOR**  
**ELECTRIC HOIST**  
**4X270 MW BHADRADRI TPS-FGD**

SPECIFICATION NO. PE-TS-440-563-A002

VOLUME - IIB

SECTION - I

SUB-SECTION - IC

REV 00

DATE MAY 2023

**SUB-SECTION - IC**  
**DATA SHEET-A**



**TECHNICAL SPECIFICATION FOR  
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### A.0.0 TECHNICAL DATA SHEET OF ELECTRIC HOIST

| Sl.no | DESCRIPTION                                 | TECHNICAL PARTICULARS   |
|-------|---|---|
| 1.0   | Type  | Steel wire electric hoist with electrically operated trolley  |
| 2.0   | Scope (Qty., Capacity, Lift, Travel Length) | As per Annexure A, sec I, Vol-IIB   |
| 3.0   | Type of service                             | Indoor  |
| 4.0   | Overload test                               | 125% of SWL   |
| 5.0   | Design Ambient temperature                  | 50° C   |
| 6.0   | General Design                              | As per IS: 3938 / 1983 or latest  |
| 6.1   | Design standards                            | IS: 3938, IS: 2266, IS: 4029, IS: 900, IS: 4237, IS: 694, IS: 3043, IS: 1822, IS: 2147, IS: 1554, IS: 325, IS: 15660, IS 9968 Part I etc as per latest revision |
| 6.2   | Duty class                                  | Class II duty   |
| 7.0   | Operating speed                             |   |
| 7.1   | Hoisting speed                              | 3 MPM.  |
| 7.2   | Trolley speed                               | 15 MPM  |
| 8.0   | Type of transmission                        | Through Electric motor and gear box.  |
| 9.0   | Wire Rope                                   |   |
| 9.1   | Construction / core                         | 6 X 36/ 6X37 Steel core   |
| 9.2   | Code  | IS:2266   |
| 9.3   | Number of falls                             | Min. 4  |
| 9.4   | Factor of safety                            | 5   |
| 10.0  | Load Hook and block                         | NORMALISED HOOK ONLY  |
| 10.1  | Type of load hook                           | Plain shank trapezoidal section with safety latch.  |
| 10.2  | Load hook Code                              | IS: 15560   |
| 10.3  | Load hook Material                          | As per IS:15560   |
| 10.4  | Hook suspension                             | Thrust bearing  |
| 10.5  | Material of block suspension                | Fabricated from steel plate, Material: IS: 2062   |
| 11.0  | Gearing                                     |   |
| 11.1  | Type  | Spur / Helical  |
| 11.2  | Gear/ pinion material                       | as per IS 3938  |
| 11.3  | Lubrication                                 | Oil splash/ grease lubricated   |
| 11.4  | Bearing type                                | Antifriction Ball / Roller  |
| 12.0  | Trolley drive                               |   |



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|      |   |  |
|------|---|--|
| 12.1 | Wheel                                       | Single flange taper thread   |
| 12.2 | Wheel conform to (Std. / code)              | IS: 3938   |
| 12.3 | Wheel material                              | C55Mn75/ En-8/ En-9/ As per IS 3938. (Max hardness 200 BHN)  |
| 12.4 | Bearing type                                | Antifriction Ball / Roller   |
| 12.5 | Trolley type                                | Rolled structural steel with side plates extended beyond wheel flanges to protect wheels.  |
| 12.6 | Hardness                                    | Max hardness 200 BHN   |
| 13.0 | SHEAVE                                      |  |
| 13.1 | Material                                    | Fabricated from steel plate. IS: 2062 Gr. A or Gr. B / as per IS: 3938   |
| 13.2 | Bearing type                                | Antifriction Ball / Roller.  |
| 14.0 | BRAKE (HOIST and TROLLEY)                   |  |
| 14.1 | Type  | DC EM brakes disc type (fail to safety).   |
| 14.2 | Capacity                                    | 150 % of FLT for hoisting, 125% of FLT for travel  |
| 14.3 | Number                                      | One number for each motor.   |
| 15.0 | ROPE DRUM                                   | As per IS 3938   |
| 15.1 | Material                                    | Seamless steel pipe. ASTM A106 / A53 grade B   |
| 15.3 | Type of groove                              | Right hand groove or Right hand and left hand groove.<br>(Shall be decided during detail engineering)                              |
|      |   |  |
| 17.0 | TYPE OF DSL (Travel)                        | PVC Shrouded bus bar (GI) conductor type DSL   |
| 16.0 | <b>Buffer stop/wheel stop</b>               | Buffer shall be provide at the end of monorail beam  |
| 18.0 | MOTORS                                      |  |
| 18.1 | Type  | Sq. Cage induction, TEFC, S4 duty, 40% CDF.  |
| 18.2 | Number of start                             | 150 starts / hr  |
| 18.3 | Voltage, Phase and Frequency                | 415V + 10%, 3 phase, 4 wire, 50 Hz, ± 5 %  |
| 18.4 | Class of insulation                         | Class "F" and temperature rise limited to class B.   |
| 18.5 | Type of enclosure                           | TEFC   |
| 18.6 | Degree of protection provided for enclosure | IP-54/IP-55 depending upon Indoor / Outdoor application  |
| 18.7 | Margin                                      | Motor rating will be calculated keeping margin of at least 15% over the maximum power requirement in the duty condition specified. |
| 19.0 | LIMIT SWITCHES                              | Hoisting <span style="float: right;">Trolley</span>  |



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|      |                                   |   |            |
|------|-----------------------------------|---|------------|
| 19.1 | Type                              | Snap action, self actuating type  | Lever type |
| 20.0 | Control panel                     | <ul style="list-style-type: none"> <li>* Fabricated from Cold rolled sheet steel not less than 2.5mm for front &amp; rear &amp; 2mm for side, top &amp; bottom portion with gland plate of 3mm thick.</li> <li>* Degree of protection shall be IP 54.</li> <li>* Power on indicating lamps shall be provided</li> <li>* Panel illumination lamps operated by door switch.</li> <li>* 2 nos earthing terminals on panel.</li> <li>* 20 % spares terminals (clip on type) shall be provided.</li> <li>* Power and control terminals (clip on type) shall be on separate channels.</li> <li>* Gland plate shall be double brass compression type.</li> </ul> |            |
| 20.1 | Qty                               | 1 No.   |            |
| 21.0 | Pendent Push buttons              | Up /down / forward / Reverse push buttons. Indicative marking for easy operation shall be provided.   |            |
| 22.0 | <b>Emergency stop push button</b> | Provided. ( Mushroom head)  |            |
| 23.0 | Power cables                      | FRLS / EPR flexible Cu cable / Aluminum cable   |            |
| 24.0 | Control cable                     | FRLS / EPR flexible Cu cable  |            |
| 25.0 | Flexible trailing cable           | FRLS / EPR flexible Cu cable / Aluminum cable   |            |
| 26.0 | Control Voltage                   | 110 V (shall be derived through suitably rated 415/110V control transformer.)   |            |



