RATE CONTRACT

VOLUME – II B & III

TECHNICAL SPECIFICATION
FOR
ELECTRIC HOIST & MANUAL HOIST

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

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

CONTENTS

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 and supervision of Erection & Commissioning at site (as required) in line with drawings/ documents/ test procedures approved by BHEL/ Customer for **ELECTRIC HOISTS & MANUAL HOIST** 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 & MANUAL HOIST.**

1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.

1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.

1.5 The general term and conditions, instructions to tenderer and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification is subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.

1.6 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information , ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Vol-III of the specification **within 10 days of receipt of 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.

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.

SECTION-I

SPECIFIC TECHNICAL REQUIREMENT

SUB-SECTION IA	**SPECIFIC TECHNICAL REQUIREMENT (MECHANICAL)**
SUB-SECTION IB	**DATA SHEET A**

SUB SECTION-IA

SPECIFIC TECHNICAL REQUIREMENT (MECHANICAL)

A. SCOPE OF WORK FOR ELECTRIC HOIST

1.1.0 SUPPLY

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

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

1. Travelling Trolley with drive arrangement.
2. Hoisting mechanism (motor and gear box, wire rope, load hook and hook block)
3. Electrical equipment's (control panel, motor, limit switches, DSL current collector etc)
4. Cable for motor, brake, limit switches, etc.
5. Painting of hoist.
6. Power supply thru' DSL along with fixing brackets/ trailing cable with festoon/taut wire arrangement (project specific).
7. Main isolating switch with earth fault protection and power cable from 1.5M above ground / operating floor upto DSL/junction box/terminal box.
8. Pendent push button with fixed type cabling / festoon type cabling arrangement. (project specific).
9. Initial fill of lubricants, grease etc.
10. Testing of hoist at manufacturers works.
11. 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.
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 Commissioning spares:- Bidder shall supply commissioning spares as per list below for commissioning of the electric hoists as specified in price format (project specific).

Sl No.	Description of equipment / item	TOTAL QUANTITY
i)	Overload Relay	1 SET
ii)	Limit Switch	1 SET
iii)	Fuse Link	1 SET
iv)	Lugs (for fixed type EH only)	2 nos.
v)	Any Other	1 SET

One set shall mean 100% requirement for one electric hoist. In case any additional spares and or 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. Refer Annexure II, Section II, Volume IIB for reference. Prices to be quoted in Price schedule.

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.

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

1.3.0. Inspection and Testing

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 involved in the specific project shall be used if required/accepted by 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 (as per requirement). Rate on per visit and per man day basis shall be quoted in the price schedule. The actual no of days shall be informed on project to project basis, as and when required.

Scope for charges per visit including service at site as per price schedule: Total lump sum price for visits should include travel expenses to & fro site, insurance (if applicable) & boarding and lodging etc for one day of stay at site including supervision charges for erection, commissioning, load testing or any other service at site. .

Scope for charges for subsequent stay at site as per price schedule: shall include charges for supervision of erection, commissioning, load testing or any other service at site including boarding & lodging for subsequent stay at site. This shall be from the day of actual commencement of supervision at site/ availability at site for supervision activity, excluding travel time to & from site. These charges shall commence if the representative of vendor has to provide service at site beyond one day.

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

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 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.

5.0.0 INFORMATION TO BE FURNISHED BY BIDDER ALONG WITH OFFER

5.1.0 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.

B. SCOPE OF WORK FOR MANUAL HOIST

1.1 The specification is intended to cover design, engineering, manufacture, inspection and testing at vendor's / sub-vendor's works, painting, forwarding, proper packing and shipment and delivery at site as required on FOR site basis, demonstration test at vendor's works (as mentioned elsewhere in the specification) of MANUAL HOIST (CHAIN PULLEY BLOCK) as per details in different sections / volumes of this specification.

1.2 The equipment to be furnished by the bidder for the MANUAL HOIST (CHAIN PULLEY BLOCK) of different capacity and lift as specified in price format along with all accessories including essential spares (as applicable) and tools and tackles. However, actual requirement of CPBs shall be informe d to bidder during project specific enquiry/ PO.

1.3 The chain pulley blocks offered shall have technical parameters as per the Data Sheet A enclosed herewith in section IB

1.4 Any equipment/accessories not specified herein but required to make the equipment complete an d efficient shall also be under bidder's scope of work.

The following shall be in the bidder's scope of work.

a. Chain pulley blocks with/without traveling trolleys as per price format.

b. Maintenance Tools and Tackles

c. Packaging.

d. O&M manuals, drawings and documents etc.

e.Inspection & testing of Chain Pulley Blocks as per QAP approved by BHEL /Customer during detail engineering.

Prime inspection agency shall be BHEL / End Customer. Equipment being supplied shall be strictly in accordance with nomenclature & technical specification.

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 screwdrivers (Min. 6 nos. Indicate the sizes)	1 Set

2.	Adjustable Spanner	1 No.
3	Wrench spanner	1 No.
4.	Grease Gun	1 No.
5.	Oil Gun	1 No.
6.	2 lb hammer with wooden handle	1 No.

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

3.0 ESSENTIAL SPARES: - Refer Annexure II of technical specification.

4.0 DRAWINGS/DESIGN DOCUMENTS FOR SUBMISSION (during detailed engineering)

A. For Approval

a.G.A. drawing showing clearances, assembly, cross section details, materials of construction, lifts & approaches etc.

b.Quality plan

c.Test certificates & reports on various shop tests (For verification only) Refer Annexure V of technical specification.

5.0 DEVIATIONS

5.1 If the offer submitted has got any deviations from technical specification in the tender document. Bidder shall tabulate the same in the 'Deviation sheet (cost of withdrawal)" format furnishing full particulars of such deviations. Deviations are to be furnished with mention to specific clause numbers notes/ comments e.g. "Refer to forwarding letter" etc. is not acceptable. Cost of withdrawal of deviations to be put against each deviation.

5.2 If there are no deviations from the tender document, bidder shall indicate so in deviation format.

5.3 Reasons/explanations for such deviations shall be furnished.

6.0 DEMONSTRATION TEST

6.1 The chain pulley blocks along with other accessories shall be demonstrated for the rated capacity. Inspection & testing shall be as per QAP enclosed

6.2 The bidder shall have full responsibility for the safe and efficient operation of the chain pulley blocks and traveling trolley with associated accessories as a single unit.

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

6.4 Demonstration test shall be carried out each time after the rectification modification is carried out.

7.0 TESTING AND INSPECTION

Chain pulley block shall be completely assembled at manufacturer's works and minimum following te sts shall be conducted at works

a) Over load test
b) Rated load test
c) Other tests as per IS-3832.

The scope of inspection & testing shall include but not limited to the following:

a) Material identification / co-relation for important items like hook, load chain, hand chain, wheel s, ratchet and pawl etc.
b) Hardness for pawl and ratchet
c) Dye penetration test/ UT test for hooks
d) Operational test including operational effort, velocity ratio etc.
e) Proof load test upto 1.5 times of working load limit.
f) Dimensional check of hook
g) Marking For details, refer standard quality plan enclosed below.
   Any additional inspection & testing requirement / CHP (customer's hold point) deemed necessary by customer/BHEL during detailed engineering shall also be complied with without any commercial or delivery implication.

8.0 PACKING For details refer Annexure-VII of technical specification.

9.0 WORKS EXCLUDED Supply of ISMB/ monorail for traveling trolley of chain pulley blocks.

QUALITY ASSURANCE AND INSPECTION REQUIREMENT

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO:	DATE:
	CUSTOMER:	QP NO.: PE-QP-STD-563-A002	DATE:
	PROJECT:	PO NO.:	DATE:
	ITEM: ELECTRIC HOIST	SYSTEM: EH / SECTION: MH	SHEET 1 of 5

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					6					*	**		
					M	B/C				D	M	B	C
1	2	3	4	5			7	8	9				10
A.	**RAW MATERIAL**												
A.1	MS PLATES FOR HOIST STRUCTURE, GEAR BOX, & ROPE DRUM (IF FABRICATED)	CHEMICAL & MECHANICAL PROPERTIES	MA	CHEMICAL & MECHANICAL	1 SAMPLE / HEAT		IS 2062 E250 GR- A/ BR APPROVED DRAWING/DATA SHEET		MTC/ LAB TEST REPORT	√	P	V	V	In the absence of correlated TC Lab testing shall be done.
		ULTRASONIC TEST OF PLATES (For Thk >25mm)	MA	NDT	100%	100%	ASTM A 435	ASTM A 435	IR	√	P	V	V	
A.2	PIPE FOR ROPE DRUM (IF SEAM LESS PIPE IS USED)	CHEMICAL & MECHANICAL PROPERTIES & ACID ETCHING	MA	CHEMICAL & MECHANICAL	1 SAMPLE / HEAT/SIZE		ASTM A106 GR A/B APPROVED DRAWING/DATA SHEET		MTC/IR/LAB TEST REPOT	√	P	V	V	In the absence of correlated TC Lab testing shall be done.
		ULTRASONIC TEST FOR SEAMLESS PIPE (For Thk >25mm)	MA	UT	100%	100%	ASTM E-213	ASTM E-213	IR	√	P	V	V	
A.3	FORGINGS / ROLLED BARS FOR GEARS, PINIONS & WHEELS	CHEMICAL & MECHANICAL PROPERTIES	MA	CHEMICAL & MECHANICAL	1 SAMPLE / HEAT/SIZE		APPROVED DRAWING/DATA SHEET.		MTC/ LAB TEST REPORT	√	P	V	V	In the absence of correlated TC Lab testing shall be done.
		ULTRASONIC TEST	MA	NDT	100%	100%	ASTM A 388		IR	√	P	V	V	Only for dia/thickness 40 mm & above
B.	**BOUGHT OUT ITEMS**												
B.1	HOOKS	MAKE & DIMENSIONS	MA	VISUAL	100%	100%	IS 15560/ AS PER APPROVED BOI LIST		TC	√	P	V	V	
		CHEMICAL & MECHANICAL	MA	CHEMICAL & MECHANICAL	1 SAMPLE / HEAT/SIZE		IS 1875/APPROVED DATA SHEETS /DRAWINGS.		IR	√	P	V	V	
		PROOF LOAD TEST	MA	MECHANICAL	100%	100%	IS-15560/IS 3815/APP. DRG./ DS	IS-15560/IS 3815/APP. DRG./ DS	IR	√	P	V	V	
		UT FOR INNER DEFECTS	CRITICAL	NDT	100%	100%	ASTM A 388		IR	√	P	V	V	On shank portion only
		DPT TEST BEFORE & AFTER PROOF LOAD TEST	CRITICAL	NDT ON MACHINED SURFACE	100%	100%	ASTM E-165	NO DEFECTS	IR	√	P	V	V	

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Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO:	DATE:
	CUSTOMER:	QP NO.: PE-QP-STD-563-A002	DATE:
	PROJECT:	PO NO.:	DATE:
	ITEM: ELECTRIC HOIST	SYSTEM: EH / SECTION: MH	SHEET 2 of 5

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					6				*	**			
					M	B/C			D	M	B	C	
1	2	3	4	5			7	8	9				10
B.2	WIRE ROPES	MAKE, TYPE & IDENTIFICATION	MA	VISUAL	100%	100%	AS PER APPROVED BOI LIST		MTC	√	P	V	V	
		DIMENSION, BRAKING STRENGTH, CONST.	MA	REVIEW	100%	100%	IS-2266 / APPROVED DRAWING/DATA SHEET		MTC	√	P	V	V	
B.3	PULLEY/SHEAVE	CHEMICAL, MECHANICAL VISUAL DIMENSION	MA	REVIEW	100%	100%	APPROVED DRAWING/DATA SHEET/MFG STD		MTC/IR/LAB REPORT	√	P	V	V	
B.4	MOTOR<30 KW	MAKE/TYPE/RATING, ROUTINE TEST	MA	VISUAL, REVIEW	100%	100%	APPROVED DRAWING/DATA SHEET/ AS PER APPROVED BOI LIST		MTC	√	P	V	V	
B.5	GEAR BOX	MAKE / TYPE / RATING / REDUCTION RATIO/ BACKLASH & TOOTH CONTACT	MA	VISUAL	100%	100%	APPROVED DRAWING/DATA SHEET/ AS PER APPROVED BOI LIST/ MFG STD		IR	√	P	V	V	
		NO LOAD RUN TEST (NOISE LEVEL, TEMP.RISE, OIL LEAKAGE, VIBRATION)	MA	VISUAL	100%	100%	NOISE LEVEL < 85 dB at 1 mtr TEMP. RISE= AMB+30 °C NO OIL LEAKGE APPROVED DRAWING/DATA SHEET		IR	√	P/V	V	V	
B.6	BRAKE	MAKE / TYPE / RATING	MA	VISUAL	100%	100%	APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST		MTC/IR	√	P	V	V	
		ROUTINE TEST	MA	REVIEW	100%	100%			MTC	√	P	V	V	
B.7	LIMIT SWITCH, RELAY, CONTACTOR, TRANSFORMER/ PUSH BUTTON /TERMINAL BLOCK, SELECTOR SWITCH, INDICATION LAMP /SFU	MAKE/TYPE/RATING	MA	VISUAL	100%	100%	APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST		IR	√	P	V	V	
B.8	CABLES - LT POWER / CONTROL	MAKE / TYPE / RATING	MA	VISUAL	100%	100%	APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST		MTC/IR	√	P	V	V	
		ROUTINE TEST	MA	REVIEW	100%	100%			MTC	√	V	V	V	
B.9	VVVF DRIVE (AS APPLICABLE)	MAKE / TYPE / RATING	MA	VISUAL	100%	100%	APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST		MTC/IR	√	P	V	V	
		ROUTINE TEST	MA	REVIEW	100%	100%				√	P	V	V	

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Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

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		PROJECT:	PO NO.:	DATE:
		ITEM: ELECTRIC HOIST	SYSTEM: EH	SECTION: MH	SHEET 3 of 5

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					6					*	**		
					M	B/C				D	M	B	C	
1	2	3	4	5			7	8	9					10
B.10	CONTROL PANEL & PANDENT STATION BOX	MAKE/TYPE/RATING	MA	VISUAL	100%	100%	APPROVED DRAWING / DATA SHEET / AS PER APPROVED BOI LIST		IR	√	P	V	V	
		SHEET /GLAND PLATE THICKNESS, PAINT SHADE, DFT, ADHESION	MA	VISUAL	100%	100%			IR	√	P	V	V	
C	IN PROCESS INSPECTION													
C.1	ROLLING & WELDING OF ROPE DRUM (IF FABRICATED)	WPS, PQR & WPQ	MA	REVIEW	100%	100%	AS PER ASME SEC-IX		QW 481-84	√	P	V	V	NTPC/BHEL/TUV/LLOYD/ DNV approved WPS& qualified welders to be used. In case of non availability of the same, WPS to be submitted for approval.
		ROLLING & WELD PREPARATION	MA	VISUAL & MEASURE	100%	100%	AS PER DRAWING.		IR	√	P	V	V	
		NDT TEST ON WELD	MA	DPT	100%	10%	ASTM E 165	ASME SECTION VIII DIV-1 APPENDIX-8 CL.NO.8.4	IR	√	P	V	V	
		RT OF BUTT WELD JOINTS (IF APPLICABLE)	CRTICAL	RT	100%	100%	ASME SEC-V	ASME SEC-VIII, DIV-1	IR	√	P	V	V	
C.2	ROPE DRUM, PULLEY & HOOK SHANK (AFTER FINAL MACHINING)	VISUAL & DIMENSION	MA	VISUAL & MEASURE	100%	100%	MANUFACTURE DRAWING		IR	√	P	V	V	
		NDT ON MACHINE SURFACE	MA	DPT	100%	100%	ASTM E 165	ASME SECTION VIII DIV-1 APPENDIX-8 CL.NO.8.4	IR	√	P	V	V	
C.3	TROLLEY STRUCTURE	WELD SOUNDNESS DIMENSIONS	MA	DPT & VISUAL & MEASUREMENT	100%	100%	ASTM E 165	ASME SECTION VIII DIV-1 APPENDIX-8 CL.NO.8.4	IR	√	P	V	V	
C.4	GEAR & PINIONS, WHEELS (AFTER FINAL MACHINING)	NDT ON MACHINE SURFACE	MA	DPT	100%	100%	ASTM E 165	ASME SEC-VIII, DIV-1 APPEND.8 CL.8.4	IR	√	P	V	V	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
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		CUSTOMER:	QP NO.: PE-QP-STD-563-A002	DATE:
		PROJECT:	PO NO.:	DATE:
		ITEM: ELECTRIC HOIST	SYSTEM: EH / SECTION: MH	SHEET 4 of 5

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					6					*	**		
					M	B/C				D	M	B	C	
1	2	3	4	5			7	8	9					10
C.5	STRESS REVIEVING OF GEAR BOXES (IF FABRICATED)	SR OF GEAR BOX CASING	MA	SR>25mm Thick	100%	100%	ASME SEC. VIII DIV I UCS 56	ASME SEC. VIII DIV I UCS 56	SR REPORT	√	P	V	V	
D	**FINAL INSPECTION**													
	COMPLETE ASSEMBLED HOIST ALONG WITH ACTUAL CONTROL PANEL, VVFD & PUSH BUTTON (AS APPLICABLE)	VISUAL & DIMENSION	MA	VISUAL & MEASURE	100%	100%	IS:3938/ APPROVED DRAWING / DATA SHEET		IR	√	P	W	V/W	.
D.1	NO LOAD TEST & FULL LOAD TEST	CURRENT DRAWN, SPEED OF HOIST ENCHING OPERATION, INTERLOCKING SEQUENCE OPEARTION	MA	VISUAL & MEASURE	100%	100%	IS:3938/ APPROVED DRAWING / DATA SHEET		IR	√	P	W	V/W	
	OVERLOAD TEST AT 125%	HOLDING CAPACITY OF BRAKES	MA	VISUAL	100%	100%	IS:3938/ APPROVED DRAWING / DATA SHEET		IR	√	P	W	V/W	
D.2	CONTROL PANEL	VISUAL, MAKE, VERIFICATION & DIMENSION	MA	VISUAL & MEASURE	100%	100%	IS:3938/ APPROVED DRAWING / DATA SHEET		IR	√	P	W	V/W	
		INGRESS PROTECTION BY PAPER INSERTION METHOD	MA	VISUAL	100%	100%	IS:3938/ APPROVED DRAWING / DATA SHEET		IR	√	P	W	V/W	
		HV/IR	MA	MEASURE	100%	100%	IS:3938/ APPROVED DRAWING / DATA SHEET		IR	√	P	W	V/W	
		PAINT SHADE, DFT	MA	VISUAL & MEASURE	100%	100%	IS:3938/ APPROVED DRAWING / DATA SHEET		IR	√	P	W	V/W	
D.3	SPARES (MANDATORY / RECOMMENDED SPARE / COMMISSIONING SPARES/ TOOLS & TACKLES)	VERIFICATION OF MAKE, TYPE, SIZE, RATING	MA	REVIEW OF INTERNAL INSPECTION REPORTS / MFR'S TC / COC	100%	-	APPROVED SPARE LIST / BBU		APPD DRG / DATA SHEET	IR / COC	P	V/W	V	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO:	DATE:
		CUSTOMER:	QP NO.: PE-QP-STD-563-A002	DATE:
		PROJECT:	PO NO.:	DATE:
		ITEM: ELECTRIC HOIST	SYSTEM: EH / SECTION: MH	SHEET 5 of 5

