



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
PROJECT ENGINEERING MANAGEMENT

Enq No.: PE/PG/RTC/E-5453/2016

Date: 24.01.2017

TENDER ENQUIRY THROUGH E-PROCUREMENT

DUE DATE
FEB, 15, 2017
02.00 P.M.

Subject: Tender Enquiry for Rate Contract of Electric Hoists for one year with a provision for further extension after review on mutual consent

Dear Sir,

We are pleased to invite your tender offers for subject package. Please upload your best quotation/ offer in two (2) parts on <https://bheleps.buyjunction.in> for the requirement strictly as per schedule of price format before above mentioned due date & time. The details of the tender enquiry is as mentioned below:

Sl. No	Description for which Rate Contract is desired	Tentative Quantity	Delivery required
1	Electric Hoists - Refer Technical specification no PE-TS-RC-563-A002 for detailed description.	As per BOQ cum price schedule in Annexure-I) cumulative for the Prospective Projects as per Annexure-IV.	The delivery period for all the items of Electric Hoists shall be four (04) months from drawing/doc approval for respective project/requirement under the RC. Other schedules like submission of drawings, approval of drawings, inspection etc. shall be as per the Technical Specification no. PE-TS-RC-563-A002 (Drawings/Documents schedule as per Annex-V in Section-II page 48 of 112) shall be submitted within two week of PO for respective project under RC). Delays due to non-fulfilment of the requirements as specified in the specification shall be to the vendor's account. Vendors shall be informed that delivery period mentioned above is for contractual LD calculation purpose, however in case of exigencies BHEL may ask for early delivery.

(i) Rate contract on firm price basis is proposed for one year from placement of Rate Contract PO with a provision for further extension after review on mutual consent.

(ii) Rate contract shall be decided on the basis of grand Total FOR site price of Total BOQ of different capacity of Electric Hoists as listed in price format for items at sl. 1.1.0 to 1.6.0 (i.e. in Annex-I, II, III & A), bidders to quote Ex-work price, ED, CST (not VAT) & Freight charges (Including service tax) as percentage (%) of ex-work prices strictly as per schedule of price format.

Bidders to quote prices strictly as per Price Formats- Annex-I, II, III, A & B.

Please reply to:
PEM -Power Sector
PPEI Building,
BHEL House
HRD & ESI Complex,
Plot-25, Sector-16-A NOIDA – 201301

Phone: 0120-4213591
Fax : 0120-4329026
e-mail: ncsharma@bhelpem.co.in

Regd. Office:

Siri Fort
New Delhi - 110049



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(iii) Bidders to note that it is mandatory to quote prices for "Additional Items" as per price format Annex-B, in absence of the same, bid will be considered as part bid and will not be considered for further evaluation.

(iv) Bidders to note that though evaluation is proposed on Grand total FOR SITE (for main supply + commissioning spares + Essential Spares). But bidder have to ensure the following in their price break-up:

1) % allocation (of grand total) against each item of main supply and Commissioning spares & Essential Spares as indicated in the price schedule against each item (Annex-I) for given BOQ.

2) Further there are some Additional items under heading "Additional Prices for PVC shrouded Bus Bar, Flexible Trailing Power (Cu) Cable on T track, Variable Voltage Variable Frequency (VVVF) Drives for creep speed of motions & Maintenance tools and tackles" bidders to submit separate bid for these items in the price schedule Annexure-B. The Additional item price shall be opened & overall L1 bidder in items at sl. 1.1.0 to 1.6.0 (i.e. in Annex-I, II, III & A) have to match the L1 prices of Additional item category.

(v) Essential Spares (Annex-II & III) are proposed to be considered for evaluation, however, bidder shall be inform that ordering of the same is subject to received order of end customer i.e. in case end customer asked for Essential Spares along with main supply item then only order for Essential Spares shall be placed otherwise only main supply shall be taken.

(vi) Electric Hoists of different capacity and lift are required for prospective projects (refer Annex-IV), however bidders will be asked to consider delivery anywhere in India. Quantity variation shall be applicable in line with cl. no. 6 of GCC rev-06. Project list is indicative only, BHEL may ask for delivery anywhere in India for any of the project added in the prospective project list/ for existing projects during RC period.

(vii) Bidders to note that evaluation shall be done on CST basis, however in case, the entire business volume goes to one vendor (or volume of business shared between the vendors in line with enquiry) having manufacturing facility in the same state, then BHEL may do suitable amendment in PO on case to case basis for taking care the provision of VAT in case of project falling in the same State where manufacturing factory of the vendor is also located.

(viii) Rate Contract is proposed to be done with 2 vendors in ratio of 60:40 value wise at L1 FOR site price for Electric Hoists (% of splitting of RC between 2 vendors may be changed during ordering process if L1 bidder is not customer approved); however order for a project shall not be split the same shall be informed to bidders through NIT.

L1 rates shall be counter offered to vendors (L2, L3 & so on) in succession. If none accepts L1 rates, RC shall be done with L1 vendor for 100 % value. Since the rate contract is being proposed on two vendors, vendors shall be asked to quote prices with CST against form C and same state ordering shall not be done to save VAT.

(ix) Drawings/ documents submission, equipment manufacture inspection & dispatch requirement will be as per Technical Specification no. PE-TS-RC-563-A002.

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(x) **Pre-Qualifying Requirements (PQR):** All the bidders (registered/ non-registered) will be asked to submit documents fulfilling PQR requirements (as per enclosed annex-VI) with the bid & their further evaluation shall be done based on qualification in PQR.

(xi) Bidders to note that their bid shall be conditional subject to qualify PQR by registered vendors & non-registered vendors have to qualify PQR & get registered with PEM for the package.

For registration in PEM "Bidders needs to apply & get registered for subject package with PEM before P-2 (price bid opening) & **hence you need to apply online for registration on PEM web portal & have to enclose acknowledgement with this effect with the bid documents else your bid will not be considered for evaluation**"

Online Registration Portal is operational in BHEL. Non-registered Vendors, who wish to apply for registration with BHEL-PEM, have to apply through Online Registration Portal available at www.bhelpem.com → vendor section → Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and submit the application for registration. One set of hard copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted.

(xii) **Integrity Pact (IP) shall be applicable for subject tender:**

IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. A Panel of Independent External Monitors (IEMs) has been appointed to oversee implementation of IP in BHEL.

The IP (Refer Annexure-IX, as per GCC Rev-06) is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

Details of IEM for this tender are furnished below:-

Name: - Sh. VVR Sastry, Ex-CMD/ BEL

Address: - 957, 9th Main 3 Stage, 3 Block, Basaveswaranagar, Bangalore- 560079

Email: - sastryvvr@gmail.com

No routine correspondence shall be addressed to the IEM (phone/post/email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department.

For all clarifications/ issues related to the tender, Please contact:

Mr. N.C Sharma, Sr.ENGR./MM e-mail : ncsharma@bhelpem.co.in Ph. No. 0120- 4213591	Mr. I P Singh, Sr. Mgr./ CMM e-mail: INDRA@bhelpem.co.in Ph. No. 0120-4368749
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However, for **Technical clarifications**, following persons may be contacted:

Mr. VIVEK V HEMROM, Dy. MGR./MAUX e-mail: VIVEKVHEMROM@bhelpem.co.in Ph. No.0120-4368530	Mr LALIT JINDAL, MGR/MAUX e-mail : lalitjindal@bhelpem.co.in Ph. No.0120- 4368918
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(xiii) Bidder are required to submit offer strictly in accordance with the requirements of the above tender documents. Deviations (Technical as well as Commercial) from NIT are generally not acceptable, if any, Technical deviations and Commercial deviations shall be furnished in "Cost of Withdrawal sheet" (as per Annexure-II of GCC Rev. 06, copy enclosed) only under the headings

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“TECHNICAL DEVIATIONS” and “COMMERCIAL DEVIATIONS” respectively, along with reasons for taking such deviations. Deviations (Technical & Commercial) taken other than as mentioned on cost of withdrawal sheet shall not be considered.

(GCC Rev. 06 is available on <http://www.bhelpem.com/Documents/GCC/GCC-Rev-06.pdf> , you are requested to kindly download the same).

Tender Enquiry Terms and Conditions: -

1. Offers should be submitted in two parts online at <https://bheleps.buyjunction.in> as follows:

Part-I: TECHNO-COMMERCIAL BID (along with un-priced copy of Annexure-I, II, III, A & B)

Part-II: PRICE BIDS (along with priced copy of Annexure-I, II, III, A & B)

2. For detailed instructions, please see clause no. 2 of “Instructions to Bidders” of GCC, Rev. 06.
3. Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
4. Bidder to submit complete tender in all respects duly signed & stamped on each and every page by the authorized signatory of the bidder as a token of acceptance of all the terms and conditions of tender.
5. Unsolicited fresh/ revised price bids shall not be entertained.
6. Tender will be opened at **03.00 PM on 15/02/2017**.
7. Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any/ all tender(s) in part or full without assigning any reason whatsoever.
8. Purchaser reserves the right to split up the scope of the tender enquiry and place the orders for different scope/ items with different bidders and also increase or decrease the quantity.
9. BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit ‘Process compliance form’ (to the designated service provider) as well as ‘Online sealed bid’ in the Reverse Auction. Non-submission of ‘Process compliance form’ or ‘Online sealed bid’ by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. **The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.**

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).”

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As a reminder to the bidders, system will flash following message (in RED Color) during the course of 'online sealed bid':

"Bidders to submit online sealed bid less than or equal to their envelope sealed bid already submitted to BHEL"

Detailed guidelines of **reverse auction 2016** are available in "information section" of **www.bhhelpem.com**, same are applicable for subject tender.

10. Any taxes and duties applicable on the date of bid but not quoted by the bidders shall be to the bidder account.
11. Delivery terms for dispatches shall be FOR Dispatch Station.
12. CIF is not available for this package.
13. Bidders to submit their offers strictly in line with the enclosed Price Formats (Annex-I, II, III, A & B).
14. This enquiry is subject to Conditions/ limits if any imposed in PMD / Vendor registration.
15. Procurement of the subject package shall be done through e-procurement.
16. All corrigenda, addenda, amendments, time extensions, clarifications etc. to the tender will be hosted on EPS website (<https://bheleps.buyjunction.in>), BHEL website (www.bhel.com), BHEL-PEM website (www.bhhelpem.com) & CPP Portal. Bidders should regularly visit websites to keep themselves updated.
17. Foreign and indigenous bidders participating through open tender will necessarily have to buy class III DSCs issued by the certifying authorities in India for future tenders. Basic procedure /checklist has been uploaded on www.bhel.com for participating in tender enquires through e-procurement.
18. Bidder to note that all other terms and condition shall be strictly as per NIT, GCC Rev. 06 & SCC. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be NIT (this letter) / SCC / GCC Rev. 06.

NOTE: In case you are not making an offer against this enquiry, you are requested to send a regret letter so as to reach us on or before the due date.

Thanking you,
Yours faithfully,
For and on behalf of BHEL

N C Sharma
Sr. ENGR. / MM

नरेश चन्द्र शर्मा / Naresh Chandra Sharma
वरिष्ठ अभियंता (एम.एम.) / Sr. Engineer (MM)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.
पावर सेक्टर-परियोजना इंजीनियरिंग प्रबंधन
Power Sector-Project Engineering Management
प्लॉट नं.-25, सेक्टर-16ए, नोएडा-201 301
Plot No. 25, Sector-16A, Noida-201 301

Enclosures:

- a) NIT (this letter itself)
- b) Technical Specification No. PE-TS-RC-563-A002.
- c) Annexure-I, II, III & A : Price Format for Main supply, Essential Spares & Commissioning spares
- d) Annexure-B: Price Format for Additional Items
- e) Annexure-IV: List of prospective projects
- f) Annexure-V: Special Conditions of Rate Contract (SCC).
- g) Annexure-VI: PQR (Pre-qualifying Requirement)
- h) Cost of Withdrawal sheet (Annexure-II of GCC Rev. 06)
- i) Integrity Pact

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ANNEXURE-I

PRICE FORMAT-RATE CONTRACT FOR ELECTRIC HOIST

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	Unit	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (including cess) (Rs.)	CST @ % (Rs) against form C and form E	FREIGHT CHARGES @ % of Ex-work (including Service Tax) (Rs.)	TOTAL F.O.R. SITE PRICE (Rs.)	% break-up of each item w.r.t total price
1	2	3	4	5	6	7	8	9	10	11
1.0.0	Total lump sum firm price for design, engineering, manufacture, fabrication, assembly, supply, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles, mandatory spares alongwith spares for erection, startup and commissioning as required, forwarding, proper packing, shipment and delivery at site, preparation and submission of drawing / documents & equipment/system guarantee etc. Inclusive of all prevailing taxes, duties and other levies for the package specified above for above mentioned project, complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order of package mentioned above with following details:									100.0
1.1.0	Electric Wire Rope Hoists including Isolating switch, cable from Isolating switch to DSL, end stoppers and any other item/s required to make the following electric hoists complete and suitable for travel in both Straight as well as Curved path with all accessories and working in NON HAZARDOUS area.									
1.1.1	Non hazardous Capacity-1T Lift-9m	4	NO							0.48
1.1.2	Non hazardous Capacity-2T Lift-6 m	14	NO							1.78
1.1.3	Non hazardous Capacity-2T Lift-12m	16	NO							2.08
1.1.4	Non hazardous Capacity-3T Lift - 6.0m.	48	NO							6.38
1.1.5	Non hazardous Capacity-3T Lift - 9m	111	NO							15.69
1.1.6	Non hazardous Capacity - 3T Lift -12m.	38	NO							6.22
1.1.7	Non hazardous Capacity - 3T Lift- 15m.	22	NO							4.04
1.1.8	Non hazardous Capacity - 3T Lift- 24m.	7	NO							1.64
1.1.9	Non hazardous Capacity - 3T Lift- 32.0m.	4	NO							0.95
1.1.10	Non hazardous Capacity-5T capacity Lift- 6m	17	NO							3.04
1.1.11	Non hazardous Capacity- 5T Lift- 9m	101	NO							18.36
1.1.12	Non hazardous Capacity- 5T Lift-15m.	18	NO							3.44
1.1.13	Non hazardous Capacity - 5T Lift- 24m	2	NO							0.38
1.1.14	Non hazardous Capacity - 8T Lift- 6m.	2	NO							0.50
1.1.15	Non hazardous Capacity - 8T Lift-9m.	25	NO							6.38
1.1.16	Non hazardous Capacity - 8T Lift-12m	3	NO							0.87
1.1.17	Non hazardous Capacity -10T Lift- 6m	1	NO							0.29
1.1.18	Non hazardous Capacity - 10T Lift-9m	15	NO							4.37
1.1.19	Non hazardous Capacity - 10T Lift- 12m	22	NO							6.48
1.1.20	Non hazardous Capacity- 10T Lift-24 m	1	NO							0.30

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	Unit	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (including cess) (Rs.)	CST @ % (Rs.) against form E	FREIGHT CHARGES @ % of Ex-work (including Service Tax) (Rs.) (1)	TOTAL F.O.R. SITE PRICE (Rs.)	% break-up of each item w.r.t total price
1.1.21	Non hazardous Capacity - 10T Lift - 32 m	14	NO							4.95
1.1.22	Non hazardous Capacity - 12T Lift- 6m.	1	NO							0.28
1.1.23	Non hazardous Capacity-12T Lift- 12m.	1	NO							0.29
1.1.24	Non hazardous Capacity - 12T Lift- 15m.	1	NO							0.29
1.1.25	Non hazardous Capacity - 15T Lift- 6m	1	NO							0.30
1.1.26	Non hazardous Capacity-15T Lift- 12m	4	NO							1.23
1.1.27	Non hazardous Capacity-15T Lift-15m	14	NO							4.34
1.2.0	Electric Wire Rope Hoists including Isolating switch, cable from Isolating switch to DSL, end stoppers and any other item/s required to make the following electric hoists complete and suitable for travel in both Straight as well as Curved path with all accessories and working in HAZARDOUS AREA.									
1.2.1	Hazardous Capacity-1T Lift- 9m	1	NOS							0.24
1.2.2	Hazardous Capacity- 2T Lift- 9m	1	NOS							0.25
1.2.3	Hazardous Capacity-3T Lift- 9m.	1	NOS							0.26
1.3.0	Commissioning spares for Non Hazardous area Electric hoists of 1T, 2T,3T,5T,8T,10T,12T & 15T capacity (Break up as per Annexure A)	1	LOT							0.06
1.4.0	Commissioning spares for Hazardous area Electric hoists of 1T, 2T & 3T capacity (Break up as per Annexure A)	1	LOT							0.03
1.5.0	Essential Spares for Non Hazardous area Electric hoists of 1T, 2T,3T,5T,8T,10T,12T & 15T capacity (Break up as per Annexure II)	1	LOT							2.86
1.6.0	Essential Spares for Hazardous area Electric hoists of 1T, 2T & 3T capacity (Break up as per Annexure-III).	1	LOT							0.95
	Total from 1.1.1 to 1.6.0 (should match with value quoted at 1.0.0 above)									
Note 1 Bidder to quote prices of Commissioning spares as per Annex-A & same needs to be matched to break-up as given above. 2 Bidder to quote prices of Essential spares for Non-Hazardous Area as per Annex-II & for Hazardous area as per Annex-III, same needs to be matched to break-up as given above. 3 Essential Spare are proposed to be considered for evaluation, however, bidder to note that ordering of the same is subject to ordering for the same from the end customer i.e. In case end customer asks for essential spares then only order for essential spares shall be placed otherwise only main supply shall be taken. 4 Bidders are also required to Inform full CST & VAT value in case of BHEL is not able to provide forms to avail concessional taxes (it is for future reference only) 5 Bidder to note that total price indicated above at sl no. 1.0.0 shall be considered for evaluation.										
										(Bidder's Seal & Sign)