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## ANNEXURES

|              |   |
|--------------|---|
| ANNEXURE-I   | MAKES OF SUB VENDORS ITEMS                                  |
| ANNEXURE-II  | MANDATORY SPARE LIST  |
| ANNEXURE-III | PAINTING SPECIFICATION                                      |
| ANNEXURE-IV  | INSPECTION AND TESTING REQUIREMENT                          |
| ANNEXURE-V   | DRAWINGS/ DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT |
| ANNEXURE-VI  | CHECK LIST FOR OPERATION AND MAINTENANCE MANUAL             |
| ANNEXURE-VII | STANDARD PACKING LIST                                       |



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**ANNEXURE -II**

**MANDATORY SPARES FOR ELECTRIC HOIST**

|      |   |  |
|------|---|--|
| 1.1  | Bearings for travel wheels  | 4 set  |
| 1.2  | Bearings for gear boxes for each type of hoist                                  | 4 set  |
| 1.3  | Break liners for all the brakes   | 200% of total population of each type & size       |
| 1.4  | Oil seals   | 200% of total population of each type, size rating |
| 1.5  | Brake springs for all brakes  | 200% of total population of each type, size rating |
| 1.6  | Wire ropes for hooks  | 200% installed on each crane and hoist             |
| 1.7  | Solenoid coils for brakes   | 4 set  |
| 1.8  | Overload relay for motors   | 4 Nos.   |
| 1.9  | Limit switches for hoists and travel mechanisms                                 | 4 set  |
| 1.10 | (i) Spare motors for hoist motion   | 2 Nos.   |
|      | (ii) Spare motors for travel motion   | 2 Nos.   |
| 1.11 | Travel machinery  |  |
|      | i. Gear wheel   | 2 set  |
|      | ii. Internal clip   | 4 Nos.   |
|      | iii. Pinion   | 2 No.  |
| 2    | Electrical Items  |  |
| 2.1  | 415 Volt Motor (Upto 30 KW Rating)  |  |
| a    | Driving End & Non-Driving End Bearing   | 4 Set for each type and rating of Motor            |
| b    | Cooling Fan   | 4 Nos. for each type and rating of Motor           |
| c    | Motor Terminal Block  | 10 Nos. for each type and rating of Motor          |
| d    | Complete Set of Coupling  | 2 Set of each application                          |
| 3    | C&I Items   |  |
| a    | Back-up panel mounted devices (Selector switches/ Push buttons/ Indicators etc. | 10% of installed capacity                          |
| b    | Lamps/ LEDs   | 200% of the total quantity                         |
| c    | Blank Tiles   | 20% of installed capacity                          |
| d    | MCBs  | 20% of each type & rating                          |
| e    | Fuses/ Fuse holder  | 200% of each type & rating                         |

- a. "One (1) set of each type & size" is defined as 100% requirement for one hoist.  
b. 200% of total population of each type, size and rating is defined as 200% requirement for one hoist.

**NOTES**



**TECHNICAL SPECIFICATION FOR  
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- 1 Set for the particular equipment, would include all components required to replace the item, for example a set of bearing shall include all hardware normally required while replacing the bearings. It is further, intended that the assembly / sub-assembly which have different orientation (like left hand or right hand, top or bottom), different direction of rotation or mirror image positioning or any other reasons which result in maintaining two different sets of the spares to be used for the subject assembly / sub-assembly, these shall be considered as different types of assembly/sub-assembly. One (1) set means 100% requirement for one crane.
- 2 Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc. these shall cover all the items supplied and installed.
- 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.
- 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.
- 5 Mandatory spares shall not be dispatched before dispatch of corresponding main equipment. The spares shall be treated and packed for a long storage under the climatic condition prevailing at site.
- 6 **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.
- 7 **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.
- 8 Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender specification, same shall be deemed to have been covered in bidder's scope of supply.



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**ANNEXURE-III  
PAINING SPECIFICATION**

**A) Structural**

**Surface preparation** : De greasing and Mechanical cleaning with wire brush or hand tool. (SA 1/ ST 2 / ST 3 as applicable)

**Primer** : Red oxide Zinc phosphate (Alkyd medium)- 2 coat , DFT 35  $\mu$  per coat.

**Finish Coat** : Synthetic enamel (Alkyd medium) as per IS: 2932- 2 coats, DFT 35  $\mu$  per coat.

**Total DFT** : 140 $\mu$

**B) Electrical /Control Panel**

**Surface preparation**: Seven tank process

**Primer** : Red Oxide Zinc phosphate (Alkyd medium)- 2 coat , Minimum DFT 35  $\mu$  per coat.

**Finish Coat** : Synthetic enamel (Alkyd medium) as per IS: 2932- 2 coats, Minimum DFT 35  $\mu$  per coat.

**Total DFT** : 140  $\mu$

**COLOR SHADE FOR CRANE**

| S. No | Item Description      | Color Shade   | Remarks                            |
|-------|-----------------------|---|------------------------------------|
| 1     | Structure             | Golden yellow, shade 356 as per IS-5  |                                    |
| 2     | Bottom block assembly | Golden yellow, shade 356 as per IS-5  | With black strip                   |
| 3     | Hooks                 | Golden yellow, shade 356 as per IS-5  | With 100 mm wide black zebra strip |
| 4     | Panels and motors     | Color shade for Control panels shall be Opaline green for exterior and semi glossy white for interior |                                    |