SL NO.	COMPONENT & OPERATIONS	CHARACTERIST-ICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					6									
					M	B/C				D	M	B	C	
1	2	3	4	5			7	8	9					10
D.4	PAINTING OF HOIST	VISUAL DFT, MEASUREMENT & PAINT SHADE	MA	VISUAL & MEASUREMENT	100%	100%	APPROVED DRAWING / DATA SHEET	IR	√	P	V	V		
D.5	PACKING	PACKING SOUNDNESS	MA	VISUAL	100%	100%	APPROVED DOCUMENT/ PACKING SPECIFICATION	IR	√	P	V	V		

LEGENDS:
***D: ***RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION, ** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B**: ~~MAIN SUPPLIER/~~ BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER, **P**: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR**, CR:** CRITICAL

For final inspection, end customer verification/ witness shall be project to project basis

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:			Checked by:		
Reviewed by:			Reviewed by:		

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER'S NAME & ADDRESS :	**MANUFACTURING QUALITY PLAN** **ITEM :** Chain Pulley Block **QP No.:** **REV**.:0, **Date.:** , **PAGE**: 1 OF 4	**PROJECT :** **PACKAGE : CHAIN PULLEY BLOCK** **VOL IIB, SEC C**

Sr. No.	COMPONENT / OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	C/N				M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	10.			11.
1	**RAW MATERIAL & B/OUT ITEMS:**												
1.1	HOOKS	CHEMICAL & MECH	MA	LAB ANALYSIS	ONE SAMPLE PER HEAT		MATERIAL SPECIFICATION AS PER APPROVED DRAWINGS.		MTC. ✓	P	V	V	
		MARK & IDENTIFICATION	MA	VISUAL	100%		HOOK TC FROM COMPETENT AUTHORITY		TC ✓	P	V	V	
		INTERNAL DEFECTS	MA	UT	100%		ASTM A-388	(REFER NOTE I)	IR ✓	P	V	V	
		PROOF LOAD TEST	MA	REVIEW	100%		IS 15560		TC ✓	P	V	V	
		NDT AFTER PROOF LOAD TEST	MA	DPT	100%		ASTM E-165	NO RELEVANT INDICATTION	TC ✓	P	V	V	
1.2	LOAD CHAIN	- DIMENSIONS	MA	MEASUREMENT	100%		APPD. DRGS	APPD. DRGS.	IR ✓	P	V	V	
		- BREAKING STR & % ELONGATION	MA	-TENSILE TEST	1/LOT		-DO-	-DO-	MTC ✓	P	V	V	
		- PROOF LOAD -HEAT TREATMENT	MA	-TENSILE TEST	100%		-DO-	-DO-	MTC ✓	P	V	V	
			MA	REVIEW	100%		-DO-	-DO-	HT CHRT ✓	P	V	V	
		-GRADE	MA	REVIEW	1/BATCH		-DO-	-DO-	MTC ✓	P	V	V	

	LEGEND:	FOR CUSTOMER USE	
MANUFACTURER / CONTRACTOR SUB-CONTRACTOR	** M : MANUFACTURER / SUB-SUPPLIER C : BHEL / NOMINATED INSPECTION AGENCY. N : CUSTOMER/ NOMINATED INSPECTION AGENCY. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION		
SIGNATURE		REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY & SEAL

	MANUFACTURER'S NAME & ADDRESS :	**MANUFACTURING QUALITY PLAN** **ITEM :** Chain Pulley Block **QP No.:** **REV.**:0, **Date.:** , **PAGE**: 2 OF 4	**PROJECT :** **PACKAGE : CHAIN PULLEY BLOCK** **VOL IIB, SEC C**

Sr. No. 1.	COMPONENT / OPERATION 2.	CHARACTERISTICS 3.	CLASS 4.	TYPE OF CHECK 5.	QUANTUM OF CHECK 6. M	C/N	REFERENCE DOCUMENT 7.	ACCEPTANCE NORMS 8.	FORMAT OF RECORD 9.		AGENCY 10. M	C	N	REMARKS 11.
1.3	RAW MATL. (BAR /FORGING) FOR GEAR/ RATCHET PAWL / RATCHET WHEEL & PLATES FOR FABRICATION	CHEMICAL COMPOSITION MECHANICAL INTERNAL DEFECTS	MA MA MA	Review Review UT	ONE SAMPLE PER HEAT 100%		Material specification as per approved drawings. ASTM A-388 REFER NOTE 1		MFR'S TC IR	✓ ✓ ✓	P P P	V V V	V V V	TC or inspection report for components shall be given. For rounds ≥40mm and plates ≥20.
1.4.	LOAD CHAIN WHEELS	- CHEMICAL & MECHANICAL PROPERTIES	MA	CHEMICAL MECHANICAL PROPERTIES	ONE SAMPLE PER LOT		APPD. DRG.	APPD. DRG.	MTC	✓	P	V	V	
1.5	BEARINGS	MAKE, TYPE, CATALOUGE NO.	MA	VISUAL	RANDOM		APP DRG / MFR"S CATALOGUE	APP DRG / MFR"S CATALOGUE	IR	✓	P	V	V	
1.6	HAND CHAIN WHEEL	CHEMICAL MECHANICAL PROPERTIES	MA	CHEMICAL MECHANICAL PROPERTIES	ONE SAMPLE PER LOT		AS PER DRAWING	AS PER DRAWING	MTC	✓	P	V	V	
1.7	HAND CHAIN	GRADE/ DIMENSION	MA	GRADE DIMENSION	100%		AS PER DRAWING	AS PER DRAWING	MTC	✓	P	V	V	

	LEGEND:	FOR CUSTOMER USE	
MANUFACTURER / CONTRACTOR SUB-CONTRACTOR	** M : MANUFACTURER / SUB-SUPPLIER C : BHEL / NOMINATED INSPECTION AGENCY. N : CUSTOMER/ NOMINATED INSPECTION AGENCY. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION		
SIGNATURE		REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY & SEAL

	MANUFACTURER'S NAME & ADDRESS :	**MANUFACTURING QUALITY PLAN** **ITEM :** Chain Pulley Block **QP No.:** **REV**.:0, **Date.:** , **PAGE**: 3 OF 4	**PROJECT :** **PACKAGE : CHAIN PULLEY BLOCK** **VOL IIB, SEC C**

Sr. No. 1.	COMPONENT / OPERATION 2.	CHARACTERISTICS 3.	CLASS 4.	TYPE OF CHECK 5.	QUANTUM OF CHECK 6. M	 C/N	REFERENCE DOCUMENT 7.	ACCEPTANCE NORMS 8.	FORMAT OF RECORD 9.		AGENCY 10. M	 C	 N	REMARKS 11.
1.8	TROLLEY GEARS, PINION,WHEELS, AXLE	CHEMICAL & MECHANICAL	MA	LAB ANALYSIS,	100%		APPVD DRGS	APPVD DRGS	IR/TC	✓	P	V	V	
2	**IN PROCESS**													
2.1	RATCHET PAWL / RATCHET WHEEL	-HARDNESS -SURFACE CRACK	MA MA	HARDNESS DPT	100% 100 %		IS:3832/ APPD DRG. ASTM E165	IS:3832/ APPD. DRG. NO DEFECT	IR IR	✓ ✓	P P	V V	V V	
2.2	GEARS AND PINIONS AFTER MACHINING	HEAT TREATMENT SURFACE HARDNESS SURFACE CRACK DIMENSION	MA MA MA MA	HT CHART HARDNESS DPT FOR SURFACE CRACK MEASURE	100% 10% 100% 10%		IS 1875/IS 4367/IS 3832 --DO-- ASTM E 165	 NO DEFECT IS 3832	IR IR IR IR	✓ ✓ ✓ ✓	P P P P	V V V V	V V V V	
3.0	**FINAL INSPECTION**													
3.1	COMPLETE ASSEMBLY	OVERALL DIMENSION ENDURNACE TYPE TEST OPERATIONAL PROOF LOAD & LIGHT LOAD TEST HEIGHT OF LIFT	CR MA CR MA	MEASUREMENT TYPE TEST LOAD TEST VISUAL	100 % 1 PER SIZE 100% 100 %		IS:3832 /APPD DRG IS 3832 -DO- -DO-	IS:3832 /APPD DRG IS 3832 -DO- -DO-	IR TC IR IR	✓ ✓ ✓ ✓	P P P P	W V W W	V V V V	

	LEGEND:	FOR CUSTOMER USE	
MANUFACTURER / CONTRACTOR SUB-CONTRACTOR	** M : MANUFACTURER / SUB-SUPPLIER C : BHEL / NOMINATED INSPECTION AGENCY. N : CUSTOMER/ NOMINATED INSPECTION AGENCY. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION		
SIGNATURE		REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY & SEAL

BHEL	MANUFACTURER'S NAME & ADDRESS :	**MANUFACTURING QUALITY PLAN** **ITEM :** Chain Pulley Block **QP No.:** **REV**.:0, **Date.:** , **PAGE**: 4 OF 4	**PROJECT :** **PACKAGE : CHAIN PULLEY BLOCK** **VOL IIB, SEC C**

Sr. No. 1.	COMPONENT / OPERATION 2.	CHARACTERISTICS 3.	CLASS 4.	TYPE OF CHECK 5.	QUANTUM OF CHECK M C/N 6.	REFERENCE DOCUMENT 7.	ACCEPTANCE NORMS 8.	FORMAT OF RECORD 9.		AGENCY M 10.	AGENCY C 10.	AGENCY N 10.	REMARKS 11.
		SWIVELING OF HOOK EFFORT	MA MA	VISUAL PULL ON CHAIN	100% 100%	APPROVED DRG -DO-	APPROVED DRG -DO-	IR IR	✓ ✓	P P	W W	V V	
3.2	PAINTING	-CLEANING - SHADE & DFT OF PAINT	MA MI	VISUAL VISUAL	AT RANDOM AT RANDOM	APPROVED DRAWING/ **SPECIFICATION**	APPROVED DRAWING/ **SPECIFICATION**	IR IR		P p	--- W	--- ---	
3.3	NAME PLATE	VERIFICATION	MA	VISUAL	100%			IR		P	V	---	
3.4	PACKING	-VERIFICATION	MI	VISUAL	100%	SPECS.	SPECS.	IR		P	---	---	
3.5	REVIEW OF QA DOCUMENTATION	VERIFICATION	MA	VISUAL	100%	APPD. QP	APPD. QP		✓	V	V	V	

CR – CRITICAL, MA – MAJOR , MI – MINOR

NOTE 1: WHEN BACK WALL ECHO (BWE) IS SET AT 100% OF FULL SCREEN HEIGHT (FSH) IN DEFECT FREE AREA THEN
(A) DEFECT ECHO SHALL NOT EXCEED 20% OF FSH &
(B) BWE SHOULD BE MINIMUM 80% OF FSH IN ANY AREA.
NOTE 2: RECORDS IDENTIFIED WITH TICK SHALL BE ESSENTIALLY INLCUDED IN QA DOCUMENTATION.

	LEGEND:	FOR CUSTOMER USE	
MANUFACTURER / CONTRACTOR SUB-CONTRACTOR	** M : MANUFACTURER / SUB-SUPPLIER C : BHEL / NOMINATED INSPECTION AGENCY. N : CUSTOMER/ NOMINATED INSPECTION AGENCY. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION		
SIGNATURE		REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY & SEAL

SUB SECTION-IB

DATA SHEET A

ELECTRIC HOIST 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	Project specific info. shall be provided
6.0	General Design & duty	As per IS: 3938 latest conforming to Class-2
7.0	Operating speed	
7.1	Hoisting motion	3 m/min upto 16T capacity For EH cap. $\geq$ 20T, speed shall be 1.5 m/min. However in some specific project/s speed shall be 3m/min for which prices are also to be quoted in bill of quantity indicated in price schedule.
7.2	Trolley motion	5 m/min to 15 m/min (To be informed on project to project basis)
7.3	Creep Speed	10% of main speed
8.0	Type of transmission	Through Electric motor and gearbox
9.0	**Wire Rope**	
9.1	Construction / core	Extra flexible plough steel, 6 x36 construction, (Steel / Fiber core to be informed project to project basis). Grade 1960 N/mm^2 .
9.2	Code	IS:2266
9.3	Number of falls	Min. 4
9.4	Factor of safety	5 to 6
10.0	**Load Hook and block**	NORMALISED HOOK ONLY
10.1	Type of load hook	Shank type swiveling with safety latch and also with swivel lock pin.
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
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 to be decided in detail engineering.
12.4	Bearing type	Antifriction Ball / Roller
12.5	Trolley type	Adjustable type to accommodate beams flange width. Actual beam size shall be confirmed during detail engineering before manufacturing clearance.
12.6	Hardness	200 BHN (max)
12.5	Type	Tapered/ Flat tread based on beam type, size of ISMB or NPB. Same is project specific and shall be confirmed during detail engineering
13.0	**SHEAVE**	
13.1	Material	Fabricated from steel plate. IS: 2062 Gr. B / carbon steel casting as per IS 1030 or as per IS: 3938.
13.2	Bearing type	Antifriction Ball / Roller
14.0	**BRAKES**	
14.1	Type	For Hoisting & CT: DCEM/ACEM (fail to safe) Shall be applicable for upto 15T capacity. Above 15T capacity (& in certain cases above 10T capacity) EHT brakes shall be provided.
14.2	Capacity	150 % of rated motor torque for hoisting motion 125 % of rated motor torque for travel motion
14.3	Number	One number for each motor.
15.0	**SWEEPS**	To be provided
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 DSL / EPR flexible trailing cable for hoist mounted panels. The indicated ratings of Shrouded bus bar DSL in price schedule is minimum. Next higher rating to be quoted in case of unavailability.	
19.0	MOTORS	HOIST & TROLLEY	
19.1	Type	Sq. Cage induction, TEFC, S4 duty, 40% /60% CDF. Service class of motor shall be Class 2 / Class 4 as per IS:3938, to be informed on project to project basis.	
19.2	Number of start	150/300 starts / hr (Project specific)	
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" or 70°C	
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 considering 15%/ 25%(project specific) margin over the maximum power requirement.	
20.0	**LIMIT SWITCHES**	Hoisting / lowering	Trolley
20.1	Type (project specific)	-Snap action, self-actuating type	Two/ one-way lever
		Rotary geared + gravity type	Two/ one-way lever
20.2	Construction	Shall be housed in robust metallic, oil and dust tight enclosure conforming to IP-65. At least 2 NO and 2 NC contacts shall be provided for each limit switch. Material of contact shall be high grade silver cadmium plated with high conductivity and non-corrosive type.	
21.0	CONTROL PANEL (Hoist mounted).	* 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 (LED type) 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	Control Voltage (AC)	110 V / 24V (Shall be informed on project to project basis)	
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	Extruded FRLS PVC inner sheath, Extruded FRLS PVC TYPE ST2 outer sheathed/ EPR flexible Cu cable (Project specific) (Min. size 4 sq. mm for Cu & 10 sq mm for Al)
25.0	Control cable	Extruded FRLS PVC inner sheath, Extruded FRLS PVC TYPE ST2 outer sheathed /EPR flexible Cu cable / Al cable (Project specific) (Min. size 2.5 sq. mm for Cu & 10 sq mm for Al)
26.0	Control for motions	
26.1	Speed Control	Thru' VVVF with minimum 6 pulse design
26.2	Starting torque of VVVF	Upto 200% typical
26.3	Starting current	Less than 150 % of rated torque
26.4	Temperature	Capable of withstanding upto 50^{o}C without derating.
27.0	Control Transformer	Dry type, with insulation class B or better.
27.1	Quantity & rating	2 x 100% with minimum 20% over loading to be considered while sizing the rating.
28.0	Lifting slings	To be provided (Shall be informed on project to project basis)

29.0 OTHER REQUIREMENTS

1. Inching operation of hoist is to be through main hoist motor.
2. DSL phase indicating lamps (LED type) to be provided.
3. Pull out torque of motor at rated voltage shall be 275% of full load torque.
   Starting torque of motor at rated voltage shall be 225% 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 whichever is more.
6. Spring or rubber buffers shall be provided on the trolley

30.0 SPECIAL HAZARDOUS AREA REQUIREMENT (PROJECT SPECIFIC).

i. All wheels shall be provided with phosphor bronze type /equivalent or better.
ii. Any other mechanism where two non-lubricated parts mate, one of them shall be for non-ferrous material like phosphor bronze, aluminum bronze.
iii. All electrical components/ equipment for hoist shall meet the requirements of hazardous area & shall be flame proof/explosion proof type. Motor located in hazardous area shall have flameproof enclosure conforming to IS: 2148 /Equiv.
iv. Coupling guards shall be non-sparking (i.e. non-ferrous/non-metallic) type.
v. Travel DSL shall be flexible trailing cable type.
vi. Hoists shall be suitable for hazardous area (i.e. Zone-2) for gas group IIA, IIB

31.0 OUTDOOR HOIST REQUIREMENT

i. Motors, panels and other electrical equipments shall be suitable for outdoor operation with suitable IP protection.
ii. Canopy arrangement required for motors & panels to protect the same from direct sunlight & rain.
iii. Wire rope shall be galvanized.

32.0 CURVED HOIST REQUIREMENT

i. Electric hoists running in curved path shall be swiveling arrangement for smooth running of hoists.
ii. 2 nos. CT motors shall be provided for curved electric hoists.
iii. For hoists capacity $\leq$ 5T, minimum radius of curvature shall be 1.5 mtr.
iv. For hoists capacity > 5T, minimum radius of curvature shall be 2 mtr.

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. 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.