(Handwritten Signature)

ESSENTIAL SPARES- NON HAZARDOUS AREA
Annexure-II
PRICE FORMAT-ESSENTIAL SPARES FOR ELECTRIC HOIST

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
1	2	3	4	5	6	7	8	9
A	ESSENTIAL SPARES (1T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
3.00	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
B	ESSENTIAL SPARES (2T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8.00	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

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S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
C	ESSENTIAL SPARES (3T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8.00	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, LLPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
D	ESSENTIAL SPARES (5T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

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S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
E	ESSENTIAL SPARES (8T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, LLPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

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S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
F	ESSENTIAL SPARES (10T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
G	ESSENTIAL SPARES (12T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
H	ESSENTIAL SPARES (15T CAPACITY- NON HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each type, size						
21	Push buttons	1 no of each type, size						
22	Overload relays.	1 no of each type, size						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each type and						
30	VVVF drive for Cross travel	1 no. of each type and						

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S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each type and						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating of motor						
x)	Fan Cover	1 no for each type and rating of motor						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								
GRAND TOTAL[A to H]								

Note

- The lists of spares indicated are for the type equipment generally used in thermal power plants. If the design or type of equipment proposed by the bidder is different, then the bidder shall suit the spares list according to the type of equipment. However, the numbers or quantity of spares, indicated shall not be reduced.
- All essential spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is not applicable for particular equipment then suitable applicable alternate spare have been offered / shall be supplied without any financial implication.
- Any change or variation in equipment or systems during detailed engineering stage which would cause changes / variations in the essential spares quantity, shall be supplied by Vendor without any commercial implications
- For quantities indicated in percentage, fractions are to be rounded-off to next higher integer.
- Any item which is "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Vendor without any extra cost.
- If any of the items of spares/tools & tackles ordered is found to be not applicable during detailed engineering stage/execution stage, the contractor will have to supply alternative items of spares/tools & tackles. The alternative items of spares/tools & tackles are to be mutually agreed between the PURCHASER and VENDOR
- Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender technical specification, same shall be deemed to have been covered in bidders scope of supply.
- "One (1) Set" and "One (1) set of each type & size" is defined as 100% requirement for one hoist.
- 100% of total population of each type, size and rating is defined as 100% requirement for one hoist.

ESSENTIAL SPARES- HAZARDOUS AREA							Annexure-III	
PRICE FORMAT-ESSENTIAL SPARES FOR ELECTRIC HOIST								
S.No	Description of equipment / Item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (Rs)	TOTAL F.O.R. SITE PRICE (Rs.)
1	2	3	4	5	6	7	8	9
A	ESSENTIAL SPARES (1T CAPACITY- HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each						
21	Push buttons	1 no of each						
22	Overload relays.	1 no of each						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each						
30	VVVF drive for Cross travel	1 no. of each						

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) / Rs)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors.	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating						
x)	Fan Cover	1 no for each type and rating						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								

S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.)	TOTAL F.O.R. SITE PRICE (Rs.)
B	ESSENTIAL SPARES (2T CAPACITY- HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each						
21	Push buttons	1 no of each						
22	Overload relays.	1 no of each						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each						
30	VVVF drive for Cross travel	1 no. of each						

S.No	Description of equipment / Item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) / Rs)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating						
x)	Fan Cover	1 no for each type and rating						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						
Total(1 to 52)								



S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.)	TOTAL F.O.R. SITE PRICE (Rs.)
C	ESSENTIAL SPARES (3T CAPACITY- HAZARDOUS AREA)							
1	Bearings for trolley wheel	100% for one EH						
2	Bearings for gear boxes for hoist	100% for one EH						
3	Hoist pulley bearings	100% for one EH						
4	Input pinion for Hoist Gearbox	100% for one EH						
5	Input pinion for CT Gearbox	100% for one EH						
6	First pinion assembly	100% for one EH						
7	Brake liners for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
8	Brake springs for							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
9	Brake coil for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
10	Solenoid for brake							
i)	Hoist brake	100% for one EH						
ii)	CT brake	100% for one EH						
11	CT wheel assembly (complete)	100% for one EH						
12	CT wheel assembly (complete) (idle)	100% for one EH						
13	Wire rope							
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH						
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH						
c)	For 10m -12.0m lift Electric Hoist	100% for one EH						
d)	For 13m -15.0m lift Electric Hoist	100% for one EH						
e)	For 16m -24.0m lift Electric Hoist	100% for one EH						
f)	For 25m -32.0m lift Electric Hoist	100% for one EH						
14	Rope Guide	100% for one EH						
15	Rope Tightner	100% for one EH						
16	Rope sheave assembly with bearings	100% for one EH						
17	Oil seals							
i)	Travel gear box	100% for one EH						
ii)	Hoist gear box	100% for one EH						
18	Cross travel machinery							
i)	Gear wheel	1 set						
ii)	Internal clip	1 set						
iii)	Pinion	1 set						
19	Rubber bushes for flexible couplings	1 set						
20	Contactors	1 no of each						
21	Push buttons	1 no of each						
22	Overload relays.	1 no of each						
23	MCBs.	1set						
24	MCCBS	1set						
25	Fuse links.	1set						
26	Limit Switches for							
i)	Main Hoist	1set						
ii)	Cross Travel	1 set						
27	Current Collector shoes	1 Set						
28	Sockets of each type	1 set						
29	VVVF Drive for Hoisting	1 no. of each						
30	VVVF drive for Cross travel	1 no. of each						

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S.No	Description of equipment / Item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (including Service Tax) (Rs.)	TOTAL F.O.R. SITE PRICE (Rs.)
31	Control module	1 no. of each						
32	Fixed + moving + spring contacts for	1 set						
33	No volt coil for each type of	1 set						
34	Fuses of each type	1 set						
35	Indicating lamps of each type	1 set						
36	Coils for each type of breaker	1 set						
37	Double roller collectors	1 set						
38	Collector roller	1 set						
39	Timers of each type	1 set						
40	Resistor element of each size and type	1 set						
41	control circuit fuses	1 set						
42	Main contacts for each type and rating of contactors	1 set						
43	Auxiliary contacts for each type and rating of contactors	1 set						
44	Electric meter.	1 set						
45	Power supply modules.	1 set						
46	Push buttons, ILPBs.(complete with contact elements)	1 set						
47	415 V Motor							
i)	Terminal plates	1 set						
ii)	Heaters	1 set						
iii)	Greasing arrangements	1 set						
iv)	Motor of hoist motion	1 set						
v)	Motor of travel motion	1 set						
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set						
vii)	Stator winding coils for all type of LT motors	1 set						
viii)	Dust seals and gaskets for each type of motors	1 set						
ix)	Cooling Fans	1 no for each type and rating						
x)	Fan Cover	1 no for each type and rating						
48	Diode bridge	1 no for each type and rating						
49	Switch Fuse Units	1 No						
50	Lubricating Oil Pump Motor	1 no for each type and rating						
51	Bearing Seal	1 set						
52	Transformer	1 set						

Total(1 to 52)

GRAND TOTAL[A to C]

Note

- The lists of spares indicated are for the type equipment generally used in thermal power plants. If the design or type of equipment proposed by the bidder is different, then the bidder shall suit the spares list according to the type of equipment. However, the numbers or quantity of spares, indicated shall not be reduced.
- All essential spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is not applicable for particular equipment then suitable applicable alternate spare have been offered / shall be supplied without any financial implication.
- Any change or variation in equipment or systems during detailed engineering stage which would cause changes / variations in the essential spares quantity, shall be supplied by Vendor without any commercial implications.
- For quantities indicated in percentage, fractions are to be rounded-off to next higher integer.
- Any item which is "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Vendor without any extra cost.
- If any of the items of spares/tools & tackles ordered is found to be not applicable during detailed engineering stage/execution stage, the contractor will have to supply alternative items of spares/tools & tackles. The alternative items of spares/tools & tackles are to be mutually agreed between the PURCHASER and VENDOR.
- Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender technical specification, same shall be deemed to have been covered in bidders scope of supply.
- "One (1) Set" and "One (1) set of each type & size" is defined as 100% requirement for one hoist.
- 100% of total population of each type, size and rating is defined as 100% requirement for one hoist.

ANNEXURE-A								
PRICE FORMAT-COMMISSIONING SPARES FOR ELECTRIC HOIST								
S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
1	2	3	4	5	6	7	8	9
A	COMMISSIONING SPARES For 1T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
	Total11 to IV)							
B	COMMISSIONING SPARES For 2T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
v)	Any Other	1 SET						
	Total11 to IV)							
C	COMMISSIONING SPARES For 3T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
	Total11 to IV)							
D	COMMISSIONING SPARES For 5T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
	Total11 to IV)							
E	COMMISSIONING SPARES For 8T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
	Total11 to IV)							
F	COMMISSIONING SPARES For 10T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
	Total11 to IV)							
G	COMMISSIONING SPARES For 12T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
	Total11 to IV)							
H	COMMISSIONING SPARES For 15T capacity Electric Hoist- Non Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
	Total11 to IV)							
	GRAND TOTAL[A to H]							

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S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.) (r)	TOTAL F.O.R. SITE PRICE (Rs.)
A	COMMISSIONING SPARES For 1T capacity Electric Hoist- Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
			Total I to IV)					
B	COMMISSIONING SPARES For 2T capacity Electric Hoist- Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
			Total I to IV)					
C	COMMISSIONING SPARES For 3T capacity Electric Hoist- Hazardous Area							
i)	Overload Relay	1 SET						
ii)	Limit Switch	1 SET						
iii)	Fuse Link	1 SET						
iv)	Any Other	1 SET						
			Total I to IV)					
			GRAND TOTAL[A to C]					
Note								
1 The lists of spares indicated are for the type equipment generally used in thermal power plants. If the design or type of equipment proposed by the bidder is different, then the bidder shall suit the spares list according to the type of equipment. However, the numbers or quantity of spares, indicated shall not be								
2 All essential spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is not applicable for particular equipment then suitable applicable alternate spare have been offered / shall be supplied without any financial implication.								
3 Any change or variation in equipment or systems during detailed engineering stage which would cause changes / variations in the essential spares quantity, shall be supplied by Vendor without any commercial implications								
4 For quantities indicated in percentage, fractions are to be rounded-off to next higher integer.								
5 Any item which is "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Vendor without any extra cost.								
6 If any of the items of spares/tools & tackles ordered is found to be not applicable during detailed engineering stage/execution stage, the contractor will have to supply alternative items of spares/tools & tackles. The alternative items of spares/tools & tackles are to be mutually agreed between the PURCHASER and								
7 Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender technical specification, same shall be deemed to have been covered in bidders scope of supply.								
8 "One (1) Set" and "One (1) set of each type & size" is defined as 100% requirement for one hoist.								
9 100% of total population of each type, size and rating is defined as 100% requirement for one hoist.								

ANNEXURE-B									
PRICE FORMAT -RATE CONTRACT FOR ELECTRIC HOIST									
S.No	Description of equipment / item	TOTAL TENTATIVE QUANTITY	UOM	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED) (Rs)	ED @ % (Including cess) (Rs.)	CST @ % (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (Rs.)	TOTAL F.O.R. SITE PRICE (Rs.)
1	2	3	4	5	6	7	8	9	10
2	PVC SHROUDED BUS BAR TYPE DSL suitable for both straight and curved path complete with all accessories for following ratings.								
2.1	PVC SHROUDED (GJ) DSL (100 AMPS)	1	METER						
2.2	PVC SHROUDED (SS) DSL (40 AMPS)	1	METER						
2.3	PVC SHROUDED (Cu) DSL (160 AMPS)	1	METER						
2.4	PVC SHROUDED (GS) DSL (100 AMPS)	1	METER						
3	FLEXIBLE TRAILING POWER (Cu) CABLE on T track, supported on trolley complete with all accessories. (Size to be indicated by the Bidder)								
3.1	TRAILING POWER (Cu) CABLE -1T hazardous area.	1	METER						
3.2	TRAILING POWER (Cu) CABLE - 2T hazardous area.	1	METER						
3.3	TRAILING POWER (Cu) CABLE -3T hazardous area.	1	METER						
4	Variable Voltage Variable Frequency (VVVF) Drives for creep speed of motions as follows								
4.1	VVVF drive for hoisting motion -1T	1	NOS.						
4.2	VVVF drive for hoisting motion -2T	1	NOS.						
4.3	VVVF drive for hoisting motion -3T	1	NOS.						
4.4	VVVF drive for hoisting motion -5T	1	NOS.						
4.5	VVVF drive for hoisting motion -8T	1	NOS.						
4.6	VVVF drive for hoisting motion-10T	1	NOS.						
4.7	VVVF drive for hoisting motion -12T	1	NOS.						
4.8	VVVF drive for hoisting motion-15T	1	NOS.						
4.9	VVVF drive for CT motion-1T	1	NOS.						
4.10	VVVF drive for CT motion-2T	1	NOS.						
4.11	VVVF drive for CT motion-3T	1	NOS.						
4.12	VVVF drive for CT motion-5T	1	NOS.						
4.13	VVVF drive for CT motion-8T	1	NOS.						
4.14	VVVF drive for CT motion-10T	1	NOS.						
4.15	VVVF drive for CT motion-12T	1	NOS.						
4.16	VVVF drive for CT motion-15T	1	NOS.						
5	Maintenance tools and tackles as per clause 1.1.2 of Sub section 1A, Volume IIB, Specification no PE- TS-RC-565-A002.	1	SET						
	Total:								
Note 1 Bidders are also required to inform full CST & VAT value in case of BHEL is not able to provide forms to avail concessional taxes (it is for future reference only) (Bidder's Seal & Sign)									

ANNEX-IV

Sl no.	Prospective Project List
1	4x1000 Pudimadaka(NTPC)
2	1x660 Panki(UPRVUNL)
3	1x660 Bhusawal(MAHAGENCO)
4	4x660 Barethi(NTPC)
5	1x250 Rourkela(NSPCL)
6	2x660 Udangudi(TANGEDCO)
7	Ennore
8	North Chennai Ext
9	2x660 Khurja(THDC)
10	1x800 Yeramarus Extn(RPCL)
11	2x800 Udupi(Adani Power)
12	1X660 MW Sagardighi extn
13	Uppur
14	3x800 Patratu(NTPC-JBVNL JV)

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ANNEXURE-V- Special Condition of Rate Contract for Electric Hoists

1. BHEL/PEM intends to enter into Rate Contract for the tendered different capacity and lift initially for a period of one year. The Rate Contract shall come into force from the date of issue of Purchase order for Rate Contract. Validity for ordering shall be one year from the purchase order for Rate Contract.
2. The items will be required against respective projects. Exact quantities and Project name shall be intimated while placing order for a specific project based on the Rate Contract.
3. The units rate for each item should be quoted inclusive of ex-works including packing & forwarding (excepted sea worthy packing) for tendered specifications/sizes as per price schedule format. Other elements of prices such as Excise Duty, Sales Tax, and freight charges (Including service tax) % of Ex-works are also to be indicated. Destination may be anywhere in India as per project requirement.
4. The freight charges shall be paid on percentage on ex-works prices or actual freight charges paid to transporter whichever is lower against production of documentary evidence. Vendor to quote freight charges as percentage (%) of ex-works price for destination anywhere in India.
5. Vendor to note that Excise Duty is payable on self manufacturing item only as per clause no 4.1.2 of GCC Rev 06 & hence for their BOI may quote Excise Duty is inclusive or Nil.
6. The prices shall remain firm during the period of one year.
7. Inspection of materials shall be carried out by BHEL / CQA and or by Customer or by an authorized agency at manufacture's works before dispatch, if required. Dispatch of material to be done, only after receipt of BHEL/Customer MDCC. It is responsibility of vendor to for obtain Material Dispatch Clearance Certificate (MDCC) from BHEL or CUSTOMER as required before dispatch of material.
8. Items have to be manufactured as per specification and supplied strictly in accordance with the approved BHEL / Customer's Drawings & Quality Plan. The items/ test certificate of items, which for any reason are not acceptable to BHEL / Customer, shall be required to be retested. No extra charge shall be payable on those account by BHEL.
9. Mode dispatch shall be by road through Schedule Bank/BHEL (PEM) approved transporters.
10. Other terms and conditions shall be as per Standard Technical specification no. PE-TS-RC-563-A002 & GCC Rev 06, Enquiry letter.
11. Order shall be placed with CST for respective projects keeping FOR site price same, vendors to quote accordingly.
12. This enquiry is subject to Conditions/ limits if any imposed in PMD/ Vendor registration.
13. Tentative quantity is given in enquiry.
14. Bidders to submit offer for RC of said items ONLINE via e-Procurement System only. Complete tender in all respects duly signed & stamped on each and every page by the authorized signatory of the bidder as a token of acceptance of all the terms and conditions of tender.
15. The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendor/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL web site <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud as soon as it comes to their notice.