**Notes:**

- Surface preparation shown above is as per Swedish Standards SIS 05-5900. Degreasing will be as per Standard SSPC-SP1.
- In case of insulated surfaces, only primer coats shall be applied.
- Gun metal/SS items with piping and G.I. pipes will not be painted. Further SS/GI piping shall be given necessary colour banding for identification as per colour scheme.
- All instruments shall be painted as per manufacturer standard practice.
- All structural steel items shall be painted at site. Piping shall go with primer coating & finish paint shall be applied at site. Equipment shall be finish painted at shop.
- Method of painting application shall be as per paint manufacturer's recommendation.
- Paint makes - Asian Paints/Berger Paints/Shalimar Paints/Goodlass Nerolac/Addison Paints/Grand Paints/Bombay Paints/Jenson & Nicholson/CDC Carboline/Jotun/Hemple/Akzonoble



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**ANNEXURE IV- INSPECTION AND TESTING REQUIREMENT**

**Procedure for Load/Overload testing of Electric wire rope hoist at Manufacturer's Works**

Objective: To demonstrate final No load, Load, Overload, Deflection & Functional tests of assembled hoist for the purpose of acceptance in line with IS 3938 and other relevant standards.

**Basic Assumptions / Inputs for testing at Works:**

- 1) Actual job hook shall be used for load, overload tests for hoisting.
- 2) Actual wire ropes shall be used for load, overload testing.
- 3) Shop cables can be used for temporary power supply for the purpose of showing various functional tests at shop.
- 4) Interlock and limit switch operation check will be shown for hoisting and CT motion.

**Procedure for Load / Overload testing:** Complete procedure shall be as per IS 3938.

- 1) All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standards at the hoist or equipment maker's works.
- 2) The motor currents shall be checked and shall be within the rated full load current of each motor at safe working load. Normal speeds shall be achieved during full load tests.
- 3) The hoist shall be tested at manufacturer's works at 125 percent of the safe working load. The hoist shall be capable of lifting load from mid-air.
- 4) Brakes -The brakes shall be capable of holding a load 25 percent in excess of maximum safe working load when the load is suspended by the hook.
- 5) Safety device - Test for the effectiveness of the automatic device to limit the upward and downward travel of the hook.
- 6) Any test required by the purchaser beyond those called for in the appropriate Indian Standard shall be carried out.
- 7) Insulation Tests - Before the hoist is connected to the supply, the insulation of the electrical equipment shall be tested by a suitable instrument and any defect revealed shall be rectified.
- 8) All hoists performance test shall be duly certified by government approved agency.



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**ANNEXURE-V**

**A: DRAWINGS/ DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT**

The successful bidder shall submit the following drawings / documents during detail engineering for customer's approval /information:

| Sl. No. | BHEL DRG.NO        | DRAWING TITLE  | SUBMISSION SCHEDULE   |
|---------|--------------------|--|---|
| 1       | PE-V0-440-563-A202 | GA Drawing for Electric Hoist, DSL arrangement and painting details  | REV-0 WITHIN 30 DAYS FROM PO. BHEL WILL COMMENT ON R0 WITHIN 18 DAYS FROM RECEIPT. REV-1 TO BE SUBMITTED BY VENDOR WITHIN 7 DAYS. BHEL WILL FURNISH APPROVAL IN 18 DAYS FROM RECEIPT. |
| 2       | PE-V0-440-563-A210 | Mechanism Sizing Calculation   |   |
| 3       | PE-V0-440-563-A219 | Schematic Circuit Diagram including cable schedule and panel diagram |   |

Following documents shall be submitted by vendor for information –

| Sl. No. | BHEL DRG.NO        | DRAWING TITLE      |
|---------|--------------------|--------------------|
| 1       | PE-V0-440-563-A206 | O & M Manual       |
| 2       | PE-V0-440-563-A207 | Packing list       |
| 3       | PE-V0-440-563-A208 | Erection procedure |

Note:

1. MANDATORY SPARES SHALL BE IN FORM OF BBU
2. INCOMPLETE DRAWINGS/DOCUMENTS SHALL NOT BE TREATED AS SUBMITTED.
3. SQP ATTACHED IN SPECIFICATION TO BE FOLLOWED. VENDOR SHALL SUBMIT SIGNED & STAMPED COPY OF THE SAME.
4. MAKE OF BOIS SHALL BE FURNISHED BY VENDOR SHALL BE REVIEWED.

**B.0 DOCUMENT MANAGEMENT SYSTEM**

1.0 Bidder to note that BHEL reserves the right for drawing/document submission through web based Document Management System. Bidder would be provided access to the DMS for drawing/document approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7.
- Internet speed – 2 mbps (Minimum preferred).
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked.
- Vendor's Internal proxy setting should not block DMS application's link (<http://124.124.36.198/wrenchwebaccess/login.aspx>)



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### C.0 NO.OF DRAWINGS/DOCUMENTS FOR SUBMISSION

| S. No | Description                                   | TSGENCO           |                    |                                |                |          |           |          |            | Consultant |     |      | Equipment Vendor | Remarks |
|-------|---|-------------------|--------------------|--------------------------------|----------------|----------|-----------|----------|------------|------------|-----|------|------------------|---------|
|       |   | Director Projects | Director Technical | CE/Civil Thermal Projects Hyd. | CE/ TPC-I, Hyd | CE/ O&M/ | SE/ Civil | SE/E&M / | DE Constr. |            | HYD | BTPS |                  |         |
| A     | <b>Letter Of Intent or Contract Documents</b> | 1                 | 1                  | 1                              | S              | 1        | 2         | 2        | 1          | 1          | 1   | 1    | 2                |         |
| B     | <b>Vendor Drawings</b>                        |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
| 1.    | Preliminary                                   | 1                 | 1                  | 1                              | 2              | 1        | 1         | 2        | 2          | 12         | 1   | -    | S                |         |
| 2.    | Return preliminary with comments              | -                 | -                  | 1                              | 2              | 1        | 1         | 1        | 1          | S          | 1   | -    | 1                |         |
| 3.    | Final and any revision thereof                |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
|       | a. Civil                                      | 1                 | 1                  | 6+1T                           | 1              | 1        | 6+1T      | 1        | -          | 2+1T       | 1   | 1    | S                |         |
|       | b. E&M  | 1                 | 1                  | 1                              | 6+1T           | 1        | 1         | 6+1T     | 1          | 2+1T       | 1   | 1    | S                |         |
| C.    | <b>Design Drawings</b>                        |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
| 1.    | Preliminary                                   |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
|       | a. Civil                                      | 1                 | 1                  | 2                              | 1              | 1        | 2         | 1        | 1          | 4          | 1   | 1    | S                |         |
|       | b. E&M  | 1                 | 1                  | 1                              | 2              | 1        | 1         | 2        | 1          | 4          | 1   | 1    | S                |         |
| 2.    | Released for construction                     |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
|       | a. Civil                                      | 1                 | 1                  | 2                              | 1              | 1        | 6         | 1        | 1          | 1          | 1   | 2    | S                |         |
|       | b. E&M  | 1                 | 1                  | 1                              | 1              | 2        | 1         | 6        | 1          | 1          | 1   | 2    | S                |         |
| 3.    | Return marked 'As built'                      |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
|       | a. Civil                                      | -                 | -                  | 1                              | -              | -        | 1         | -        | -          | 1          | 1   | S    | 1                |         |
|       | b. E&M  | -                 | -                  | -                              | 1              | -        | -         | 1        | 1          | 1          | 1   | S    | 1                |         |
| 4.    | As built drawings                             |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
|       | a. Civil                                      | -                 | -                  | 1+1T                           | -              | 2+1T     | 5+1T      | -        | 1          | 1+1T       | -   | 1    | S                |         |
|       | b. E&M  | -                 | -                  | 1                              | 2+1T           | 2+1T     | -         | 5+1T     | 1+1T       | 1+1T       | -   | 1    | S                |         |