MANUAL HOIST TECHNICAL DATA SHEET

SPECIFICATION & DATA SHEET FOR CHAIN PULLEY BLOCKS WITH / WITHOUT TROLLEY		
A. GENERAL INFORMATION		
1	Type	Chain pulley block with/ without travelling trolley
2	Design	As per IS: 3832
3	Duty Class	Class –2 as per IS: 3832
B. TECHNICAL PARAMETERS / DESIGN FEATURES		
4	**Hoisting Mechanism**	
a)	Type	Hand operated gear transmission
b)	Hook	Point hooks with shank, as per IS: 15560, swivelling with safety latch
c)	Hook bearing	Thrust ball bearing of hook suspension
d)	Gears / pinion	Spur / Helical
i)	Material	As per IS 3832
ii)	Type of bearing used	Antifriction ball bearing / Roller
e)	Ratchet Pawl & Wheel	
i)	Material	Steel, hardened and tempered
ii)	Hardness	The hardness of the pawl tip shall not be less than 40HRC and that of ratchet is not less than 30HRC.
iii)	Type of bearing used	Antifriction ball bearing / Roller
f)	Load Chain	Link type,T(8), As per ISO: 3077 / IS-3109/IS-6216
g)	Load chain wheel material	As per IS 3832 / pressed steel
h)	Hand Chain (For hoist)	Link type, Mild steel (grade 30) as per IS 2429 Part I / II
i)	Hand chain wheel (with flanges) material	As per IS 3832 / pressed steel
j)	Method of lubrications	Grease
k)	Brakes	Screw and friction disc type
5	**Trolley & Bridge Drive**	**(Applicable for CPB with trolley only)**
a)	Trolley	Geared (Manually operated)
i)	Material of frame	Rolled structural steel (IS:2062 Grade A or B)
b)	Hand Chain For trolley	Link type, Mild steel (grade 30) as per IS 2429 Part I / II
c)	Trolley Wheel material	Carbon steel
i)	Type of bearing used	Antifriction ball bearing
d)	Gears / pinion	Spur / Helical
i)	Material	As per IS 3832
ii)	Type of bearing used	Antifriction ball bearing / Roller
e)	Method of lubrications	Grease
C. TESTING AND INSPECTION		
6	Inspection and Testing	As per Quality Plan.

SECTION-II

STANDARD TECHNICAL REQUIREMENT

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

SUB SECTION-IIA

STANDARD TECHNICAL REQUIREMENT (MECHANICAL)

ELECTRIC HOIST

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 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 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.

3.0.0 Technical Particulars

3.1.0 Type - Electrically operated shall be trolley type or fixed type suitable for non - hazardous or hazardous area, indoor or outdoor application to be quoted as per bill of material indicated in price schedule. Project specific requirement shall be ordered by BHEL based on same.

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) 1S: 1822 Motor starters for Voltages up to 650V.

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.

5.0.0 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.

Motor & brake details.

Any other detail as per IS 3938.

Nameplates shall be provided with non-corrosive material. All lubrication points shall be provided with nameplates.

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.

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. Duty class of the hoists shall be class 2 with design ambient of 50 degC.

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/Customer.

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: Hooks shall meet the dimensional, material testing & inspection requirement of IS 15560. The hook shall be provided with standard depress type safety latch and swivel thrust bearings with hardened race. Lugs for fixing safety latch shall be either forged along with the hook or clamp type latch with lugs shall be provided. Welding of lugs not permitted. Locking arrangement shall be provided to avoid unscrewing of the hook in service. Material of hook shall conform to IS-1875 or equivalent (with minimum tensile strength 50-62 Kg/mm2.) and made by controlled grain forging and normalized. Ball & roller bearings shall not be used in these hooks. Anti-friction thrust bearings shall be used.

8.9.0 Hoists shall be designed for low headroom and for closest hook approaches.

8.10.0 Two no end stoppers of MOC IS 2062 and 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 as per IS 3938. All fabricated gearboxes shall be stress relieved.

Gears shall be of cast or forged steel and pinions shall be forged steel and shall be machine cut. Gear and pinion teeth shall be treated for resistance to wear.

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: Wire ropes shall meet the requirement of IS 2266. Shall have six strands of 37/36 wires per strand with an ultimate tensile strength of 180 Kg/mm2. The wire rope shall be hot dip galvanized, as per IS 1835 type B. All wire ropes shall be proof load tested for 2 times of SWL/Fall. Breaking load shall not be less than five times SWL/Fall. Indicating the breaking force of wire rope, test certificate provided by the wire rope manufacturer for breaking load test shall be furnished during inspection. The rope shall be of sufficient length to retain two full wraps on the drum at lowest hook position. Type shall be of right hand lay. Left hand lay wire ropes shall not be used (Reverse bend ropes shall not be used). Minimum number of falls of rope shall be four (4). The rope shall be free from kinks and shall be continuous.

8.15.0 ROPE DRUM & SHEAVES: Drum shall be of welded steel or seamless steel and Sheave shall be of cast or welded steel. Rope shall be of sufficient length so that 3 (three) full laps remain on the drum at extreme low position of the hook, not taking into consideration the turns covered by the rope anchorage and One spare groove for each lead of the wire rope on the drum when hook is at its highest position. Drum can be grooved right or left or both, and grooves shall suit the ropes used. Sheaves shall be equipped with sheave guards to retain the rope in groove.

8.16.0 GEAR & PINIONS: Material of construction shall be conforming to relevant Indian Standard (IS:3681) /(BS 970) or equivalent and shall be hardened if required to achieve the specified hardness. Hardness for Cross Travel & Long Travel (CT & LT) shall be in the range of 250 to 290 BHN for pinions and 215 to 255 BHN for gears. Hardness for hoisting shall be in the range of 285 to 300 BHN for pinions & 250 to 265 BHN for gears. In case of case-hardened gears and pinions, a max. hardness of 350 BHN for gears and 390 BHN for pinions is acceptable. However, vendor shall maintain and ensure that gear hardness is always less than pinion hardness by at least 35 BHN. Surface hardening of steel is not acceptable. Helical/Spur gears shall be used for hoists, CT & LT. All gears and pinions shall be examined by LPI/MPI for surface cracks after hardening. In case of enclosed gearing, means shall be provided for ample lubrication. Such lubrication points

are to be indicated in the drawing. The vendor shall specify the specification of lubricant, market trade names, quantity of lubricant requirement and frequency of lubrication.

8.17.0 All welds shall conform to IS 1024 and welders shall be qualified to AWS D1.1/ ASME Section IX.

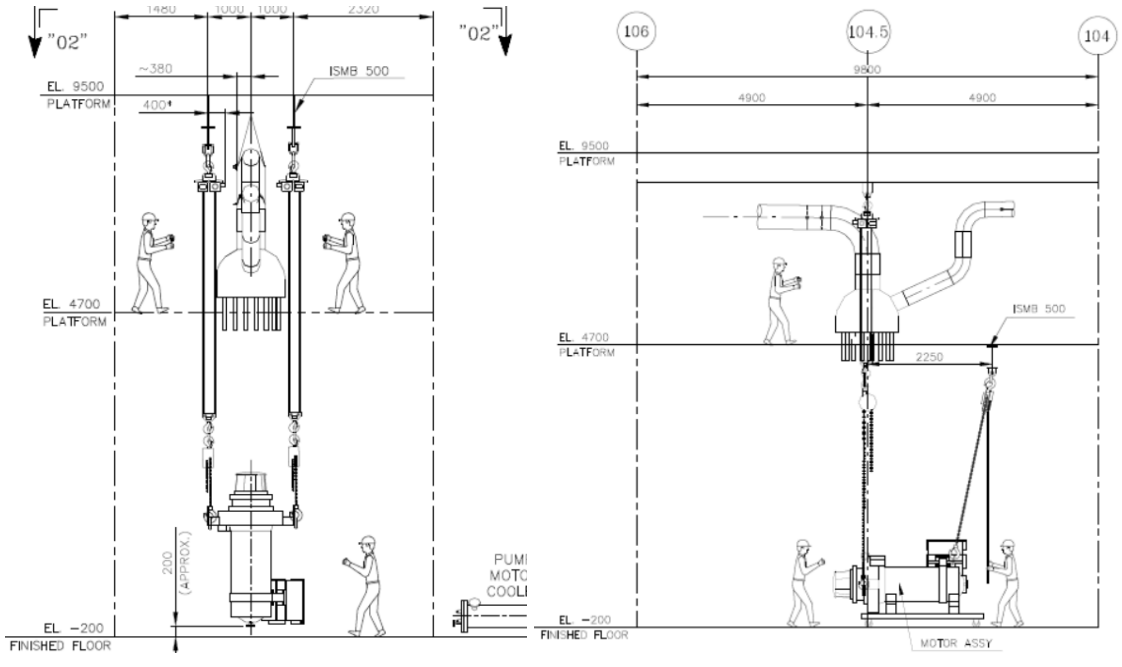
8.18.0 Electric Hoist to be provided with hard rubber sweepers.

8.19.0 The bottom block shall be of enclosed type and shall have guard against rope jamming in normal use.

8.20.0 Rotating & Stationary shafts: The material for shafts shall be as per relevant Indian standard or its equivalent and shall be hardened and tempered with a minimum tensile strength of 60 Kg/mm2 and hardness shall be maximum 175 to 250 BHN. UT test shall be done for all Shafts of diameter more than 50mm. UT acceptance norms shall be as per ASME section VIII; Division 2.

8.21.0 **Electric hoist of capacity 55T-12m lift & 20T-16m lift are for ID Fan Motor and Economiser (Pressure Part) handling. Suitable integral platform shall be provided at hoist to access control panel / motor / trolley /brake etc. for the same.**

8.22.0 **For 16T lug mounted electric hoists, one no. of the same shall be accompanied with one no. 16T chain pulley block (fixed type with hooks at both end) with 5.0 m lift. Two (2) sets of the same (refer drawing below) shall be used in tandem operation for lifting of BCW pump handling. During tandem operation both hoists shall be controlled single control panel. Suitable lugs to suspend these hoists with load to be supplied by hoist supplier. Same shall be suitable welded at site.**



Chain pulley block shall of class 2 duty and shall be designed as per IS-3832.

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, IS 12615:2011 and IS/IEC 60034-1:2014 as per norms. Motor terminal box shall be provided with suitable earthing stud inside the terminal box. It shall be possible to rotate the terminal box by 90 degrees. Insulation shall be minimum Class F or better insulation materials with additional phase insulating material, extra end-turn bracing and Class H spike resistant wire.

Motors shall be capable of a 20 second stall at six times full load current without injurious heating to motor components.

The Starting torque of the motor shall not be less than 225 % of the full load torque.

The pull out torque of the motor shall not be less than 275 % of the full load torque. All the motors shall be suitable for reversing, frequent starting and braking.

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. Control circuit shall be protected by individual control MCB's with minimum. short ckt. rating 9kA and rating 16A.

The electrical protective panel shall be a cubicle fabricated from 2 mm thick sheet steel with lockable-hinged door. It shall be dust and vermin proof with degree of protection as IP-55 or as specified in data sheet A. All the equipment inside the panel shall have permanent identification. The panels shall be front connected type with front-hinged door for access to wiring and terminals. Engraved nameplate shall be furnished for all panels and also for the equipments and devices mounted there on. The following minimum equipments shall be provided.

a) One triple pole air break type main contactor with thermal overload relay.

b) One triple pole main line connecting/disconnecting switch.

c) Switch fuse unit with D.O.L. starter for each motion.

d) Thermal overload relay for each drive. It shall be ambient temperature compensated and adjustable type.

e) Contactors, timer and auxiliary contactors.

f) Control transformer with fuses.

g) Indicating lamps to indicate the live condition of all three phases.

h) Other equipments as per supplier's standard practice. Air break contactors shall conform to category AC-4 duty. The contactor drop off voltage shall be between 45-50% of rated voltage.

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

j) Terminal Blocks shall be of Clip on type. Shall be suitable for 1.5mm2 copper conductor. 20% of additional terminal blocks shall be supplied as spares along with the supply.

k) Thermal over load relays shall be provided suitably for all motions.

l) Indicating Lamps shall be provided wherever required.

m) Cables shall be capable to withstand Outdoor atmosphere conditions of rain & Sun up to 50 DEG C.

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". Rotary + gravity type hand reset limit switches shall be provided for hoisting.

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

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

12.0 Brakes: Hoisting and cross travel shall be provided with electro- mechanical friction shoe type brake or Disc type brakes or Electromagnetic disc type brake or Electro hydraulic thruster brake. The brakes shall be released with electric power and fail-safe in case of power failure. All brakes shall, irrespective of controller portion, be applied

immediately on operating an emergency push button or switch. It shall be possible to arrest the full load at any desired location with minimum slip. Slip with reference to speed shall be specified along with the offer. Brakes shall be designed as per the latest edition of IS:3938 / International standards.

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

It shall be suspended by wire rope to prevent pull on the cables. The following minimum push buttons key operated type.

a) Main" ON", "OFF" push button key operated and lockable in "OFF" position. This push button will operate the main contactor.

b) Hoist and lower directions. (2Nos.)

c) Trolley travels both directions. (2 Nos.)

d) Inching speed for hoisting & lowering

e) Inching speed for trolley motion.

f) Creep speeds (Project specific)

h) Emergency stop push button (mushroom type).

i) Alarm bell push button.

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 and independently.

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. Isolating switch shall be equipped with MCCB with three indicators for phases.

Power feeding to the hoist shall be thru one of the following methods 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 : Trailing cable shall be 1100 V grade, tinned copper, heat resistant, with EPR insulation and as per Class – 5 of IS-8130. Also should have inner PCP sheath and outer CSP sheath with nylon chord reinforcement & heat resistant, oil resistant and flame retardant heavy duty FRLS type complete with DSL trolley on T track / taut wire arrangement retractable type including necessary fixing arrangements such as auxiliary beam, brackets, supporting plates, junction box etc.

DSL/Flexible trailing cables (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.

A. Cable Trolley Type:

Cable trolleys shall run on "Tee" track / I-Beam. The system shall consist of:

- "Tee" track
- Cable Trolleys
- Flexible power cable (Fixed & Trailing)

- Switch fuse units / Isolators
- Supports for Auxiliary girder or "Tee" track / I-Beam
- Link chain
- Fasteners

A.1 Construction:

A.1.a "Tee:" Track / I-Beam:

The system shall be provided with rolled sections suitable for cable trolley wheels as per the relevant Indian Standard. The <Tee= track / I-Beam shall be designed with minimum deflection for smooth travel of cable trolleys.

A.1.b Cable Trolleys:

4-wheeled cable trolleys shall be of sturdy design constructed with suitable material. Diameter of trolley wheels shall be minimum 40mm. and with double seal roller or ball bearing. The cable trolleys shall be designed to take the load of cable and moving with the cable load smoothly on auxiliary girder or "Tee" track. Suitable arrangement shall be provided to tie the power cable and link chain with cable trolley. Vendor shall specify the construction of material selected in the offer. Arrangement drawing shall be submitted along with the offer for review. After placement of purchase order, the same shall be submitted for approval. Vendor shall indicate the weight of total cable trolleys in the drawing.

A.1.c Flexible Power Cable: (Fixed & Trailing)

(For Cable trolley & Taut Wire Loop type)

The trailing cable shall be suitable for 415V AC; 3 phase with neutral; 50Hz.; copper PVC flexible cable, PVC 650/1100V grade, suitable size/rating (for all motors running simultaneously) for the equipment under supply. The power supply flexible trailing cable shall comply with latest revision of IS 694 / IS 1554 Part 1 /IS9968 and other relevant Indian standard for the equipment under supply. If any special requirement, respective IS Standard as mentioned in Section –5 of this specification shall be followed. For sub-vendor list refer clause no 2.12.5. Vendor shall indicate the weight of total system in the drawing.

A.1.d Switch Fuse Units or Isolators: (For Cable trolley type & TW Loop type)

The system shall be supplied along with suitable switch fuse units / isolators to take the full load current, when the equipment trolley with hoist) is working with maximum safe working load.

A.1.e Supports:

The system shall be provided with suitable supports to take the load of <Tee= track / I-Beam, cable trolleys, power flexible trailing and other materials.

A.1.f Link Chain:

The system shall be provided with suitable link chain to pull the trolleys, which is with the load of cable. During pulling of cable trolleys due to impact load, the chain shall not fail at any point. The chain shall be made out of minimum 3mm diameter carbon steel wire.

A.1g Fasteners:

Suitable fasteners shall be provided. Fasteners shall be electro - galvanized / Hot dipped.

B. Taut wire loop:

Ceramic reel insulator shall drag on stretched steel wire with trailing cable. The system shall consist of:

- Bracket
- End hook
- Flexible power cable (Fixed & Trailing)
- Switch fuse units/Isolators
- Reel insulator
- Steel wire rope
- Rope clamp & thimble
- Leather belt or nylon wire rope
- Fasteners.

B.1 Construction:

B.1a Bracket:

Suitable size and material shall be provided to take the load of cable and axial force by the end hook.

B.1b End hook:

Suitable end hook shall be provided for the size of steel wire rope.

B.1c Reel insulator:

Cable reel insulators shall be of ceramic, with suitable size of the stretch wire. Suitable arrangement shall be provided in the reel insulator to tie the trailing cable with nylon rope or leather belt.

B.1d Steel wire rope:

Steel wire rope shall be of minimum 6mm diameter as per latest revision of IS 2365. Steel wire rope shall be suitably sized for load of cable without sagging for the total travel length.

B.1e Rope clamp & thimble:

Suitable rope clamps and thimbles shall be provided to tie the rope with bracket through end hook.

B.1f Leather belt or nylon tie:

Leather belt or nylon tie shall be supplied to tie the trailing power cable with reel insulator.

B.1g Fasteners:

Suitable fasteners shall be provided wherever required. Fasteners shall be Electrogalvanized / hot dipped.

16.0 WIRING SYSTEM

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

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

c) Power cables shall be Extruded FRLS PVC inner sheath, Extruded FRLS PVC TYPE ST2 outer sheathed. Minimum size 4 mm sq for Copper 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 Extruded FRLS PVC inner sheath, Extruded FRLS PVC TYPE ST2 outer sheathed. Minimum size 2.5 mm sq.

f) Armoured cables or un-armoured running through the flexible conduits may be used for power wiring / control and auxiliary circuit wiring shall run through flexible conduits.

g) Each motor shall be wired independently. Power and control wiring shall be effectively separated.

h) Each wire shall be identified at both ends with wire designation in accordance with circuit wiring diagram.

i) All wire termination to the panels shall be provided with clamp type connections screw. Type terminals with screw directly impinging on conductors are not acceptable.

j) Multi-way terminal blocks complete with screw nut, washer and marking strips shall be furnished for terminating the panel wiring and outgoing.

k) Not more than two wires shall be connected to any terminal on either side of terminal block. If necessary number of terminals shall be jumped together to provide the wiring points

l) Each terminal block shall be marked with designation in accordance with conductors wiring diagram.

m) Adequate short circuit protection shall be provided for main and individual circuits.

n) All power & control cables shall be tagged at both ends (as per approved drawings) for quick identification. The cables & wiring system for each motion shall be independent & common runs shall be avoided. Power cables & control cables shall be effectively separated & all connections shall be terminated to terminal box suitable for outside connections.

o) Control supply transformer:

Dry type step down control supply transformer 415V/110V AC shall be provided to derive control supply for starter operation and indication. The transformer shall have minimum class 'B' insulation. The rating of the transformer shall be decided based on maximum power consumption plus 25% margin. The transformer shall meet IS 12021

17.0 Electrical components:

i. The insulation values of all electrical equipments should be checked. Reading shall be not less than 1.0 M□ with an unregulated type tester with DC voltage not less than twice the rated voltage.

ii. Control panel shall be verified for make, model no. and location of all relays & components as per the approved drawing.

iii. Functional test shall be conducted for power and control circuits.

iv. Test for high voltage and measurement of insulation resistance shall be conducted.

v. Degree of protection test report shall be submitted. (Type test report)

vi. The satisfactory operation of each controller, switch, contactor relay, other control devices, the connectors of all circuits and protective devices shall be tested under the most unfavourable conditions.

vii. TC for control panel, pendant stations and motors shall be provided.