Annex-VI

**BHEL-PEM-MAUX
PRE-QUALIFICATION CRITERIA**

	PACKAGE: ELECTRIC HOISTS PRE-QUALIFICATION REQUIREMENT- ELECTRIC HOIST WITH MINIMUM 3 T CAPACITY	PE-PQ-999-563-12000-A001	
		DATE	29/04/2016
		REV NO	00

1.0	Supplier should have capabilities for design/ manufacture and having in-house/ out-sourced facility for testing of electric hoist of minimum 3 T capacity.
2.0	The supplier has to submit either of following supporting documents meeting above mentioned pre-qualifying requirement 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 pre-qualifying requirement. OR 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. OR c. Minimum one PO/ LOI /LOA/ WO after commissioning of first order from same purchaser meeting the minimum pre-qualifying requirement. OR d. In case, vendor has executed contract (s) for BHEL-PEM, internal assessment by BHEL-PEM shall be followed for evaluation for satisfactory performance. For this, vendor to submit the request along-with relevant documents. OR Minimum three customer's/ third party's inspection reports/ test certificates/commissioning certificates meeting the minimum pre-qualifying requirement.
3.0	Minimum two (2) nos. Purchase orders, shall be submitted which should not be more than ten (10) years old as on date of bid submission, for establishing continuity in business.
4.0	Indian stockiest/ trader/ distributor/ dealer/ authorized agent/ channel partner/ Indian sales office or subsidiary of principal - with aftersales service agreement with OEM/principal are also acceptable provided OEM/principal meets the minimum pre-qualification criteria stipulated above at pt no 1.
5.0	Credentials for S/G EOT crane shall also be considered for qualification for Electric Hoists.

Supplier to comply general points of PQR available at <http://bhelpem.com/vensection/pmd/pmd.aspx>
in case supplier is not OEM, the offer shall be evaluated as per point no 1 of general PQR.

Prepared by

Reviewed by

Approved by

ANNEXURE-II: DEVIATION SHEET (COST OF WITHDRAWAL)



PROJECT:-

PACKAGE:-

TENDER ENQUIRY REFERENCE:-

NAME OF VENDOR:-

SL NO	VOLUME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
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TECHNICAL DEVIATIONS

COMMERCIAL DEVIATIONS

PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE

NAME	DESIGNATIONS	SIGN & DATE	
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NOTES:

- For self manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
- For directly dispatchable items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.
- All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.
- Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of
- Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.
- Bidder shall furnish price copy of above format along with price bid.
- The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.
- Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.
- For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.
- Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.
- All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.
- Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.
- In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive
- In case of discrepancy in the nature of impact (positive/ negative) positive will be considered for evaluation and negative for ordering

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ANNEXURE– IX

INTEGRITY PACT

Between

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

and

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

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

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

Section 1 – Commitments of the Principal

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

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

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

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

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

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

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

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

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

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or

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document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

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

Section 3 – Disqualification from tender process & exclusion from future contracts

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

Section 4 – Compensation for Damages

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

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

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

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders / Contractors / Sub-contractors

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

Section 8 –Independent External Monitor(s)

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

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

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

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

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

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

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins and shall be binding on and from the submission of bid(s) by

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bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

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

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

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

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

For & On behalf of the Principal
(Office Seal)

For & On behalf of the Bidder/ Contractor
(Office Seal)

Place-----

Date-----

Witness: _____
(Name & Address) _____

Witness: _____
(Name & Address) _____

RATE CONTRACT

VOLUME – II B & III

**TECHNICAL SPECIFICATION
FOR
ELECTRIC WIRE ROPE HOIST**

SPECIFICATION NO.: PE-TS-RC-563-A002 Rev 00



**BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR- PROJECT ENGINEERING MANAGEMENT
NOIDA
INDIA**



**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
ELECTRIC WIRE ROPE HOISTS**

SPECIFICATION No: PE-TS-RC-563-A002

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SPECIFIC TECHNICAL REQUIREMENT

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SPECIFIC TECHNICAL REQUIREMENT

SUB-SECTION IA

SPECIFIC TECHNICAL REQUIREMENT (MECHANICAL)

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SPECIFIC TECHNICAL REQUIREMENT (ELECTRICAL)

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DATA SHEET A



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SPECIFIC TECHNICAL REQUIREMENT (MECHANICAL)



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1.0 INTENT OF SPECIFICATION

- 1.1 The specification is intended to cover design, engineering, manufacturing, inspection and testing, painting, supply/ delivery duly packed at FOR site including essential spares, erection & commissioning spares, maintenance tools & tackles, all accessories including freight in line with drawings/ documents/ test procedures approved by BHEL/ Customer for ELECTRIC HOISTS as per details in different sections / volumes of this specification.
- 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 HOISTS.**
- 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 technical specification.** 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 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.



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- 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 Cost of withdrawal format given in General Condition of Contract (GCC) otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification. If there are no deviations from the tender document, bidder shall indicate 'NO DEVIATION' in the deviation schedule.
- 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 Customer including their consultant as interpreted by BHEL in the relevant context.

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).
- 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://dms-server.bhelpem.com/WrenchWeb.>)



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PROJECT INFORMATION:

(Project specific)



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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 equipments (control panel, motor, limit switches)
4. Flexible trailing cable for motor, brake, limit switches, etc.
5. Painting of hoist.
6. Power supply thru' DSL including current collector, brackets etc.
7. Testing of hoist.
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. Initial fill of lubricants, grease etc.
10. 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

A complete unused new set of tools & tackles and accessories along with detailed instructions and maintenance manual for the hoists shall be supplied. Each tool and wrench shall be stamped, so as it can be easily identified for 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 and specially protected against rusting and minimum the following shall be provided. The tools and tackles shall be suitable for maintenance of electric hoists of various capacities.

S. No.	Description	Qty.
1	Complete set of ring spanners (Indicate the sizes offered)	1 Set
2	Complete set of screwdrivers (Min. 6 nos. Indicate the sizes)	1 Set
3.	Adjustable Spanner	1 No.
4.	Insulated pliers	1 No.
5	Wrench spanner	1 No.



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- | | | |
|----|-------------|-------|
| 6. | Grease Gun | 1 No. |
| 7. | Oil Gun | 1 No. |
| 8. | Hand Lamp | 1 No. |
| 9 | Line tester | 1 No. |

Note: All maintenance tools & tackles are to be supplied in a tool box.

1.1.3 Erection and commissioning spares. (For details refer price format)- Bidder shall supply overload relays, fuse links, limit switch etc for commissioning of the electric hoists as specified in price format (project specific). In case any additional spares /quantity are required, the same shall also be included if it is deemed necessary for commissioning of hoists.

1.1.4 Essential Spares – Shall be project specific. General list is given at Annexure II, Section II, Volume IIB for reference.

1.2.0 Services to be provided by the bidder

1.2.1. Design, engineering with associated documentation. Erection and commissioning procedure with illustrative drawings shall be submitted by successful bidder for carrying out the erection and commissioning of hoist, sub assembly along with its accessories at site including operation and maintenance manual.

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 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. Packing, forwarding and transportation to site.

Normal : In general packing shall be for normal environment in wooden box for protection from rain, wind etc. Complete list in form of Bill of Quantity carrying all technical details of the items/components shall be furnished separately for each electric hoist.

1.3.0. Inspection and Testing



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Shall be as per enclosed standard manufacturing quality plan and approved drawings /documents 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. If available existing RQP/SQP approved by NTPC/BHEL or any other agency i.e EIL/TCE etc involved in the specific project shall be used if required/accepted by the end user i.e Customer.

1.4.0. Drawing / design document for submission: Drawing/ design documents to be submitted as per list & submission schedule attached as Annexure-V, Section II, Volume IIB.

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, Section II, Volume IIB of this specification.

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. Rate on per 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.

2.0.0. Works Excluded

2.1.0 Supply of ISMB / monorail.

2.2.0 Erection and Commissioning of electric hoists.

2.3.0 Purchaser shall provide single point 415V, 3 or 4 phase, and 50Hz supply (3 wire or 4 wire shall be project specific) 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 to receive this power and cable required from isolating switch to DSL.

Any other supply required by the bidder shall be arranged by the bidder, 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



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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. Makes of Sub - Vendor items

Reference list for makes of various items /components, assemblies will be as per Annexure-I, Section II, Volume II-B of the specification. However final list of makes of sub vendor shall be approved by BHEL/Customer during detail engineering without any commercial & delivery implication to BHEL.

6.0.0 INFORMATION TO BE FURNISHED BY BIDDER ALONG WITH OFFER

6.1.0 Bidder shall submit only the documents indicated at Section IIIA, Volume III of this specification. If there is any deviation, the same shall be furnished by the bidder in a separate Deviation Schedule. Bidder to specifically note that deviation mentioned elsewhere (other than in a separate Deviation Schedule) shall not be taken cognizance of in any case.



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QUALITY ASSURANCE AND INSPECTION REQUIREMENT

		MANUFACTURERS NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT		RATE CONTRACT			
		AS PER APPROVED VENDOR LIST		ITEM:	ELECTRIC WIRE ROPE	QP NO	PE-TS-RC-563-A002	PACKAGE		ELECTRIC HOIST			
				REV		0	CONTRACT No						
				DATE		01.12.16	CONTRACTOR		BHEL-PEM				
				PAGE		1 of 4							
Sl.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CATEGORY	TYPE OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		REMARKS	
								D*	M	C	N		
1	2	3	4	5	6	7	8	9		**	10	11	
1.0	RAW-MATERIALS												
1.1	a) STRUCTURAL MATERIAL b) RAW MATERIAL FOR HOIST AND GEAR BOX HOUSING, TROLLEY PLATE, ROPE DRUM IF FABRICATED	CHEM & MECH PROPS	MA	Lab analysis	1 SAMPLE PER LOT%	IS 2062 /APPD. DRG./ DATA SHEET		MTC/IR	√	P/V	V	V	Test shall be carried out in absence of mill TC or non-correlation of TC with material.BHEL to identify Samples for testing. Test to be carried out at NABL accredited Lab. Reports to be submitted for verification during inspection.
		NDT	MA	UT	100%	ASTM A388-2004	NOTE 1	IR	√	P	V	V	For plate thickness above 40mm
1.1 A	SEAMLESS PIPE FOR ROPE DRUM	CHEMICAL , MECHANICAL	MA	Lab analysis	1 SAMPLE /pipe	Approved drg/ASTM A 106 Grade A or B		MTC/IR	√	P/V	V	V	Test shall be carried out in absence of mill TC or non-correlation of TC with material.BHEL to identify Samples for testing. Test to be carried out at NABL accredited Lab. Reports to be submitted for verification during inspection
		Flattening & Acid Etching test	MA	PHYSICAL & METALLOGRAPHY	1 SAMPLE /pipe	No cracks, pitting, rusting , damage etc		IR	√	P	V	V	
		SURFACE DEFECTS	MA	Visual	100%								
1.2	FORGINGS FOR GEARS,PINIONS, SHAFT/AXLES, WHEELS	MECH , CHEM. PROPS	MA	Lab analysis	100%	APPD. DRG./ DATA SHEET	APPD. DRG./ DATA SHEET / IS:3938	LAB. REPORT / MANUFACTURER'S TEST CERTIFICATE	√	P	V	V	
		NDT	CR	UT	100%	ASTM A 388	NOTE 1	INSPN. REPORT	√	P	V	V	IF DIA/THK > 50mm
		Hardness , surface defects after machining/grinding	MA	DPT/MPI	100%	ASTM E -165 /E-709, No linear indication		MTC	√	P	V	V	
1.3	WIRE ROPE	Dimensional, type, constrcution ,	MI	measurement	100%	APPD. DRG./ DATA SHEET	APPD. DRG./ DATA SHEET	MFRS' TEST CERT.	√	P	V	V	
		EXAMINATION OF REPORT OF BREAKING LOAD CAPACITY	CR	Review of TC	100%	IS: 2266		MFRS' TEST CERT.	√	P	V	V	
1.4	HOOKS	MECH. , CHEM. PROPS.	MA	Lab analysis	100%	APPROVED DRG/DATA SHEET IS:15560		MFRS' TEST CERT.	√	P	V	V	
		U.T IF SHANK DIA > 50mm	CR	NDT	100%	ASTM A 388	NOTE 1	INSPN. REPORT	√	P	W	V	SHANK PORTION ONLY
		Dimension & PROOF LOAD TESTING	CR	Measurment , PROOF LOAD TEST	100%	APPROVED DRG/DATA SHEET / IS:3938 / IS:15560		QCR	√	P	W	V	IF REQUIRED BY END CUSTOMER.
		DP AFTER PROOF LOAD	CR	NDT	100%	ASTM E-165	NO CRACKS	INSPN. REPORT	√	P	W	V	
1.5	SHEAVES	MECH	MA	Tensile & hardness	1/lot	Approved drgs		MTC/IR	√	P	V	V	

		MANUFACTURERS NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT		RATE CONTRACT			
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							REV	0	CONTRACT No				
							DATE	01.12.16	CONTRACTOR		BHEL-PEM		
							PAGE	1 of 4					
Sl.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CATEGORY	TYPE OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
									D*	M	C	N	
1	2	3	4	5	6	7	8	9		**	10		11
1.6	CASTING FOR BEARING PLATED, ROPE GUIDES, PULLEYS ETC	CHEMICAL & MECHANICAL	MAJOR	LAB ANALYSIS	1/LOT	APPROVED DRG/MFG STANDARD	APPROVED DRG/MFG STANDARD	LAB REPORT	√	P	V	V	
2.0	IN-PROCESS												
2.1	Welding process capability and welder skill	WPS,PQR & WPQ	MA	Welding procedure approval and Welder performance qualification in accordance with ASME Section IX	100%	ASME Section IX		WPS,PQR & WPQ		P	V	V	In case approved WPS/PQR/WPQ from BHEL/NTPC/EIL/LLOYDS/TPL/ or as accepted by Customer, then documents/records to be submitted for verification during inspection, else, Vendor shall get the approval of Welding Procedure / Welder from the identified agency prior to carrying out welding at the job.
2.2	Welding of trolley, rope drum etc	Fillet weld	MA	LPI/MPI	100%	ASTM E165 or Eq/ No cracks or linear indication		INSPN. REPORT	√	P	V	V	
		Butt welds	MA	RT	100%	ASME SEC VIII, DIV 1, UW 51/52		RT FILM & REPORT	√	P	V	V	100% RT for butt weld in tension and 25 % in compression. 100% RT on butt weld of rope drum.
2.3	NDT OF LOAD BEARING BUTT WELDS (IF ANY)	WELD QUALITY OF BUTT WELDS IN TENSION	CR	PT & RT	100%	ASME SEC. VIII DIV. I	ASME SEC. VIII DIV. 4 . CLUW-51 FOR RT APPENDIX -8 FOR PT	INSPN. REPORT ND FILM	√	P	W	V/ W	FILMS TO BE REVIEWED BY BHEL & END CUSTOMER/THIRD PARTY. DPT SHALL BE CHP .
2.4	GEAR BOXES												
	COMPLETE ASSEMBLY	OVERALL DIMENSIONS. LEAK TEST, REDUCTION RATIO, BACK LASH AND CONTACT PATTERN	MA	MEAS./VISUAL	100%	MFG. DRG./KERSON E TEST	MFG. DRG./NO LEAKAGE WHEN FILLED	INSPN. REPORT	√	P	V		
	NO LOAD RUN TEST FOR 4 HRS	CHECK FOR OIL LEAKAGE, VIBRATION, NOISE ,TEMP. RISE	MA	PERFORMANCE	100%	APPROVED DRGS /No leakage,Noise 85dbA maxat 1 mtrs, vibration 75 microns max, oil temp rise 20 deg above ambient max		- DO -	√	P	V	V	
3.0	ELECTRICALS												
1	MOTORS & CABLES	Make, type , rating	MA	Visual /measurment	100%	Apprvd drg	IS 325 / IS:3938	IR, MTC	√	P	V	V	For motor refer Note: 2
		ROUTINE TESTS											
3	LIMIT SWITCHES,SFU, ISOLATOR/ O/L RELAY, MCB, FUSES,PUSH BUTTONS,CONTACTOR, INDICATING LAMPS etc	Make , type , rating, functional, Continuity	MA	Review of TC	100%	Approved drgs		IR	√	P	V	V	
4	BRAKES	Make , type , rating, HV/IR, Functional test	MA	Review of TC	100%	Approved drgs		IR, MTC	√	P	V	V	
5	DSL	Make , type , rating, dimension	MA	Review of TC	100%	Approved drgs		IR	√	P	V	V	
6	Control transformer	Make , type , rating, input/output	MA	Review of TC	100%	Approved drgs		IR	√	P	V	V	
-	CONTROL PANEL, PENDANT SWITCH	* FIXING OF COMPONENTS WIRING MARKING CONTINUITY * FUNCTIONAL TEST * IR & H.V. TEST * IP - PROTECTION TEST * PAINT SHADE, THICKNESS, SHEET THICKNESS, ADHESION TEST	MA	VISUAL/MEASUR	100%	APPD.DRG. WIRING DIAGRAM,	APPD. DRG. WIRING DIAGRAM,	IR	√	P	V	V	
8	VVVF DRIVES (IF APPLICABLE)	MAKE , TYPE , RATING , ROUTINE TESTS	MA	VISUAL/ VERIFY	100%	APPROVED DRAWINGS	APPROVED DRAWINGS	MTC	√	P	V	V	