| S. No | Description                         | TSGENCO           |                    |                                |                |          |           |          |            | Consultant |     |      | Equipment Vendor | Remarks |
|-------|-------------------------------------|-------------------|--------------------|--------------------------------|----------------|----------|-----------|----------|------------|------------|-----|------|------------------|---------|
|       |                                     | Director Projects | Director Technical | CE/Civil Thermal Projects Hyd. | CE/ TPC-I, Hyd | CE/ O&M/ | SE/ Civil | SE/E&M / | DE Constr. |            | HYD | BTPS |                  |         |
| D     | Progress Report Monthly             |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
| 1.    | Equipment vendor                    | 1                 | 1                  | 1                              | 2              | 1        | 1         | 2        | 1          | 1          | 1   | 1    | S                |         |
| 2.    | Consultant                          | 1                 | 1                  | 2                              | 2              | 1        | 1         | 2        | 1          | S          | 1   | 1    | Nil              |         |
| E     | Test & Inspection Reports           |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
| 1.    | Equipment manufacturer              |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
|       | a. Civil                            | 1                 | 1                  | 1                              | 2              | 1        | 1         | 1        | -          | 11         | 1   | 1    | S                |         |
|       | b. E&M                              | 1                 | 1                  | -                              | 2              | 1        | -         | 1        | 1          | 11         | 1   | 1    | S                |         |
| 2.    | Consultant                          | 1                 | 1                  | -                              | 2              | 1        | -         | 1        | 1          | S          | -   | 1    | -                |         |
| F     | Instruction Manuals/Data Books      |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
| 1.    | Equipment manufacturer              |                   |                    |                                |                |          |           |          |            |            |     |      |                  |         |
|       | a. Civil                            | 1                 | 1                  | 1+1T                           | 1              | 1        | 6+1T      | 1        | 1          | 2+1T       | 1   | 1    | S                |         |
|       | b. E&M                              | 1                 | 1                  | -                              | 3+1T           | 1        | -         | 6+1T     | 2          | 3+1T       | 1   | 1    | S                |         |
| 2.    | Consultant                          | 1                 | 1                  | -                              | 10+1T          | 1        | -         | 15+1T    | -          | S          | 1   | 1    | Nil              |         |
| G     | Consultant                          | 1                 | 1                  | 1                              | 8+1T           | 1        | 1         | 2        | 1          | 1          | 1   | 1    | S                |         |
| H     | Design Calculations                 | 1                 | 1                  | 1                              | 8+1T           | 1        | 1         | 2        | 1          | 1          | 1   | 1    | S                |         |
| I     | Final consulting Engineering Report | 1                 | 1                  | 1                              | 10             | 1        | 1         | 2        | 1          | S          | 1   | 1    | Nil              |         |

S – Source, T – Transparency & Soft Copy on CD,

TSGENCO : Telangana State Power Generation Corporation Limited

Director, Projects, Hyd : Director/ Projects, TSGENCO, Vidyut Soudha, Hyderabad – 500 082

#### Note:

a) Bidder to note that all the drawings and documents shall also be submitted on CD's (compact disc) in following software.

- I. All the drawings shall be prepared in AutoCAD.
- II. All the documents shall be prepared MS word / EXCEL.
- III. PDF files for all drawings/documents shall also be submitted.



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**ANNEXURE -VI**

**Check List for Operation & Maintenance Manual**

0Project name :  
1Project number :  
2Package Name :  
3PO reference :  
4Document number :  
5Revision number :

| Sl.no. & Sections | Description   | Tick ( √ )if included in Manual |    |                | Remarks |
|-------------------|---|---------------------------------|----|----------------|---------|
|                   |   | Yes                             | No | Not Applicable |         |
| <b>1.</b>         | <b>Cover page</b>   |                                 |    |                |         |
| 1.1               | Project Name  |                                 |    |                |         |
| 1.2               | Customer/consultant Name  |                                 |    |                |         |
| 1.3               | Name of Package   |                                 |    |                |         |
| 1.4               | Supplier details with phone, FAX ,email address , Emergency Contact number  |                                 |    |                |         |
| 1.5               | Name and sign of prepared by , checked by & approved by   |                                 |    |                |         |
| 1.6               | Revision history with approval Details  |                                 |    |                |         |
| <b>2.0</b>        | <b>Index</b>  |                                 |    |                |         |
| 2.1               | showing the sections & related page nos<br>All the pages should be numbered section wise  |                                 |    |                |         |
| <b>3.0</b>        | <b>Description of Plant/System</b>  |                                 |    |                |         |
| 3.1               | Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases |                                 |    |                |         |
| 3.2               | Equipment list and basic parameter with Tag numbers   |                                 |    |                |         |
| 3.3               | Data sheets approved by Customer/for information and catalogues provided by original manufacturer   |                                 |    |                |         |
| 3.4               | Associated other packages and Interface /terminal points  |                                 |    |                |         |
| 3.5               | P&ID & Process Diagrams   |                                 |    |                |         |
| 3.6               | GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)  |                                 |    |                |         |
| 3.7               | Single line/wiring diagrams   |                                 |    |                |         |
| 3.8               | Control philosophy /control write-ups   |                                 |    |                |         |
| <b>4.0</b>        | <b>Commissioning Activities (if not covered in separate document i.e. erection manual, commissioning manual)</b>  |                                 |    |                |         |



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|      |   |  |  |  |  |
|------|---|--|--|--|--|
| 4.1  | Pre-Commissioning Checks  |  |  |  |  |
| 4.2  | handling of items at site   |  |  |  |  |
| 4.3  | Storage at site   |  |  |  |  |
| 4.4  | Unpacking & Installation procedure  |  |  |  |  |
| 5.0  | <b>Operation Guidelines for plant personal/user/operator</b>  |  |  |  |  |
| 5.1  | Interlock & Protection logic along with the limiting values of protection settings for the equipment along with brief philosophy behind the logic, drawings etc. to be provided.  |  |  |  |  |
| 5.2  | Start up, normal operation and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc. with Equipment isolating procedures to be mentioned. |  |  |  |  |
| 5.3  | Do's & Don't of the equipments.   |  |  |  |  |
| 5.4  | Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition   |  |  |  |  |
| 5.5  | Parameters to be monitored with normal values and limiting values   |  |  |  |  |
| 5.6  | Trouble shooting with causes and remedial measures  |  |  |  |  |
| 5.7  | Routine operational checks, recommended logs & records  |  |  |  |  |
| 5.8  | Changeover schedule if more than one auxiliary for the same purpose is given  |  |  |  |  |
| 5.9  | Painting requirement and schedule   |  |  |  |  |
| 5.10 | Inspection, repair , Testing and calibration procedures   |  |  |  |  |
| 6.0  | <b>Maintenance guidelines for plant personal</b>  |  |  |  |  |
| 6.1  | List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.  |  |  |  |  |
| 6.2  | Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given. |  |  |  |  |
| 6.3  | Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given  |  |  |  |  |
| 6.4  | Long term maintenance schedules especially for structural, foundations etc.   |  |  |  |  |



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|-------------|--|--|--|--|--|
| <b>6.5</b>  | Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul. Storage/handling requirement of consumables/self-life. |  |  |  |  |
| <b>6.6</b>  | List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given  |  |  |  |  |
| <b>6.7</b>  | List of vendors & Sub-vendors with their latest addresses, service centres , Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.  |  |  |  |  |
| <b>6.8</b>  | List of mandatory and recommended spare parts list   |  |  |  |  |
| <b>6.9</b>  | Tentative Lead time required for ordering of spares from the equipment supplier  |  |  |  |  |
| <b>6.10</b> | Guarantee and warranty clauses   |  |  |  |  |
| <b>7.0</b>  | <b>Statutory and other specific requirements considerations.</b>   |  |  |  |  |
| <b>8.0</b>  | <b>List of reference documents</b>   |  |  |  |  |
| <b>9.0</b>  | <b>Binding as per requirement</b>  |  |  |  |  |

Checked by  
Dealing Engineer

Key Resource Person

Section Head



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**ANNEXURE -VII  
STANDARD PACKING LIST**

PROJECT TITLE:

| Sl no.   | Description of items   | Rating<br>(to be<br>indicated by<br>supplier) | Qty<br>(to be<br>indicated<br>by<br>supplier) | Box<br>No. | Remark                  |
|--|--|---|---|------------|-------------------------|
| EH details-<br>Vendor job no.-<br>Area-<br>Identification no.-<br>CAP- (T) , Lift- (m), Span- (m), Travel- (m) |  |   |   |            |                         |
| A. Main Crane  |  |   |   |            |                         |
| 1  | Girder   | in nos.                                       |   |            |                         |
| 2  | EH assembly not less than following items -<br>Hook,<br>Rope drum,<br>Sheaves & eq. assly,<br>Hoist motor, Hoist brake, Hoist gear box<br>Wire rope,<br>CT motor, CT brake, CT gear box<br>CT wheel assembly |   |   |            |                         |
| 3  | VVVF for hoisting  | in kW   |   |            | fitted to control panel |
| 4  | VVVF for CT  | in kW   |   |            | fitted to control panel |
| 5  | VVVF for LT  | in kW   |   |            | fitted to control panel |
| 6  | Driving side end carriage  | in nos.                                       |   |            |                         |
| 7  | Non-Driving side end carriage  | in nos.                                       |   |            |                         |
| 8  | LT gear box assembly with motor and brake  | in nos.                                       |   |            |                         |
| 9  | LT wheel assembly  | in nos.                                       |   |            |                         |
| 10   | LT end stopper   | in nos.                                       |   |            |                         |
| 11   | CT stopper   | in nos.                                       |   |            |                         |
| 12   | Hoisting limit switch  | in nos.                                       |   |            |                         |
| 13   | CT limit switch  | in nos.                                       |   |            |                         |
| 14   | LT limit switch  | in nos.                                       |   |            |                         |
| 15   | CT limit switch striker plate  | in nos.                                       |   |            |                         |
| 16   | LT limit switch striker plate  | in nos.                                       |   |            |                         |
| 17   | LT rubber buffer   | in nos.                                       |   |            |                         |



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|----------------------------------|--|--|--|--|--|
| 18                               | Control panel with base  | in nos.                                |  |  |  |
| 19                               | Pendent with pendent cable   | in nos.                                |  |  |  |
| 20                               | All cables as per approved cable schedule<br>(include approved cable schedule as annexure) | in lot                                 |  |  |  |
| 21                               | Rope clamp   | in nos.                                |  |  |  |
| 22                               | Festooning cable for CT motion / T track arnagement  | in lot                                 |  |  |  |
| 23                               | cable tray ( for cable from isolating switch to DSL) along with tying arrangement          | min 10 mtr                             |  |  |  |
| 24                               | Earthing cable   | in 'm'                                 |  |  |  |
| 25                               | Cable glands   | in nos.                                |  |  |  |
| 26                               | Cable lugs   | in nos.                                |  |  |  |
| 27                               | Fasteners  | in nos.                                |  |  |  |
| 28                               | Temporary cable  | in 'm'                                 |  |  |  |
| 29                               | Isolating switch   | rating/no.                             |  |  |  |
| 30                               | Lubricants   | ltr.                                   |  |  |  |
| 31                               | Any other items  |  |  |  |  |
| <b>B. DSL and accessories</b>    |  | <b>to be checked from DSL drawing</b>  |  |  |  |
| 1                                | DSL (rating, type)   | in 'm'                                 |  |  |  |
| 2                                | Current collector  | in nos.                                |  |  |  |
| 3                                | Current collector mounting bar   | in nos.                                |  |  |  |
| 4                                | DSL brackets   | in nos.                                |  |  |  |
| 5                                | End cap  | in nos.                                |  |  |  |
| 6                                | Centre power feed kit  | in nos.                                |  |  |  |
| 7                                | 4 pole hanger clamp  | in nos.                                |  |  |  |
| 8                                | Splice cover   | in nos.                                |  |  |  |
| 9                                | Joint clamp  | in nos.                                |  |  |  |
| 10                               | Indication lamp for DSL  | in nos.                                |  |  |  |
| 11                               | Any other  |  |  |  |  |
| <b>C. RAIL and accessories</b>   |  | <b>Applicable for crane only</b>       |  |  |  |
| <b>Applicable for crane only</b> |  | <b>to be checked from rail drawing</b> |  |  |  |
| 1                                | Rail length total (size)   | in 'm'                                 |  |  |  |
| 2                                | Alignment block  | in nos.                                |  |  |  |
| 3                                | Rail clamp total   | in nos.                                |  |  |  |
| 4                                | End stopper  | in nos.                                |  |  |  |
| 5                                | Sole plate (thk in mm)<br>(*in case of RCC gantry girder)                                  | in 'm'                                 |  |  |  |
| 6                                | Anchor bolt for DSL (size)<br>(*in case of RCC gantry girder)                              | in nos.                                |  |  |  |



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| 7   | Foundation bolt for DSL (size)<br>(*in case of RCC gantry girder) | in nos. |  |  |  |
| 8   | ISMC for DSL (size)<br>(*in case of RCC gantry girder)            | in nos. |  |  |  |
| 9   | Any other   |         |  |  |  |
| <b>D. Maintenance tools &amp; tackles</b> |   |         |  |  |  |
| 1   | Complete set of ring spanners<br>(Indicate the sizes offered)     | 1 Set   |  |  |  |
| 2   | Complete set of screwdrivers<br>(Min. 6 Nos., Indicate the sizes) | 1 Set   |  |  |  |
| 3   | Adjustable Spanner  | 1 No.   |  |  |  |
| 4   | Insulated plier   | 1 No.   |  |  |  |
| 5   | Wrench spanner  | 1 No.   |  |  |  |
| 6   | Grease Gun  | 1 No.   |  |  |  |
| 7   | Oil Gun.  | 1 No.   |  |  |  |
| 8   | Hand Lamp.  | 1 No.   |  |  |  |
| 9   | Line tester   | 1 No.   |  |  |  |
| 10  | Hydraulic jack  | 1 No.   |  |  |  |
| <b>E. E&amp;C spares</b>                  |   |         |  |  |  |
| 1   | Overload relay  | in nos. |  |  |  |
| 2   | Limit switch  | in nos. |  |  |  |
| 3   | Fuses   | in nos. |  |  |  |

**Note: Packing list to be verified by vendor during supervision.**

Not applicable items to be marked NA in packing list



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**SUB-SECTION - IIA**  
**STANDARD TECHNICAL REQUIREMENT**  
**(MECHANICAL)**



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### **STANDARD TECHNICAL SPECIFICATION**

This specification covers the design, engineering, manufacture, inspection and testing at manufacturer's works, properly packed and delivery to site for the steel wire rope electric hoist as specified in the Data Sheet A enclosed. The equipment specified shall include all accessories required for trouble free operation.

#### **2.0.0 Design Particulars**

The steel wire rope electric hoist covered in this specification shall be suitable for the lift as specified in Annexure- A, Sec I, Vol IIB. Equipment offered shall be conforming to specification requirements as per IS: 3938 (latest edition) and other specified Indian Standards.

#### **3.0.0 Technical Particulars**

**3.1.0 Type** - Electrically operated with trolley.

#### **3.2.0 Applicable IS**

#### **DESCRIPTION**

|                |  |
|----------------|--|
| IS: 3938       | Specification for electrical wire rope hoist   |
| IS: 2266       | Specification for steel wire ropes for general engineering purposes.                       |
| IS: 900        | Code of practice for installation and maintenance of induction motor                       |
| IS: 4237       | General requirement of switchgear and control gear for voltage motor exceeding 1000 Volts. |
| IS: 694        | Copper conductors PVC insulated cables for voltage up to 1000 Volts                        |
| IS: 3043       | Code of practice for Earthing.   |
| IS: 1822       | Motor starters for Voltages up to 650V.  |
| IS: 2147       | Degree of protection provided by enclosures for low voltage switch gear and control gear.  |
| IS: 1554       | PVC insulated (Heavy-duty) electric cables for working voltages and including 1100 volts.  |
| IS: 325        | Three phase induction motors.  |
| IS: 15660      | Point hook with shank.   |
| IS 9968 Part I | Flexible trailing cables   |
| IS: 4029       | Guide testing induction motor.   |

#### **4.0.0 Quality Plan & Inspection**

To ensure that the equipment and services are in accordance with the specification, the vendor shall follow/adopt BHEL's STANDARD QUALITY PLAN (enclosed herewith)/Customer approved QAP to control critical activities at all essential points. The enclosed standard quality plan should be duly signed and



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stamped as a token of acceptance and submitted by the bidder along with the offer.

Inspection shall be carried out by BHEL/customer representative as the case may be in line with the approved drawing / document.

#### 5.0.0 Name Plate

All the electric hoists shall be provided with individual nameplate indicating minimum the following data's:

Name of manufacturer

Capacity (in tons)

Lift (in meters)

Serial No.

Any other detail as per IS 3938

#### 6.0.0 Painting Procedure

6.1.0 Refer annexure-III, section-I for painting specification & color scheme

6.2.0 All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes shall be adopted to clear the surfaces.

6.3.0 Machined and bearing surface shall be protected with varnish or thick coat of grease.

#### 7.0.0 GENERAL DESIGN FEATURE

- I. Design shall conform to IS: 3938 (Latest edition) and other standards as specified.
- II. Parts requiring replacement or lubrication shall be easily accessible & without dismantling type.
- III. Equipment shall include the devices as required and comply with applicable standards/specification requirements.
- IV. Defects in material not acceptable/allowed. Rectification of any flaw is permissible only with the approval of Purchaser.
- V. Hoist shall be rigid in construction and all movements shall be smooth and non-jerky.
- VI. Design shall provide for easy maintenance of all parts, particularly the wheel bearings.
- VII. Design shall conform to IS: 3938 and other standards as specified.
- VIII. Both hoists and trolleys are driven electrically. Wheels shall be single flanged type and to suit different monorail beam sizes and the same shall be intimated to purchaser during of manufacturing stage.
- IX. Hook shall be swiveling type and fitted with a safety latch.
- X. Hoists shall be designed for minimum headroom above the highest position of hook and for closest hook approaches.
- XI. Two no end stoppers of MOC IS 2062 and of adequate capacity shall be supplied for each electric hoist.



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- XII. Gear Box: Gears shall be completely covered and enclosed in oil tight casing & sealed with gasket. The gearboxes shall be of mild steel or cast steel as per IS 3938. All fabricated gearboxes shall be stress relieved. Gears shall be of cast or forged steel and pinions shall be forged steel and shall be machine cut. Gear and pinion teeth shall be treated for resistance to wear.
- XIII. Bearing: Ball and roller antifriction bearing shall be used throughout, except where specified otherwise. Life of bearing shall be calculated in accordance with manufacturers recommendations. Provision shall be made for service lubrication of all bearings. Bearing enclosures shall be designed as far as possible to exclude dirt and prevent oil leakage.
- XIV. Couplings: Motor shafts shall be connected to gear box input extension shafts through flexible gear coupling.
- XV. Wire ropes: Ropes of steel /fibre core as specified in Data Sheet – A shall be of right hand lay, of 6x36 construction of best plough steel having minimum tensile strength as 160-180 kg/mm<sup>2</sup>. Left hand lay wire ropes shall not be used (Reverse bend ropes shall not be used).

### 8.0.0 ELECTRICAL MOTOR DESIGN

Motor shall be squirrel cage induction type, and suitable for AC supply of 415V, 3 /4 phase, 50 Hz, 40%/60% CDF (as per data sheet-A) with IP—55 degree of protection. Motors shall be class 'F' insulated with temperature rise limited class B & suitable for 150/300 starts per hour (as per data sheet-A). Motors shall conform to IS 325, IS 12615:2011 and IS/IEC 60034-1:2014 as per norms. Motor terminal box shall be provided with suitable earthing stud inside the terminal box. It shall be possible to rotate the terminal box by 90 degrees. Insulation shall be minimum Class F or better insulation materials with additional phase insulating material, extra end-turn bracing and Class H spike resistant wire. Motors shall be capable of a 20 second stall at six times full load current without injurious heating to motor components. The pull out torque of the motor shall not be less than 275 % of the full load torque. All the motors shall be suitable for reversing, frequent starting and braking.

### 9.0.0 Protective Panel / Controls

Heavy duty, electrical panel, direct on reversing type Air brake contactors, electrically interlocked for safety with necessary control gears such as control transformer, MCB (Control and Power), limit switches, thermostat, space heater, neutral link, ON/OFF 3 Phase door interlock switch, wrong connection preventor, overload relays, single phase preventor, indicating lamps, cable glands, lugs, terminals, cables etc. housed in totally enclosed IP- 55 degree of panel. Control voltage shall be 24V/110V. Actual control voltage level shall be informed on project to project basis. Control circuit shall be protected by individual control MCB's with minimum. short ckt. rating 9kA and rating 16A. The electrical protective panel shall be a cubicle fabricated from 2 mm thick sheet steel with lockable-hinged door. It shall be dust and vermin proof with degree of protection as IP-55 or as specified in data sheet A. All the equipment inside the panel



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shall have permanent identification. The panels shall be front connected type with front-hinged door for access to wiring and terminals. Engraved nameplate shall be furnished for all panels and also for the equipments and devices mounted there on. The following minimum equipments shall be provided.

- a) One triple pole air break type main contactor with thermal overload relay.
- b) One triple pole main line connecting/disconnecting switch.
- c) Switch fuse unit with D.O.L. starter for each motion.
- d) Thermal overload relay for each drive. It shall be ambient temperature compensated and adjustable type.
- e) Contactors, timer and auxiliary contactors.
- f) Control transformer with fuses.
- g) Indicating lamps to indicate the live condition of all three phases.
- h) Other equipments as per supplier's standard practice. Air break contactors shall conform to category AC-4 duty. The contactor drop off voltage shall be between 45-50% of rated voltage.
- i) All internal wiring shall be identified with numbering ferrules at both ends as per the relevant wiring diagram.

#### 10.0.0 LIMIT SWITCH

The hoist mechanism of the hoist shall be provided with rotary/gravity/snap action type limit switch to open the control circuit and in order to prevent the hook from over hoisting and over lowering. One gravity type back-up limit switch of hand-reset type shall be provided. This switch shall operate in the event of failure of main limit switch if called for in data sheet "A". Rotary + gravity type hand reset limit switches shall be provided for hoisting. Lever operated limit switches shall be provided for cross traverse. These limit switches shall be self-reset type.

The limit switches shall be housed in robust metallic oil and dust tight enclosure conforming to IP:65. At least 2 NO and 2 NC contacts shall be provided for each limit switch. All limit switch shall confirm to IEC-60947-5-1. Material of contact shall be high grade silver cadmium plated with high conductivity and non-corrosive type.

#### 11.0.0 BRAKE

The hoist and cross traverse motors are fitted with an DC electro-magnetic disc type brake designed and built to arrest, and hold safely the full load capacity of load. The brakes shall be fail-safe type wherein failure of current immediately applies the brake.

#### 12.0.0 PUSH BUTTON STATION

Pendent push button station shall be provided with glow type push buttons for hoisting/lowering, cross traverse forward/reverse and emergency stop (mushroom head type) etc. The contactors are operated by



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pendent push button station suspended from the hoist for easy operation and suspension is made on steel wire/ link chain. Normally pendent shall be fixed type. Necessary, T track / taut wire arrangement including fixing arrangements such as auxiliary beam, brackets, supporting plates etc. as applicable shall be provided in order to clear the pendent and its cable from auxiliary structure, piping, equipment's etc. Necessary cable glands, lugs, terminals along with connecting cable of 14Core, 1.5sqmm copper flexible cable shall be provided. Emergency stop push button shall be mushroom head (lockable) type. Push buttons shall return to off position when released. It shall be suspended by wire rope to prevent pull on the cables. The following minimum push buttons key operated type.

- a) Main" ON", "OFF" push button key operated and lockable in "OFF" position. This push button will operate the main contactor.
- b) Hoist and lower directions. (2Nos.)
- c) Trolley travels both directions. (2 Nos.)
- d) Inching speed for hoisting & lowering
- e) Inching speed for trolley motion.
- f) Creep speeds ( if applicable)
- h) Emergency stop push button (mushroom type).
- i) Alarm bell push button.

### 13.0.0 EARTHING & GROUNDING

The hoist structure, motor frame and all other electrical equipments shall be grounded in accordance with the Indian Electricity Rules. The connections from hoist to 4th conductor of down shop leads shall be by means of current collector.

The equipment fed by flexible cables shall be grounded by means of fourth core provided in the flexible trailing cable. Pendent push button station shall be earthed separately and independently.

### 14.0.0 POWER SUPPLY TO HOIST:

Purchaser shall provide single point 415V, 3 /4 phase, and 50Hz supply at any point of the bay. Bidder shall provide main isolating switch at 1.5 M above the ground / operating floor level to receive this incoming power. The details of incoming cable shall be provided to the bidder on project to project basis during detail engineering. It shall be bidder's responsibility to supply isolators suitable for the incoming cable. Isolating switch shall be equipped with MCCB with three indicators for phases.

Power feeding to the hoist shall be thru one of the following methods-

- i) Shrouded Bus Bar Conductor Type DSL complete with brackets and other fixing arrangements.
- ii) EPR flexible trailing cable: Trailing cable shall be 1100 V grade, tinned copper, heat resistant, with EPR insulation and as per Class – 5 of IS-8130. Also should have inner PCP sheath and outer CSP sheath with nylon chord reinforcement & heat resistant, oil resistant and flame retardant heavy duty FRLS type



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complete with DSL trolley on T track / taut wire arrangement retractable type including necessary fixing arrangements such as auxiliary beam, brackets, supporting plates, junction box etc.

DSL/Flexible trailing cables shall be sized considering both hoisting, travel motion as well as other auxiliary power requirement. Voltage drop requirement of maximum 3% across the DSL/trailing cable from the incoming supply to motor terminal with hoist at extreme end of travel and with allowance of minimum 20% for wear & tear shall be considered while sizing the conductor along with other factors like derating etc . Calculation for the same be furnished as and when required by purchaser/end customer.

The collector system per conductor shall be spring loaded type metallic shoes to maintain adequate contact pressure.

**15.0.0 WIRING SYSTEM:**

- a) The supplier shall furnish all power, control and auxiliary circuit wiring of the equipment and the panel located on the trolley.
- b) The wiring shall be complete in all respect to ensure the proper functioning of the equipment.
- c) Power wiring to any motor shall be done with 1100V grade Cu conductor, PVC insulated / armoured /FRLS cable of suitable sizes as specified in Data Sheet A.
- d) For selecting the cable rating, cable for power wiring, consideration shall be given to the motor duty, ambient temperature grouping and disposition of the cables voltage drop etc.
- e) All control and auxiliary external circuit wiring shall be done with PVC insulated FRLS type 2.5mm stranded copper conductor.
- f) Armoured cables or un-armoured running through the flexible conduits may be used for power wiring / control and auxiliary circuit wiring shall run through flexible conduits.
- g) Each motor shall be wired independently. Power and control wiring shall be effectively separated.
- h) Each wire shall be identified at both ends with wire designation in accordance with circuit wiring diagram.
- i) All wire termination to the panels shall be provided with clamp type connections screw. Type terminals with screw directly impinging on conductors are not acceptable.
- j) Multi-way terminal blocks complete with screw nut, washer and marking strips shall be furnished for terminating the panel wiring and outgoing.
- k) Not more than two wires shall be connected to any terminal on either side of terminal block. If necessary number of terminals shall be jumped together to provide the wiring points
- l) Each terminal block shall be marked with designation in accordance with conductors wiring diagram.
- m) Adequate short circuit protection shall be provided for main and individual circuits.
- n) All power & control cables shall be tagged at both ends (as per approved drawings) for quick identification. The cables & wiring system for each motion shall be independent & common runs



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shall be avoided. Power cables & control cables shall be effectively separated & all connections shall be terminated to terminal box suitable for outside connections.

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**LIST OF DRAWINGS / DOCUMENTS TO BE SUBMITTED WITH THE BID**

Bidder shall submit the following drawings / documents along with their bid

- a) Deviation schedule with reference to specific clauses of the specification along with reason for such deviation in the format given in GCC. In case of no deviation, bidder to mention "No deviation" on signed and stamped copy of Deviation sheet.
- b) Copy of pre-bid clarifications, if any, duly signed & stamped
- c) Signed/ Stamped copy of Compliance cum Confirmation Certificate (Vol-III)
- d) Un priced copy of price format indicating quoted/ not quoted against each row/column along with cost of withdrawal / price implication format for deviations.

OFFER WILL BE CONSIDERED AS INCOMPLETE IN ABSENCE OF ANY OF ABOVE DOCUMENTS. DOCUMENT OTHER THAN ABOVE, IF ANY, SUBMITTED WITH THE OFFER WILL NOT FORM PART OF CONTRACT AND ACCORDINGLY WILL NOT BE CONSIDERED FOR BID EVALUATION.



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### **COMPLIANCE CUM CONFIRMATION CERTIFICATE**

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

- a) 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" and those resolved as per 'Schedule of Deviations', if applicable, with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'.
- c) 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 shall be within the contracted price with no extra implications to BHEL after award of the contract.
- d) All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance
- e) 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.
- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions.
- i) 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
- j) 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.
- k) As built drawings shall be submitted as and when required during the project execution.



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- l) 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.
- m) Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- n) 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.
- o) 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.