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 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 ± 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.

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

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.

MANUAL HOIST (CHAIN PULLEY BLOCK)

GENERAL
This specification covers the design, manufacture, assembly, painting, inspection and testing at manufacturer's works of hand operated chain pulley block. The equipment shall be designed for operation suitable for OUTDOOR DUTY without any roofing above the equipment.

Manual hoist will be operating in normal ambient temperature range of 0 – 50 degC. The atmosphere will be with excessive dust, heal, moisture and corrosive fumes.

CODES AND STANDARDS
The design, manufacture, inspection and testing and performance of hand operated chain pulley blocks shall confirm to latest editions of the following standards : -

- IS: 3832 Specification for hand operated chain pulley block.
- IS 807:1976 Codes of Practice for Design, Manufacture, Erection and Testing (Structural Portion) of cranes and hoists.
- IS: 3109(Part II) Calibrated load chain for pulley blocks and other lifting appliances
- IS: 2429(Part I) Non calibrated hand chain for pulley blocks and other lifting appliances
- IS: 4460 Method for rating of machine cut spur and helical gears
- IS 3077:2001 Short Link Chain, Calibrated for Chain Pulley Blocks and other Lifting Appliances, grade T (8)
- IS:15560: 2005 Point Hooks with Shank up to 160 Tonne Specification
- IS 6216 Short Link Chain, Grade T (8) Calibrated For Pulley Block And Other Lifting App liances
- IS 304 High Tensile Brass Ingots and Castings
- IS 3681 General plan for spur gear and helical gears.
- IS 2062 Wieldable structural steel.
- IS 1024 - Code of practice for use of welding in bridges and structures subject to dynamic loading.
- IS 2004 - Carbon steel forgings for general engineering purposes
- IS 4368 - Alloy steel billets, blooms, and slabs for forging for general engineering purposes.

EQUIPMENT- MANUAL HOIST (CHAIN PULLEY BLOCK)–

The block shall be so designed that all components shall withstand without failure, an application to the block of a load equal to at least four times theworking load limit.

Following points to be taken care-

- Minimum effort to lift and move the under hung crane & chain pulley block with rated safe working load
- Self-braking systems for holding the load and stop the crane in any position.
- Compact design and even loading of bearings.
- Ease of installation and maintenance.
- Interlock mechanism shall be capable of taking the axial load due to the movement of equipment with rated safe working load.

Frame- Frame shall be robust in design and of welded construction .The frame shall be select ed in such a way that head room requirement is minimum. Frame shall maintain alignment un der all expected conditions of services.

Chain- The load chain shall be electrically welded, accurately calibrated, and pitched arid polis hed conforming to IS: 6216 Grade 80(T8)/ IS 3109 (Part 2) / IS 3077:2001

i.The load chain shall be electrically welded, accurately calibrated, and pitched arid polished c onforming to IS 3109 (Part 2)/ IS 3077:2001/ IS 6216. The chain shall be pitched and polished. The chain shall be coated with rust preventive oil. All chains shall be tested for 2 times of SWL and other testing shall be as per BIS IS/ISO 3077.

ii. The hand chain shall be of GRADE L(3) and conform to IS: 2429 (Part 1). The chains shall be pitched and polished. The chain link dimensions shall be 6.0 mm conforming to IS 2429 (Part 1). The length of chain shall be such that the lowest point of loop will be 0.4 meter above the operating level. The chain shall be coated with rust preventive oil.

Hook: Hooks shall meet the dimensional, material, testing & inspection requirement of IS 15560. The hook shall be provided with standard depress type safety latch and swivel thrust bearings with hardened race. Lugs for fixing safety latch shall be either forged along with the hook or clamp type latch with lugs shall be provided. Welding of lug is not permitted. Locking arrangement shall be provided to avoid unscrewing of the hook in service. Material of hook shall be conforming to IS 2004 - 35C8 or equivalent (Tensile strength shall be in the range of 50 to 62 Kg/Sq.mm) and made by controlled grain forging and normalised. All the hooks shall be tested for twice the safe working load. After the proof load all hooks shall be examined by LPI/MPI & UT (UT required for hooks >5.0T capacity) for cracks. The hook shall not distort or fracture. Ball & roller bearings shall not be used in these hooks. The bottom hook block shall be provided with thrust bearing to enable its free swivelling in the loaded condition without twisting the load chain.

Reduction Gear- The reduction gear shall be either spur or worm/ worm wheel type. The spur gear and worm shall be of high grade carbon steel and heat treated. The worm wheel shall be of bronze. A detachable steel cover shall be provided for total enclosure of the gear train and ample lubrication to be provided.

Brakes- Brakes shall beprovided with an automatic mechanical load brake, Ratchet & pawl type, which will prevent self-lowering of the load and arrest and sustain load in all working positions. The load brake shall also allow smooth lowering of the load without serious overheating which may impair efficient working of the block.The pawl and ratchet shall be made of steel and hardened and tempered to provide satisfactory degree of wear resistance.

Hardness shall be minimum 375BHN for Pawl & minimum 300 BHN for Ratchet. However vendor shall maintain and ensure that ratchet hardness is always less than pawl hardness by at least 50BHN. Material shall be of 45C8 - IS2004 & IS 4368 or equivalent. Supplier shall indicate material specification and provide material test certificates for compliance.

Bearing- Bearing used shall be as per guidelines laid down in IS: 3832.

Load Chain/ Hand Chain Wheels- The load chain wheel shall be made of heavy duty malleable casting and shall be designed to ensure, effective operation of the chain. Load chain wheels shall be mounted on two ball bearings.

Hand chain wheel shall be made from malleable casting/ pressed sheet steel. The idler wheel shall be so shaped as to avoid the twisting of the chain during operation. The p.c.d of idler wheels shall be such that the bending action of the link is avoided. The hand chain wheel shall be provided with flanges and designed to ensure effective operation with hand chain.

The chain guide shall be so designed that the chain will neither come out of the wheel during use nor get caught between guide & the wheel.

Trolley: Monorail trolley frame shall be of heavy section rolled steel, held together by bolts. Wheels shall be of high grade cast iron/steel mounted on ball bearings. Axles and shafts shall be of carbon steel, accurately machined and suitably supported. The trolley shall be suitable for variations in I section beams. The trolley shall be geared travel type. The trolley shall have provision for mounting the chain pulley block.

Suspension fittings other than hook shall be of sufficient strength to afford a static factor of safety of not less than 4(four).

Idler wheels: The chain pulley blocks shall be provided with idler wheels so shaped as to avoid twisting of the chain when passing around.

Wheels: Wheels shall be spur geared type cast/forged, 4 wheeled driven by hand chain.

Ratchet Lever: The ratchet lever consists of toothed wheel, pawl, catch etc., The pawls shall be of strength to arrest the full load from lowering due to gravity. The relative width and positioning of the ratchet wheel and the pawl shall be such as shall ensure full engagement irrespective of wear of the friction faces. The pawl and the ratchet shall be made of steel, hardened and tempered or given an equivalent treatment to provide satisfactory degree of wear resistance together with toughness. The hardness of the pawl tip shall not be not less than 40HRC and that of ratchet not less than 30HRC. The pawl shall engage with the ratchet wheel either by means of a spring other than a tension spring or by some other equally effective means. The pawl shall be so positioned that it engages the ratchet wheel under

gravity should it operating mechanism fails. Adequate arrangements shall be made to ensure that the pawl does not seize on the pawl pin.

Other components- All other components of chain pulley block such as anchorage, guide, pawl, stripper etc. shall be designed and provided as per IS: 3832. The effort required for hoisting and travel shall be as stipulated in IS 3832.

Name Plates:

Nameplates shall be provided with non-corrosive material.

Nameplates shall have details of the equipment, model no., type, capacity, lift, span, and motor & brake details.

All lubrication points shall be provided with nameplates.

SUB SECTION-IIB

STANDARD TECHNICAL REQUIREMENT (ELECTRICAL)

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR ELECTRIC HOISTS	SPECIFICATION NO.
		VOLUME NO. : **II-B**
		SECTION : **C**
		REV NO. : **00** DATE :
		SHEET : 1 OF 3

TECHNICAL SPECIFICATION

FOR

(ELECTRICAL PORTION)

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.

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)

PACKAGE: ELECTRIC HOISTS
SCOPE OF VENDOR: SUPPLY

ANNEXURE - I

S. NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
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 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

BHEL	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 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.

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 mimimum 20,000 starts during the life time of the motor

3.4 **Running Requirements**

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

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

3.5 **Stress During bus Transfer**

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

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

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

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

4.0 **CONSTRUCTIONAL FEATURES**

4.1 Indoor motors shall conform to degree of protection IP: 54 as per IS: 4691. Outdoor or semi-indoor motors shall conform to degree of protection IP: 55 as per IS: 4691and 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 cool oth directions of rotation.

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**

BHEL	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 : 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	SPECIFICATION NO.
BHEL	**LV MOTORS**	VOLUME II B
	DATA SHEET-A	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 ± 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, 1Φ , 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 ANNUXURE
18.0	Terminal box	:	Suitable to rotate at 90 degrees
19.0	Paint shade	:	Shall be given during detailed engg.

Note: LT motor shall be energy efficient class IE-3 in line with IS -12615-2011.

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	

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 ≥ 55KW)	
	a) Torque speed characteristic	
	b) Thermal withstand characteristic	
	c) Current vs time	
	d) Speed vs time	

	QUALITY PLAN	CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
		BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01			SPECIFICATION TITLE			
	SHEET 1 OF 2	SYSTEM			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 P	AGENCY W	AGENCY V	REMARKS
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 TITLE	SPECIFICATION : NUMBER :
		BIDDER/ VENDOR :	QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01	SPECIFICATION : TITLE :
	SHEET 2 OF 2	SYSTEM	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 P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9	10	10	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.

Legends for Inspection agency

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

	DOCUMENT TITLE **TECHNICAL SPECIFICATION FOR 1.1 kV XLPE POWER CABLES**	SPECIFICATION NO. VOLUME II B SECTION D REVISION 0 SHEET 1 OF 2

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, ASTMD:2843, ASTMD: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	Ish= k A/ √ (t) where, Ish = 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	SPECIFICATION NO.
	TECHNICAL SPECIFICATION FOR 1.1 kV XLPE POWER CABLES	VOLUME II B
		SECTION D
		REVISION 0
		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	*Pressure/Vacuum extruded*
(ii)	Without fillers	*Pressure extruded*
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 *Round Wire* 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	*Black*
(c)	Whether FRLS	Yes
(d)	Method of application	Extruded

ANNEXURES

ANNEXURE-I

MAKES OF SUB VENDORS ITEMS (AS PER APPLICABILITY)

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	ALSTOM		
		CROMPTON GREAVES		
		KIRLOSKAR ELECTRIC CO. LTD.		
		SIEMENS		
		BHARAT BIJLI		
		MARATHON		
		ABB		
		LHP		
		NGEF (upto 15 kW)		
		JYOTI		
7.	BRAKES	ELECTROMAG		
		SPEED-O- CONTROL		
		BCH		FOR DCEM BRAKES ONLY
		KAKKU		FOR DCEM BRAKES ONLY
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		

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		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.	CONTROL TRANSFORMERS	KAPPA		
		SILCON		
		POWER PACK		
		PRAGATI		
		CANDS		
		PRECISE		
		INDCOIL		
		LOGICSTAT		
		AUTOMATIC ELECTRIC		
		INDUSTRIAL PRAYOG		
		SILKAAN ELECTRIC MFG. CO. LTD.		
		SOUTHERN ELECTRIC		
		NEC		
15.	CABLE LUGS	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	

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

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		UNIVERSAL	SATNA	
		INCAB		
		ICL	NEW DELHI	
		APAR INDUSTRIES LTD	MUMBAI	
		CMI LTD	FARIDABAD	
		KEI INDUSTRIES LTD	NEW DELHI	
		SUYOG ELECTRICALS LTD	VADODARA	
19.	XLPE POWER CABLES	APAR INDUSTRIES LTD	MUMBAI	
		CORDS CABLE INDUSTRIES LTD	NEW DELHI	
		CRYSTAL CABLE INDUSTRIES LTD	KOLKATA	
		DIAMOND POWER INFRASTRUCTURE LTD	VADODARA	
		GEMSCAB INDUSTRIES LTD	NEW DELHI	
		GOVIND CABLE INDUSTRIES	KOLKATA	
		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	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		SUYOG ELECTRICALS LTD	VADODARA	
		SRIRAM CABLES PVT. LTD	NEW DELHI	
		TORRENT CABLES LTD	AHMEDABAD	
		UNIVERSAL CABLES LTD	SATNA	
21.	CABLE GLAND	COMMET		
		SUNIL&CO		
		ARUP ENGINEERING		
		JAINSON		
		DOWELL		
22.	PUSH BUTTONS	SIEMENS		
		L&T		
		BCH		
		SCHNEIDER		
23.	LIMIT SWITCHES	SPEED-O-CONTROL		
		ELECTROMAG		
24.	PENDENT PUSH BUTTON STATION	OEM		
25.	INDICATING LAMPS	TECKNIC		
		BCH		
		SIEMENS		
		STANDARD		
26.	MCB	MDS		
		INDO COPP		
		STANDARD		
		SIEMENS		
		L&T		
		ABB		
		SCHNEIDER		
27.	PANELS	OEM		
		RITTAL		
		PYROTECH		
28.	RESISTANCE BOXES	ENAPROS		
		OEM		
		SAFEX FIRE SERVICES LTD		
		UNITED FIRE EQUIPMENTS PVT. LTD		
		ZENITH FIRE SERVICES (INDIA) PVT LTD		
29.	VVVF	ABB		
		SIEMENS		
		L&T		
		FUJI ELECTRIC		
		YASAKAWA JAPAN,		UKAI
		SCHNEIDER		UKAI
		ROCKWELL AUTOMATION		UKAI
30.	SHROUDED DSL	SUSHEEL		
		STROMAG		

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
31.	LOAD CELL	IPA		
		SARTORIUS		
32.	GEAR BOX	OEM		* = Applicable for Geared Motors only (if applicable for project)
		ELECON ENGINEERS		
		SHANTHI GEARS		
		PBL*		
		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.

ANNEXURE II

ESSENTIAL SPARES LIST FOR ELECTRIC HOIST & MANUAL HOIST (PROJECT SPECIFIC)

1. ESSENTIAL SPARES

The bidder shall indicate the prices in the 'Schedule of ESSENTIAL Spares' whether or not he considers it necessary for the Employer to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price.

Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise.

2. All spares supplied under this contract shall be strictly inter changeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.

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

4. The Contractor shall warrant that all spares supplied will be new and in accordance with the contract Documents and will be free from defects in design, material and workmanship.

5. Material Codification:
The bidder to provide datasheets/ assembly drawings of the manufacturer/ any other relevant document showing Bill of Material(s), Make, Model Number, Part Number etc. through which mandatory spares to be supplied can be uniquely identified. This would facilitate the Employer to assign a unique code to each of the mandatory spare as brought out in GCC. The bidder shall extend all necessary assistance in this regard.

S.No	Description of equipment / item	QUANTITY	Total Qty
A	**ESSENTIAL SPARES (1T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	15
2.00	Bearings for gear box for hoisting motion	100% for one EH	15
3.00	Bearings for gear box for CT motion	100% for one EH	15
4.00	Hoist pulley bearings	100% for one EH	15
5.00	Hook thrust bearing	100% for one EH	15
6.00	Drum bearing	100% for one EH	15
7.00	Bearing Seal	100% for one EH	15
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	3
15.00	Complete Gear box / gear set for CT motion	100% for one EH	3
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	3
ii)	Oil seals for Hoist gear box	100% for one EH	3
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners with rivets for		

i)	Hoist brake	100% for one EH	16
ii)	CT brake	100% for one EH	16
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	14
ii)	CT brake	100% for one EH	14
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	3
23.00	Brake assembly for CT motion	100% for one EH	3
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	13
b)	suitable for 12 m lift	100% for one EH	13
c)	suitable for 15 m lift	100% for one EH	9
26.00	Rope Guide	100% for one EH	2
27.00	Rope Tightner	100% for one EH	2
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	3
33.00	Main contactors	1 set for one EH	3
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3

36.00	Overload relays	1 no of each type, size and rating for one EH	13
37.00	Relay	1 no of each type for one EH	3
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	16
ii)	Cross Travel	1 set for one EH	16
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	3
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3

57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	14
ii)	Motor of travel motion	1 set for one EH	14
iii)	Terminal plates	1 set for one EH	1
iv)	Motor Terminal Block	1 set for one EH	1
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	3
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply Transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3

69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	3
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
B	**ESSENTIAL SPARES (2T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	41
2.00	Bearings for gear box for hoisting motion	100% for one EH	41
3.00	Bearings for gear box for CT motion	100% for one EH	41
4.00	Hoist pulley bearings	100% for one EH	41
5.00	Hook thrust bearing	100% for one EH	41
6.00	Drum bearing	100% for one EH	41
7.00	Bearing Seal	100% for one EH	41
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	9
15.00	Complete Gear box / gear set for CT motion	100% for one EH	9
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20

ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	54
ii)	CT brake	100% for one EH	54
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	38
ii)	CT brake	100% for one EH	38
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 6 m lift	100% for one EH	11
b)	suitable for 9 m lift	100% for one EH	25
c)	suitable for 13 m lift	100% for one EH	22
d)	suitable for 18 m lift	100% for one EH	8
e)	suitable for 30 m lift	100% for one EH	25
26.00	Rope Guide	100% for one EH	6
27.00	Rope Tightner	100% for one EH	6
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3

31.00	Local Control Station	One (1) No. each type	3
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	30
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	44
ii)	Cross Travel	1 set for one EH	44
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	3
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	3
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3

53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	33
ii)	Motor of travel motion	1 set for one EH	33
iii)	Terminal plates	1 set for one EH	3
iv)	Motor Terminal Block	1 set for one EH	3
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3

63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
C	**ESSENTIAL SPARES (3T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	42
2.00	Bearings for gear box for hoisting motion	100% for one EH	42
3.00	Bearings for gear box for CT motion	100% for one EH	42
4.00	Hoist pulley bearings	100% for one EH	42
5.00	Hook thrust bearing	100% for one EH	42
6.00	Drum bearing	100% for one EH	42
7.00	Bearing Seal	100% for one EH	42
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3