		MANUFACTURERS NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT		RATE CONTRACT			
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				REV		0	CONTRACT No						
				DATE		01.12.16	CONTRACTOR		BHEL-PEM				
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Sl.No	COMPONENT & OPERATIONS	CHARACTERISTICS	CATEGORY	TYPE OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		REMARKS	
								D*	M	C	N		
1	2	3	4	5	6	7	8	9		**	10	11	
4.0	FINAL INSPECTION												
4.1	COMPLETELY ASSEMBLED HOIST	1. COMPLETENESS, CORRECTNESS, WELD QUALITY, OVERALL DIMENSIONS	MA	VISUAL, MEAS	100%	APPD. DRG.	APPD. DRG.	MNFRS' TEST CERT.	√	P	W	W	CHP
4.2	ASSEMBLED HOIST PERFORMANCE WITH ACTUAL CONTROL PANEL, AND PENDENT PUSH BUTTON	1. LOAD TEST	CR	LOAD TEST at SWL	100%	IS:6547 / IS:3938	IS:6547 / IS:3938	MNFRS' TEST CERT.	√	P	W	W	CHP
		2. HOISTING & LOWERING SPEED, PERFORMANCE OF CONTROLLERS SWITCHES CONTACTORS, RELAYS AND OTHER CONTROL DEVICES CORRELATIONS OF CIRCUITS AND INTERLOCKS AND SEQUENCES OF OPERATION , CURRENT MEASUREMENT,LIMIT	CR	MEAS & VISUAL	100%	IS:3938, TECH SPEC.	TECH SPEC.	MNFRS' TEST CERT.	√	P	W	W	CHP
		3. OPERATION OF ALL PROTECTIVE DEVICES	CR	VISUAL	100%	TECH SPEC	TECH SPEC.	MNFRS' TEST CERT.	√	P	W	W	CHP
4.3	OVER LOAD TEST	OVER LOAD TEST INCLUDING HOLDING CAPACITY OF BRAKES, LIFTING LOAD FROM MID AIR, SOUNDNESS OF WELD AFTER OVERLOAD	CR	TEST AT 125 % OF-SWL	100%	IS:3938	IS:3938	INSPN. REPORT	√	P	W	W	CHP
5	PAINTING												
5.1	PRIMER & FINISHING AND SHADE	Examination - Shade , DOP by paper insertion method	MI	visual	100%	DRG. & DATA SHEET & RELV. IS SPEC.		MNFRS' TEST CERT.		P	V		
		DFT	MA	measurement	Sample					P	V		
6	PACKING	STURDINESS, PROTECTION MARKING	MA	VISUAL	100%	MFG STD	MFG STD			P			
NOTE:													
1	When back wall echo is set to 100% in sound area then a) defect echo shall not exceed 20% b) Back echo shall be minimum 80% in any area.												
2	less than 30 KW. Acceptance of motor less than 30 KW is based on COC of the manufacturer & the contractor confirming as follows : It is hereby confirmed that the above mentioned motor/motors was/were manufactured taking care of specific requirement regarding ambient temp, voltage & frequency variation, hot start, pull out torque, starting KVA/KW, temp rise, distance between center of stud and gland plate and tested in accordance with approved drawing/data sheet.												
		LEGND											
		* RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY MANUFACTURER IN QA DOCUMENTATION.											
		** M: MANUFACTURER/SUBCONTRACTOR											
		C: BHEL/BHEL NOMINATED THIRD PARTY INSPECTION AGENCY											
MANUFACTURER/ SUB CONTRACTOR		N: CUSTOMER/CUSTOMER'S CONSULTANT/CUSTOMER'S APPOINTED THIRD PARTY											
		'P'- PERFORM", 'W'- WITNESS AND "V"- VERIFICATION											
SIGNATURE		" CHP" CUSTOMER HOLD POINT					REVIEWED BY		NAME & SIGN OF APPROVING AUTHORITY & SEAL				



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CUSTOMER SPECIFICATION

(Project specific)



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SPECIFIC TECHNICAL REQUIREMENT (ELECTRICAL)

(PROJECT SPECIFIC)



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DATA SHEET A



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TECHNICAL DATA SHEET

S.N..	DESCRIPTION	TECHNICAL PARTICULARS
1.0	Type	Electric wire rope hoist
2.0	Scope (Qty., Capacity, Lift, Travel Length)	The scope shall be specific for particular projects and shall be given at the time of enquiry of individual project as per scope of enquiry.
3.0	Type of service	Indoor/outdoor to be informed on project to project basis.
4.0	Overload test	125% of SWL
5.0	Design Ambient temperature	50° C
6.0	General Design & duty	As per IS: 3938 latest conforming to Class-II
7.0	Operating speed /Creep speed	(Creep speed shall be project specific)
7.1	Hoisting motion	2.5 M/Min to 3 M/Min (To be informed on project to project basis)
7.2	Trolley motion	7 M/min to 10 M/min (To be informed on project to project basis)
8.0	Type of transmission	Through Electric motor and gearbox
9.0	Wire Rope	
9.1	Construction / core	6 x36 construction (Steel / Fiber core to be informed project to project basis)
9.2	Code	IS:2266
9.3	Number of falls	Min. 4
9.4	Factor of safety	Not less than 5
10.0	Load Hook and block	NORMALISED HOOK ONLY
10.1	Type of load hook	Shank type swiveling with safety latch
10.2	Load hook Code	IS: 15560
10.3	Load hook Material	As per IS: 1875, minimum Class 3
10.4	Hook suspension	Thrust bearing
10.5	Material of block suspension	Fabricated from steel plate, Material: IS: 2062 grade A or B
11.0	Gear & pinion	
11.1	Type	Spur / Helical
11.2	Material	Gear: 16 Mn Cr 5 / 20 Mn Cr 5 / C40 / C50 / EN19 / EN24 / SAE 8620 / 16 Cr Ni 4 / 18 Ni Cr Mo5 / 39 Ni Cr. MO3 / 42 Cr MO4
11.3	Lubrication	Oil splash / grease lubricated
11.4	Bearing type	Antifriction Ball / Roller



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12.0	Trolley drive	
12.1	Wheel	Single flanged
12.2	Wheel conform to (Std. / code)	IS: 3938
12.3	Wheel material	Cast , forged or rolled steel.
12.4	Bearing type	Antifriction Ball / Roller
12.5	Trolley type	Adjustable type to accommodate beams flange width of standard sizes given in schedule attached at end of this data sheet. Trolley shall accommodate one size higher or lower beam size given in the schedule.
12.6	Hardness	200 BHN (max)
13.0	SHEAVE	
13.1	Material	Fabricated from steel plate. IS: 2062 Gr. B or as per IS: 3938
13.2	Bearing type	Antifriction Ball / Roller
14.0	BRAKE (HOIST)	
14.1	Type	DC EM (disc/shoe type- fail to safe-project specific)
14.2	Capacity	150 % of FLT
14.3	Number	One number.
15.0	BRAKE (TROLLEY)	
15.1	Type	DC EM (disc/shoe type- fail to safe-Project specific)
15.2	Capacity	125 % of FLT or 100% of motor torque (Which ever is higher)
15.3	Number	One number for each motor.
16.0	Lubrication	Oil splash/Grease lubrication
17.0	ROPE DRUM	
17.1	Material	Seamless steel pipe. ASTM A106 Gr A /B /ASTM 53 grade B; Fabricated from MS as per IS 2062 Gr A/B.
17.2	Flange / Flangeless	Flanged
17.3	Type of groove	RHO and LHO/LHO/RHO lay type to suit the layout requirement for nearest hook approaches.(Shall be decided during detail engineering).
18.0	TYPE OF POWER SUPPLY TO HOIST	
18.1	CT travel	Shrouded Bus Bar (Copper/Galvanized Steel /Stainless Steel/Galvanized Iron) Conductor Type / EPR flexible trailing cable. (To be informed on project to project basis.)
19.0	MOTORS	HOIST TROLLEY
19.1	Type	Sq. Cage induction, TEFC, S4 duty, 40% /60% CDF
19.2	Number of start	150/300 starts / hr (Project specific)



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19.3	Voltage , Phase and Frequency	415V $\pm$ 10%, 3 phase, 50 Hz, 3 wire/ 4 wire shall be informed during detail engineering.
19.4	Class of insulation	Class "F" and temperature rise limited to class "B" whichever is lower.
19.5	Type of enclosure	TEFC
19.6	Degree of protection provided for enclosure	IP-55
19.7	Margin	The motor rating shall be arrived at considering 15% margin over the duty point input or 10% over the maximum demand of the driven equipment, whichever is higher, considering highest system frequency.
20.0	LIMIT SWITCHES	Hoisting / lowering Trolley
20.0	Type	----Snap action, self actuating type / two/one way lever ----- -
21.0	CONTROL PANEL (Hoist mounted / wall mounted) project specific.	* Fabricated from CRCA steel sheet min 2 mm thick. * Degree of protection shall be IP 55. * Power on indicating lamps shall be provided * Panel illumination lamps operated by door switch. * 2 nos earthing bolts on panel. * 20 % spares terminals(clip on type) shall be provided. * Power and control terminals (clip on type) shall be on separate channels. * Gland plate thickness shall be minimum 3mm. * Gland plate shall be double brass compression type.
22.0	Quantity	As per manufacturer design.
23.0	Pendent Push buttons station	Up /down / forward / Reverse push buttons (glow type). Indicative marking for easy operation shall be provided. 1.Suitable for IP 55 protection 2.Ambient temp (-25 to 60 deg C) 3.Suitable for upto: 1.5 X 14C cable entry. 4.Pendant cable shall be multicore EPR flexible. 5.PVC coated steel wire rope for pendant shall be 2 mm.)
24.0	Power cables	FRLS PVC / EPR flexible Cu cable (Project specific) (Min. size 2.5 sq. mm for Cu & 16 sq mm for Al)
25.0	Control cable	FRLS PVC / EPR flexible Cu cable / Al cable (Project specific) (Min. size 1.5 sq. mm for Cu & 16 sq mm for Al)
26.0	Control Voltage (AC)	110 V/24V (Shall be informed on project to project)
27.0	Control for motions	
27.1	Speed Control	Thru' VVVF with minimum 6 pulse design
27.2	Starting torque of VVVF	Upto 200% typical
27.3	Starting current	Less than 150 % of rated torque
27.4	Temperature	Capable of withstanding upto 50°C without derating.



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28.0 OTHER REQUIREMENTS

1. Inching operation of hoist is to be through main hoist motor.
2. DSL phase indicating lamps to be provided.
3. Pull out torque of motor at rated voltage shall be 275% of full load torque.
4. Earthing conductor size shall be minimum as follows
 - a) Push buttons – 8 SWG GI wire
 - b) Panel & motors – 25 x 3 mm GS flats
5. Bearing life shall be 20 years minimum or 10,000 working hours. (Project specific)

29.0 SPECIAL HAZARDOUS AREA REQUIREMENT (PROJECT SPECIFIC).

1. All wheels shall be provided with phosphor bronze type.
2. Any other mechanism where two non-lubricated parts mate, one of them shall be for non-ferrous material like phosphor bronze aluminum bronze.
3. All electrical components/ equipment for hoist shall meet the requirements of hazardous area & shall be explosion proof type.
4. Coupling guards shall be non-sparking (i.e. non-ferrous/non-metallic) type.
5. Travel DSL shall be flexible trailing cable type.
6. Hoists shall be suitable for hazardous area (i.e. Zone-2) for gas group IIA, IIB

Note:

1. For items/components having multiple choice of material of construction, rating, type, size etc, the final selection shall be on project to project basis during detail engineering. Bidder to note that there shall be no price implication on final selection of the same.
2. The bidder shall fill Technical details against each item marked (*), during detailed engineering only.
3. In case of discrepancy between the Data sheet and requirement given elsewhere in the technical specification, bidder to bring out the same within 10 days of issue of enquiry. In case the same is noticed during detail engineering the more stringent of the two as per the interpretation of Purchaser/Customer shall be applicable.



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STANDARD TECHNICAL REQUIREMENT

SUB-SECTION IIA

STANDARD TECHNICAL REQUIREMENT (MECHANICAL)

SUB-SECTION IIB

STANDARD TECHNICAL REQUIREMENT (ELECTRICAL)



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STANDARD TECHNICAL REQUIREMENT (MECHANICAL)



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1.0.0 STANDARD TECHNICAL SPECIFICATION

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

2.0.0 Design Particulars

The electric wire rope hoist covered in this specification shall be of most optimum headroom type suitable as specified in Data Sheet-A. Equipment offered shall be conforming to specification requirements as per IS: 3938 (latest edition) and other specified Indian Standards.

Low headroom hoist: In some particular areas/application low headroom hoists shall be required. The maximum headroom (i.e from hook centre to bottom of monorail beam) shall be 600mm. The requirement for such low headroom hoist shall be given on project to project basis. However the impact price has to be quoted capacity wise in the price schedule.

3.0.0 Technical Particulars

3.1.0 Type - Electrically operated with trolley suitable for non – hazardous or hazardous area to be informed on project to project basis.

The hoist shall be used indoors for most of the areas. However for some specific areas (to be informed on project to project basis) the hoists shall be suitable for outdoor application. In such cases suitable protection like canopy etc for motor along with suitable protection for electrical panel and components shall be provided.

3.2.0 Applicable Indian Standards

DESCRIPTION

- | | |
|---------------|--|
| i) IS: 2266 | Specification for steel wire ropes for general engineering purposes. |
| ii) IS: 4029 | Guide testing induction motor. |
| iii) IS: 900 | Code of practice for installation and maintenance of induction motor. |
| iv) IS: 4237 | General requirement of switchgear and control gear for voltage motor exceeding 1000 Volts. |
| v) IS: 694 | Copper conductors PVC insulated cables for voltage up to 1000 Volts |
| vi) IS: 3043 | Code of practice for earthing. |
| vii) IS: 1822 | Motor starters for Voltages up to 650V. |



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- viii) IS: 2147 Degree of protection provided by enclosures for low voltage switch— gear and control gear.
- ix) IS: 1554 PVC insulated (Heavy-duty) electric cables for working voltages and including 1100 volts.
- x) IS: 325 Three phase induction motors.
- xi) IS: 15660 Point hook with shank.
- xii) IS 9968 Part I Flexible trailing cables

4.0.0 Quality Plan & Inspection

To ensure that the equipment and services are in accordance with the specification, the Bidder shall follow/adopt BHEL's Standard Manufacturing quality plan enclosed herewith to control critical activities at all essential points.

Inspection shall be carried out by BHEL, BHEL nominated third party inspection agency/Customer or its representative as the case may be in line with the approved drawing / document.

5.0. Name Plate for load indication

The hoists shall have a permanent inscription of English on each side, readily visible from the ground level, stating the following:

Name of manufacturer

Capacity (in tons)

Maximum Lift (in meters)

Serial No.

Any other detail as per IS 3938.

6.0.0 Painting Procedure – Indicative painting procedure is elaborated at Annexure III. Actual painting procedure shall be informed on project to project basis.

6.1.0 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.

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

6.3.0 Details of painting shall be specified elsewhere in the specification.

7.0.0 COLOR SCHEME- Indicative scheme is given at Annexure III for reference. Actual color scheme shall be informed on project to project basis.



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Color scheme shall be intimated to Bidder during the contract execution stage and the same shall be strictly followed without any commercial and delivery implication to BHEL.

8.0.0 GENERAL DESIGN FEATURE

- 8.1.0 Design shall conform to IS: 3938 (Latest edition) and other standards as specified.
- 8.2.0 Parts requiring replacement or lubrication shall be easily accessible & without dismounting type.
- 8.3.0 Equipment shall include the devices as required and comply with applicable standards / specification requirements.
- 8.4.0 Defects in material are not acceptable/allowed. Rectification of any flaw is permissible only with the approval of Purchaser.
- 8.5.0 Hoist shall be rigid in construction and all movements shall be smooth and non-jerky.
- 8.6.0 Design shall provide for easy maintenance of all parts, particularly the wheel bearings.
- 8.7.0 Both hoists and trolleys shall be driven electrically. Wheels shall be single flanged type and to suit different monorail beam sizes. Design shall allow without dismantling, increase or decrease in wheel to wheel gap to make the hoist suitable for different flange width of ISMB. Suitable washers and length of load pin shall be provided for this purpose.
- 8.8.0 Hook shall be swivelling type and fitted with a safety latch.
- 8.9.0 Hoists shall be designed for low headroom and for closest hook approaches.
- 8.10.0 End stoppers of adequate capacity shall be supplied for each electric hoist.

8.11.0 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. All fabricated gearboxes shall be stress relieved.

8.12.0 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.

8.13.0 Couplings : Motor shafts shall be connected to gear box input extension shafts through flexible gear coupling.

8.14.0 Wire ropes: Ropes of steel /fibre core as specified in Data Sheet – A/B shall be of right hand lay, of 6x36 construction of best plough steel having minimum tensile strength as 160-180



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kg/mm². Left hand lay wire ropes shall not be used (Reverse bend ropes shall be avoided as far as possible).

9.0 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 with IP—55 degree of protection. Motors shall be class 'F' insulated with temperature rise limited class B & suitable for 150 starts per hour/ 300 starts per hour (to be informed on project to project basis.) Motors shall conform to IS-325.

10.0 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.

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 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.



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i) All internal wiring shall be identified with numbering ferrules at both ends as per the relevant wiring diagram.

11.0 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".

Lever operated limit switches shall be provided for cross traverse. These limit switches shall be self-reset type.

12.0 Brake: The hoist and cross traverse motors shall be fitted with DC electro-magnetic disc / shoe (to be informed on project to project basis) type brakes designed ,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. Manual reset of brake shall be provided.

13.0 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). The contactors are operated by pendent push button station suspended from the hoist for easy operation and suspension is made on steel link chain. Pendent shall be retractable type. Necessary cable glands, lugs, terminals along with connecting cable of 12C/14C—1.5sqmm copper flexible cable shall be provided. Emergency stop push button shall be mushroom head (lockable) type. Push button 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.

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 (Project specific)
- h) Emergency stop push button (mushroom type).



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- i) Alarm bell push button.(Project specific)

14.0 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.

15.0 POWER SUPPLY TO HOIST:

Purchaser shall provide single point 415V, 3 /4 phase, and 50Hz supply (3 wire or 4 wire shall be informed on project to project basis) 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 bidders responsibility to supply isolators suitable for the incoming cable.

Power feeding to the hoist shall be thru one of the following methods to be informed on project to project basis.

- i) Shrouded Bus Bar Conductor Type DSL complete with brackets and other fixing arrangements.
- ii) EPR flexible trailing cable : Cu conductor ,1.1kV grade ,for 3wire /4 wire system, EPR insulated heat resistant, oil resistant and fire retardant type complete with DSL trolley on T track / taut wire arrangement including necessary fixing arrangements such as auxiliary beam, brackets, supporting plates, junction box etc.

DSL/Flexible trailing cables (requirement to be informed on project to project basis) 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.

16.0 WIRING SYSTEM



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The supplier shall furnish all power, control and auxiliary circuit wiring of the equipment and the panel located on the trolley.

The wiring shall be complete in all respect to ensure the proper functioning of the equipment.

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.



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TECHNICAL SPECIFICATION FOR VVVF DRIVE

1.0 General

- a) This part of the specification describes the general requirements for the Variable Voltage Variable frequency Drives, herein referred to as AC Drives, for use with standard IEC design AC squirrel cage induction motors. The nominal values, the standard documents and the drive's minimum performance are defined in this part. **To avoid any mismatch between the motor and its control equipment, the AC Drive shall be capable of auto adjustment by automatic measurement of the motor parameters with/without motor rotation.**

- i. Speed control of hoist shall be through Variable Voltage Variable Frequency System (VVVF) with minimum 6 (six) pulse design.
- ii. Necessary input & output devices to be provided to reduce harmonics, as per IEE519, at supply side of the drive at the switchgear.
- iii. All necessary protections e.g. Input Phase Loss, Earth Fault, Over Voltage, Output Short Circuit, Load Loss, Input Transient Protection, Overload etc. to be provided.
- iv. VVVF system shall be capable of generating suitable starting torque (220% typical) with / without encoder, however starting current shall not exceed 150% of the rated torque.
- v. VVVF system shall be capable of withstanding upto 50 deg C. ambient temp without derating
- vi. Squirrel cage Induction motor with VPI insulation shall be provided with VVVF system.
- vii. Protective Pane Provided with isolating switch, power contactor control and indication to switch ON/OFF power to starter panels, control and lighting transformer.
- viii. Starter Panel:
Separate VVVF system panels to be provided for CT, LT and hoist motion
 - (a) Contactors: AC 4 duty for reversing application AC 3 duty for non-reversing application
 - (b) Switches: AC 23 for motor application, AC 22 for other application.
 - (c) Fuses: HRC
 - (d) Overload relay: Temperature compensated, bimetallic with single phasing preventor.
- ix. Panel shall be fabricated out of 2 mm thick rolled sheet steel. IP 55 degree of protection. Paint shade shall be RAL 9002 for front & rear and RAL 5012 for side



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covers. Space heaters to be provided.

2.0 User interface

2.1 General

The user interface shall be identical throughout the power range and type to avoid confusion amongst the users and need for training in several different units.

2.2 Inputs and outputs

A. At least, the following standard Inputs and Outputs shall be provided, to be used in interface with the control system:

Analogue Inputs : 1 x Programmable differential voltage input $\pm 10V$,
1 x Programmable current input 0(4) - 20mA
1 x Programmable voltage input 0 – 10V

Analogue Output : 1 x Programmable analogue outputs 0(4) - 20mA or 0 – 10V

Logic inputs : 6 x Programmable logic Inputs isolated from the mains

Relay Outputs : 2 x Programmable Digital outputs with a changeover dry contact

All the control terminals shall be clearly marked.

B. At least, it shall be possible to assigned the following functions to the I/Os:

Analogue input	Analogue outputs
Speed reference Summing reference	Motor current Motor frequency Motor torque Motor power
Logic input	Relay or logic outputs (open collector)
Forward Reverse Jog Preset speeds Reference switching Ramp switching Parameter sets selection Fast stop Freewheel stop + speed - speed External fault	Ready Drive running High speed attained Drive fault Frequency threshold attained Motor thermal state attained Torque or current limitation attained Brake control

2.3 Programming terminal

A. The AC drive shall have a keypad /display for programming and controlling purposes. An IP54 or IP65 remote mounting shall be possible at a distance of 10m.



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- B. Password protection shall be provided to avoid unauthorized tampering with the set parameters.
- C. The programming terminal shall be able to display the commercial reference of the AC drive and of the options, the software version, the serial number
- D. Direct keypad entry shall be provided to observe the following actual parameters. Any one of the following parameters or actual values shall be selected to be always displayed:-
 - i. Input Voltage
 - ii. Input Frequency
 - iii. Output Frequency
 - iv. Output Power
 - v. Output Current
 - vi. Motor Speed

The following parameters shall always be displayed during normal operation:-

- i. Drive Status

The following drive control functions at least shall be available from the keypad:-

- i. Run
- ii. Stop
- iii. Local / Remote selection.
- iv. Forward/Reverse (if function enabled)
- v. Accelerate
- vi. Decelerate
- vii. Parameter setting

2.4 Application programming

The AC Drive shall be designed for both simple and the most complicated applications, yet it shall be user friendly. It shall be possible to reset the parameter settings back to the original factory settings through the keypad.

2.5 PC Tools

The AC Drive Supplier shall have a Windows based PC software available for monitoring and controlling the AC Drives, and the software shall be offered as an option. The software shall be supplied with the necessary hardware and a provision for connecting a PC with the AC Drives. It shall be possible to set and modify parameters, control the drive, read actual values and make trend analysis using the software.

3.0 Software features

- A. Restart



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In the event of a fault trip due to over voltage, over current or loss of analogue signal, the AC DRIVE shall be programmable to attempt an automatic restart. For safety reasons, the maximum number of attempts shall be within a selectable time. If the fault does not clear after the attempts, the drive shall lock out.

B. Brake logic control

The AC Drive shall have a built-in function to control a mechanical brake in order to move the load in a smooth and safe way. The brake logic control shall be adapted to the different movements: hoisting, travel, orientation.

4.0 Preferred makes:

As per attached sub-vendor list.



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ANNEXURE-I

MAKES OF SUB VENDORS ITEMS

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
1.	STEEL	SAIL		
		TISCO		
		JINDAL		
		ESSAR		
2.	HOOKS	STEEL FORGING & ENGG. CO.,	KOLKATA	
		SIMRITI FORGING		
		KARACHIWALA		UP TO 25T CAPACITY
3.	GEAR COUPLINGS	ALLIANCE		
		FLEX-TRANS (formerly known as HICLIFF)		
		SAHARA		
		NUTECH		
		OEM		
4.	WIRE ROPE	USHA MARTIN		
		FORT WILLIAMS		
		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		
8.	CONTACTOR	SIEMENS		
		L&T		
		SCHNEIDER (Earlier TELE MECHANIQUE)		
		BCH		
9.	OVER LOAD RELAYS	SIEMENS		
		L&T		
		ABB		
		SCHNEIDER (Earlier TELE MACHANIQUE)		
10.	HRC FUSES	SIEMENS		



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		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	
		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	



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		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	
		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	



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SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		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	
		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	
		TORRENT CABLES LTD	AHMEDABAD	
		UNIVERSAL CABLES LTD	SATNA	
21.	CABLE GLAND	COMMET		



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SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		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		
30.	SHROUDED DSL	SUSHEEL		
		STROMAG		
31.	LOAD CELL	IPA		
		SARTORIUS		
32.	GEAR BOX	OEM		* = Applicable for Geared Motors only
		ELECON ENGINEERS		
		SHANTI GEARS		
		PBL *		



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SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		NAW*		
		NORD*		
		SEW*		
		BONGFILIOLI*		

NOTE:

1. THE SUB VENDOR LIST ABOVE IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND CUSTOMER APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL.

BIDDER TO PROPOSE SUB VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.

2. THE INSPECTION CATEGORY WILL BE INTIMATED AFTER AWARD OF CONTRACT BY BHEL/CUSTOMER. HOWEVER THE SAME WILL BE ADHERED BY THE BIDDER WITHOUT ANY COMMERCIAL AND DELIVERY IMPLICATION TO BHEL/ CUSTOMER.



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ANNEXURE II

ESSENTIAL SPARES LIST FOR ELECTRIC WIRE ROPE HOIST (PROJECT SPECIFIC)

1	Bearings for trolley wheel	100% for one EH
2	Bearings for gear boxes for hoist	100% for one EH
3	Hoist pulley bearings	100% for one EH
4	Input pinion for Hoist Gearbox	100% for one EH
5	Input pinion for CT Gearbox	100% for one EH
6	First pinion assembly	100% for one EH
7	Brake liners for	
i)	Hoist brake	100% for one EH
ii)	CT brake	100% for one EH
8	Brake springs for	
i)	Hoist brake	100% for one EH
ii)	CT brake	100% for one EH
9	Brake coil for brake	
i)	Hoist brake	100% for one EH
ii)	CT brake	100% for one EH
10	Solenoid for brake	
i)	Hoist brake	100% for one EH
ii)	CT brake	100% for one EH
11	CT wheel assembly (complete) (driving)	100% for one EH
12	CT wheel assembly (complete) (idle)	100% for one EH
13	Wire rope	
a)	For 3.0m -6.0m lift Electric Hoist	100% for one EH
b)	For 7.0m -9.0m lift Electric Hoist	100% for one EH
c)	For 10m -12.0m lift Electric Hoist	100% for one EH
d)	For 13m -15.0m lift Electric Hoist	100% for one EH
e)	For 16m -24.0m lift Electric Hoist	100% for one EH
f)	For 25m -32.0m lift Electric Hoist	100% for one EH
14	Rope Guide	100% for one EH
15	Rope Tightner	100% for one EH
16	Rope sheave assembly with bearings	100% for one EH
17	Oil seals	
i)	Travel gear box	100% for one EH
ii)	Hoist gear box	100% for one EH
18	Cross travel machinery	
i)	Gear wheel	1 set
ii)	Internal clip	1 set
iii)	Pinion	1 set



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19	Rubber bushes for flexible couplings	1 set
20	Contactors	1 no of each type, size and rating
21	Push buttons	1 no of each type, size and rating
22	Overload relays.	1 no of each type, size and rating
23	MCBs.	1set
24	MCCBS	1set
25	Fuse links.	1set
26	Limit Switches for	
i)	Main Hoist	1set
ii)	Cross Travel	1 set
27	Current Collector shoes	1 Set
28	Sockets of each type	1 set
29	VVVF Drive for Hoisting	1 no. of each type and rating.
30	VVVF drive for Cross travel	1 no. of each type and rating.
31	Control module	1 no. of each type and rating.
32	Fixed + moving + spring contacts for each type of contactor	1 set
33	No volt coil for each type of contactor	1 set
34	Fuses of each type	1 set
35	Indicating lamps of each type	1 set
36	Coils for each type of breaker	1 set
37	Double roller collectors	1 set
38	Collector roller	1 set
39	Timers of each type	1 set
40	Resistor element of each size and type	1 set
41	control circuit fuses	1 set
42	Main contacts for each type and rating of contactors	1 set
43	Auxilliary contacts for each type and rating of contactors	1 set
44	Electric meter.	1 set
45	Power supply modules.	1 set
46	Push buttons, ILPBs.(complete with contact elements)	1 set
47	415 V Motor	
i)	Terminal plates	1 set



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ii)	Heaters	1 set
iii)	Greasing arrangements	1 set
iv)	Motor of hoist motion	1 set
v)	Motor of travel motion	1 set
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set
vii)	Stator winding coils for all type of LT motors	1 set
viii)	Dust seals and gaskets for each type of motors	1 set
ix)	Cooling Fans	1 no for each type and rating of motor
x)	Fan Cover	1 no for each type and rating of motor
48	Diode bridge	1 no for each type and rating
49	Switch Fuse Units	1 No
50	Lubricating Oil Pump Motor	1 no for each type and rating
51	Bearing Seal	1 set
52	Transformer	1 set

Note:

1. "One (1) set of each type & size" is defined as 100% requirement for one electric wire rope hoist.
2. 100% of total population of each type, size and rating is defined as 100% requirement for each hoist.



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ANNEXURE III **PAINTING (PROJECT SPECIFIC)**

Painting of the equipment shall be carried out to protect the same from rusting / corrosion during shipping, long storage at site, erection, and during its normal operation / usage.

Whilst the essential requirements of surface preparation and painting are specified here, these in no way relieve the contractor of his responsibility to carry out his work in accordance with good practices. However, any deviation/modification from the specification shall be referred to the purchaser for approval.

The following specification shall be followed in general for electric wire rope hoists and its accessories. Vendor to note that the same is indicative and specific requirement (including color coding) shall be informed on project to project basis.

Hoist:

SURFACE CLEANING -Shot blast cleaning/ abrasive blast cleaning to SA 2 1/2 (near white metal) 35-50 microns..

PRIMER PAINT:-

2 COATS OF AIR DRYING EPOXY POLYAMIDE RESIN BASED RED OXIDE ZINC PHOSPHATE
DFT-60 MICRON (30 MICRON PER COAT).

INTERMEDIATE PAINT:-2 PACK OF AIR DRYING HIGH BUILD EPOXY RESIN BASED PAINT WITH MIO
DFT 80 MICRONS.

FINISH PAINT: TWO COATS OF AIR DRYING EPOXY POLYAMIDE ENAMEL SUITABLY PIGMENTED 60 MICRON. (30 MICRON/COAT)

TOTALDFT=280 MICRON

Shade

Structure: Golden yellow , RAL 1004

Panel:

Surface preparation by (7) tank process & phosphating to coating weight of 16.15 gm Per sq. mtr.

Primer: HB Epoxy based polyamide cured (2) pack zinc phosphate primer %VS=58 min. One coat.
DFT 75µ per coat.

Finish : Aliphatic Acrylic (2) pack polyurethane paint two coat.
DFT 65 µ per coat.

Total DFT : 205 µ

Paint shade RAL-9002 for complete panel except on end covers whose shade shall be RAL-5012



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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.