11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	10
15.00	Complete Gear box / gear set for CT motion	100% for one EH	10
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	55
ii)	CT brake	100% for one EH	55
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	39
ii)	CT brake	100% for one EH	39
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 6 m lift	100% for one EH	23
b)	suitable for 9 m lift	100% for one EH	25
c)	suitable for 15 m lift	100% for one EH	23

d)	suitable for 35 m lift	100% for one EH	22
26.00	Rope Guide	100% for one EH	7
27.00	Rope Tightner	100% for one EH	7
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	4
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	30
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	45
ii)	Cross Travel	1 set for one EH	45
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5

50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	4
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	4
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	33
ii)	Motor of travel motion	1 set for one EH	33
iii)	Terminal plates	1 set for one EH	3
iv)	Motor Terminal Block	1 set for one EH	3
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3

xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
D	**ESSENTIAL SPARES (5T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	33
2.00	Bearings for gear box for hoisting motion	100% for one EH	33
3.00	Bearings for gear box for CT motion	100% for one EH	33
4.00	Hoist pulley bearings	100% for one EH	33

5.00	Hook thrust bearing	100% for one EH	33
6.00	Drum bearing	100% for one EH	33
7.00	Bearing Seal	100% for one EH	33
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	7
15.00	Complete Gear box / gear set for CT motion	100% for one EH	7
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	45
ii)	CT brake	100% for one EH	45
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	31
ii)	CT brake	100% for one EH	31
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10

24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 6 m lift	100% for one EH	15
b)	suitable for 9 m lift	100% for one EH	18
c)	suitable for 15 m lift	100% for one EH	15
d)	suitable for 21 m lift	100% for one EH	4
26.00	Rope Guide	100% for one EH	5
27.00	Rope Tightner	100% for one EH	5
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	3
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	23
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3

44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	35
ii)	Cross Travel	1 set for one EH	35
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	3
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	3
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	25
ii)	Motor of travel motion	1 set for one EH	25
iii)	Terminal plates	1 set for one EH	2
iv)	Motor Terminal Block	1 set for one EH	2
v)	Space Heaters	1 set for one EH	3

vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
E	**ESSENTIAL SPARES (6T CAPACITY- NON**		

	HAZARDOUS AREA)		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	16
2.00	Bearings for gear box for hoisting motion	100% for one EH	16
3.00	Bearings for gear box for CT motion	100% for one EH	16
4.00	Hoist pulley bearings	100% for one EH	16
5.00	Hook thrust bearing	100% for one EH	16
6.00	Drum bearing	100% for one EH	16
7.00	Bearing Seal	100% for one EH	16
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	1
15.00	Complete Gear box / gear set for CT motion	100% for one EH	1
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	26
ii)	CT brake	100% for one EH	26
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10

ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	16
ii)	CT brake	100% for one EH	16
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 12 m lift	100% for one EH	5
26.00	Rope Guide	100% for one EH	1
27.00	Rope Tightner	100% for one EH	1
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	10
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3

41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	16
ii)	Cross Travel	1 set for one EH	16
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	10
ii)	Motor of travel motion	1 set for one EH	10

iii)	Terminal plates	1 set for one EH	3
iv)	Motor Terminal Block	1 set for one EH	3
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2

74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
F	**ESSENTIAL SPARES (8T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	11
2.00	Bearings for gear box for hoisting motion	100% for one EH	11
3.00	Bearings for gear box for CT motion	100% for one EH	11
4.00	Hoist pulley bearings	100% for one EH	11
5.00	Hook thrust bearing	100% for one EH	11
6.00	Drum bearing	100% for one EH	11
7.00	Bearing Seal	100% for one EH	11
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	3
15.00	Complete Gear box / gear set for CT motion	100% for one EH	3
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	3
ii)	Oil seals for Hoist gear box	100% for one EH	3
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	12
ii)	CT brake	100% for one EH	12

19.00	Brake springs for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	3
23.00	Brake assembly for CT motion	100% for one EH	3
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	9
b)	suitable for 25 m lift	100% for one EH	3
26.00	Rope Guide	100% for one EH	2
27.00	Rope Tightner	100% for one EH	2
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	3
33.00	Main contactors	1 set for one EH	3
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	9
37.00	Relay	1 no of each type for one EH	3

38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		3
i)	Main Hoist	1 set for one EH	12
ii)	Cross Travel	1 set for one EH	12
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	3
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3

61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	10
ii)	Motor of travel motion	1 set for one EH	10
iii)	Terminal plates	1 set for one EH	1
iv)	Motor Terminal Block	1 set for one EH	1
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	3
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3

71.00	Make and trip coils	1 set for one EH	3
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
G	**ESSENTIAL SPARES (10T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	18
2.00	Bearings for gear box for hoisting motion	100% for one EH	18
3.00	Bearings for gear box for CT motion	100% for one EH	18
4.00	Hoist pulley bearings	100% for one EH	18
5.00	Hook thrust bearing	100% for one EH	18
6.00	Drum bearing	100% for one EH	18
7.00	Bearing Seal	100% for one EH	18
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	11
15.00	Complete Gear box / gear set for CT motion	100% for one EH	11
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	3
ii)	Oil seals for Hoist gear box	100% for one EH	3
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3

18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	22
ii)	CT brake	100% for one EH	22
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	14
ii)	CT brake	100% for one EH	14
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	3
23.00	Brake assembly for CT motion	100% for one EH	3
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 12 m lift	100% for one EH	6
b)	suitable for 17 m lift	100% for one EH	3
c)	suitable for 21 m lift	100% for one EH	3
d)	suitable for 28 m lift	100% for one EH	10
e)	suitable for 35 m lift	100% for one EH	3
26.00	Rope Guide	100% for one EH	7
27.00	Rope Tightner	100% for one EH	7
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	3
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	3
33.00	Main contactors	1 set for one EH	3

34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	11
37.00	Relay	1 no of each type for one EH	3
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	22
ii)	Cross Travel	1 set for one EH	22
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	3
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	3
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	3
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3

56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	15
ii)	Motor of travel motion	1 set for one EH	15
iii)	Terminal plates	1 set for one EH	4
iv)	Motor Terminal Block	1 set for one EH	4
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	3
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3

67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	3
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
H	**ESSENTIAL SPARES (12.5T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	11
2.00	Bearings for gear box for hoisting motion	100% for one EH	11
3.00	Bearings for gear box for CT motion	100% for one EH	11
4.00	Hoist pulley bearings	100% for one EH	11
5.00	Hook thrust bearing	100% for one EH	11
6.00	Drum bearing	100% for one EH	11
7.00	Bearing Seal	100% for one EH	11
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	3
15.00	Complete Gear box / gear set for CT motion	100% for one EH	3

16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	3
ii)	Oil seals for Hoist gear box	100% for one EH	3
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	11
ii)	CT brake	100% for one EH	11
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	11
ii)	CT brake	100% for one EH	11
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	3
23.00	Brake assembly for CT motion	100% for one EH	3
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 12 m lift	100% for one EH	2
b)	suitable for 20 m lift	100% for one EH	8
c)	suitable for 36 m lift	100% for one EH	11
26.00	Rope Guide	100% for one EH	3
27.00	Rope Tightner	100% for one EH	3
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3

31.00	Local Control Station	One (1) No. each type	3
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	3
33.00	Main contactors	1 set for one EH	3
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	11
37.00	Relay	1 no of each type for one EH	3
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	11
ii)	Cross Travel	1 set for one EH	11
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	3
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	3
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	3
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3

53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	11
ii)	Motor of travel motion	1 set for one EH	11
iii)	Terminal plates	1 set for one EH	3
iv)	Motor Terminal Block	1 set for one EH	3
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	3
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3

63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	3
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
I	**ESSENTIAL SPARES (15T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	22
2.00	Bearings for gear box for hoisting motion	100% for one EH	22
3.00	Bearings for gear box for CT motion	100% for one EH	22
4.00	Hoist pulley bearings	100% for one EH	22
5.00	Hook thrust bearing	100% for one EH	22
6.00	Drum bearing	100% for one EH	22
7.00	Bearing Seal	100% for one EH	22
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3

11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	5
15.00	Complete Gear box / gear set for CT motion	100% for one EH	5
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	33
ii)	CT brake	100% for one EH	33
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	21
ii)	CT brake	100% for one EH	21
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	2
b)	suitable for 15 m lift	100% for one EH	7
c)	suitable for 23 m lift	100% for one EH	1

26.00	Rope Guide	100% for one EH	4
27.00	Rope Tightner	100% for one EH	4
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	3
	Electrical spares		3
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	5
35.00	Coil for contactors	1 set for one EH	5
36.00	Overload relays	1 no of each type, size and rating for one EH	13
37.00	Relay	1 no of each type for one EH	3
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	23
ii)	Cross Travel	1 set for one EH	23
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5

50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	3
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	3
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	14
ii)	Motor of travel motion	1 set for one EH	14
iii)	Terminal plates	1 set for one EH	1
iv)	Motor Terminal Block	1 set for one EH	1
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3

xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
J	**ESSENTIAL SPARES (20T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	23
2.00	Bearings for gear box for hoisting motion	100% for one EH	23
3.00	Bearings for gear box for CT motion	100% for one EH	23
4.00	Hoist pulley bearings	100% for one EH	23

5.00	Hook thrust bearing	100% for one EH	23
6.00	Drum bearing	100% for one EH	23
7.00	Bearing Seal	100% for one EH	23
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	7
15.00	Complete Gear box / gear set for CT motion	100% for one EH	7
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	5
ii)	CT brake	100% for one EH	5
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	36
ii)	CT brake	100% for one EH	36
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	20
ii)	CT brake	100% for one EH	20
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10

24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	4
b)	suitable for 16 m lift	100% for one EH	9
c)	suitable for 20 m lift	100% for one EH	3
26.00	Rope Guide	100% for one EH	4
27.00	Rope Tightner	100% for one EH	4
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	14
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		

i)	Main Hoist	1 set for one EH	26
ii)	Cross Travel	1 set for one EH	26
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting		
i)	For hoisting speed- 1.5 mpm	1 no. of each type and rating for one EH	1
ii)	For hoisting speed- 3 mpm	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion (Speed 1.5 mpm)	1 set for one EH	10
ii)	Motor of hoist motion (Speed 3 mpm)	1 set for one EH	7
iii)	Motor of travel motion	1 set for one EH	17
iv)	Terminal plates	1 set for one EH	3

v)	Motor Terminal Block	1 set for one EH	3
vi)	Space Heaters	1 set for one EH	3
vii)	Greasing arrangements	1 set for one EH	3
viii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
ix)	Stator winding coils for all type of LT motors	1 set for one EH	3
x)	Rotor pinion	1 set	3
xi)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xii)	Cooling Fans	1 no for each type and rating of motor	3
xiii)	Fan Cover	1 no for each type and rating of motor	3
xiv)	Complete Set of Coupling	1 set for one EH	3
xv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2

75.00	Control switches	1 no. of each type	2
K	**ESSENTIAL SPARES (22T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	16
2.00	Bearings for gear box for hoisting motion	100% for one EH	16
3.00	Bearings for gear box for CT motion	100% for one EH	16
4.00	Hoist pulley bearings	100% for one EH	16
5.00	Hook thrust bearing	100% for one EH	16
6.00	Drum bearing	100% for one EH	16
7.00	Bearing Seal	100% for one EH	16
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	1
15.00	Complete Gear box / gear set for CT motion	100% for one EH	1
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	5
ii)	CT brake	100% for one EH	5
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	26
ii)	CT brake	100% for one EH	26
19.00	Brake springs for		

i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	16
ii)	CT brake	100% for one EH	16
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	5
26.00	Rope Guide	100% for one EH	1
27.00	Rope Tightner	100% for one EH	1
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	10
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3

40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	16
ii)	Cross Travel	1 set for one EH	16
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting		
i)	For hoisting Speed 1.5 mpm	1 no. of each type and rating for one EH	1
ii)	For hoisting Speed 3 mpm	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3

60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion (speed 1.5 mpm)	1 set for one EH	6
ii)	Motor of hoist motion (speed 3 mpm)	1 set for one EH	4
iii)	Motor of travel motion	1 set for one EH	10
iv)	Terminal plates	1 set for one EH	3
v)	Motor Terminal Block	1 set for one EH	3
vi)	Space Heaters	1 set for one EH	3
vii)	Greasing arrangements	1 set for one EH	3
viii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
ix)	Stator winding coils for all type of LT motors	1 set for one EH	3
x)	Rotor pinion	1 set	3
xi)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xii)	Cooling Fans	1 no for each type and rating of motor	3
xiii)	Fan Cover	1 no for each type and rating of motor	3
xiv)	Complete Set of Coupling	1 set for one EH	3
xv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3

70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
L	**ESSENTIAL SPARES (30T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	1
2.00	Bearings for gear box for hoisting motion	100% for one EH	1
3.00	Bearings for gear box for CT motion	100% for one EH	1
4.00	Hoist pulley bearings	100% for one EH	1
5.00	Hook thrust bearing	100% for one EH	1
6.00	Drum bearing	100% for one EH	1
7.00	Bearing Seal	100% for one EH	1
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	1
15.00	Complete Gear box / gear set for CT motion	100% for one EH	1
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	3
ii)	Oil seals for Hoist gear box	100% for one EH	3
17.00	Brake shoe with lining for		

i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	1
ii)	CT brake	100% for one EH	1
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	1
ii)	CT brake	100% for one EH	1
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	3
23.00	Brake assembly for CT motion	100% for one EH	3
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	3
26.00	Rope Guide	100% for one EH	1
27.00	Rope Tightner	100% for one EH	1
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		3
32.00	Contactors	1 no of each type, size and rating for one EH	3
33.00	Main contactors	1 set for one EH	3
34.00	Auxiliary contactors	1 set for one EH	3

35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	3
37.00	Relay	1 no of each type for one EH	3
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	1
ii)	Cross Travel	1 set for one EH	1
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	3
50.00	VVVF Drive for Hoisting		
i)	For hoisting speed 1.5 mpm	1 no. of each type and rating for one EH	1
ii)	For hoisting speed 3 mpm	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3

55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion (speed 1.5 mpm)	1 set for one EH	2
ii)	Motor of hoist motion (speed 3 mpm)	1 set for one EH	1
iii)	Motor of travel motion	1 set for one EH	3
iv)	Terminal plates	1 set for one EH	3
v)	Motor Terminal Block	1 set for one EH	3
vi)	Space Heaters	1 set for one EH	3
vii)	Greasing arrangements	1 set for one EH	3
viii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	3
ix)	Stator winding coils for all type of LT motors	1 set for one EH	3
x)	Rotor pinion	1 set	3
xi)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xii)	Cooling Fans	1 no for each type and rating of motor	3
xiii)	Fan Cover	1 no for each type and rating of motor	3
xiv)	Complete Set of Coupling	1 set for one EH	3
xv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3

64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	3
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
M	**ESSENTIAL SPARES (40T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	3
2.00	Bearings for gear box for hoisting motion	100% for one EH	3
3.00	Bearings for gear box for CT motion	100% for one EH	3
4.00	Hoist pulley bearings	100% for one EH	3
5.00	Hook thrust bearing	100% for one EH	3
6.00	Drum bearing	100% for one EH	3
7.00	Bearing Seal	100% for one EH	3
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3

13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	2
15.00	Complete Gear box / gear set for CT motion	100% for one EH	2
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	3
ii)	Oil seals for Hoist gear box	100% for one EH	3
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	4
ii)	CT brake	100% for one EH	4
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	3
ii)	CT brake	100% for one EH	3
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	2
ii)	CT brake	100% for one EH	2
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	3
23.00	Brake assembly for CT motion	100% for one EH	3
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 12 m lift	100% for one EH	2
26.00	Rope Guide	100% for one EH	1
27.00	Rope Tightner	100% for one EH	1
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3

30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	3
	Electrical spares		3
32.00	Contactors	1 no of each type, size and rating for one EH	3
33.00	Main contactors	1 set for one EH	3
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	2
37.00	Relay	1 no of each type for one EH	3
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	4
ii)	Cross Travel	1 set for one EH	4
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	3
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	3
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	3
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3

54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		3
i)	Motor of hoist motion	1 set for one EH	3
ii)	Motor of travel motion	1 set for one EH	3
iii)	Terminal plates	1 set for one EH	1
iv)	Motor Terminal Block	1 set for one EH	1
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	3
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3

65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	3
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
N	**ESSENTIAL SPARES (55T CAPACITY- NON HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	16
2.00	Bearings for gear box for hoisting motion	100% for one EH	16
3.00	Bearings for gear box for CT motion	100% for one EH	16
4.00	Hoist pulley bearings	100% for one EH	16
5.00	Hook thrust bearing	100% for one EH	16
6.00	Drum bearing	100% for one EH	16
7.00	Bearing Seal	100% for one EH	16
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3

14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	1
15.00	Complete Gear box / gear set for CT motion	100% for one EH	1
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	5
ii)	CT brake	100% for one EH	5
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	26
ii)	CT brake	100% for one EH	26
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	16
ii)	CT brake	100% for one EH	16
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 12 m lift	100% for one EH	5
26.00	Rope Guide	100% for one EH	1
27.00	Rope Tightner	100% for one EH	1
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3

30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		3
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	10
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	16
ii)	Cross Travel	1 set for one EH	16
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting		
i)	For speed 1.5 mpm	1 no. of each type and rating for one EH	1
ii)	For speed 3 mpm	1 no. of each type and rating for one EH	1

51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion (for speed 1.5 mpm)	1 set for one EH	6
ii)	Motor of hoist motion (for speed 3 mpm)	1 set for one EH	4
iii)	Motor of travel motion	1 set for one EH	10
iv)	Terminal plates	1 set for one EH	3
v)	Motor Terminal Block	1 set for one EH	3
vi)	Space Heaters	1 set for one EH	3
vii)	Greasing arrangements	1 set for one EH	3
viii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
ix)	Stator winding coils for all type of LT motors	1 set for one EH	3
x)	Rotor pinion	1 set	3
xi)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xii)	Cooling Fans	1 no for each type and rating of motor	3

xiii)	Fan Cover	1 no for each type and rating of motor	3
xiv)	Complete Set of Coupling	1 set for one EH	3
xv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
O	**ESSENTIAL SPARES (2T CAPACITY-HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	19
2.00	Bearings for gear box for hoisting motion	100% for one EH	19
3.00	Bearings for gear box for CT motion	100% for one EH	19
4.00	Hoist pulley bearings	100% for one EH	19
5.00	Hook thrust bearing	100% for one EH	19
6.00	Drum bearing	100% for one EH	19

7.00	Bearing Seal	100% for one EH	19
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	3
15.00	Complete Gear box / gear set for CT motion	100% for one EH	3
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	5
ii)	CT brake	100% for one EH	5
18.00	Brake liners for with rivets for		0
i)	Hoist brake	100% for one EH	30
ii)	CT brake	100% for one EH	30
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	18
ii)	CT brake	100% for one EH	18
21.00	Diode bridge	100% for one EH	3
22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3

ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	7
26.00	Rope Guide	100% for one EH	2
27.00	Rope Tightner	100% for one EH	2
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	12
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	20
ii)	Cross Travel	1 set for one EH	20
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3

48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	13
ii)	Motor of travel motion	1 set for one EH	13
iii)	Terminal plates	1 set for one EH	1
iv)	Motor Terminal Block	1 set for one EH	1
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3
vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3

x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
P	**ESSENTIAL SPARES (3T CAPACITY-HAZARDOUS AREA)**		
	Mechanical spares		
	Bearings		
1.00	Bearings for trolley wheel	100% for one EH	19
2.00	Bearings for gear box for hoisting motion	100% for one EH	19

3.00	Bearings for gear box for CT motion	100% for one EH	19
4.00	Hoist pulley bearings	100% for one EH	19
5.00	Hook thrust bearing	100% for one EH	19
6.00	Drum bearing	100% for one EH	19
7.00	Bearing Seal	100% for one EH	19
	Gears		
8.00	Input pinion for Hoist Gearbox	100% for one EH	3
9.00	Input pinion for CT Gearbox	100% for one EH	3
10.00	Gear wheel for Hoist Gearbox	100% for one EH	3
11.00	Gear wheel for CT Gearbox	100% for one EH	3
12.00	Internal clip for Hoist Gearbox	100% for one EH	3
13.00	Internal clip for CT Gearbox	100% for one EH	3
14.00	Complete Gear box / gear set for hoisting motion	100% for one EH	3
15.00	Complete Gear box / gear set for CT motion	100% for one EH	3
16.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
ii)	Oil seals for Hoist gear box	100% for one EH	20
17.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	5
ii)	CT brake	100% for one EH	5
18.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	30
ii)	CT brake	100% for one EH	30
19.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
ii)	CT brake	100% for one EH	10
20.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	18
ii)	CT brake	100% for one EH	18
21.00	Diode bridge	100% for one EH	3

22.00	Brake assembly for hoisting	100% for one EH	10
23.00	Brake assembly for CT motion	100% for one EH	10
24.00	**Wheels**		
i)	CT wheel assembly (complete) (driving)	100% for one EH	3
ii)	CT wheel assembly (complete) (idle)	100% for one EH	3
25.00	**Wire rope**		
a)	suitable for 9 m lift	100% for one EH	7
26.00	Rope Guide	100% for one EH	2
27.00	Rope Tightner	100% for one EH	2
28.00	Rope sheave assembly	100% for one EH	3
29.00	Rubber bushes for flexible couplings	100% for one EH	3
30.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
31.00	Local Control Station	One (1) No. each type	1
	Electrical spares		
32.00	Contactors	1 no of each type, size and rating for one EH	10
33.00	Main contactors	1 set for one EH	10
34.00	Auxiliary contactors	1 set for one EH	3
35.00	Coil for contactors	1 set for one EH	3
36.00	Overload relays	1 no of each type, size and rating for one EH	12
37.00	Relay	1 no of each type for one EH	5
38.00	Timers of each type	1 set for one EH	3
39.00	MCBs.	1 set for one EH	3
40.00	MCCB	1 set for one EH	3
41.00	Switch Fuse Units	1 No. for one EH	3
42.00	Fuses of each type	1 set for one EH	3
43.00	Fuse links	1 set for one EH	3
44.00	Control circuit fuses	1 set for one EH	3
45.00	Limit Switches for		

i)	Main Hoist	1 set for one EH	20
ii)	Cross Travel	1 set for one EH	20
46.00	Door limit switch	1 set for one EH	3
47.00	Selector switch	1 set for one EH	3
48.00	Current Collector shoes/ rollers	1 Set for one EH	3
49.00	Complete current collector assembly	1 Set for one EH	5
50.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	1
51.00	VVVF drive for Cross travel	1 no. of each type and rating for one EH	1
52.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3
53.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
54.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
55.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
56.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
57.00	Indicating lamps of each type	1 set for one EH	3
58.00	Electric meter	1 set for one EH	3
59.00	Resistor element of each size and type	1 set for one EH	3
60.00	Hooter	1 set for one EH	3
61.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	13
ii)	Motor of travel motion	1 set for one EH	13
iii)	Terminal plates	1 set for one EH	1
iv)	Motor Terminal Block	1 set for one EH	1
v)	Space Heaters	1 set for one EH	3
vi)	Greasing arrangements	1 set for one EH	3

vii)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
viii)	Stator winding coils for all type of LT motors	1 set for one EH	3
ix)	Rotor pinion	1 set	3
x)	Dust seals and gaskets for each type of motors	1 set for one EH	3
xi)	Cooling Fans	1 no for each type and rating of motor	3
xii)	Fan Cover	1 no for each type and rating of motor	3
xiii)	Complete Set of Coupling	1 set for one EH	3
xiv)	End shield (DE & NDE)	1 set of each type	3
62.00	Control supply transformer	1 set for one EH	3
63.00	1.1 KV Grade power cables for each type and size.	1 m	3
64.00	1.1 KV Grade control cables for each type and size.	1 m	3
65.00	Control Trailing Cable for Electrical Hoist	1 m	3
66.00	Power Trailing Cable for Electrical Hoist	1 m	3
67.00	Power terminal block	1 set for one EH	3
68.00	Control terminal block	1 set for one EH	3
69.00	End plates for Power & Control terminal block	1 set for one EH	3
70.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
71.00	Make and trip coils	1 set for one EH	10
72.00	Ammeters	1 no. of each type & rating	2
73.00	Voltmeter	1 no. of each type & rating	2
74.00	Any special meter	1 no. of each type	2
75.00	Control switches	1 no. of each type	2
Q	**ESSENTIAL SPARES (16T CAPACITY- NON HAZARDOUS AREA)- LUG MOUNTED**		

	Mechanical spares		
	Bearings		
1.00	Bearings for gear box for hoisting motion	100% for one EH	14
2.00	Hoist pulley bearings	100% for one EH	14
3.00	Hook thrust bearing	100% for one EH	14
4.00	Drum bearing	100% for one EH	14
5.00	Bearing Seal	100% for one EH	14
	Gears		
6.00	Input pinion for Hoist Gearbox	100% for one EH	3
7.00	Gear wheel for Hoist Gearbox	100% for one EH	3
8.00	Internal clip for Hoist Gearbox	100% for one EH	3
9.00	Internal clip for CT Gearbox	100% for one EH	3
10.00	Complete Gear box / gear set for hoisting motion	100% for one EH	2
11.00	Oil seals		
i)	Oil seals for CT gear box	100% for one EH	20
12.00	Brake shoe with lining for		
i)	Hoist brake	100% for one EH	5
13.00	Brake liners for with rivets for		
i)	Hoist brake	100% for one EH	25
14.00	Brake springs for		
i)	Hoist brake	100% for one EH	10
15.00	Brake coil/ solenoid for brake		
i)	Hoist brake	100% for one EH	13
16.00	Diode bridge	100% for one EH	3
17.00	Brake assembly for hoisting	100% for one EH	10
18.00	**Wire rope**		
i)	suitable for 9 m lift	100% for one EH	3
19.00	Rope Guide	100% for one EH	1
20.00	Rope Tightner	100% for one EH	1
21.00	Rope sheave assembly	100% for one EH	3

22.00	Rubber bushes for flexible couplings	100% for one EH	3
23.00	Thrusters with cups and seals for electro-hydraulic thruster brakes	1 set for one EH	3
24.00	Local Control Station	One (1) No. each type	3
	Electrical spares		
25.00	Contactors	1 no of each type, size and rating for one EH	10
26.00	Main contactors	1 set for one EH	10
27.00	Auxiliary contactors	1 set for one EH	3
28.00	Coil for contactors	1 set for one EH	3
29.00	Overload relays	1 no of each type, size and rating for one EH	8
30.00	Relay	1 no of each type for one EH	5
31.00	Timers of each type	1 set for one EH	3
32.00	MCBs.	1 set for one EH	3
33.00	MCCB	1 set for one EH	3
34.00	Switch Fuse Units	1 No. for one EH	3
35.00	Fuses of each type	1 set for one EH	3
36.00	Fuse links	1 set for one EH	3
37.00	Control circuit fuses	1 set for one EH	3
38.00	Limit Switches for		
i)	Main Hoist	1 set for one EH	15
39.00	Door limit switch	1 set for one EH	3
40.00	Selector switch	1 set for one EH	3
41.00	Current Collector shoes/ rollers	1 Set for one EH	3
42.00	Complete current collector assembly	1 Set for one EH	5
43.00	VVVF Drive for Hoisting	1 no. of each type and rating for one EH	3
44.00	Control module of VVVF drive	1 no. of each type and rating for one EH	3

45.00	Power supply module of VVVF drive	1 no. of each type and rating for one EH	3
46.00	Dynamic braking resistance	1 no. of each type and rating for one EH	3
47.00	Push buttons -Contact Element	1 no of each type, size and rating for one EH	3
48.00	Push buttons, ILPBs.(complete with contact elements)	1 set for one EH	3
49.00	Indicating lamps of each type	1 set for one EH	3
50.00	Electric meter	1 set for one EH	3
51.00	Resistor element of each size and type	1 set for one EH	3
52.00	Hooter	1 set for one EH	3
53.00	415 V Motor		
i)	Motor of hoist motion	1 set for one EH	9
ii)	Terminal plates	1 set for one EH	1
iii)	Motor Terminal Block	1 set for one EH	1
iv)	Space Heaters	1 set for one EH	3
v)	Greasing arrangements	1 set for one EH	3
vi)	Bearings (DE and NDE) for each type and rating of motors.	1 set for one EH	5
vii)	Stator winding coils for all type of LT motors	1 set for one EH	3
viii)	Rotor pinion	1 set	3
ix)	Dust seals and gaskets for each type of motors	1 set for one EH	3
x)	Cooling Fans	1 no for each type and rating of motor	3
xi)	Fan Cover	1 no for each type and rating of motor	3
xii)	Complete Set of Coupling	1 set for one EH	3
xiii)	End shield (DE & NDE)	1 set of each type	3
54.00	Control supply transformer	1 set for one EH	3

55.00	1.1 KV Grade power cables for each type and size.	1 m	3
56.00	1.1 KV Grade control cables for each type and size.	1 m	3
57.00	Control Trailing Cable for Electrical Hoist	1 m	3
58.00	Power Trailing Cable for Electrical Hoist	1 m	3
59.00	Power terminal block	1 set for one EH	3
60.00	Control terminal block	1 set for one EH	3
61.00	End plates for Power & Control terminal block	1 set for one EH	3
62.00	Carbon brushes and brush holders for all slip ring type motors	1 set for one EH	3
63.00	Make and trip coils	1 set for one EH	10
64.00	Ammeters	1 no. of each type & rating	2
65.00	Voltmeter	1 no. of each type & rating	2
66.00	Any special meter	1 no. of each type	2
67.00	Control switches	1 no. of each type	2
NOTE:			
i	*One "1 set for one EH" is defined as 100% requirement for one electric hoist*		
ii	*One (1) set of each type" is defined as 100% requirement for one electric hoist.*		

S.No	Description of equipment / item	Unit	Total Qty
A.	**ESSENTIAL SPARES -MANUAL HOIST 1T CAPACITY**		
1.00	Load chain Wheel	No	1
2.00	Load chain stripping fork	No	1
3.00	Hand Chain wheel	No	1
4.00	Ratchet pawl	No	1
5.00	Locking ratchet wheel	No	1
6.00	Guide roller	No	1
7.00	Brake disc	No	1
8.00	All Bearings of each type & size used in wheels, lifting hook etc.	Set	12+1

9.00	Load chain (for hoisting)- for 6m lift	Lot	12
10.00	Grooved pulley	Set	1
11.00	Pinion	Set	1
12.00	Shaft pin	Set	1
B.	**ESSENTIAL SPARES -MANUAL HOIST 2T CAPACITY**		
1.00	Load chain Wheel	No	1
2.00	Load chain stripping fork	No	5
3.00	Hand Chain wheel	No	2
4.00	Ratchet pawl	No	1
5.00	Locking ratchet wheel	No	2
6.00	Guide roller	No	2
7.00	Brake disc	No	2
8.00	All Bearings of each type & size used in wheels, lifting hook. Etc.	Set	29
9.00	Load chain (for hoisting)		
a	For 10 mtr lift	Lot	16
b	For 12 mtr lift	Lot	12
10.00	Grooved pulley	Set	2
11.00	Pinion	Set	1
12.00	Shaft pin	Set	1
C	**ESSENTIAL SPARES - MANUAL HOIST 5T CAPACITY**		
1.00	Load chain Wheel	No	1
2.00	Load chain stripping fork	No	1
3.00	Hand Chain wheel	No	1
4.00	Ratchet pawl	No	1
5.00	Locking ratchet wheel	No	1
6.00	Guide roller	No	1
7.00	Brake disc	No	1
8.00	All Bearings of each type & size used in wheels, lifting hook. Etc.	Set	2
9.00	Load chain (for hoisting)- for 6m lift	Lot	1
10.00	Grooved pulley	Set	1
11.00	Pinion	Set	1

12.00	Shaft pin	Set	1
D.	**ESSENTIAL SPARES -MANUAL HOIST 16T CAPACITY**		
1.00	Load chain Wheel	No	2
2.00	Load chain stripping fork	No	10
3.00	Hand Chain wheel	No	4
4.00	Ratchet pawl	No	2
5.00	Locking ratchet wheel	No	4
6.00	Guide roller	No	4
7.00	Brake disc	No	4
8.00	Bearings of each type & size used in load chain wheels, lifting hook.	Set	30
9.00	Load chain (for hoisting)- for 6m lift	Lot	28
10.00	Grooved pulley	Set	4
11.00	Pinion	Set	2
12.00	Shaft pin	Set	2
NOTE:			
i	*One (1) set defined as 100% requirement for one manual hoist*		
ii	*One (1) Lot defined as 100% requirement for one manual hoist*		

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.

Different painting specification based on customer requirement/project site requirement have been indicated in general for electric 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 during detail engineering.

Electric Hoist:

Option-1:

Surface cleaning -shot blast cleaning/ abrasive blast cleaning to Sa 2 1/2 (near white metal) 35-50 microns.

Primer paint:- Two coats of air drying epoxy polyamide resin based red oxide zinc phosphate DFT-100 micron (50 micron per coat).

Intermediate paint:- Two pack of air drying high build epoxy resin based paint with MIO /TIO2 DFT 100 microns.

Finish paint: Two coats of air drying epoxy polyamide enamel suitably pigmented 75 micron with glossy finish. (min 35 micron/coat). additional one coat (minimum DFT of 25 microns) of finish coat of polyurethane shall be provided.

Total DFT=300 micron

Shade:
Structure: Golden Yellow, RAL 1004

Option-2:

Steel surface which is to be painted shall be cleaned of dust and grease and the heavier layers of rust shall be removed by chipping prior to actual surface preparation. The surface shall be abrasive blasted to Sa 2½ finish as per SIS05-5900.

Primer paint shall be Zinc Silicate/phosphate of approved brand. DFT -60 microns.

Two intermediate MIO Epoxy paint, and one top polyurethane coating of approved brand shall be applied. Dry film thickness of each intermediate coat shall be 90 microns and top polyurethane coating shall be 30 microns.
The under coat and finish coat shall be of different tint to distinguish the same from finish paint.
The total dry film thickness shall be 330 microns

Shade
Structure: Shade 356 of IS 5 / Shade 540 of IS 5.

Option-3:

Surface preparation: Steel Surfaces : Blasting according to SIS 055900 grade Sa 2½
Primer: One (1) layers of Primer paint shall be Solvent based IZS - VS of 60%. Zn Dust - 1.77 kg/ltr minimum. Zn dust by weight - minimum 85%. Pot life 12 hrs/ 21 Deg.- Paint to meet compositional & performance specifications for SSPC Paint 20, Level 1, DFT 75 µm.
Touch up: One (1), Two component Zinc rich Primer meeting performance and compositional specifications of SSPC Paint 20 Level2, DFT 75 µm.
Mid Coat: One (1), 2 pack High build High Solid Lamellar MIO based Epoxy Mid coat., DFT 200 µm.
Finish Coat: One (1) finishing coats of 2 pack Acrylic Aliphatic Polyurethane top coat - with Gloss retention of at least 90% on QUVB exposure of minimum 1000 hrs. DFT 75 µm.
DFT : 330µm

Mechanical Components and Motor:
Surface preparation : Blasting according to SIS 055900 grade Sa 2½
Catalyzed Zn rich Primer with a VS of 60% min, complying to SSPC Paint 20 level 2 DFT 75 µm.
Finish Coat : Two (2) finishing coat of two component High Build high Solid Aliphatic Amine Cured Epoxy coating. - Min VS 85%. DFT 200 µm.
Total DFT : 275 µm

D) All the parts to be sprayed shall be degreased according to SSPC-SP 1.
Primer Coat: 1 coat of inorganic ethyl self curing zinc silicate primer (coating) at 75 microns DFT/Coat to be applied by airless/pressure pot. The primer should meet the requirements of IS – 14946 performance standard. Minimum Metallic Zinc in the dry film by weight must be 75%. Volume solids of the primer must be 60% .
Intermediate coat – 1 coat of High build epoxy MIO coating cured with polyamide hardener at 100 microns DFT/ Coat to be applied by airless spray. Minimum Natural Lamellar Micaceous Iron Oxide content in the dry film must be 50% by weight. Volume solids of the product must be 60% .
Finish Coat- One coat of High Build Gloss Aliphatic Acrylic Polyurethane at 50 micron/coat dry film thickness to be applied by brush/airless spray. Volume Solids of the product must be 62%.
Total DFT : 225 µm

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 80 µ per coat.

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

Total DFT : 205 µ

Or Powder coated – 75 µ Total DFT.

Paint shade RAL-9002 for complete panel except on end covers whose shade shall be RAL-5012 or RAL 7032 or RAL7035 / shade 631 of IS 5 to be informed on project to project basis.

ANNEXURE IV- INSPECTION AND TESTING REQUIREMENT

Purchaser's and End user's representative shall have access to the works of vendor at all reasonable times for the purpose of witnessing the purchased equipment being tested.

All electrical and mechanical equipment like motor, ropes, cables, electrical control panel etc. shall be tested as per the relevant IS standard at the vendor's / Subvendor's works.

The Trolley with hoist shall be run 5 times at manufactures works. First and 5th runs shall be tested with 125% safe working load. Second, third and fourth run with safe working load shall be conducted without any pause. The motor currents shall be checked and shall be with in the rated full load current of each motor at safe working load. The hoist shall be capable of lifting load from mid-air and moving the load without any problem. Normal speed shall be achieved during full load tests.
Headroom variation shall be checked & allowable variation is 50mm only. Hook approach shall be checked as per approved drawing. (Ref. Standard : cl.20.2 of IS 3938)
The brakes for hoisting and cross travel shall be tested with 125% safe working load. The brakes shall be capable of holding this load, when the load is suspended by the hoist hook. Maximum slip (braking path) shall be as per approved data sheet / drawing for hoisting and cross travel motions.
Test shall be conducted for effectiveness of automatic devices for hoist to limit the upward/downward & travel of hoist.
The limit switch shall be checked at vendor's works. Others shall be checked at site by Purchaser / End user and if found defective, the same shall be replaced at free of cost by vendor.
Before the hoist is put into operation, over load relays (electrical) shall be tested for lift & cross travel and sustain 125% safe working load.
Trolley with hoist gears shall be tested with & without load for alignments, smooth and trouble-free operation.
Equipment shall be tested for hoisting and cross travel with 125% SWL.
Hoisting, and cross travel speed shall be tested and shall ensure the tolerance with in 10%. Hoisting and CT shall be tested for minimum 1.0 to 2.0m. (for hoisting- height & for cross travel-length). Vendor shall be responsible for meeting for full lift and lower limit switch operation at site. Any failure at site to meet the above requirement shall be resolved by the vendor at site at his cost.
Load test for EH shall be carried out after installation at site under the supervision of the vendor's representative, to the satisfaction of the Purchaser / End
user. Vendor should depute their Engineer for a period of 10 days per boiler free of
cost.
All welding shall be tested with LPI / MPI. All butt welds shall be tested with radiography. Acceptance norms for radiography shall be as per AWS D1.1. /ASME Sec IX.

Procedure for Load/Overload testing of Electric 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 Trolley with hoist shall be run 5 times at manufactures works. First and 5th runs shall be tested with 125% safe working load. Second, third and fourth run with safe working load shall be conducted without any pause.

4) Brakes -The brakes shall be capable of holding a load 25 percent in excess of maximum safe working load when the load is suspended by the hook.

5) Safety device - Test for the effectiveness of the automatic device to limit the upward and downward travel of the hook.

6) Any test required by the purchaser beyond those called for in the appropriate Indian Standard shall be carried out.

7) Insulation Tests - Before the hoist is connected to the supply, the insulation of the electrical equipment shall be tested by a suitable instrument and any defect revealed shall be rectified.

8) All hoists performance test shall be duly certified by government approved agency.

MANUAL HOIST:

Purchaser's (BHEL) and end user's (BHEL's customer) representative shall have the access to the works of vendor at all reasonable times for the purpose of witnessing the purchased equipment being tested.
Each chain pulley block with trolley shall be subjected to 1.5 times the safe working load for a lift of minimum one metre, which shall ensure that every part of the block mechanism and each tooth of the gears come under load. The trolley with load shall be tested for smooth operation for cross travel without any problems.

All visual examination after operational proof tests for deformation, cracks etc, shall be checked by Purchaser or it's appointed representative for all 100% cases.
Type test (static loading) shall be conducted at 200% safe working load Static tensile loading shall be done once in a year or if there is a design change whichever is earlier. Records shall be maintained by the supplier for this and a copy of the same shall be furnished.

Certificate of test and examination shall be issued for the chain pulley blocks with trolley giving the following information.

1. Safe Working Load
2. Range of Lift
3. Load chain & hand chain size and grade
4. Span of the crane
5. Over hang on either side
6. Proof load applied.

Hooks

1. Raw material test certificate shall be submitted from manufacturer.
2. Proof load at 200% of safe working load on each hook irrespective of capacities.
3. Chemical composition and destruction test shall be carried out on one sample per batch.
4. After proof load test, hook shall be examined for cracks, deformation, flaws and other defects with LPI / MPI Hooks above 5T capacity shall be examined with UT. Acceptance norms for LPI / MPI · No linear indications or crack are acceptable while carrying-out LPI / MPI For UT, it shall be as per ASME -Sec. VIII -Division 2. - AM203.2.

Load Chain:

1. Breaking Test:
   First few links of the lot (Refer IS /ISO 1834) shall be tested for minimum breaking load (400% SWL) after manufacture, heat treatment and calibration.

   The sample shall first be subjected to proof loading and then shall be tested to destruction and breaking load.
2. Rolling Over Wheel Test:
   Full length of chain after proof loading shall be passed over actual load chain wheel.

All structural welds, gears, castings/forging shall be examined by MPI / LPI for cracks, surface defects. Acceptance norms for LPI / MPI: No linear indications or crack are acceptable while carrying-out LPI / MPL All butt welds shall be tested radiography and acceptance norms shall be as per AWS D1.11 ASME -Section IX.

Performance test for Chain pulley blocks & Ratchet lever:

1. Chain pulley block with trolley shall be checked for smooth running on monorail with load above 2meters from ground
2. Wheels shall be checked for matching with monorail I runway beam.
3. Ratchet lever shall be checked for its smooth operation to the rated capacity
4. Equipment shall be provided with nameplates consisting of-
   a) Description b) Serial No. c) Manufacturer d) Type e)Capacity & size. And f) Year of manufacture

ANNEXURE – V

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

ELECTRIC HOIST

Sl. No.	BHEL DRG.NO	Customer's drawing no	DRAWING TITLE	PRIMARY/ SECONDARY	SUBMISSION SCHEDULE - WEEK NUMBER FROM DATE OF P.O	Remarks
1	SHALL BE INFORMED ON PROJECT TO PROJECT BASIS	SHALL BE INFORMED ON PROJECT TO PROJECT BASIS	Mechanism Sizing Calculation OF ELECTRIC HOIST	Primary	R-0 within 21 days from PO & subsequent revisions within 7 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.	For Customer's approval
2			Manufacturing Quality Plan with Sub vendor list OF ELECTRIC HOIST	Primary		For Customer's approval
3			Schematic Circuit Diagram of ELECTRIC HOIST.	Primary		For Customer's information
4			GA Drawing for Electric Hoist, DSL arrangement and painting details OF ELECTRIC HOIST	Primary		For Customer's approval
5			Details/ drawing of gear box, couplings, hooks, brakes etc.	Secondary	R-0 within 30 days from PO & subsequent revisions within 7 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.	For Customer's approval
6			Erection & commissioning procedure OF ELECTRIC HOIST	Secondary		For BHEL's information
7			Mandatory spare parts list (if applicable) OF ELECTRIC HOIST	Secondary		For Customer's approval
8			Detailed BOM/BOQ for Hoist	Secondary		For BHEL's information

9			O & M Manual OF ELECTRIC HOIST	Secondary	within 73 days.	For Customer's information
10			Billing break up	Secondary	within 73 days.	For Customer's approval.

MANUAL HOIST:

Sl. No.	**BHEL DRG.NO**	**Customer's drawing no**	**DRAWING TITLE**	**PRIMARY/ SECONDARY**	**SUBMISSION SCHEDULE - WEEK NUMBER FROM DATE OF P.O**	**Remarks**
1	SHALL BE INFORMED ON PROJECT TO PROJECT BASIS	SHALL BE INFORMED ON PROJECT TO PROJECT BASIS	Manufacturing Quality Plan with Sub vendor list OF CHAIN PULLEY BLOCK	Primary	R-0 within 21 days from PO & subsequent revisions within 7 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.	For approval
2			GA Drawing for CHAIN PULLEY BLOCK along with painting details	Primary		For approval
3			O & M Manual OF CHAIN PULLEY BLOCK	Secondary	R-0 within 30 days from PO & subsequent revisions within 7 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.	For Information
4			Erection procedure OF CHAIN PULLEY BLOCK	Secondary		For Information
5			Mandatory spares list of CHAIN PULLEY BLOCK	Secondary		For approval

Notes:
INCOMPLETE DRAWINGS/DOCUMENTS SHALL NOT BE TREATED AS SUBMITTED.

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 (One copy to be supplied with Tools and tackles)	
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 dics) 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.

ANNEXURE-VI

CHECK LIST FOR OPERATION & MAINTENANCE MANUAL

Project name:
Project number:
Package Name :
PO reference:
Document number:
Revision 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)				
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 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

ANNEXURE –VII

PACKING PROCEDURE

COMMON GUIDELINES FOR PACKING

1. **GENERAL:**

The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & long storage. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.

All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.

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.

2. **TYPES OF PACKING:**

The following 5 types of packing have been standardized for packing of General Components/ Assemblies.

1) '**OP**' - Open Type.

2) **'PP**' - Partially Packed.

3) '**CP**' – Crate/Box Packing - Components/Equipment requiring physical protection.

4) '**CQ**' - Case Packing – Machined components-Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.

5) **'CR'** - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc…

3. **DESCRIPTION OF TYPES OF PACKING:**

The various types of packing, as standardized above, are described below.

3.1 'OP' - Open Type

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

3.2 'PP' - Partially Packed

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

3.3 'CP' - Crate Packing

Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.

3.4 'CQ' - Case Packing - Machined Components/Assemblies/Equipment

Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of silica gel or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces.

For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.

3.5 'CR' - Case Packing - Electrical & Electronic Components/Assemblies

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

Empty space in the cartons shall be filled with rubberized coir to get proper cushioning effect. The cartons shall be manufactured from corrugated Fiber Board.

4 PREPARATION OF PACKING CASES

4.1 DIMENSIONS:

a) Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units.

b) Width of all planks including the tongue shall be more than 125mm and after plaining it shall be minimum 100mm.

c) Minimum number of planks shall be used for a shook.

d) Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel.

e) Width of binding planks shall be minimum 100mm.

f) Distance between any 2 binding planks shall be less than 750mm.

g) diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm

h) Distance of the outer edges of these planks from the edge of case shall be less than 250mm.

i) Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

4.2 JOINTING OF PLANKS

Single length planks shall be used for cubicles whose overall length is less than 2400mm. For cubicles of length more than 2400mm, jointing is permitted. The jointing shall be done with one single or maximum of 2 planks of wood same as other planks of width 250 mm (minimum) with two rows of nails on either side of the joint in zigzag manner. From the joint along height side, it shall be of lap joint with overlap of at least the width of plank.

4.3 TONGUE AND GROOVE JOINTS

Two consecutive planks shall be joined by tongue and groove joint. Depth of tongue shall be 12+1 mm, thickness of tongue shall be 8 +1 mm. The groove dimensions shall be such that the tongue fits tightly into the groove to make a good joint. This type of joint can be done based on the product requirement wherever required.

4.4 PERMISSIBLE DEFECTS

Wood shall be free from knots, bows, visible sign of infection and any kind of decay caused by insects, fungus, etc.

End splits: Longest end splits at each end shall be measured and lengths added together. The added length shall not exceed 60mm per meter run of shook's. Wood pins shall be used to prevent further development of split.

Surface cracks: Surface cracks with a maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.

4.5 OTHER MATERIALS

4.5.1 NAILS

The dia. of the nails shall be 3.15mm. The length of the nails shall be 65mm wherever two planks of 25mm thickness are joined and 75mm wherever a 25mm planks is joined to a 50mm plank.

4.5.2 BLUE NAILS

These are used for nailing bituminized Kraft paper/hessian cloth to the planks. The length of the nails shall be 16mm.

4.5.3 HOOP IRON STRIPS

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

4.5.4 CLIPS

These shall be used for strapping the hoop iron strips on the boxes.

4.5.5 BRACKETS

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

4.5.6 FASTENERS

Bolts, double nuts, spring washers will have to be used for packing of some special items like transformers, reactors, breakers, etc., to hold the job to the bottom plank of the box. The bolts, nuts, washers will be provided by the vendor. Drilling of holes will have to be done using contractor's tools.

4.5.7 MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM

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

4.5.8 RUBBERISED COIR:

The rubberized coir is used as cushioning material. For the packing of loose items, items are

to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

4.5.9 FOAM RUBBER / 'U' FOAM:

This is used for covering the delicate items. This material is provided by the vendor.

4.5.10 MARKING PLATE:

This shall be of anodized aluminium sheet. Size of the marking plate shall be maintained minimum of size as per the details specified in the Figure 4.

4.5.11 PACKING SLIP HOLDER:

This shall be of galvanized iron tinned sheet /Aluminium sheet

4.5.12 SILICA GEL:

Silical gel shall be used for such products only where moisture needs to be avoided.

4.5.13 COTTON BAGS:

These are used for holding silica gel. The bags shall have the following matter indicated on them:

BHEL-UNIT NAME PLACE -PINCODE
SILICA GEL -INDICATING TYPE
BLUE : -ACTIVE
ROSE : -REDUCED ACTIVITY
WHITE : -NO ACTIVITY. TO BE REPLACED WITH FRESH SILICA GEL

4.5.14 COTTON/ PLASTIC TAPE:

This is used for tying small items. And also to prevent vibrations of moving parts within the cubicles.

4.5.15 MARKING INK:

The ink used normally is black in color. In some special cases other color also will have to be used. The ink shall be non-fading/indelible and non-washable by water.

4.5.16 POLYETHYLENE BAGS:

These are to be used for keeping the Packing slips. The bag shall be of size 70mm X 100mm (minimum).

4.5.17 Hessian cloth, twine thread, paint will have to be used in packing certain items.

4.5.18 Mechanical Latching clamps:

For CLW Railway panels and similar Panels self-locking clamps can also be used on need basis in conjunction with or apart from regular bolt and nut fixing arrangement. For reusable boxes, these clamps provide easy locking and unlocking arrangement. These clamps will be made available from BHEL in some cases.

4.5.19 STICKERS

The following stickers to be put by the vendor on cubicles/Boxes after packing.

1) Case No sticker: 2 nos. Size 25.Cm x 0.45Cm

2) BHEL Monogram sticker: 1 no. Size 1.75Cm x 2.3Cm

3) Address sticker: 2 nos. Size 3.8Cm x 3.0Cm

4) Direction sticker "Front" & "Back" - 4 nos. Size 2.0Cm x 0.75Cm

5) Chain Mark Sticker: 4 Nos. Size – 3.0Cm x 0.75Cm

6) "Fragile" sticker: 2 Nos. Size. 2.1Cm x 1.5Cm

7) "DO NOT STACK" sticker - 2 Nos. Size 3.0Cm x 2.2Cm

In place of stickers, writing all the details legibly with paint shall be allowed & respective units may take decision accordingly.

5. PACKING OF CUBICLES:

5.1 The packing is to be done as per clause 4 in all respects.

5.2 The cubicles are already fixed on wooden pallets. Hence the contractor need not arrange the bottom pallets normally.

5.3 The cubicles will be of different sizes both width wise and lengthwise. The cubicles may be made up of single suite, 2 Suite, 3 Suite, 4 Suite, etc., The width of the cubicles generally varies from 400 mm to 1650mm.The length of the cubicle, generally varies from 1500 mm to 4800 mm. The height is normally 2430 mm. In some cases, the height may be less/more.

5.4 MULTI LAYER CROSS LAMINATED POLY FILM

The inner surface of 4 sides of shook's shall be nailed with Multi-layer cross laminated poly film (as per 4.5.7) using blue nails (as per 4.5.2) wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.

The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film (as per 4.5.7). This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.

The cubicles shall be covered with Multi-layer cross laminated poly film (as per 4.5.7).

5.5 SILICA GEL:

Silica gel (as per 4.5.12) packed in cotton bags shall be kept at different places inside the cubicle as per BHEL-Unit directions. Each suit of cubicle shall be provided with 1 kg of Silica gel (for a 4 suit cubicle 4 kgs of Silica Gel to be used. The bag containing silica gel to be as per 4.5.13).

5.6 LOOSE PARTS:

Any loose parts in the cubicles shall be tied using cotton/ plastic tape. Wooden battens shall be provided wherever necessary.

5.7 WOODEN BATTENS:

In case of cubicle which are not rectangular in shape like control desks, sufficient number of wooden rafters/battens of proper size shall be provided to give strength to the package.

5.8 RUBBERISED COIR:

Gap between the cubicle and the case shall be filled with rubberized coir (as per 5.5.8) with distance between consecutive layers less than 500mm.

5.9 CLAMPING:

Packing shall be bound at edges by nailing M.S. Clamps / Brackets (as per 5.5.5). Each vertical edge shall have minimum 3 clamps. Top horizontal edges will have one clamp for every meter length of package. However, minimum 4 clamps shall be nailed at the top for any cubicle.

5.10 PACKING SLIP:

Packing slip kept in the polyethylene bag (As per 5.5.16) shall be placed in the box at appropriate place. In addition, one more packing slip covered in polyethylene cover and packing slip holder (as per 5.5.11) shall be nailed to front / rear of case.

5.11 MARKING PLATE:

One no. (As per 5.5.10) shall be nailed to the front side of the case.

5.12 CASE MOUNTING:

After complete packing, stencil marking of various details and marking of symbols shall be done as per BHEL instructions using indelible / non washable marking ink.

5.13 Different types (Typical) of Cubicles with sizes for Packing

1. Single suite cubicle - 900 x 950 x2500
2. Two suite cubicle - 1650 x 950 x 2500
3. Three suite cubicle - 2400 x 950 x2500
4. Four suite cubicle - 3150 x 950 x 2500
5. Regulation cub - 1300 x 1350 x 2500
6. Thy cub - 2870 x 1350 x 2500
7. VFD Cub - 3800 x 1550 x 2500

6 PACKING OF LOOSE ITEMS/SPARES

1) Shape of cases shall be square, rectangular with single gabled roof or with double gabled roof depending on the nature of the job to be packed. Construction shall be as per drawings enclosed. Only gable will be additional as required.
2) Wood with Tongue and Groove joint as per clause 4.3.
3) Width of planks shall be at least 100 mm. Width of binding planks (battens) shall be at least 75mm.
4) External surface of planks on front and rear shall be plane 100% (except bottom plank).
5) Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 4.5.7) using blue nails.
6) Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
7) Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
8) Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
9) Silica gel as per clause 4.5.12 held in cotton bags as per clause 4.5.13 shall be kept at proper places in the box.
10) Packing slip kept in polyethylene bag (clause 4.5.16) shall be placed in the box.
11) Marking plate as per clause 4.5.10 shall be nailed to side of the box.
12) Two numbers of hoop iron strips as per clause 4.5.3 shall be strapped tightly on the case using clips.

13) Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.

14) Loose items to be kept inside the cubicle

- The components which are removed from cubicle for shipping purpose only, such as meters shall be kept inside the cubicle individually, kept in wooden box and tied firmly in bottom of Cubicle.
- Other items which are given loose in addition to cubicle shall be packed in separate boxes.