**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
ELECTRIC WIRE ROPE HOISTS**

STANDARD TECHNICAL REQUIREMENT

SPECIFICATION No: PE-TS-RC-563-A002

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ANNEXURE – V

A.0 DRAWINGS/DESIGN DOCUMENTS FOR SUBMISSION (during detailed engineering)

Sl. No.	BHEL DRG.NO	Customer's drawing no	DRAWING TITLE	SUBMISSION SCHEDULE - WEEK NUMBER FROM DATE OF P.O	Remarks
1	PE-V0-XXX-563-A201	SHALL BE INFORMED ON PROJECT TO PROJECT BASIS	Manufacturing Quality Plan with Sub vendor list OF ELECTRIC HOIST	2	For Customer's approval
2	PE-V0-XXX-563-A202		GA Drawing for Electric Hoist, DSL arrangement and painting details OF ELECTRIC HOIST	3	For Customer's approval
3	PE-V0-XXX-563-A219		Schematic Circuit Diagram OF ELECTRIC HOIST	3	For Customer's information
4	PE-V0-XXX-563-A210		Mechanism Sizing Calculation OF ELECTRIC HOIST	3	For Customer's approval
5	PE-V0-XXX-563-A218		Detailed BOM/BOQ for Hoist	5	For BHEL's information
6	PE-V0-XXX-563-A206		O & M Manual OF ELECTRIC HOIST	6	For Customer's information
7	PE-V0-XXX-563-A211		Electrical Load for Electric hoist	3	For BHEL's information
8	PE-V0-XXX-563-A207		Mandatory spare parts list (if applicable) OF ELECTRIC HOIST	4	For Customer's approval
9	PE-V0-XXX-563-A208		Erection procedure OF ELECTRIC HOIST	6	For BHEL's information
	XXX= PROJECT TO PROJECT BASIS				

Notes:

BHEL/CUSTOMER SHALL COMMENT /APPROVE THE DRAWINGS WITHIN 21 DAYS OF RECEIPT OF DRAWINGS.

VENDOR SHALL RESUBMIT THE REVISED DRAWINGS WITHIN 7-10 DAYS OF RECEIPT OF COMMENTS.

INCOMPLETE DRAWINGS/DOCUMENTS SHALL NOT BE TREATED AS SUBMITTED.

MANUFACTURING SHALL BE STARTED ON RECEIPT OF CAT II APPROVED DRAWINGS.



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B.0 NO.OF DRAWINGS/DOCUMENTS FOR SUBMISSION

A.	Drawing for Approval	No. of prints/copies (hard prints)
i.	For approval	8
ii.	For final distribution (after the vendor obtains final approval from the customer).	12
B.	Certificate, reports etc. (Material test, inspection report and all other type of tests etc.)	6
C.	O&M Manual	
I.	Draft for approval	2
ii.	For final distribution	12

Note:

a) The number of prints/hard copies are indicative and may change on project to project basis.

b) Bidder to note that all the drawings and documents shall also be submitted on CD's (compact discs) 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.

C.0 DOCUMENT MANAGEMENT SYSTEM

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).
- 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://dms-server.bhelpem.com/WrenchWeb>.)



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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	
1.	Cover page				
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				
2.0	Index				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	Description of Plant/System				
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				
4.0	Commissioning Activities (if not covered in separate document i.e. erection manual, commissioning manual)				



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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	Operation Guidelines for plant personal/user/operator				
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	Maintenance guidelines for plant personal				
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				



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	especially for structural, foundations etc.				
6.5	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.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				
6.7	List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				
8.0	List of reference documents				
9.0	Binding as per requirement				

Checked by

Dealing Engineer

Key Resource Person

Section Head



**TECHNICAL SPECIFICATION FOR
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ANNEXURE –VII

PACKING PROCEDURE

Normal Packing:

All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection.

The 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.

Site storage and preservation details have been detailed below.

CONTENT

- 1 SCOPE OF THE DOCUMENT
- 2 PURPOSE OF STORAGE & PRESERVATION
- 3 MEASURES TO BE TAKEN FOR STORAGE AND PRESERVATION
 - a) GENERAL STORAGE REQUIREMENTS
 - b) GENERAL PRESERVATION REQUIREMENTS
 - c) GENERAL INSPECTION REQUIREMENTS
- 4 TYPE OF STORAGE FOR VARIOUS EQUIPMENT
5. CONCLUSION
6. STACKING ARRANGEMENT FOR PLATES AND STRUCTURAL STEEL

1. SCOPE OF THE DOCUMENT

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

2. PURPOSE OF STORAGE & PRESERVATION

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

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

a) GENERAL STORAGE REQUIREMENTS

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

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

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

b) GENERAL PRESERVATION REQUIREMENTS

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

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.
11. Following preservatives/preservation methods can be used depending upon type of equipment
 - a. Rust preventive fluid (RPF)
 - b. Rust protective paints
 - c. Tarpaulin covers, in case of outdoor storage
 - d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –
 - Ingress of moisture and corrosion damages.
 - Damage to protective coating.
 - Open ends in pipes, vessels and equipment -
 - In case any open ends are noticed, same shall be capped.
2. Any damages to equipment / materials.
 - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
 - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

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

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

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



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

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





iii Open storage (O)

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

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

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



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

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

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

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

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H ₂ SO ₄)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

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

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

5. CONCLUSION

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

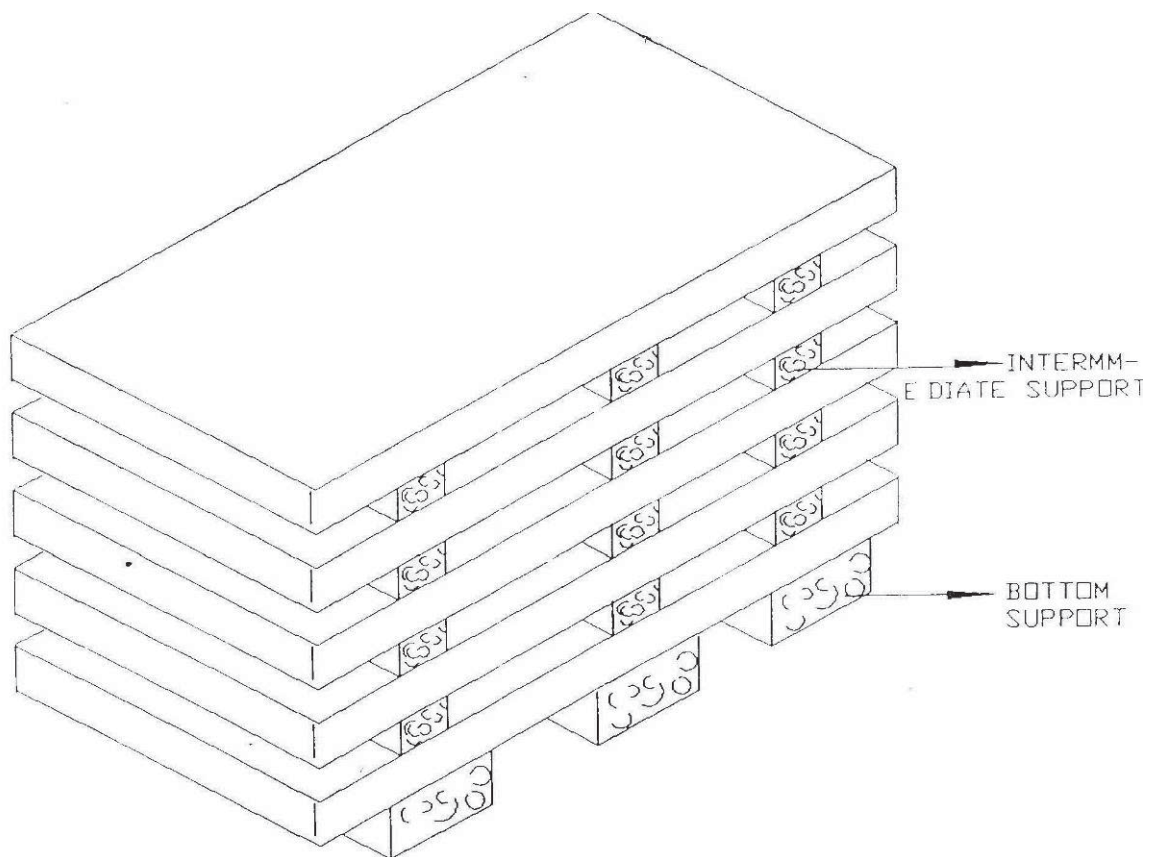


Figure – 1 – PLATE STACKING ARRANGEMENT

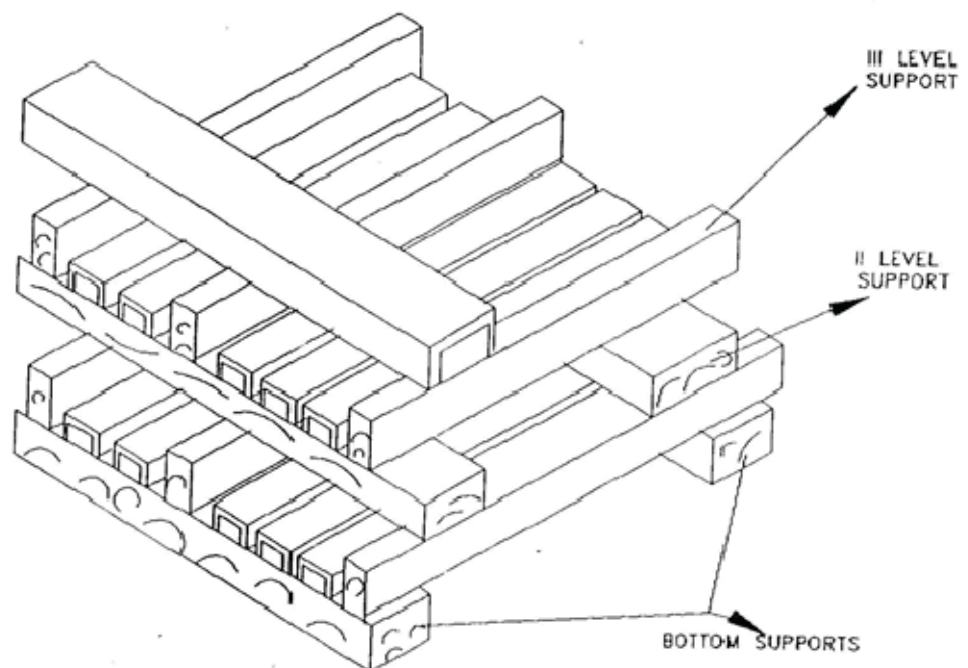


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT



**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
ELECTRIC WIRE ROPE HOISTS**

STANDARD TECHNICAL REQUIREMENT

SPECIFICATION No: PE-TS-RC-563-A002

VOLUME: II B

SECTION-II

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SUB SECTION-IIB

STANDARD TECHNICAL REQUIREMENT (ELECTRICAL)

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR ELECTRIC HOIST	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION : C
		REV NO. : 00 DATE :
		SHEET : 1 OF 3
TECHNICAL SPECIFICATION FOR ELECTRIC HOIST (ELECTRICAL PORTION)		

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR ELECTRIC HOIST	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION : C
		REV NO. : 00 DATE :
		SHEET : 2 OF 3

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 Single girde crane and 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.

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR ELECTRIC HOIST	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION : C
		REV NO. : 00 DATE :
		SHEET : 3 OF 3

4.0

List of enclosures :

- a) Electrical scope between BHEL & vendor (Annexure –I)
- b) Technical specification for motors.
- c) Datasheets & quality plan for motors.
- d) Electrical Load data format (Annexure –II)
- e) BHEL cable listing format (Annexure –III)
- f) Datasheet for Cables
- g) Conduit and pipe specification

REV: 00 DATE: 12.03.2015

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR (FOR EPC PROJECTS)
ELECTRIC HOISTS

PACKAGE:
SCOPE OF VENDOR: SUPPLY
ANNEXURE - I

<u>S. NO</u>	<u>DETAILS</u>	<u>SCOPE SUPPLY</u>	<u>SCOPE E&C</u>	<u>REMARKS</u>
1	Isolating Switch	Vendor	BHEL	BHEL will provide one number 415 V(3ph, 3W) 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. OR 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 2. Solder less crimping type heavy duty tinned copper lugs for power & control cables.
7	a) Input cable schedules (C & I) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	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.

Note:

Power supply by BHEL at S no 1 whether 3ph, 3W or 3ph, 4W shall be project specific.

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
		VOLUME NO. : II-B
		SECTION : D
		REV NO. : 00 DATE : 29/08/2005
		SHEET : 1 OF 1

GENERAL TECHNICAL REQUIREMENTS

FOR

LV MOTORS

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

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
		VOLUME NO. : II-B
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		SHEET : 1 OF 4

1.0

INTENT OF SPECIFIATION

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 for rotating electrical machnines
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.

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		SHEET : 2 OF 4
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: 55 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.		

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
		VOLUME NO. : II-B
		SECTION : D
		REV NO. : 00 DATE : 29/08/2005
		SHEET : 3 OF 4
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 U 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.	
4.9	General	

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
		VOLUME NO. : II-B
		SECTION : D
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		SHEET : 4 OF 4
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.		

	TITLE LV MOTORS <u>DATA SHEET-A</u>	SPECIFICATION NO.	
		VOLUME	II B
		SECTION	D
		REV NO. 00	DATE 16/01/2016
		SHEET	1 OF 1
1.0	Design ambient temperature	:	50 °C
2.0	Maximum acceptable kW rating of LV motor	:	Upto 160KW
3.0	Installation (Indoors/ Outdoors)	:	As required
4.0	Degree Of Protection	:	IP55
5.0	Cooling	:	TEFC
6.0	Details of supply system		
	a) Rated voltage (with variation)	:	415V $\pm$ 10%
	b) Rated frequency (with variation)	:	50 Hz (Variation: +5% 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 box	:	50 kA for 0.25 sec
	f) LV System grounding	:	Solidly
7.0	Class of insulation	:	Class 'F', with temp rise limited to class B.
8.0	Minimum voltage for starting (As percentage of rated voltage)	:	80% of rated voltage
9.0	Power cables data	:	Shall be given during Detailed engg.
10.0	Earth Conductor Size & Material	:	Shall be given during Detailed engg.
11.0	Space heater supply(30KW & ABOVE)	:	240 V, 1 Φ , 50 Hz
12.0	Rating up to which Single phase motor	:	Acceptable below 0.20 Kw
13.0	TYPE OF STARTER PROVIDED IN MCC	:	DOL
14.0	Locked rotor current		
	a) Limit as percentage of FLC	:	As per IS 12615
	b) Permissible tolerance, if any	:	
15.0	Additional tests	:	As per QP
16.0	Flame-proof motor		
	a) Enclosure suitable (As per IS:2148)	:	As per requirement
	b) Classification of Hazardous area (As per IS: 5572 part-I)	:	As per requirement
	c) Degree of protection	:	IP65
17.0	Makes	:	AS PER ANNEXURE
18.0	Terminal box	:	Suitable to rotate at 90 degrees
19.0	Paint shade	:	Shall be given during detailed engg.