7 BOX SIZES

7.1 BOX SIZES

Table 1 – SPARES WOODEN BOX DETAILS

SNO	BOX TYPE	BOX SIZE (in mm)	BOX Wt (in KG)	Carrying Capacity
1	A	800 X 200 X 200	15	
2	B	1500 X 200 X 200	22	
3	C	2000 X 200 X 200	27	
4	D	1100 X 200 X 200	15	
5	E	200 X 200 X 200	5	
6	F	320 X 250 X 260	13	
7	G	320 X 250 X 430	16	
8	H	430 X 370 X 430	23	
9	I	1100 X 400 X 400	45	
10	J	1500 X 500 X 400	65	
11	K	2000 X 500 X 400	93	
12	L	2500 X 500 X 400	88	
13	M	900 X 600 X 600	100	
14	N	3000 X 400 X 400	60	
15	P	600 X 500 X 400	35	
16	Q	710 X 630 X 600	90	
17	R	850 X 630 X 670	102	
18	S	1000 X 770 X 670	140	

19	T	2500 X 850 X 800	180	
20	U	1500 X 700 X 700	120	
21	W	1200X900X600	120	
22	Y	450 X 200 X 200	10	

Table 2 – WOODEN BOX DETAILS

BOX TYPE	BOX SIZE (in MM)	BOX Wt (in KG)	Carrying Capacity
1	320X250X260	10	
2	320X250X430	15	
3	430X370X430	25	
4	670X670X470	65	
5	720X630X600	75	
6	1000X770X660	100	
7	1100X430X670	80	
8	1200X1200X900	80	
9	1300X770X1050	155	
10	2500X850X800	225	
11	2000X1500X1200	305	
12	1850X1050X1250	260	
13	2000X800X800	180	
14	2600X1500X1600	470	
15	250X250X600	20	
16	250X250X880	30	
17	300X300X700	25	
18	380X380X880	45	
19	510X510X1400	60	
20	570X570X1400	80	
21	575X575X1875	105	
22	3600X1100X1100	390	
23	900X500X800	110	
24	2000X950X740	225	
25	1600X1120X700	220	
26	2500X2000X1200	490	
27	2900X1900X1400	525	
28	3000X1000X900	370	
29	3200X2200X950	450	
30	2150X1100X750	325	
31	2000X2000X700	130	
32	700X1200X1325	130	

TABLE 3 STEEL BOXES

S.NO. LENGTH	TYPE	DIMENSION IN MM			WEIGHT	CARRYING CAPACITY (KGS)
		BREADTH	HEIGHT			
1	I	2480	1680	1500	339	4500
2	II	1200	900	600	61	2000
3	IIB	1800	850	950	115	2500
4	III	900	600	600	29	1000
5	IV	600	450	500	19	750
6	V	400	350	300	11	500

TYPICAL PATTERN OF WOODEN BOX

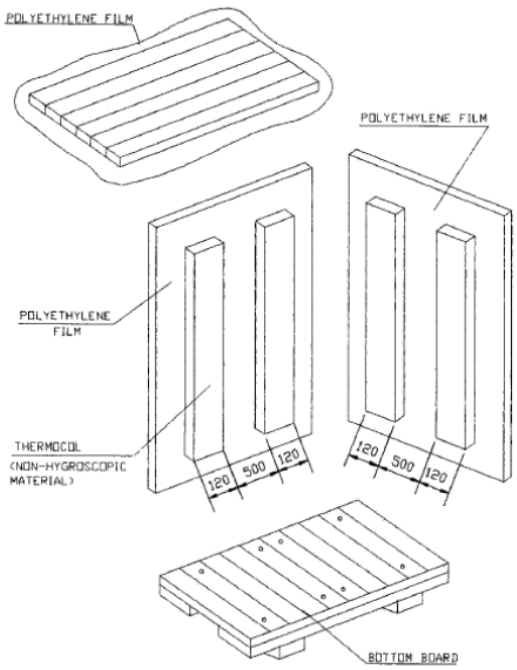


Figure 1

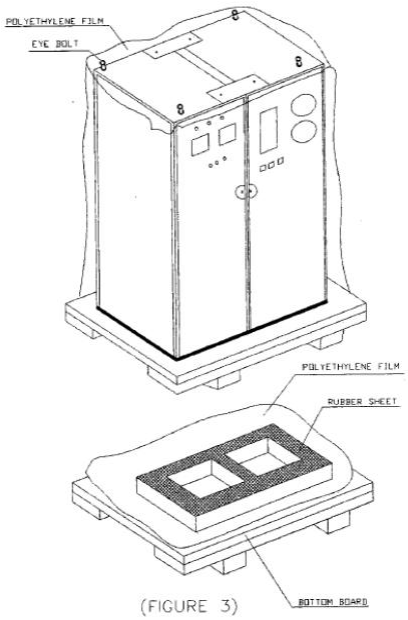
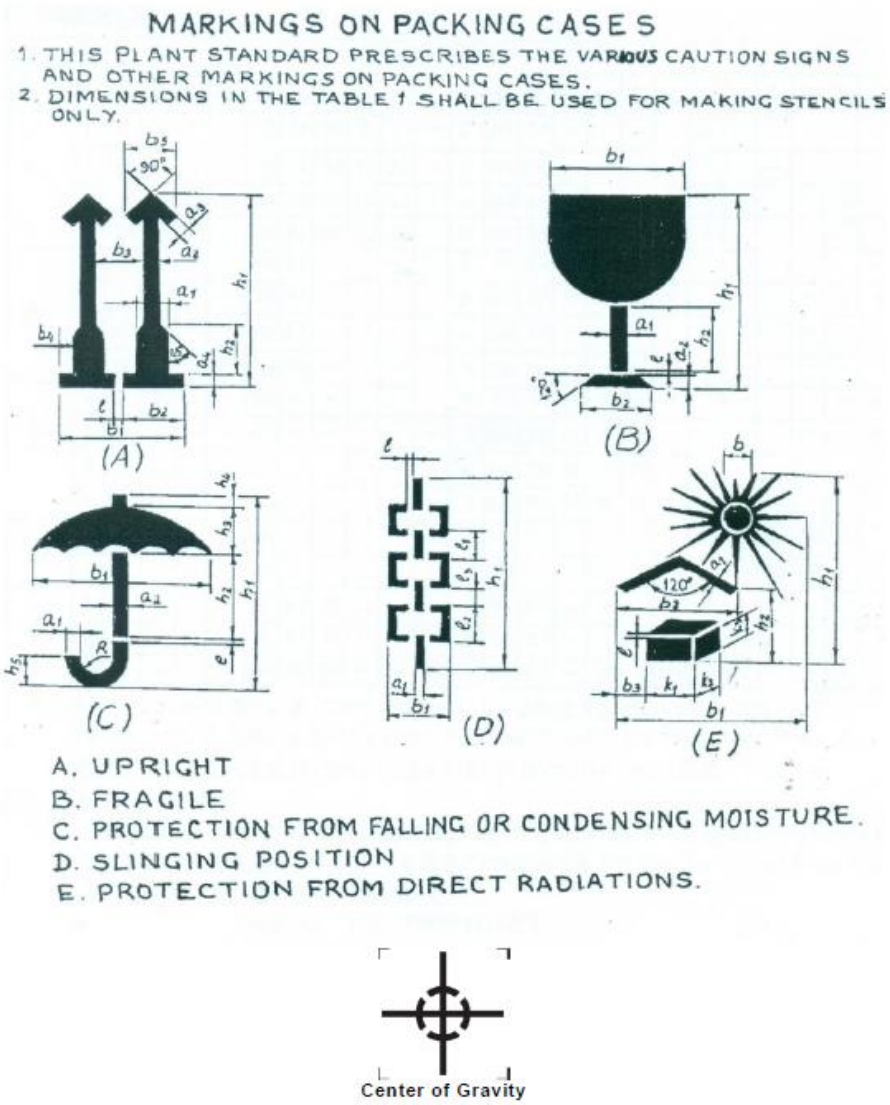


Figure 2

7.3 SEALED PACKING:

Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and edges are to be protected by rubber mats to prevent the polyethylene sheet from damage. Top surface of the case shall be free from dents to prevent rain water pockets.

8 MARKINGS/STENCILINGS


MARKINGS ON PACKING CASES
1. THIS PLANT STANDARD PRESCRIBES THE VARIOUS CAUTION SIGNS AND OTHER MARKINGS ON PACKING CASES.
2. DIMENSIONS IN THE TABLE 1 SHALL BE USED FOR MAKING STENCILS ONLY.
(A)
(B)
(C)
(D)
(E)
A. UPRIGHT
B. FRAGILE
C. PROTECTION FROM FALLING OR CONDENSING MOISTURE.
D. SLINGING POSITION
E. PROTECTION FROM DIRECT RADIATIONS.

Center of Gravity

Figure 3

DESIGN-ATION		DIMENSION IN MM																						
		a1	a2	a3	a4	b1	b2	b3	b4	b5	b	l	h1	h2	h3	h4	h5	k1	k2	k3	l1	l2	l3	R
A	1	12	5	5	4	52	25	19	8	21		2	84	23										
	2	17	7	7	6	75	36	29	11	30		3	119	33										
	3	24	10	10	8	104	50	38	16	42		4	168	46										
	4	34	14	14	11	147	71	59	23	60		5	239	65										
B	1	5	5			50	33					2	84	25										
	2	7	7			71	47					3	119	36										
	3	10	10			100	66					4	168	50										
	4	14	14			142	94					5	239	71										
C	1	4	3			66						2	80	39	19	5	11							6
	2	6	4			85						3	114	55	27	7	16							9
	3	8	6			120						4	160	78	38	10	22							12
	4	11	9			170						5	227	110	54	14	31							17
D	1	6				30						4	148								30	30	10	
	2	9				42						5	209								42	42	14	
E	1	3				69	47	10			16	2	91	26				17	8	11				
	2	4				98	67	15			23	3	128	33				24	11	16				
	3	6				138	94	20			32	4	182	62				34	16	22				

Table 4

Black and Red Marking Ink to IS:1234 "Ink, Stencil, Oil Base, For Marking Porous Surfaces" or duplicating ink stencilling, oil base for marking porous surfaces.

All cases containing fragile items are to be stencilled with red marking and stencilling paint/ink

"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".

Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.

In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel.

Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.

Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.

Note: Incase the size of package is small for using the stencils, then hand written letters/figures shall be allowed.

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

Figure 4 – TYPICAL MARKING PLATE (225 X 170)

Figure 5

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

9 STANDARD METHOD OF PACKING

Table 5 - Standard Method of Packing

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
PRESSUE VESSELS								
TOWERS					O			
TANKS					O			
VESSELS					O			
GASKETS	O							
FASTENERS	O							

COVERS		O						
EXCHANGERS								
HEAT EXCHANGERS					O			
TUBE BUNDLE	O							
SHELL					O			
AIR FIN COOLERS					O			
COLOUMNS, MOTOR SUSPENSIONS, PLENUM CHAMBERS, SCREEN GUARDS, ETC					O			
BEARING BLOCKS	O							
FANS	O	O						
MOTORS	O							
GASKETS	O							
FASTENERS	O							
TEST FLANGES			O					
TEST RINGS			O					
COVERS			O					
CRYOGENIC VESSELS								
COLD CONVERTERS					O			
HORIZONTAL STORAGE TANKS					O			
TRANSPORTATION TANK					O			
COLD BOX					O			
DRYING UNIT					O			
DRYING BOTTLES					O			
MOISTURE SEPARATORS					O			
SILENCERS					O			
ONGC SKIDS					O			
VAPORISER		O						
SPECIAL PRODUCTS								
SI/VI PIPING		O						
CRO BIO CONTAINERS	O							
DESCRIPTION	**CASE**	**CRATE**	**SKID**	**BUNDLE**	**BARE**	**DRUM**	**METAL DRUM**	**FIBRE DRUM**
AIR BOTTLES	O							
TITANIUM BOTTLE	O							
WAR HEAD CONTAINER	O							
MISSILE CONTAINER	O							
FUEL CONTAINER	O							
AIR LOCK ASSEMBLY	O							
BOILER DRUMS					O			

BOILER ITEMS								
COILS			O					
PANELS					O			
HEADERS			O		O			
FEEDERS								
MACHINED ITEMS								
SHELL SEGMENTS					O			
SHELL SEGMENTS IN STACKS					O			
SPHERE PETALS								
COLOUMNS, BASE PLATES, TIERCOS, PIPES, NOZZLE E1, F1, INTERNAL PIPES, PADS ETC.					O			
ROLLERS	O							
VALVE TRAYS								
VALVE TRAY COMPONENTS	O							
LATTICE GIRDERS		O						
FASTENERS	O							
GASKETS	O							
SUB CONTRACTS								
FAB STRUCTURALS					O			
SUPPORTING STRUCTURALS					O			
STRUCTURE SUB ASSEMBLY					O			
FAB PIPES					O			
GRATINGS					O			
STAIR CASES					O			
HANDRAILS/ PLATFORMS					O			
BOUGHT OUT COMPONENTS								
IRON & STEEL (LIKE PLATES, BEAMS, ANGLES, CHANNELS ETC.)					O			
PIPE FITTINGS								
CS PIPES, TUBES					O			
SS PIPES, TUBES					O			
FIN TUBES	O							
ELBOWS		O			O			
DESCRIPTION	**CASE**	**CRATE**	**SKID**	**BUNDLE**	**BARE**	**DRUM**	**METAL DRUM**	**FIBRE DRUM**
FLANGES	O	O						
VALVES	O							

GAUGES	O							
DEMISTERS		O						
ABSCRBANTS (LIKE MOLECULAR SIEVES, ACTIVATED ALUMINA, MOBILE SORBID)						O		
PAINT TINS		O						
PAINT DRUMS						O		
IGNITORS	O							
SPRAY NOZZLES	O							
ELECTRICAL INSTRUMENTATION								
MOTORS, PUMPS, COMPRESSORS, TURBINES	O							
SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES		O						
INDICATORS, VIBRATOR SWITCHES	O							
CABLE BUNDLES, CABLE DRUMS					O			
CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL		O						
OPERATIONAL SPARES	O							

10 PROCEDURE FOR HANDLING OF COMPONENTS

The purpose of this procedure is to protect the quality of the components/equipment while handling in various stages of manufacturing packing & despatching.

10.1 Adequate care shall be taken in handling the material, and components to avoid damage during receipts, storage issue manufacture & despatch operations.

10.2 Appropriate material handling equipment like fork lifters, cranes etc. shall be used where needed.

10.3 Lifting by crane and transportation by trolley of critical items and large components like rotors castings etc. shall be done carefully.

10.4 For critical items, where specified, special handling fixtures shall be used for lifting.

10.5 Slings and shackles used for lifting the components/equipment shall be checked for fitness and suitability before use.

10.6 Slings used on machined surfaces shall be suitably padded. No slings shall be used on journal surfaces.

10.7 Precision machined components like blades, catches, rollers etc. shall be lifted using suitable wooden pallets.

10.8 HANDLING OF COMPONENTS ON RECEIPT/DESPATCH

Before loading/unloading a packing case from the carrier look for the following shipping instructions painted on the packing case.

a) The markings showing the upright position.

b) The markings showing the sling position

c) Markings showing the fragile contents.

d) Other required markings as per clause no.10

10.8.1 Appropriate cranes and slings should be used for different components/ cases. Slings should normally make an angle as minimum as possible (width wise) but in no case more than 15º.

10.8.2 Handling and lifting should be done without jerks or impacts.

10.8.3 Immediately after receipt of the goods, the packing should be examined all-round for any sign of damage. If necessary, lift the cover or a number of boards of the case so as to make the contents visible. In the event of sealed packing being used the plastic sheeting should not be damaged. It is imperative that the packing material is restored in original condition after the inspection.

10.8.4 On receipt of the equipment it should be checked with the shipping list and missing or damage if any should be reported immediately. It is important to arrange for immediate examination to determine the extent of the damage, the cause of the damage and where applicable the person or persons responsible for the damage. According to general practice when transporting by railway or by road vehicle the carrier concerned should be immediately called upon (within specified periods) for jointly establishing a statement of the damage. This is essential as a basis for a subsequent claim and possible damage report to the insurance company.

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

10.8.6 Silica gel and such other chemicals kept in the box as desiccants and indicators should also be left in the box itself.

11 GENERAL GUIDELINES FOR ODC TRANSPORTATION/DESPATCH

Based on the Dimensions/Weight indicated in the Transportation Sketch, the type of Trailer is decided and indicated in the Tender Enquiry.

11.1 TRANSPORTATION:

1. LOW BED TRAILERS (LB 8):

Well Bed Length : 10000mm
Over Gooseneck : 13000mm
Width : 3000mm
Carrying Capacity : 40MT

2. LOW BED TRAILERS (LB 16):

Well Bed Length : 12000mm
Over Gooseneck : 16000mm
Width : 3000mm
Carrying Capacity : 75MT

3. TOW TYPE TRAILERS (WITH FRONT DOLLEY 16 TYRES): 12000MM length (for Exceptional equipment length: 30000mm and above)

Bigger Dia equipment are loaded in the Well with overhanging.

Smaller Dia equipment with excess length are loaded over Gooseneck with rear hanging. The Vehicle Dimensions are defined above are only guidelines for selection based on actual Dimensions/ Weight of the Consignment

11.2 PACKING:

For all ODCs, Wooden Saddles are cut to the diameter of equipment as per the Transportation Sketch.

Wooden Saddles	For Diameter up to 4000mm	For Diameter above 4000mm
Length:	1836/2743mm (6'0"/9'0")	3353mm (11'0")
Width:	300mm (1'0")	300mm (1'0")
Height:	Saddle + one/two wedges a top	Saddle + three/four wedges a top

Number of Saddles:	
Minimum	3 in case of Loading inside Well +1 when loaded on Gooseneck
Maximum:	4 in case of Loading inside Well +2 when loaded on Gooseneck

For Securing the equipment firmly on the Trailer, 19mm (3/4"), wire rope with 25mm (1") Heavy Duty Turn Buckles / BD Clamps are used as Lashing for the equipment.

12 GUIDELINES FOR HANDLING/LOADING/LASHING

- Jobs to be checked for complete painting before loading.
- Components to be lifted with Nylon belts. This protects painting, edges and attachments.
- All the components to be transported by putting inside the properly fabricated Crating
- Small components may fall down while transporting without closed crating and there are chances of missing of small parts. Hence, it is always better to transport small components in closed containers/crating. Loose to be being shipped in a closed crating.
- No component loaded over the crating.
- **LASHING:** Use Nylon belts only for lashing of all components. It prevents removal off painting and cut in the materials.

SECTION-III

DOCUMENTS TO BE SUBMITTED BY BIDDER

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

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

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

a) PQR documents

b) 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

c) Copy of pre-bid clarifications, if any, duly signed & stamped

d) Signed/ Stamped copy of Compliance cum Confirmation Certificate (Vol-III)

e) Un priced copy of price format indicating **"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.

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.

f) 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.

g) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.

h) All sub vendors shall be subject to BHEL/ CUSTOMER approval in the event of order.

i) Guarantee for plant /equipment shall be as per relevant clause of GCC /SCC /Other Commercial Terms & Conditions.

j) 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.

k) 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.

l) As built drawings shall be submitted as and when required during the project execution.

m) 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.

n) 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.

o) 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.

p) Bidder agreed to confirm and compliance with technical specification and subsequent clarification on bids during pre- award discussion.

SUB SECTION-IIIC
DEVIATION SCHEDULE

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

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