	TITLE LV MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 1 OF 2

S. No.	Description		Data to be filled by successful bidder
A.	General		
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.	Design and Performance Data		
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			

	TITLE LV MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 2 OF 2

S. No.	Description	Data to be filled by successful bidder
	c) At starting	
C.	Constructional Features	
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)	
D.	Characteristic curves/ drawings (To be enclosed for motors of rating $\geq 55\text{KW}$)	
	a) Torque speed characteristic	
	b) Thermal withstand characteristic	
	c) Current vs time	
	d) Speed vs time	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

		QUALITY PLAN SHEET 1 OF 2		CUSTOMER :		PROJECT			SPECIFICATION :			
				BIDDER/ :		TITLE			NUMBER :			
				VENDOR		QUALITY PLAN			SPECIFICATION			
SYSTEM		NUMBER PED-506-00-Q-006, REV-01			TITLE			SECTION			VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	MANUF'S SPEC	MANUF'S SPEC	-DO-	2	-	-	
		2.DIMENSIONS	MA	-DO-	-DO-	MFG. DRG./MFG. SPEC.	MFG. DRG./MFG. SPEC.	-DO-	2	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/COLOUR CODE	MA	VISUAL	100%	MFG.SPEC./RELEVANT IS	MFG.SPEC. RELEVANT IS	-DO-	2	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	MANUFR'S SPEC/BHEL SPEC./RELEVANT STANDARD	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST AS PER BHEL SPEC.	MA	-DO-	100%	IS-325/BHEL SPEC./DATA SHEET	SAME AS COL.7	TEST REPORT	2	1		NOTE -1 & NOTE-3
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET & RELEVANT IS	INSPN. REPORT	2	1	-	NOTE -1 & NOTE-3
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									

		QUALITY PLAN		CUSTOMER :			PROJECT			SPECIFICATION :		
				BIDDER/ :			TITLE			NUMBER :		
		SHEET 2 OF 2		VENDOR			QUALITY PLAN			SPECIFICATION :		
		SYSTEM			NUMBER PED-506-00-Q-006, REV-01			TITLE :				
					ITEM AC ELECT. MOTORS BELOW 55KW (LV)			SECTION		VOLUME III		
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			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: 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 2 WHERE EVER CUSTOMER IS INVOLVED IN INSPECTION, (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER. 3 FOR EXHAUST/VENTILATION FAN MOTORS OF RATING UPTO 1.5KW , ONLY ROUTINE TEST CERTIFICATES SHALL BE FURNISHED FOR SCRUTINY. <u>Legends for Inspection agency</u> 1. BHEL/CUSTOMER 2. VENDOR (MOTOR MANUFACTURER) 3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER) P. PERFORM W. WITNESS V. VERIFY												
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN SHEET 1 OF 9		CUSTOMER :		PROJECT TITLE			SPECIFICATION : NUMBER :			
				BIDDER/ VENDOR :		QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
				SYSTEM		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	10	11	11	
1.0	RAW MATERIAL & BOUGHT OUT CONTROL											
1.1	SHEET STEEL, PLATES, SECTION, EYEBOLTS	1.SURFACE CONDITION	MA	VISUAL	100%	-	FREE FROM BLINKS, CRACKS, WAVINESS ETC	LOG BOOK	3	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	-DO-	3	-	-	
		3.PROOF LOAD TEST (EYE BOLT)	MA	MECH. TEST	-DO-	-DO-	-DO-	INSPEC. REPORT	3	-	2	
1.2	HARDWARES	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, UN-EVENNESS ETC.	-DO-	3	-	-	
		2.PROPERTY CLASS	MA	VISUAL	SAMPLES	MANFR'S DRG./SPEC BOOK	RELEVENT IS/SPEC.	SUPPLIERS TC & LOG	3	-	2	
1.3	CASTING	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, BLOW HOLES ETC.	LOG BOOK	3	-	2	
		2.CHEM. & PHY. PROP.	MA	CHEM & MECH TEST	1/HEAT NO.	MANFR'S DRG./SPEC	RELEVENT IS/	SUPPLIER'S TC	3	-	2	
		3.DIMENSIONS	MA	MEASUREMENT	100%	MANUFR'S DRG.	MANUFR'S DRG.	LOG BOOK	3	-	2	
1.4	PAINT & VARNISH	1.MAKE, SHADE, SHELF LIFE & TYPE	MA	VISUAL	100% CONTINUOUS	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	LOG BOOK	3	-	2	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :		
				BIDDER/ VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE		
		SHEET 2 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.5	SHAFT (FORGED OR ROLLED)	1. SURFACE COND.	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	-	VENDOR'S APPROVAL IDENTIFICATION SHALL BE MAINTAINED
		2. CHEM. & PHYSICAL PROPERTIES	MA	CHEM. & PHYSICAL TESTS	1/HEAT NO. OR HEAT TREATMENT BATCH NO	MFG. DRG. SPEC.	RELEVANT IS	SUPPLIER'S TC	3	-	2	
		3. DIMENSIONS	MA	MEASUREMENT	100%	-DO-	MANUFR'S DRG.	LOG BOOK	3	-	2	
		4.INTERNAL FLAWS	CR	UT	-DO-	ASTM-A388	MANUFR'S SPEC. BHEL SPEC.	-DO-	3	2	1	
1.6	SPACE HEATERS, CONNECTORS, TERMINAL BLOCKS, CABLES, CABLE LUGS, CARBON BRUSH TEMP. DETECTORS, RTD, BTD'S	1. MAKE & RATING	MA	VISUAL	-DO-	MANUFR'S DRG. SPEC.	MANUFR'S DRG. SPEC.	-DO-	3	-	2	FOR DIA OF 55 MM & ABOVE
		2. PHYSICAL COND.	MA	-DO-	-DO-	-	NO PHYS. DAMAGE, NO ELECTRICAL DISCONTINUITY	-DO-	3	-	2	
		3.DIMENSIONS (WHEREVER APPLICABLE)	MA	MEASUREMENT	SAMPLE	MANUFR'S DRG./ SPEC.	MANUFR'S DRG. / SPEC.	-DO-	3	-	2	
		4.PERFORMANCE/ CALIBRATION	MA	TEST	100%	-DO-	-DO-	INSP. REPORT	3	-	2	
BHEL			PARTICULARS		BIDDER/VENDOR							
			NAME									
			SIGNATURE									
			DATE					BIDDER'S/VENDORS COMPANY SEAL				

		QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :		
				BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE		
		SHEET 3 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
1.7	OTHER INSULATING MATERIALS LIKE SLEEVES, BINDINGS CORDS, PAPERS, PRESS BOARDS ETC.	1. SURFACE COND. ETC.	MA	VISUAL	100%	-	NO VISUAL DEFECTS	INSPT. REPORT	3	-	2	
		2. OTHER CHARACTERISTICS	MA	TEST	SAMPLE	MANUF'S SPEC.	MANUF'S SPEC.	LOG BOOK AND OR SUPPLIER'S TC	3	-	2	
1.8	SHEET STAMPING (PUNCHED)	1. SURFACE COND.	MA	VISUAL	100%	-	NO VISUAL DEFECTS (FREE FROM BURS)	LOG BOOK	3	-	-	
		2.DIMENSIONS INCLUDING BURS HEIGHT	MA	MEASUREMENT	SAMPLE	MANUFR'S DRG. .	MANUFR'S DRG.	-DO-	3	-	2	
		3. ACCEPTANCE TESTS	MA	ELECT. & MECH TESTS	-DO-	MANUF'S SPEC./ RELEVANT IS	RELEVANT IS	SUPPLIER'S TC	3	-	2	FOR MV MOTOR INSULATION/VARNISH THICKNESS SHALL BE MORE THAN THE BURS HEIGHT
1.9	CONDUCTORS	1. SURFACE FINISH	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	LOG BOOK	3*	-	2*	* MOTOR MANUFACTURER TO CONDUCT VISUAL CHECK FOR SURFACE FINISH ON RANDOM BASIS (10% SAMPLE) AT HIS WORKS AND MAINTAIN RECORD FOR VERIFICATION BY BHEL/CUSTOMER.
		2.ELECT. PROP, & MECH. PROP	MA	ELECT. & MECH.TEST	SAMPLES	RELEVANT IS/ BS OR OTHER STANDARDS	RELEVANT IS/ BS OR OTHER STANDARDS	SUPPLIERS TC & VENDOR'S INSPN. REPORTS	3	-	2	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN		CUSTOMER :		PROJECT TITLE			SPECIFICATION : NUMBER :			
				BIDDER/ VENDOR		QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
		SHEET 4 OF 9		SYSTEM		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	
1.10	BEARINGS	3.DIMENSIONS	MA	MEASUREMENT	-DO-	-DO-	-DO-	Log Book	3	-	2	
		1.MAKE & TYPE	MA	VISUAL	100%	MANFR'S DRG./ APPROVED DATASHEET	MANFR'S DRG./ APPROVED DATASHEET	-DO-	3	-	2	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	BHEL DATA SHEET	BHEL DATA SHEET BEARING MANUF'S CATALOGUES	-DO-	3	-	2	
		3.SURFACE FINISH	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	2	
1.11	SLIP RING (WHEREVER APPLICABLE)	1.SURFACE COND.	MA	VISUAL	100%	-	-DO-	-DO-	3	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANUF'S DRG	MANUF'S DRG	-DO-	3	-	-	
		3.TEMP.WITH-STAND CAPACITY	MA	ELECT.TEST	-DO-	MANUF'S SPEC./ BHEL SPEC.	MANUF'S SPEC./ BHEL SPEC.	-DO-	3	-	2	
		4.HV/IR	MA	-DO-	100%	-DO-	-DO-	-DO-	3	-	2	
1.12	OIL SEALS & GASKETS	1.MATERIAL OF GASKET	MA	VISUAL	100%	MANUF'S DRG/SPECS	MANUF'S DRG./ SPECS.	-DO-	3	-	-	
		2.SURFACE COND.	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	-	
		3.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANUF'S DRG	MANUF'S DRG	-DO-	3	-	-	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN		CUSTOMER :		PROJECT			SPECIFICATION :			
				BIDDER/ :		TITLE			NUMBER :			
		SHEET 5 OF 9		VENDOR		QUALITY PLAN			SPECIFICATION :			
		SYSTEM		NUMBER PED-506-00-Q-007, REV-03			TITLE					
				ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III		
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
2.0	IN PROCESS											
2.1	STATOR FRAME WELDING (IN CASE OF FABRICATED STATOR)	1.WORKMANSHIP & CLEANNES	MA	VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	3/2	2	-	
		2.DIMENSIONS	MA	MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-	
2.2	MACHINING	1.FINISH	MA	VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	2	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-	
		3.SHAFT SURFACE FLOWS	MA	PT	-DO-	RELEVANT SPEC./ASTM-E165	MANUF'S SPEC./BHEL SPEC./	-DO-	2	-	1	
2.3	PAINTING	1.SURFACE PREPARATION	MA	VISUAL	100%	MANFR'S SPEC/BHEL SPEC./RELEVANT STAND	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-	
		2.PAINT THICKNESS (BOTH PRIMER & FINISH COAT)	MA	MEASUREMENT BY ELCOMETER	SAMPLE	-DO-	-DO-	-DO-	2	-	-	
		3.SHADE	MA	VISUAL	-DO-	-DO-	-DO-	Log Book	2	-	-	
		4.ADHESION	MA	CROSS CUTTING & TAPE TEST	-DO-	-DO-	-DO-	Log Book	2	-	-	
BHEL			PARTICULARS		BIDDER/VENDOR							
			NAME									
			SIGNATURE									
			DATE					BIDDER'S/VENDORS COMPANY SEAL				

		QUALITY PLAN		CUSTOMER :		PROJECT TITLE			SPECIFICATION : NUMBER :			
				BIDDER/ VENDOR :		QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
		SHEET 6 OF 9		SYSTEM		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
2.4	SHEET STACKING	1.COMPLETENESS	MA	MEASUREMENT	SAMPLE	MANUFR'S SPEC.	MANUFR'S SPEC.	Log Book	2	-	-	(FOR MOTORS OF 2MW AND ABOVE) * ON 10% RANDOM SAMPLE
		2.COMPRESSION & TIGHTENING	MA	MEASUREMENT	100%	-DO-	-DO-	Log Book	2	-	-	
		3.CORE LOSS & HOTSPOT	MA	ELECT.TEST	-DO-	-DO-	-DO-	Log Book	2	1*	1	
2.5	WINDING	1.COMPLETENESS	CR	VISUAL	100%	MANUFR'S SPEC./BHEL SPEC.	MANUFR'S SPEC./BHEL SPEC.	Log Book	2	-	-	FOR MV MOTOR
		2.CLEANLINESS	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	-	
		3.IR-HV-IR	CR	ELECT. TEST	-DO-	-DO-	-DO-	Log Book	2	-	1	
		4.RESISTANCE	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	
		5.INTERTURN INSULATION	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	-	
		6.SURGE WITH STAND AND TAN. DELTA TEST	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	
2.6	IMPREGNATION	1.VISCOSCITY	MA	PHY. TEST	AT STARTING	-DO-	-DO-	Log Book	2	-	-	THREE DIPS TO BE GIVEN
		2.TEMP. PRESSURE VACCUM	MA	PROCESS CHECK	CONTINUOUS	-DO-	-DO-	Log Book	2	-	-	
		3.NO. OF DIPS	MA	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :		
				BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE		
		SHEET 7 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	10			11
2.7	COMPLETE STATOR ASSEMBLY	4.DURATION	MA	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	VERIFICATION FOR MV MOTOR ONLY
		1.COMPACTNESS & CLEANLINESS	MA	VISUAL	100%	-DO-	-DO-	Log Book	2	-	-	
2.8	BRAZING/COMPRESSION JOINT	1.COMPLETENESS	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	-	
		2.SOUNDNESS	CR	MALLET TEST & UT	-DO-	-DO-	-DO-	Log Book	2		1	
		3.HV	MA	ELECT. TEST	-DO-	-DO-	-DO-	Log Book	2		1	
2.9	COMPLETE ROTOR ASSEMBLY	1.RESIDUAL UNBALANCE	CR	DYN. BALANCE	-DO-	MFG SPEC./ ISO 1940	MFG. DWG.	Log Book	2		1	
		2.SOUNDNESS OF DIE CASTING	CR	ELECT. (GROWLER TEST)	-DO-	MFG. SPEC.	MFG. SPEC.	Log Book	2		1	
2.10	ASSEMBLY	1.ALIGNMENT	MA	MEAS.	-DO-	-DO-	-DO-	Log Book	2	-	-	
		2.WORKMANSHIP	MA	VISUAL	-DO-	-DO-	-DO-	Log Book	2	-	-	
		3.AXIAL PLAY	MA	MEAS.	-DO-	-DO-	-DO-	Log Book	2	-	1	
		4.DIMENSIONS	MA	-DO-	-DO-	MFG.DRG./ MFG SPEC.	MFG. DRG/ RELEVANT IS	Log Book	2	-	-	
		5.CORRECTNESS, COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	MFG SPEC. RELEVANT IS	MFG SPEC. RELEVANT IS	Log Book	2	-	-	
		6. RTD, BTD & SPACE HEATER MOUNTING.	MA	VISUAL	100%	MFG SPEC. RELEVANT IS	MFG SPEC. RELEVANT IS	Log Book	2		1	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE									
												BIDDER'S/VENDORS COMPANY SEAL

		QUALITY PLAN SHEET 8 OF 9		CUSTOMER :		PROJECT TITLE			SPECIFICATION : NUMBER :			
				BIDDER/ VENDOR :		QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
				SYSTEM		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
3.0	TESTS	1.TYPE TESTS INCLUDING SPECIAL TESTS AS PER BHEL SPEC.	MA	ELECT.TEST	1/TYPE/SIZE	IS-325/ BHEL SPEC./ DATA SHEET	IS-325/ BHEL SPEC./ DATA SHEET	TEST REPORT	2	1*	1	* NOTE - 1
		2.ROUTINE TESTS INCLUDING SPECIAL TEST AS PER BHEL SPEC.	MA	-DO-	100%	-DO-	-DO-	-DO-	2	1 ^{\$}	1	^{\$} NOTE - 2
		3.VIBRATION & NOISE LEVEL	MA	-DO-	100%	IS-12075 & IS-12065	IS-12075 & IS-12065	-DO-	2	1 ^{\$}	1	^{\$} NOTE - 2
		4.OVERALL DIMENSIONS AND ORIENTATION	MA	MEASUREMENT & VISUAL	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET & RELEVANT IS	INSPC. REPORT	2	1	-	
		5.DEGREE OF PROTECTION	MA	ELECT. & MECH. TEST	1/TYPE/ SIZE	RELEVANT IS	BHEL SPEC. AND DATA SHEET	TC	2	-	1	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
		6. MEASUREMENT OF RESISTANCE OF RTD & BTD	MA	-DO-	100%	-DO-	-DO-	-DO-	2	1 ^{\$}	1	^{\$} NOTE - 2
		7. MEASUREMENT OF RESISTANCE, IR OF SPACE HEATER	MA	-DO-	100%	-DO-	-DO-	-DO-	2	1 ^{\$}	1	^{\$} NOTE - 2
		8. NAMEPLATE DETAILS	MA	VISUAL	100%	IS-325 & DATA SHEET	IS-325 & DATA SHEET	INSPC. REPORT	2	1 ^{\$}	1	^{\$} NOTE - 2
		9.EXPLOSION FLAME PROOF NESS (IF SPECIFIED)	MA	EXPLOSION FLAME PROOF TEST	1/TYPE	IS-3682 IS-8239 IS-8240	IS-3682 IS-8239 IS-8240	TC	2	-	1	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
		10. PAINT SHADE, THICKNESS & FINISH	MA	VISUAL & MEASUREMENT BY ELKOMETER	SAMPLE	BHEL SPEC. & DATA SHEET	BHEL SPEC. & DATA SHEET	TC	2	1 ^{\$}	1	SAMPLING PLAN TO BE DECIDED BY INSPECTION AGENCY ^{\$} NOTE - 2
BHEL			PARTICULARS		BIDDER/VENDOR							
			NAME									
			SIGNATURE									
			DATE					BIDDER'S/VENDORS COMPANY SEAL				

		QUALITY PLAN SHEET 9 OF 9		CUSTOMER :		PROJECT TITLE			SPECIFICATION : NUMBER :			
				BIDDER/ VENDOR :		QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
				SYSTEM		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
NOTES: 1 DEPENDING UPON THE SIZE AND CRITICALLY, WITNESSING BY BHEL SHALL BE DECIDED. 2 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. 3 IN CASE TEST CERTIFICATES FOR THESE TESTS ON SIMILAR TYPE, SIZE AND DESIGN OF MOTOR FROM INDEPENDENT LABORATORY ARE AVAILABLE, THESE TEST MAY NOT BE REPEATED. 4 WHEREVER CUSTOMER IS INVOLVED IN INSPECTION, AGENCY (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER. <u>Legends for Inspection agency</u> 1. BHEL/CUSTOMER 2. VENDOR (MOTOR MANUFACTURER) 3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER) P. PERFORM W. WITNESS V. VERIFY												
BHEL			PARTICULARS		BIDDER/VENDOR							
			NAME									
			SIGNATURE									
			DATE									
												BIDDER'S/VENDORS COMPANY SEAL

[illegible]

LOAD DATA (ELECTRICAL)	JOB NO.	408	ORIGINATING AGENCY		PEM (ELECTRICAL)	
	PROJECT TITLE	1x800 MW WANAKBORI TPS	NAME		DATA FILLED UP ON	
	SYSTEM	SG CRANE & ELECTRIC HOIST	SIGN.		DATA ENTERED ON	
	DEPTT. / SECTION	ELECTRICAL	SHEET 1 OF 1	REV. 00	DE'S SIGN. & DATE	

	DOCUMENT TITLE TECHNICAL SPECIFICATION FOR 1.1 kV XLPE POWER CABLES	SPECIFICATION NO.	
		VOLUME II B	
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DATA SHEET-A

1.0	Type of Cable	LT XLPE POWER CABLE OF FRLSH TYPE	
2.0	Standard applicable in general	IS:7098 (Part-1), IS:8130, IS:5831, IS:10810, IS:3975, ASTM:2843, ASTM:2863, IEC-754-1, IEC:60332 (Part-1), IEC:60332-3-23, IEEE:60383	
3.0	Voltage Grade	1.1kV	
4.0	Number of cores, cross sectional area of conductors	As per requirement	
5.0	Formula for calculating short circuit current for different durations	$I_{sh} = k A / \sqrt{t}$ where, I_{sh} = Short circuit current in kA t = Fault clearing time in sec. K = a constant = 0.094 for Aluminium conductor XLPE insulation = 0.141 for copper conductor XLPE insulation	
6.0	Installation Conditions for specified current rating		
(a)	Ambient air temperature	50 deg. C	
(b)	Ambient temp. for underground cable	50 deg. C	
(c)	Thermal resistivity of soil	150 deg. C cm/W	
7.0	CONDUCTOR		
(a)	Material	Aluminium	Copper
	Grade and Class	STRANDED COMPACTED PLAIN Aluminium OF H2 GRADE & CLASS 2.	STRANDED COMPACTED HIGH CONDUCTIVITY PLAIN ANNEALED COPPER.
(b)	Standard Applicable	IS: 8130	
	Shape	Circular / shaped as per IS	
(d)	Min. number of strands	As per Table-2 of IS: 8130	
8.0	INSULATION		
(a)	Material	XLPE	
(b)	Standard Applicable	IS: 7098 Part-I	
(c)	Continuous withstand temperature	90°C	
(d)	Short-circuit withstand temperature	250°C	
(e)	Method of application	By extrusion; sleeve extrusion not permitted.	
9.0	CORE IDENTIFICATION	Colour coding as per IS.	
10.0	INNER SHEATH		
(a)	Material	Extruded FRLS PVC Type ST2 as per IS: 5831	
(b)	Colour	Black	
(c)	Whether FRLS	Yes	
(d)	Inner sheath applicable for single core cable	No	
(e)	Fillers	Acceptable	



DOCUMENT TITLE

TECHNICAL SPECIFICATION FOR 1.1 kV XLPE POWER CABLES

SPECIFICATION NO.

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SHEET 2 OF 2

(f)	Material of fillers (if permitted)	Same as inner sheath (Material of filler to be compatible with that of inner sheath)
(g)	Method of application	
(1)	Multi-core cables:	
(i)	With fillers	<i>Pressure/Vacuum extruded</i>
(ii)	Without fillers	<i>Pressure extruded</i>
11.0	ARMOUR (where applicable)	
(a)	Material:	
(i)	Single core cables	Non Magnetic Hard drawn Aluminium Round Wire H4 grade to IS: 3975 & 7098 part-1
(ii)	Multi-core cables	Galvanised Steel <i>Round Wire</i> armour conforming to (i) Type 'a'/'b' as per Table- 6 of IS 7098-I and (ii) IS 3975 as per project requirements.
(b)	Minimum Coverage	90%
(c)	Gap between armour wires	Shall not exceed one armour wire space (No cross-over/ over-riding)
(d)	Breaking load of joint	95 % of normal armour
12.0	OUTERSHEATH	
(a)	Material	Extruded FRLS PVC Type ST2 as per IS: 5831
(b)	Colour	<i>Black</i>
(c)	Whether FRLS	Yes
(d)	Method of application	Extruded



DOCUMENT TITLE

CONDUITS AND PIPES

SPECIFICATION NO. PES-507-27

VOLUME II B

SECTION D

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**GENERAL TECHNICAL REQUIREMENTS
OF
CONDUITS AND PIPES
SPECIFICATION NO. PES-507-27
REV 0**

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1.0 GENERAL

- 1.1 This specification covers the manufacture, inspection & testing at vendor's works and delivery to site of conduits, pipes and their fittings for electrical installation.

2.0 CODES AND STANDARDS

- 2.1 The material, constructional features and various processes involved in manufacture shall comply with currently applicable Indian Standards.
- 2.2 The following Indian Standards shall be applicable, in general. However if Data Sheet A specifies conformance to other international standards, the equivalent IEC/BS/other standards shall be considered.

- a) IS:9537 (All Parts) Conduits for electrical installation.
- b) IS:3480 Flexible steel conduits for electrical wiring.
- c) IS:6946 Flexible non-metallic conduits for electrical installation.
- d) IS:1239 Mild steel tubes, tubulars and other wrought steel fittings.
(for size above 63mm dia of rigid conduits)
- e) IS:2667 Fittings for rigid steel conduits for electrical wiring.
- f) IS:3837 Accessories for rigid steel conduits for electrical wiring.
- g) IS:3419 Fittings for rigid non-metallic conduits.
- h) IS:6005 Code of practice for phosphating iron & steel.
- i) IS:2629 Recommended practice for hot dip galvanizing on iron and steel.
- j) IS:4759 Specification for hot dip zinc coatings on structural steel and allied products.
- k) IS:6745 Methods for determination of mass of zinc coating on zinc coated iron and steel articles.

3.0 DESIGN REQUIREMENTS AND CONSTRUCTIONAL FEATURES

The conduit and conduit accessories shall include conduit plugs & caps, gaskets and box cover etc in addition to any specific requirement given in Data Sheet A. The diameter of conduits and accessories shall be uniform throughout the length.

3.1 Rigid Conduits and Fittings

- 3.1.1 Rigid conduits shall generally conform to the requirements of IS:9537 (Part I & Part II). However conduits above 63mm diameter shall conform to the requirements of IS:1239. Unless specified otherwise in Data Sheet A, all conduits and pipes shall be of medium duty.

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- 3.1.2 The rigid conduits shall be hot dip galvanized inside and outside. Weight of zinc shall be as per IS:4759. Conduits shall be thoroughly cleaned and pretreated, conforming to IS:6005.
- 3.1.3 Conduits shall be supplied in approximate length as specified below
- a) Rigid Conduits 5 metres
 - b) Flexible Conduits 10 - 30 metres
- 3.1.4 Each end of conduit length shall be threaded. The ends of conduits shall be sealed with protective caps to prevent damage to threaded portions and entrance of moisture and foreign material.
- 3.1.5 The inside surface of all conduits shall be smooth and suitable for pulling insulated cables and wires without damage.
- 3.1.6 Conduit fittings shall be made out of tube or cast to the shape as to match with corresponding conduit sizes and meet their purpose without any special adjustment.
- 3.1.7 All fittings shall be screwed type and hot dip galvanized inside and outside.
- 3.2 Flexible Metallic Conduits and Fittings
- 3.2.1 Flexible metallic conduits shall generally conform to the requirements of IS:3480.
- 3.2.2 Flexible conduits shall be made of strip steel which shall be of cold rolled mild steel. The strip shall be of uniform width and thickness throughout.
- 3.2.3 The strip shall be electro galvanized to a minimum thickness of 25 microns as specified in IS:3480. The surface of the strip shall be thoroughly cleaned before application of protective coating. Pretreatment, before galvanization, shall conform to IS:6005.
- 3.2.4 The strip for making flexible conduit shall be wound tightly and so overlapped in subsequent helicals that no openings are seen in normal position.
- 3.2.5 Flexible conduits shall be lead coated for application in high temperature zones, if specifically mentioned in Data Sheet A.
- 3.2.6 The conduit shall have uniform diameter throughout its length. The internal surface of all conduits shall be smooth and suitable for pulling insulated cables and wires without damage.
- 3.3 PVC Conduits
- 3.3.1 PVC conduits shall generally conform to the requirements of IS:9537(Part I & Part III).
- 4.0 INSPECTION
- 4.1 The following stages of manufacture shall be stage inspected by Purchaser or his duly authorized representative.
- 4.1.1 Inspection of manufacturing processes such as shearing, punching, bending, welding, galvanizing etc.
 - 4.1.2 Inspection of packing material and procedure.

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4.1.3 Inspection of finished product.

4.2 The inspection will be carried out as per agreed quality plan.

5.0 TESTING

5.1 Rigid Conduits

- a) Acceptance Tests
 - as per IS:9537 Part 1 & 2 upto 63mm OD
 - as per IS:1239 above 63mm OD
- i) Dimension checks
 - ii) Bending test (below 32mm OD)
 - iii) Compression test
- b) Special Tests (as acceptance test) as applicable to galvanizing.

5.2 Flexible Steel Conduits

- a) Acceptance Tests
 - as per IS:3480
- i) Dimension checks
 - ii) Linear breaking test
 - iii) Test for flexibility
 - iv) Bend fracture test
 - v) crushing test
- b) Special Tests (as acceptance test) as applicable to galvanizing.

5.3 PVC Conduits

- a) Type Tests
 - as per IS : 9537 (Part 1 & 3)
- i) Dimension checks
 - ii) Bending test
 - iii) Compression test
 - iv) Impact test
 - v) Collapse test
 - vi) Resistance test
 - vii) Resistance to burning

	DOCUMENT TITLE CONDUITS AND PIPES	SPECIFICATION NO. PES-507-27	
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viii) Electrical Characteristics

b) Acceptance tests - as per IS:9537 (Part 1 & 3)

i) Dimension checks

ii) Bending test

iii) Compression test

iv) Collapse test

v) Resistance to burning

vi) Electrical characteristics

5.4 Sampling for the tests shall be done as per applicable standards mentioned above.

5.5 The testing shall be carried out as per agreed quality plan.

6.0 PACKING

6.1 The material shall be packed as per manufacturer's standard. Packing procedure shall be to the purchaser's approval.

7.0 DRAWING, DATA AND DOCUMENTS REQUIRED

7.1 The following information shall be furnished within two weeks of award of contract, for purchaser's approval.

a) Manufacturing drawings/details.

b) Recommended Field quality plan covering site handling, storing, laying etc.

c) Final quality plan.

7.3 The following information shall be furnished after testing and inspection

Type Test, routine test and special test certificates in bound volume in requisite number.

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DATASHEET A

SPECIFIC TECHNICAL REQUIREMENTS

- 1.0 APPLICABLE STANDARDS: IS:9537,IS: 1239, IS:3480
- 2.0 RIGID STEEL CONDUITS & STEEL PIPES
- a) Material: Cold rolled mild steel to IS:226
 - b) Applicable standard
 - i) Upto 63mm OD: IS:9537 Part I & II
 - ii) Above 63mm OD: IS:1239
 - c) Surface treatment: Hot dip galvanizing inside & outside as per IS:2629
 - d) Wt. of zinc: as per IS 4759
 - e) Duty: Medium
 - f) Fittings: Screw type as per IS:2667
- 3.0 FLEXIBLE CONDUITS:
- a) Material: Strip steel cold rolled and annealed
 - b) Standard applicable: IS: 3480
 - c) Surface treatment: Electro galvanized as per IS: 3480
 - d) Whether lead coated: YES
 - e) Minimum thickness: 25 microns
of zinc coating
- 4.0 PVC CONDUITS
- a) Material: PVC
 - b) Applicable standard: IS: 9537 (Part I & III)



**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
ELECTRIC WIRE ROPE HOIST**

DOCUMENTS TO BE SUBMITTED BY BIDDER

SPECIFICATION No: PE-TS-RC-563-A002

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DATE: 01.12.16

SHEET :

SECTION-III

DOCUMENTS TO BE SUBMITTED BY BIDDER

- | | |
|------|---|
| IIIA | LIST OF DOCUMENTS TO BE SUBMITTED ALONG WITH
BID |
| IIIB | COMPLIANCE CUM CONFIRMATION CERTIFICATE |
| IIIC | ELECTRICAL LOAD DATA |
| IIID | DEVIATION SCHEDULE (AS PER FORMAT IN GCC) |
| IIIE | PRE BID CLARIFICATION SCHEDULE |



**TECHNICAL SPECIFICATION FOR
RATE CONTRACT OF
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**DOCUMENTS TO BE SUBMITTED BY
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**SUB SECTION-IIIA
LIST OF DOCUMENTS TO BE SUBMITTED ALONG WITH BID**



**TECHNICAL SPECIFICATION FOR
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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 under General Condition of Contract (GCC)

Or

No deviation certificate

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.



**TECHNICAL SPECIFICATION FOR
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**SUB SECTION-IIIB
COMPLIANCE CUM CONFIRMATION CERTIFICATE**



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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" in section C 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 be considered for reference only, same shall be subject to BHEL/ CUSTOMER approval in the event of order.
- 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 and within purview of the tender specification even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities.



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- 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.
- 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) Regarding commercial documents / deviations, BHEL clarified that commercial documents / deviations shall not been considered during technical evaluation. However if any issue in the commercial documents / deviation related to technical requirements needs to be highlighted and resolve in technical evaluation only.
No aspect of commercial issues needs to be highlighted / resolved in technical evaluation and their offer is strictly in compliance with technical specification. BHEL also clarified to the bidder any technical deviations (e.g. related to MDL, required documentation etc. for completion of the project) raised by them in commercial deviation either explicit or implicit shall be considered null and void even if agreed by BHEL during commercial evaluation stage.
Bidder agreed to confirm and compliance with technical specification and subsequent clarification on bids during pre- award discussion.



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SUB-SECTION-IIIC

REV 00

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**SUB SECTION-IIIC
ELECTRICAL LOAD DATA**

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONTROL CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOS				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1T CAPACITY ELECTRIC HOIST		1.5 kW	-	1	0	D	S	N	I	-								
2T CAPACITY ELECTRIC HOIST		2 kW	-	1	0	D	S	N	I	-								
3T CAPACITY ELECTRIC HOIST		2.2kW	-	1	0	D	S	N	I	-								
5T CAPACITY ELECTRIC HOIST		3.5kW	-	1	0	D	S	N	I	-								
8T CAPACITY ELECTRIC HOIST		5.5kW	-	1	0	D	S	N	I	-								
10T CAPACITY ELECTRIC HOIST		7kW	-	1	0	D	S	N	I	-								
12T CAPACITY ELECTRIC HOIST		8.5kW	-	1	0	D	S	N	I	-								
15T CAPACITY ELECTRIC HOIST		10.5kW	-	1	0	D	S	N	I	-								
NOTE:-Signed and stamped copy of this electrical load data shall be furnished by bidder along with bid. In event of ordering, above load data shall be considered as final and inputs for switchgear sizing shall be furnished to concerned electrical agency based on this electrical load data. Hence, no change in this load data shall be accommodated during detail engineering.																		
NOTES: 1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL) 2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (cc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V : ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTOR CONTROLLED)																		
	LOAD DATA (ELECTRICAL)	JOB NO.	RC		ORIGINATING AGENCY		PEM (ELECTRICAL)											
		PROJECT TITLE	RATE CONTRACT		NAME		DATA FILLED UP ON											
		SYSTEM	ELECTRIC HOISTS		SIGN.		DATA ENTERED ON											
		DEPTT. / SECTION	ELECTRICAL		SHEET 1 OF 1	REV. 00	DE'S SIGN. & DATE											



**TECHNICAL SPECIFICATION FOR
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VOLUME: III

SECTION-III

SUB-SECTION-IIID

REV 00

DATE 01.12.16

**SUB SECTION-IIID
DEVIATION SCHEDULE**

**TO BE SUBMITTED IN FORMAT GIVEN WITH GENERAL CONDITIONS OF
CONTRACT (GCC)**



**TECHNICAL SPECIFICATION FOR
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REV 00

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**SUB SECTION-IIIE
PRE BID CLARIFICATION SCHEDULE**



**TECHNICAL SPECIFICATION FOR
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SUB-SECTION-IIIE

REV 00

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PRE-BID CLARIFICATION SCHEDULE

S. No.	Section/Clause /Page No.	Statement of the referred clause	Clarification Required

The bidder hereby certifies that above mentioned are the only clarifications required on the technical specification for the subject package.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL