SPECIFICATION FOR ELECTRICALLY OPERATED HOIST

CONTENTS:

	NAME	SIGNATURE	DATE
PREPARED	P.SUBRAMANIAN		18.03.2009
CHECKED	SUDHAKAR BEHERA		18.03.2009
APPROVED	V.RAGHAVENDRAN		18.03.2009

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

SPECIFICATION FOR ELECTRICALLY OPERATED HOIST

DATA SHEET		
SL No	Description	VAR 01
1.	Name of Contract	KONIAMBO – 5312 & 5313
2.	Name of equipment	Electrically Operated Hoist
3.	Application	Emergency Boiler feed pump
		To lift feed pump and its drive motor
4.	Location	Outdoor
5.	Load to be lifted	4 T
6.	Maximum Lift	6.335 m
7.	Operating floor level	+0,000 m
8.	Maximum Head room permissible	1.5 m
9.	Size of the Monorail / beam (BHEL scope)**	ISMB 600
10.	Top level of Monorail / beam	+8.435 m
11.	Length of travel	12 m
12.	Type of monorail beam	Straight
13	Type of DSL (Down Shop Leads)	Taut Wire Loop type

*NOTE :

1) Materials are to be lifted from the ground level (0.0).
2) All components of hoists should be packed in such a way that it should not get damaged during transport.
3) The technical offer shall contain all the details specified in the point number 1 to 13 of this **Data sheet** along with the point by point confirmation / deviation to the specification number MHS-HEQ / 073 – Rev 02.
4) On placement of order, vendor to give O&M Manual – 1 sets of hard copy and 1 sets of soft copy in C.D. in both **English & French language.**
5) Painting: For coating refer **PCS-4** of **Doc No. 319000-00000-SP-2300-0001/Rev 04** and for shade, use Traffic Yellow colour (RAL 1023)

****Exact size will be given after placement of order, while approving the GA drawing.**

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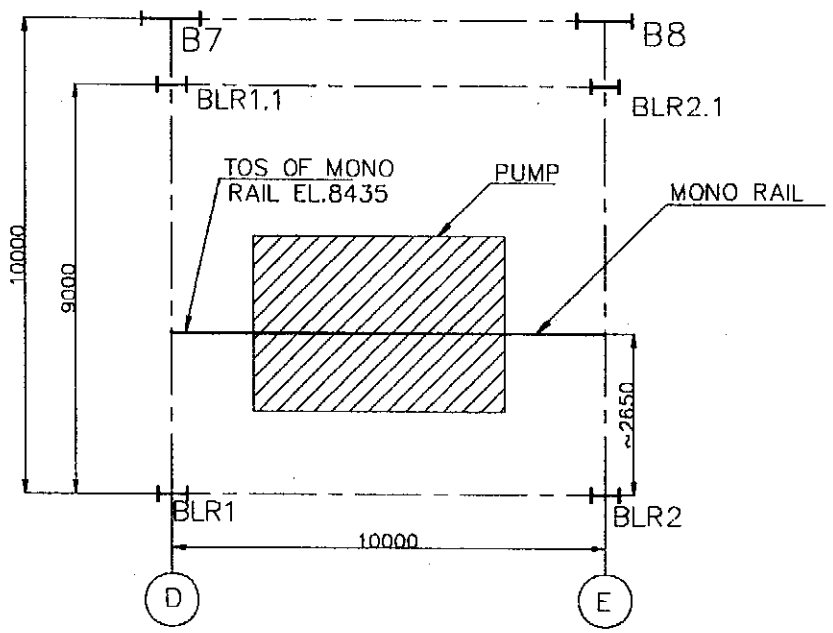
SPEC NO. FBC&HRSG:99100:011/ REV00

REV	DATE	ALTERED / APPROVED

ALL DIMENSIONS ARE IN MILLIMETRES



BHARAT HEAVY ELECTRICALS LIMITED PIPING CENTRE CHENNAI 600 017		NAME	SIGN	DATE	NO.OF VAR
	DRN	S.BALA			
	CHD	S.R.M			
	APPD	S.R.M			

DEPT / CODE	GRADE OF UNTOL.DIM C / M / F	SCALE	WEIGHT (KG).	REF. TO ASSY./OLD DRG.	REM NO.	NO. OF ITEMS
		N.T.S				

TITLE	CARD CODE	SKETCH NO.	REV
EMERGENCY BOILER FEED PUMP MONO RAIL LOCATION DETAIL	U 01	KON:MONO RAIL:001	00

V:A4 Size A4

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

BHARAT HEAVY ELECTRICALS LIMITED
TIRCHY-14

FBC&HRSG
ELECTRICAL, CONTROLS & INSTRUMENTATION

Project: Koniambo CFBC

REF: FBC&HRSG: CI: 5312: EH
Rev:00
PAGE 01 of 01
DATE: 19.02.09

ANNEXURE TO ELECTRIC HOIST MAIN SPEC (MHS-HEQ/073 REV02)

Low voltage motor Doc No: 319000-00000-JSS-1691-0001 REV 05 (14 Pages) but with change of voltage 400volts, 3Ph, 50Hz instead of 690V, 3Ph.
Annexure-2 FBC&HRSG: CI: 5312: LMV2 (2 Sheets)
Quality plan: QA: CI: STD: QP: 24

Approved vendor list for Motors: ABB / Kirloskar / Siemens / Crompton greaves / Bharat Bijlee / Alstom ind pro Ltd. Make of any one of these vendors alone is acceptable.

Approved vendor list for Power & Control Cable: Cord Cable Industries Ltd / Polycab wire Pvt Ltd / Toshniwal cable / Paramount Cable Crop / Associated Cables Pvt Ltd / Elkay Telelink Ltd / Reliance Engineers Ltd / Radiant Cables Pvt Ltd / Delton Cables Ltd / KEI Industries Ltd. Make of any one of these vendors alone is acceptable.

Control Supply Voltage: 230 V, 1Ph, 50Hz AC. This Voltage is should be derived from main power supply 400 V, 3Ph, 50Hz AC. These points may please be communicated to vendors suitably.

	PREPARED	CHECKED	APPROVED
NAME	S.RAJA RAJAN	P.S.PANDI	A.SWAMINATHAN
SIGNATURE	S. Rajaraja		

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014

MATERIAL HANDLING SYSTEM / PE(BOILERS)

TITLE SHEET

SPECIFICATION FOR ELECTRICALLY OPERATED HANDLING EQUIPMENTS

(TWH, UHC, DSI, and MALE & female interlock mechanisms)

Specification No. : MHS-HEQ/071 *REVISION No. : 02*

REV. No.	REV. DATE	CLAUSE No.	DESCRIPTION	APPROVED
00	25/11/97		Initial release	
01	30/12/98	General	Revised based on the feedbacks & task force committee recommendations	
02	20/12/99	General	Updated	

	Name	Signature	Date
Prepared	T.K.Prabhu		24/11/97
Checked	T.K.Prabhu		24/11/97
approved	A.Rajamohan		25/11/97

GENERAL SPECIFICATION FOR ELECTRICALLY OPERATED HANDLING EQUIPMENTS (TWH, UHC, DSL & INTERLOCK MECHANISMS)

Specification No. : *MHS-HEQ/073* REVISION No. 02

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

Specification No. : *MHS-HEQ/073* REVISION No. 02

1.0 SCOPE : This specification covers design, manufacture, inspection, testing and supply of electrically operated Under Hung Crane(UHC), Trolley With Hoist (TWH), Down Shop Leads(DSL) and male & female interlock mechanisms.

2.0 CODES AND STANDARDS : In addition to the following latest revision of codes and standards, the equipment shall be designed to meet the other governing standards as applicable and also meet with the local standards where the equipment is installed.

2.1 IS 3938 ... Electric wire rope hoists.
2.2 IS 807 ... Code of practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.
2.3 IS 2758 ... Mild steel point hooks for use with wire rope thimbles.
2.4 IS 3815 ... Point hooks with shanks for general engineering purposes
2.5 IS 2266 ... Steel wire rope for general engineering purpose.
2.6 IS 3681 ... General plan for spur and helical gears.
2.7 IS 325 ... Three-phase induction motors.
2.8 IS 694 ... PVC insulator cables for working voltage upto and 1100V.
2.9 IS 4691 ... Degrees of protection provided by enclosures for rotating electrical machinery.
2.10 IS 2062 ... Weldable structural steel
2.11 IS 816 ... Code of practice for metal arc welding for general engineering construction in mild steel.
2.12 IS 2074 ... Ready mixed paint air drying red oxide-zinc chrome, priming.
2.13 IS 2932 ... Enamel synthetic, exterior (a) under coating, (b) finishing.
2.14 IS 3177 .... Code of practice for electric over head travelling crane and gantry crane other than steel work cranes.
2.15 IS 13947 (Part I) Specification for low-voltage switchgear & controlgear

3.0 DESIGN AND CONSTRUCTURAL REQUIREMENTS:

3.1 **Electrically operated Under Hung Crane & Trolley With Hoist** : All equipments shall be designed for OUTDOOR application suitable for ambient temperature range of 0 to 50° C. Purchaser will provide electric supply at one or more points near to the monorail/runways as required in the layout. Service class to be considered for design of trolley with hoist and under hung crane shall be as per class 2 of IS 3938 and IS 3177 / IS 807 respectively. All material used for construction of different components shall individually conform to standard in clause 2.0. All welds shall conforms to IS 1024 and welders shall be qualified to AWS D1.1

TROLLEY WITH HOIST & UNDER HUNG CRANE

3.1.1 HOOKS : Hooks shall meet the dimensional, material testing & inspection requirement of IS 3815. 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 forged along with the hook. Welding of lugs 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 (with minimum tensile strength 50-62 Kg/sqmm.) and made by controlled grain forging and normalised. All the hooks shall be tested for twice the safe working load. One hook for every batch shall be destructive tested for 5 times of SWL after proof load. All hooks shall be examined by MPI / LPI & UT for cracks after proof load test. The hook shall not distort or fracture. Ball & roller bearings shall not be used in these hooks. UT required for hooks >5.0T capacity.

3.1.2 WIRE ROPE : Shall have six strands of 37/36 wires per strand with an ultimate tensile strength of 180 Kg/sq.mm. The wire rope shall be galvanised as per IS 1835 type B. All wire ropes shall be proof load tested for 2 times of SWL/Fall. One sample for every batch of wire rope shall be tested for breaking. Breaking load shall not be less than five times SWL/Fall. The rope shall be of sufficient length to retain two full wraps on the drum at lowest hook position. Wire ropes shall meet the requirement of IS 2266.

3.1.3 DRUM AND SHEAVE : Drum shall be of welded steel or seamless steel and Sheave shall be of cast or welded steel. The drum shall accommodate all the length of rope required for the lift plus two dead wraps at each anchor point without overlap. 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.

3.1.4 GEARS AND PINIONS : Material of construction shall be conforming to relevant Indian Standard or equivalent and case hardened. Hardness for CT & LT shall be minimum 250BHN for pinions and 200BHN for gears. Hardness for hoisting shall be minimum 350BHN for pinions & 320BHN for gears shall be maintained. However vendor shall maintain and ensure that gear hardness is always less than pinion hardness by atleast 35BHN. Helical gears only shall be used for hoists and for CT & LT, spur / helical gears shall be used. All gears and pinions shall be examined by LPI/MPI for surface cracks after hardening.

3.1.5 WHEELS: Shall be made out of forged or low carbon steel/cast steel with heat treated to 200 to 250 BHN hardness. The drive gears, if any, integral with the wheel shall be of the same material and hardness. Trolley wheels for hoists shall be spur geared type, cast / forged 4 wheeled & driven by motor.

3.1.6 ROTATING AND 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/sqmm. and hardness shall be in the range of 225 to 250BHN. Shafts shall be tested with UT for more than 50mm. dia. UT acceptance norms shall be as per ASME section VIII; Division 2.

3.1.7 BEARINGS : Shall be reputed make (FAG/SKF/TATA/NBC) and shall meet relevant IS standards. All bearing shall be designed to give a minimum service life of 20 years.

3.1.8 BRAKES : Hoisting, cross travel and long travel shall be provided with electro-mechanical friction shoe type brake or conical disc type brakes. The brakes shall be released with electric power and fail safe in case of power failure. All brakes shall, irrespective of controller poition, be applied immediately on operating an emergency push button or switch. It shall be possible to arrest the load at any desired location with minimum slip. Slip with reference to speed shall be specified along with the offer.

3.1.9 TROLLEY : Shall be of 4 wheeled spur geared type and fabricated construction. Trolley shall be designed to suit the monorail size. (Which will be furnished by purchaser during drawing approval.)

3.1.10 FRAME : The frame shall be designed to proper strength, built from steel plates with bolted/welded construction.

3.1.11 END CARRIAGES : Shall be of 4 wheeled spur geared type and fabricated construction. Suitable wheel base shall be provided. End carriages shall be designed to suit the runway beam size. (Which will be furnished by purchaser during drawing approval.) End carriages shall be connected with crane girder by welding or by fasteners (For ease of transportation, if welding required, the same shall be done at site by purchaser).

3.1.12 CRANE GIRDERS : Crane girders shall be of rolled section. Fabricated beam and welded beam shall not be used for this purpose unless otherwise specified by the purchaser for special cases. For details refer annexure - I to this specification. Camber / deflection under load shall be within SPAN / 1000 mm.. In case vendor desires to provide higher camber, same shall be clearly specified in the drawing. In any case camber provided shall not exceed -

*** In case of double girder crane :**

Span/1000mm plus deflection under self load of trolley with hoist/2

*** In case of single girder crane :**

Span/1000mm plus deflection under self load of trolley with hoist.

Allowable bend shall be 1mm/metre and maximum bend shall not exceed 6mm of total span.

3.1.13 Buffers shall be provided for stopping the crane.

3.1.14 Suitable anti tilt, roller arrangement and anti topple arrangement shall be provided in between runway beam and crane girder to avoid toppling of the equipment while the hoist is at overhang side.

3.2 **DOWN SHOP LEADS(DSL) :** DSL system shall be designed to transfer the power supply from end user supply point to the equipment, which is moving on runway beams / monorails. The DSL system shall be of Cable trolley type or Taut wire loop type as per contract requirement.

3.2.1.0 **CABLE TROLLEY TYPE** : Cable trolleys shall run on "Tee" track.

The system shall consist of :

3.2.1.1 "Tee" track

3.2.1.2 Cable Trolleys

3.2.1.3 Flexible power cable (Fixed & Trailing)

3.2.1.4 Switch fuse units / Isolators

3.2.1.5 Supports for Auxiliary girder or "Tee" track

3.2.1.6 Link chain.

3.2.1.7 Fasteners

3.2.2.0 **CONSTRUCTION :**

3.2.2.1 **"Tee:" TRACK** : The system shall be provided with rolled sections suitable for cable trolley wheels as per the relevant Indian Standard.

3.2.2.2 **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.

3.2.2.3 **FLEXIBLE POWER CABLE** : 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 and other relevant Indian standard for the equipment under supply. For sub-vendor list refer clause no 3.12.0. Vendor shall indicate the weight of total cable in the drawing.

3.2.2.4 **SWITCH FUSE UNITS or ISOLATORS:** The system shall be supplied along with suitable switch fuse units / isolators to take the full load current, when the equipment(trolley with hoist and under hung crane) is working with maximum safe working load. For sub-vendor list refer clause no 3.12.0

3.2.2.5 **SUPPORTS** : The system shall be provided with suitable supports to take the load of "Tee" track, cable trolleys, power flexible trailing and other materials.

3.2.2.6 **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 5mm diameter carbon steel wire.

3.2.2.7 **FASTENERS** : Suitable fasteners shall be provided. Fasteners shall be electro - galvanised / Hot dipped.

3.2.3.0 **TAUT WIRE LOOP** : Ceramic reel insulator shall drag on stretched steel wire with trailing cable. The system shall consist of :

3.2.3.1 Bracket
3.2.3.2 End hook
3.2.3.3 Flexible power cable (Fixed & Trailing)
3.2.3.4 Switch fuse units/Isolators
3.2.3.5 Reel insulator
3.2.3.6 Steel wire rope
3.2.3.7 Rope clamp & thimble
3.2.3.8 Leather belt or nylon wire rope
3.2.3.9 Fasteners.

3.2.4.0 **CONSTRUCTION** :

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

3.2.4.2 **End hook** : Suitable end hook shall be provided for the size of steel wire rope.

3.2.4.3 **Flexible power cable (Fixed & Trailing)**: 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 (all motors running simultaneously) for the equipment under supply. The power supply flexible trailing cable shall comply with latest revision of IS 694 and other relevant Indian standard for the equipment under supply. For sub-vendor list refer clause no. 3.12.0

3.2.4.4 **SWITCH FUSE UNITS or ISOLATORS**: The system shall be supplied along with suitable switch fuse units/isolators to take the full load current, when the equipment (trolley with hoist and under hung crane) working with maximum safe working load. For sub-vendor list refer clause no. 3.12.0

3.2.4.5 **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.

3.2.4.6 **Steel wire rope** : Steel wire rope shall be of minimum 6mm diameter as per latest revision of IS 2266. Steel wire rope shall be suitably sized for load of cable without sagging for the total travel length.

3.2.4.7 **Rope clamp & thimble** : Suitable rope clamps and thimbles shall be provided to tie the rope with bracket through end hook.

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

3.2.4.9 Suitable fasteners shall be provided wherever required. Fasteners shall be electro-galvanised / hot dipped.

INTERLOCK MECHANISM (Male & Female)

3.3.0 **Interlock mechanism (male & female)** : Male & female interlock mechanism shall be designed to transfer the trolley with hoist with rated safe working load from master crane to slave crane or master crane to fixed monorails and vice versa. The interlock mechanism shall be capable of withstanding the forces when one of the cranes is being operated by mistake. The cross travel stoppers should give way to the hoist when interlock mechanism is coupled. Dimensional tolerance for the male & female component of the interlock mechanism shall be very close which will ensure proper locking without play and smooth transfer of trolley from one crane to the other.

3.3.1 Hand wheel with chain of suitable length shall be provided to operate the male & female mechanism manually from operating floor.

3.3.2 Male and female interlock mechanism shall be designed suitably to take the axial load and safe working load.

3.4 LUBRICATION : Grease nipples shall be provided at all lubrication points. The lubrication points shall be easily accessible. Frequency of lubrication shall be minimum. Oil bath lubrication shall be preferred.

3.5 FASTENERS : All fasteners shall be made of precision grade high tensile steel (Grade 8.8 class) and galvanised as per relevant Indian standard. Load bearing fasteners shall be of specially machined bolts with suitable material and preservatives applied on it. For special bolts / fasteners, vendor shall furnish material, tensile strength and hardness in the arrangement drawing.

3.6.0 ELECTRICALS AND CONTROLS

3.6.1 CT, LT AND HOISTING MOTORS (AC; NON-FLAME PROOF)

3.6.1.0 Site condition

3.6.1.1 Altitude above sea level	:	Less than 5000m.
3.6.1.2 Ambient temp. Condition	:	50°C
3.6.1.3 Relative Humidity	:	100%
3.6.1.4 Atmosphere	:	Dusty, salty, corrosive and highly polluted.
3.6.2 Standard (Latest revision)	:	IS 325
3.6.3 Application	:	Trolley with hoist and Under Hung Crane
3.6.4 Duty cycle	:	Continuous S3/S4 ; Duty factor : 40% CDF.
3.6.5 Rated voltage, frequency	:	415V, ±10%; 50 Hz±5% and combined 10% absolute
3.6.6 Minimum starting voltage	:	80% of the rated voltage (Cl. 3.6.5).
3.6.7 Capacity to restart (at Voltage specified point no. 3.6.5)	:	No limitation on no. of starts. Application calls for many starts at frequent intervals. Vendor to specify on any limitation.
3.6.8 Direction of rotation	:	Bi-directional
3.6.9 Class of insulation	:	Class 'F' temp. rise limited to class 'B'
3.6.10 Winding treatment	:	The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot humid and tropical climate.
3.6.11 Temperature raise	:	With in specified limits. vendor to specify
3.6.12 Starting current	:	Vendor to specify.
3.6.13 Method of motor starting	:	DOL
3.6.14 Type of enclosure	:	IP 55 as per IS 4691. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.
3.6.15.0 Terminal Box	:	
3.6.15.1 Type	:	Weather proof IP 55
3.6.15.2 Cable gland	:	Double compression type.
3.6.15.3 Cable entry	:	Suitable for both, top and bottom entry.
3.6.16 Type of terminals	:	stud type with plain washers, spring washers / check nuts & Lugs.
3.6.17 Fault level	:	50 KA at 415V.
3.6.18 Painting	:	Epoxy based paint with grey colour & 40 microns DFT (Minimum).

3.6.19 Terminals	:	Separately terminated with clear identification in main terminal box with double compression type glands.
3.6.20 Lifting device	:	Eye bolt or lugs to facilitate safe lifting.
3.6.21 Documents to be furnished along with offer	:	1. Technical data sheets as per annexure -III to this specification. 2. Motor characteristic curves.
3.6.22 Inspection & Testing	:	Vendor to submit Quality plan

NOTE: Motor shall conform to IS 325 and the additional specific requirements brought out above. If motors are of special design other than standard, the same shall be witnessed during testing by BHEL or its appointed representative (Type & Routine test).

3.7.0 CONTROLS/INTERLOCKS :

The control system shall envisage a control cabinet and a push button operating station. The push button control shall have control for power switching to the motors and forward/reverse motion. The control voltage of both cabinet and push button station shall be 110V AC 50 HZ., single phase. The control stations shall have enclosure protection of IP 55. Necessary electrical interlocks shall be included in control cabinet for fail safe operation. Vendor shall clearly bring out all the interlocks in the control wiring drawing and submit the same for approval. Limit switches / Torque switches shall be provided for long travel, cross travel and hoist. These switches shall be interlocked to cut off power to the motor and restrict further movement when the limits are crossed. Crimping tool shall be used for fitting lugs.

3.8.0 CONTROL CABINET

3.8.1 APPLICATION :To house all the power contactors, control transformers, control relays, fuses, indicating lamps, switches and protection circuits of all motors of hoist.

3.8.2 TYPE : Wall mounting type. Normally mounted on a frame work of the hoist. The cabinet shall be made of minimum 1.5mm thick cold rolled sheet.

3.8.3 MOTOR PROTECTION : All motor shall be protected against under voltage, over load and short circuit condition.

3.8.4 ISOLATOR : Input power to the cabinet through switch fuse unit is required.

3.8.5 CONTROL RELAYS : Shall be provided suitably wherever required.

3.8.6 INDICATING LAMPS : Shall be provided wherever required.

3.8.7 TERMINAL BLOCKS : Clip on type. Suitable for 1.5 sqmm. copper conductor. 20% of additional terminal blocks shall be supplied as spares along with the supply.

3.8.8 CUSTOMER SUPPLY VOLTAGE : 415V 50 Hz. 3 phase

3.8.9 CONTROL VOLTAGE : 110V 50 Hz.

3.8.10 ENCLOSURE PROTECTION : IP 55 as per IS 13947(part I). Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

3.8.11 GLANDS : Shall be double compression type. To be included in vendor scope as per requirement.

3.8.12 INTERNAL WIRING :

1. PVC 650/1100V Grade 1.5 sqmm. multistrand/copper conductor.
2. All control power wiring with red and black.
3. All control wiring are to be with grey wire & shall be marked with ferules as per wiring diagram.

3.8.13 PAINTING : Exterior : Grey ; Interior : Brilliant white - glossy finish with enamel paint. For special painting if any, refer annexure - II to this specification.

3.8.14 PAINT THICKNESS : Exterior - 120 microns ; Interior - 80 microns - minimum

3.8.15 DIMENSION : Vendor to specify. The dimensional drawing, internal layout, wiring drawings shall be submitted for approval prior to manufacture.

3.9.0 CONTROL BOX

3.9.1 TYPE : Pendant station to house all start/stop/forward/reverse/up & down push button for all motors.

3.9.2 LOCATION : Hanging from equipment.

3.9.3 PUSH BUTTON : For all start green push button and for stop red push button shall be used. Make shall be of Siemens/L&T/EE. Push button shall return to "off" position when released. One stop push button shall be lockable to enable switch off power supply when equipment in not in use.

3.9.4 CONTROL VOLTAGE : 110 V AC 50 Hz. Single phase.

3.9.5 ENCLOSURE PROTECTION : IP 55 as per IS 13947 Part I. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

3.9.6 BOX MATERIAL : Cold rolled sheet steel with 1.5mm thickness minimum.

3.10.0 **CABLING** : Vendor shall include all the power and control cables necessary for the system. The cable shall comply with IS 694. The power cable shall be (FRLS) of copper PVC flexible and vendor shall indicate the conductor size and over all size in the offer for all the motors. The control cable shall be armoured of 1.5 sqmm copper conductor only. The no. of cores, cable size etc shall be indicated in the offer. There shall be 20% spare cores available for all control cables offered.

3.11.0 **EARTHING** : The total earthing shall comply with Indian electricity rules. All motor cabling shall be earthed at both ends through a copper conductor of suitable size. All the control cabinets / push button stations shall be earthed through a copper conductor of suitable size. All the earth leads shall lead to the existing earth bus.

3.12.0 *Electrical & Control Items Shall Be Of As Per The Approved Sub-Vendor/Make List Given Below.*

3.12.1 CONTROL & OVER LOAD RELAYS	:Siemens / BCH / L&T / EE Telemechanic
3.12.2 PUSH BUTTONS	:Siemens / L&T / BCH / EE Cands / Vaishno
3.12.3 FUSES	:Siemens / L&T / EE
3.12.4 TRANSFORMERS	:SE / Kappa / Ind Coil
3.12.5 MOTORS	:NGEF / Kirloskar / Siemens , Crompton Greaves
3.12.6 CONTACTORS	:Siemens / BCH / L&T / EE Telemechanics
3.12.7 LIMIT SWITCHES	: BCH / Omron / Nucon / Festo
3.12.8 LUGS	:Dowells / 3D
3.12.9 POWER & CONTROL CABLE (FRLS)	:CMI LTD. / Delton Cables / Fixwell Pushincords / Asian cables / Cable corporation of India / Finolex /Incab
3.12.10 CABLE GLANDS	:Comet brass products Power engineering co. Standard metal Industries.
3.12.11 TERMINAL BLOCKS	:Elmax / Essun / Asia
3.12.12 ISOLATOR / SWITCH FUSE UNITS	:Siemens / L&T / EE
3.12.13 POWER SWITCHES	:Siemens / L&T / EE
3.12.14 SELECTOR & CONTROL SWITCH	:Siemens / L&T / kaycee
3.12.15 INDICATION LAMPS	:Siemens / Cands / EE

4.0 PAINTING, PROTECTION, PACKING, SUPPLY and IDENTIFICATION:

4.1 SURFACE PREPARATION : Weld slag & spatter shall be removed and the surfaces to be coated shall be free from contamination. Surface defects shall be removed by suitable methods. Sharp edges shall be smoothened by grinding. Prior to surface preparation oil, grease, drilling emulsions, cutting emulsions and preservative agents shall be carefully removed by suitable solvents. The surface shall be carefully dried with clean cloths to prevent the dissolved impurities from spreading over the entire surface. The surface shall be cleaned by wire brush and shot blasting if required. Proper adhesiveness of paint to the surface shall be ensured.

4.2 PAINTING: Two coat of red oxide with minimum 40 microns DFT as per IS 2074 and two coats of synthetic enamel paint with minimum 40 microns DFT as per IS 2932. For special requirements if any refer annexure -II.

4.2.1 COLOUR SCHEME

4.2.1.1	Under hung crane	:	Golden Yellow
4.2.1.2	Trolley with hoist	:	Golden Yellow
4.2.1.3	Interlock mechanism	:	Ash grey
4.2.1.4	DSL Components	:	Ash Grey
4.2.1.5	Hook	:	Black

4.3 All the despatchable units shall be packed in a wooden case with water proof material.

4.4 The material shall be despatched with clear bill of material for each system.

4.5 Each and every despatchable items shall be identified with item no, Purchase Order reference number and tagged properly for easy identification.

5.0 INSPECTION AND TESTING :

5.1 Purchaser's(BHEL) 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.

5.2 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 / Sub-vendor's works.

5.3 The Trolley with hoist shall be run 5 times at manufactures works. All the 5 runs shall be tested with 125% safe working load with out any pause. The motor currents shall be checked and shall be with in the rated full load current of each motor at safe working lead. 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.

5.4 The brakes for hoisting, long travel 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.

5.5 Test shall be conducted for effectiveness of automatic devices for hoist to limit the upward/downward & travel of hoist and to limit the forward & reverse travel of crane. Top 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.

5.6 Over load relay shall be tested for lift & cross travel and sustain 125% safe working load. Long travel with 125% SWL shall be tested at site by purchaser / end user and if found defective, the same shall be replaced at free of cost by vendor.

5.7 Trolley with hoist and under hung crane gears shall be tested with & without load for alignments and smooth operation.

5.8 Equipment shall be tested for hoisting and cross travel with 125% SWL.

5.9 Hoisting, and cross travel speed shall be tested and shall ensure the tolerance with in 10%. Hoisting and CT shall be tested for minimum 2.0m. for hoisting height & cross travel length. Long travel speed shall be tested at site. 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 resolve by the vendor at site at his cost.

5.9.1 Long travel shall be tested at site with and without safe working load by purchaser / end user and if found defective, the same shall be replaced at free of cost by vendor.

5.10 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.

5.11 HOOKS :

5.11.1 Raw material test certificate shall be submitted from manufacturer.

5.11.2 Proof load test 200% of SWL on each hook irrespective of capacity.

5.11.3 Chemical composition and destructive test shall be carried out on one sample per batch.

5.11.4 After proof load test, hook shall be examined for cracks, deformation, flaws and other defects with LPI / MPI & UT. No linear indications or cracks are acceptable while carrying-out LPI / MPI. Acceptance norm for UT shall be as per ASME - Section VIII - Division 2.

5.12.0 UNDER HUNG CRANE

5.12.1 Check the dimensions of the under hung crane as per relevant standard.

5.12.2 DEFLECTION TEST : Under hung crane shall be tested for deflection with safe working load at the middle point of the span. Datum line for deflection is obtained by placing hoist at one extreme of the span with hook approach. The deflection with SWL at centre of span compared with this datum should be less than SPAN/1000.

5.13 DOWN SHOP LEAD SYSTEM (DSL)

5.13.1 Cable trolley shall be tested for smooth running on "Tee" track with cable load.

5.13.2 Cable reel insulator shall be tested for smooth running on steel wire rope with cable load.

5.14 ELECTRICAL COMPONENTS

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

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

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

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

5.14.5 Degree of protection test report shall be submitted. (type test report)

5.14.6 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.

5.14.7 TC for control panel, pendant stations and motors shall be provided. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

6.0 DOCUMENTS BY VENDOR

6.1.0 Documents along with the offer : (Three sets)

6.1.1 Quality plan, General arrangement and cable trolley arrangement drawings with complete bill of materials. All despatchable components / assemblies shall be indicated in detail. Sub-vendor items, make also shall be indicated in the drawing.

6.1.2 Wiring circuit diagram with details of make, type and rating of all components.

6.1.3 Spares list for 3 years trouble free operation with price.

6.1.4 Duly filled-in and signed General Data Sheet (Annexure - III) for trolley with hoist, under hung crane and down shop lead system with all required details .

6.1.5 Write up on special features if any.

6.1.6 Technical specification for equipment.

7.0 **DOCUMENTS AFTER PLACEMENT OF PURCHASE ORDER. :**

7.1 **Quality plan is to be submitted by vendor for purchaser's approval.**

7.2 Dimensional drawings of Under Hung Crane, Trolley With Hoist, Down Shop Leads, cable trolley, control panel and wiring diagram with B O M for approval.

7.3 **Following test certificates shall be provided during supply.**

7.3.1 Physical, Chemical, NDE and hardness test certificates shall be provided wherever applicable for trolley / crane wheels, wire ropes, pulleys, hook, gears, pinions, and shafts.

7.3.2 Test certificates for having carried out the tests as per clause 5.0 of this specification under purchaser and end user (if required) presence.

7.3.3 Test reports for wire rope and hooks.

7.3.4 Test reports for NDT examination of gears, wheels, pinions and hooks.

7.3.5 Type test and routine test certificates for motors and as per IS 325.

7.3.6 Performance test certificates for UHC, TWH, safety devices and other electrical items.

7.3.7 TC for control panel, pendent stations and motors shall be provided. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

7.3.8 26 sets of operation and maintenance manuals shall be provided with details for storage, installation, erection procedures, drawings, motor data sheet, operating and trouble shooting, lubrication schedule, spares data, spares identification drawings, spares replacement procedure and special requirements if any. All copies are to be sent to BHEL / Tiruchirappalli.

7.3.9 Floppies copied with arrangement drawings for equipment under supply to be provided to purchaser.

8.0 DRAWINGS AND O & M MANUALS :

8.1 The drawings furnished with the offer shall clearly indicate the items (bill of materials) that go to make the trolley with hoist, under hung crane, DSL system and interlock mechanism. The drawings shall clearly indicate the weight particulars of such items/sub assembly that will be despatched as loose items in cases / packings. The bill of material shown in the drawing shall match with that of the despatchable unit as indicated in the packing slip. The drawing shall be prepared in AUTOCAD and vendor shall forward both hard copies(3 numbers each) and floppy(Copied with drawing files) to the purchaser.

8.2 Catalogues and other details of the product shall be submitted along with the offer.

8.3 The vendor check list shall be filled up at the manufacturer's works and shall be duly signed by inspection engineer and manufacturer's representative.

8.4 O & M MANUALS

8.4.1 Number of copies required is 26

8.4.2 Manuals should be in printed form only.

8.4.3 The size of manuals should be in correct A4 size with drawings in A3 size. Large size drawings (greater than A3 size) should be reduced in A3 size and inserted.

8.4.4 Drawings shall be of printed or laser printed only.

8.4.5 Spiral or comb bound copies should be totally avoided.

8.4.6 If manuals are supplied in folders, the folder shall have 3 hole punching system.

8.4.7 O & M manuals, shall be submitted to BHEL / Tiruchirappalli prior to despatch of the equipment.

8.4.8 Manual, generally should contain the following :

8.4.8.1 Data sheet

8.4.8.2 Brief description

8.4.8.3 Operation

8.4.8.4 Maintenance (including lubrication, where necessary) and service, recommended spares for 2/3 years trouble free service.

8.4.8.5 Trouble shooting

8.4.8.6 Assembly drawings with part list, dimensional drawings & other applicable drawings.

8.4.9 Manuals should pertain only to the types or model supplied for the particular contract. Copies are to be sent to BHEL / Tiruchirappalli only.

9.0 GUARANTEE REQUIRED: 18 months from the date of commissioning or 24 months from the date of supply.

10.0 REMARKS :

10.1 Operating instruction manuals, certificates etc. shall be despatched to BHEL / Tiruchirappalli only.

10.2 Two sets of asbuilt arrangement drawings and electrical circuit drawings shall be sent along with the consignment.

10.3 It is suggested that vendor shall prepare all the O & M manuals in electronic media which will be the requirement in the days to come.

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :
Enquiry No.:

The following data sheet is to be filled by the vendor and submitted along with the offer.
This data sheet shall form part of ordering specification and shall be approved by Engineering On acceptance of the offer.

TECHNICAL DATA SHEET FOR ELECTRICALLY OPERATED UNDER HUNG CRANE & TROLLEY WITH HOIST

CR1.0	Under hung crane					
CR1.1	Capacity - in tons					
CR1.2	Span - in m					
CR1.3	Overhang on either side - in mm.					
CR1.4	Runway beam size (User / Purchaser) Will be furnished during vendor drawing approval.					
CR1.5	Operating floor - in m					
CR1.5.0	**Wheels**					
CR1.5.1	Wheel shape whether match with runway beams	Yes / No				
CR1.5.2	Wheel material					
CR1.5.3	Wheel diameter - in mm					
CR1.5.4	Wheel base - in mm.					
CR1.6.0	**Brakes**					
CR1.6.1	Operation	Electrical / Mechanical				
CR1.6.2	Shoe Material					
CR1.6.3	Type					
CR1.6.4	Make					
CR1.7.0	**Crane girder**					
CR1.7.1	Type	Single / Double / Box				
CR1.7.2	Size					
CR1.7.3	Material					
CR1.8.0	**Wheel bearing**					
CR1.8.1	Type					
CR1.8.2	Size					
CR1.8.3	Make					
CR1.9.0	**Crane speed**					
CR1.9.1	Maximum speed in m/min					
CR1.9.2	Minimum speed in m/min					
CR1.10.0	**Weight of the crane - In Kgs.**					
CR1.11.0	Dimensions of crane					

Vendor Name :
Signature :
Date :

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :
Enquiry No.:

CR1.12.0	Shaft					
CR1.12.1	Material					
CR1.12.2	Hardness					
CR1.13.0	Gears / Pinions					
CR1.13.1	Material					
CR1.13.2	Hardness					
CR1.14.0	Limit switch					
CR1.14.1	Type					
CR1.14.2	Make					
CR1.14.3	Rating					
CR1.15.0	Crane Motors					
CR1.15.1	Rating					
CR1.15.2	Type					
CR1.15.3	Make					
CR1.15.4	Power factor of motor					
CR1.15.5	Quantity					
CR1.16.0	Power supply					
CR1.16.1	Power supply rating for equipment					
CR1.16.2	Power supply rating for control					
CR1.17.0	End stopper					
CR1.17.1	Provided	Yes / No				
CR1.17.2	Type					
CR1.18.0	Clearance between Runway beam bottom & Crane girder top - in mm					
HOI.1.0	Trolley With Hoist					
HOI.1.1	Capacity - in tons					
HOI.1.2	Lift - in m					
HOI.1.3	Headroom - in mm					
HOI.1.4	Approximate Hoist dimension					
HOI.1.5	Operating floor - in m					
HOI.1.6	Approximate weight in Kgs.					
HOI.2.0	Hoist brake					
HOI.2.1	Type					
HOI.2.2	Shoe material					
HOI.2.3	Make					
HOI.3.0	Cross travel brake					
HOI.3.1	Type					
HOI.3.2	Shoe material					
HOI.3.3	Make					

Vendor Name
Signature
Date

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :

Enquiry No.:

HOI.4.0	**Hoist speed**					
HOI.4.1	Maximum speed - in m/min					
HOI.4.2	Minimum speed - in m/min					
HOI.5.0	**Cross travel speed**					
HOI.5.1	Maximum speed - in m/min					
HOI.5.2	Minimum speed - in m/min					
HOI.6.0	**Trolley wheels**					
HOI.6.1	Wheel diameter - in mm.					
HOI.6.2	Material					
HOI.6.3	Hardness					
HOI.6.4	Quantity					
HOI.7.0	**Rope**					
HOI.7.1	Rope construction					
HOI.7.2	Rope diameter - in mm					
HOI.7.3	Number of falls					
HOI.7.4	Ultimate tensile strength					
HOI.7.5	Whether wire rope has sufficient extra length to retain two full wraps on the drum	Yes / No				
HOI.7.6	Rope / Core material					
HOI.8.0	**Rope drum**					
HOI.8.1	Diameter - in mm					
HOI.8.2	Material					
HOI.9.0	**Gears & Pinions for Hoisting**					
HOI.9.1	Material					
HOI.9.2	Hardness					
HOI.10.0	**Gears & Pinions for Cross travel**					
HOI.10.1	Material					
HOI.10.2	Hardness					
HOI.11.0	**Hook**					
HOI.11.1	Material					
HOI.11.2	Hardness					
HOI.11.3	Capacity - in tons					
HOI.11.4	Safety latch provided in the hook	Yes / No				
HOI.11.5	Bearing in the swivel hook					
HOI.11.6	Locking arrangement of hook	Yes / No				
HOI.12.0	**Bearing for Cross Travel**					
HOI.12.1	Type					
HOI.12.2	Size					
HOI.12.3	Make					

Vendor Name

Signature

Date

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :
Enquiry No.:

HOI.13.0	Bearing for Hoist					
HOI.13.1	Type					
HOI.13.2	Size					
HOI.13.3	Make					
HOI.14.0	Hoist motor					
HOI.14.1	Rating					
HOI.14.2	Type					
HOI.14.3	Make					
HOI.14.4	Power factor of motor					
HOI.14.5	Quantity					
HOI.15.0	Cross travel motor					
HOI.15.1	Rating					
HOI.15.2	Type					
HOI.15.3	Make					
HOI.15.4	Power factor of motor					
HOI.15.5	Quantity					
HOI.16.0	Limit switch for Hoist					
HOI.16.1	Type					
HOI.16.2	Make					
HOI.16.3	Rating					
HOI.17.0	Limit switch for Cross travel					
HOI.17.1	Type					
HOI.17.2	Make					
HOI.17.3	Rating					
HOI.18.0	Power supply					
HOI.18.1	Power supply rating for equipment					
HOI.18.2	Power supply rating for Control					
HOI.19.0	Type of Control					
HOI.19.1	Location of Control					
DSL.1.0	DSL system for Long Travel - In m.					
DSL.1.1	Travel length - Wire / Cable trolley					
DSL.1.2	Type					
DSL.1.3	Cable size & rating					
DSL.1.4	Loop size					
DSL.1.5	Link chain size / diameter					
DSL.1.6	Pitch between two cable trolleys					
DSL.1.7	Pendent switch					
DSL.1.8.0	Isolators / Switch fuse units					
DSL.1.8.1	Type					
DSL.1.8.2	Rating					
DSL.1.9	Earthing conductor					

Vendor Name
Signature
Date

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :

Enquiry No.:

DSL 2.0	**DSL system for Long Travel - In m.**					
DSL 2.1	Travel length - Wire / Cable trolley					
DSL 2.2	Type					
DSL 2.3	Cable size & rating					
DSL 2.4	Loop size					
DSL 2.5	Link chain size / diameter					
DSL 2.6	Pitch between two cable trolleys					
DSL 2.7	Pendent switch					
DSL 2.8.0	Isolators / Switch fuse units					
DSL 2.8.1	Type					
DSL 2.8.2	Rating					
DSL 2.9	Earthing conductor					

DATA SHEET - AC MOTORS
TECHNICAL DATA SHEET FOR NON-FLAME PROOF MOTORS

EL.1	Application					
EL.2	Manufacturer					
EL.3	Type, frame size & degree of protection					
EL.4	Rated output in Kw & rated speed					
EL.5	Full load current					
EL.6	Full load efficiency & power factor					
EL.6.1	Duty cycle					
EL.7	Rated torque					
EL.7.1	Starting current					
EL.8	Starting torque in % of full load torque					
EL.9	Pull up torque in % of full load torque					
EL.10	Pull out torque in % of full load torque					
EL.11	No load starting time					
EL.12	Stator winding connection					
EL.13	Type & no. of terminals brought out					
EL.14	Resistance / phase					
EL.15	Qty. & power consumption of space heaters					
EL.15	Gland size for space heaters					
EL.17	Cable entry					
EL.18	Cable gland - Double compression					
EL.19	GD^2 of motor					
EL.20	Total weight of motor					
EL.21	Anticipated bearing life					
EL.22	Method of connection to driven equipment					

Vendor Name :
Signature :
Date :

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

roject :

nquiry No.:

TC.1.0 Test certificates to furnished along with the supply

TC.1.1	Hoist load test					
TC.1.2	Crane load test					
TC.1.3	Over load relay test					
TC.1.4	Deflection test for crane					
TC.1.5	Long Travel movement test					
TC.1.6	Cross travel movement test					
TC.1.7	Dimensional checks					
TC.1.8	Insulator test on electrical circuit					
TC.1.9	High volt test on electrical circuit					
TC.1.10	Hook type & load test					
TC.1.11	Wire rope load test					
TC.1.11.1	Individual Hooks are identified	Yes / No				
TC.12	NDT for gears, wheels, shafts & hooks					
TC.13	NDT as per Quality plan & Specification					
TC.14	Material test certificates					
TC.15	Motor routine, type & weather protection TCs					
TC.16	Control panel & Pendent I.R. HV & physical inspection record and weather protection TC					

D.1.0 TYPICAL DRAWINGS / DOCUMENTSTO BE FURNISHED ALONG WITH THE OFFER

D.1.1	Genl. arrangement / Assy. of Cranes
D.1.2	Genl. Arrangement / Assy of Hoists
D.1.3	Genl. Arrangement / Assy for DSL system
D.1.4	Genl. Arrangement / Assy for Male & Female Interlock mechanism
D.1.5	Errection drawings for Cranes, Hoists & DSL system
D.1.6	Electrical Wiring / Circuit diagram

Vendor Name

Signature .

Date :

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

SPECIFICATION FOR ELECTRICALLY OPERATED HOIST

CONTENTS:

	NAME	SIGNATURE	DATE
PREPARED	P.SUBRAMANIAN		18.03.2008
CHECKED	SUDHAKAR BEHERA		18.03.2008
APPROVED	V.RAGHAVENDRAN		18.03.2008

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

SPECIFICATION FOR ELECTRICALLY OPERATED HOIST

DATA SHEET				
SL No	Description	VAR 01	VAR 02	VAR 03
1.	Name of Contract	KONIAMBO – 5312 & 5313		
2.	Name of equipment	Electrically Operated Hoist		
3.	Application	S.A. FAN	P.A. FAN	I.D. FAN
		To lift fan equipment and its drive motor		
4.	Location	Outdoor		
5.	Load to be lifted	8 T	10 T	10 T
6.	Maximum Lift	7.418 m	7.418 m	14.368 m
7.	Operating floor level	+0,000 m	+0,000 m	+0,000 m
8.	Maximum Head room permissible	1.5 m		
9.	Size of the Monorail / beam (BHEL scope)	NPB 450	NPB 450	NPB 600
10.	Top level of Monorail / beam	+9.368 m	+9.368 m	+16.468 m
11.	Length of Longitudinal travel	22 m	22 m	40 m
12.	Type of monorail beam	Straight		
13	Type of DSL(Down Shop Leads)	Taut Wire Loop type		Cable Trolley type

*NOTE :

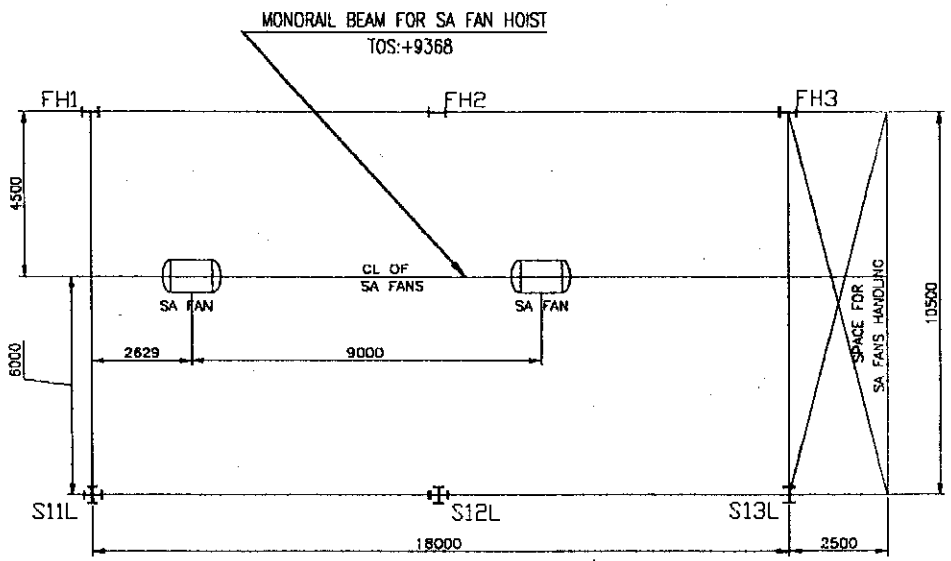
1) Materials are to be lifted from the ground level (0.0).
2) All components of hoists should be packed in such a way that it should not get damaged during transport.
3) The technical offer shall contain all the details specified in the point number 1 to 13 of this **Data sheet** along with the point by point confirmation / deviation to the specification number MHS-HEQ / 073 – Rev 02.
4) On placement of order, vendor to give O&M Manual – 2 sets of hard copy and 2 sets of soft copy in C.D. in both **English & French language**.
5) Painting: For coating refer **PCS-4** of **Doc No. 319000-00000-SP-2300-0001/Rev 04** and for shade, use Traffic Yellow colour (RAL 1023).

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

SPEC NO. FBC&HRSG:99100:010/ REV00

REV	DATE	ALTERED
		CHD & APPD

FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING
MANUFACTURE REFER RELEVANT Q.C.P\Q.P
MANUFACTURING AS PER RELEVANT Q.C.P\S.Q.P



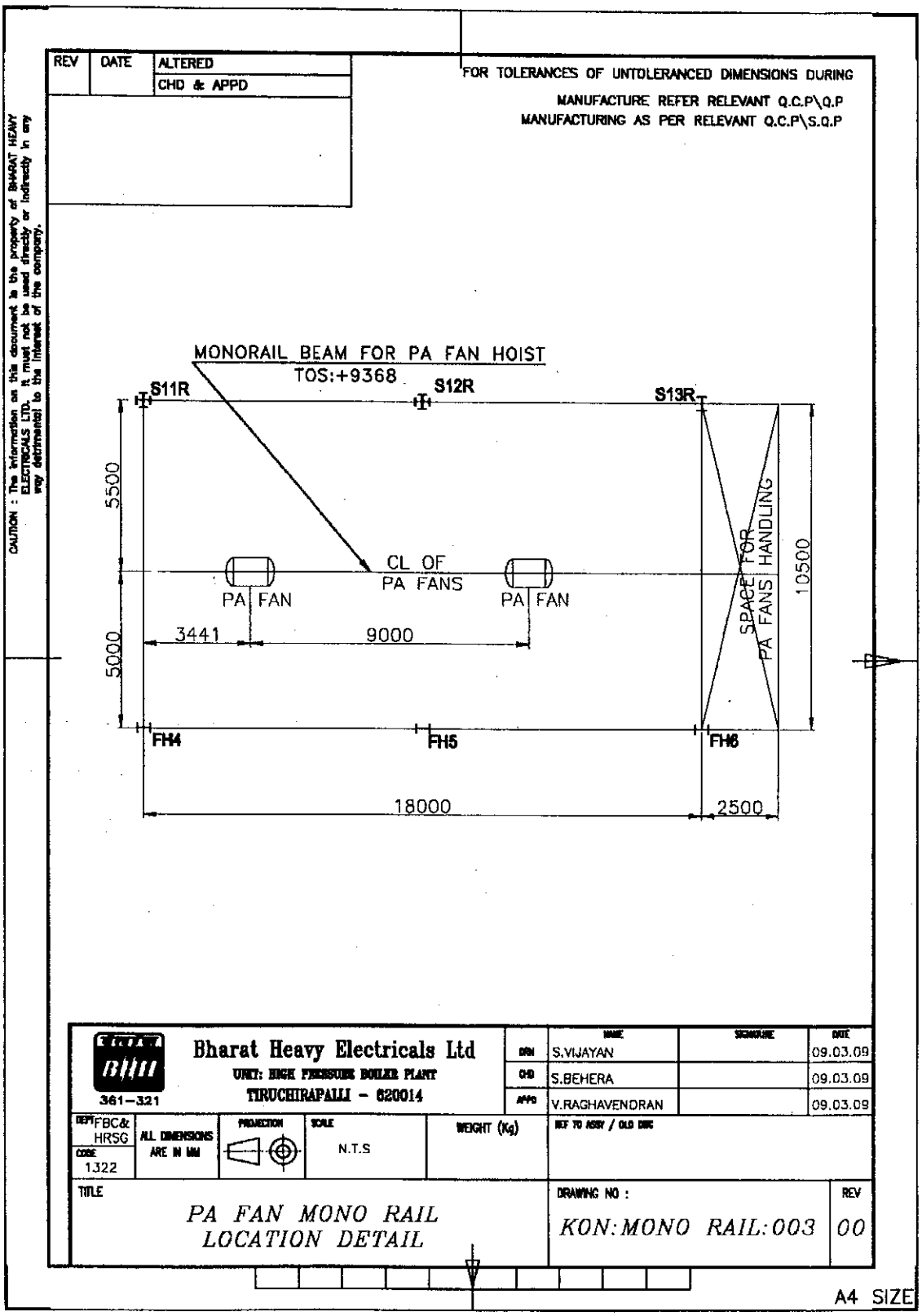
		NAME	SIGNATURE	DATE
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI – 620014 361–321	DRN	S.VIJAYAN		09.03.09
	CHD	S.BEHERA		09.03.09
	APPD	V.RAGHAVENDRAN		09.03.09

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
FBC& HRSG			N.T.S		
CODE 1322					

TITLE	DRAWING NO :	REV
SA FAN MONO RAIL LOCATION DETAIL	KON:MONO RAIL:002	00

A4 SIZE

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE



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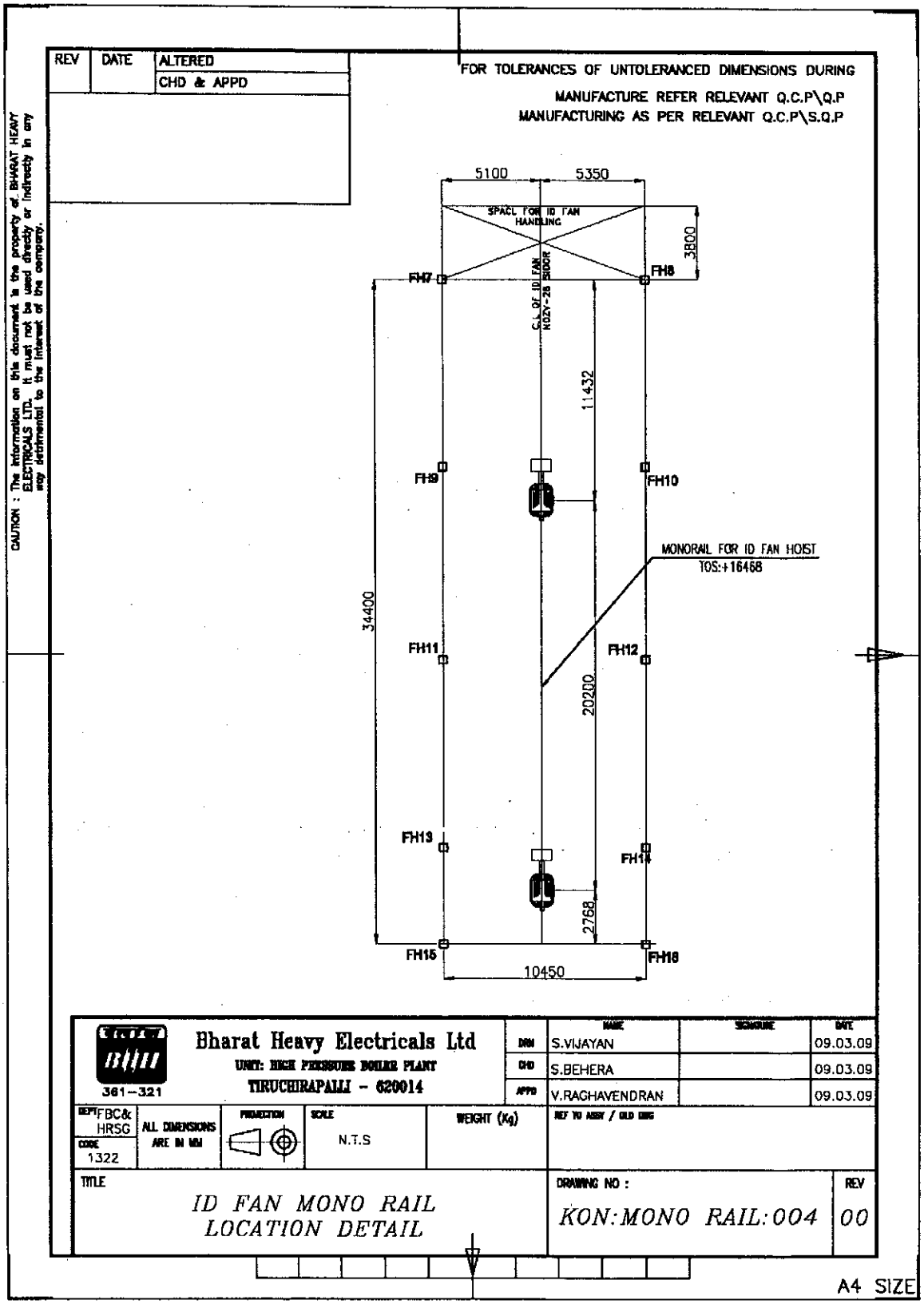

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

SPEC NO. FBC&HRSG:99100:010/ REV00

BHARAT HEAVY ELECTRICALS LIMITED
TIRCHY-14

FBC&HRSG
ELECTRICAL, CONTROLS & INSTRUMENTATION

Project: Koniambo CFBC

REF: FBC&HRSG: CI: 5312: EH
Rev:00
PAGE 01 of 01
DATE: 19.02.09

ANNEXURE TO ELECTRIC HOIST MAIN SPEC (MHS-HEQ/073 REV02)

Low voltage motor Doc No: 319000-00000-JSS-1691-0001 REV 05 (14 Pages) but with change of voltage 400volts, 3Ph, 50Hz instead of 690V, 3Ph.
Annexure-2 FBC&HRSG: CI: 5312: LMV2 (2 Sheets)
Quality plan: QA: CI: STD: QP: 24

Approved vendor list for Motors: ABB / Kirloskar / Siemens / Crompton greaves / Bharat Bijlee / Alstom ind pro Ltd. Make of any one of these vendors alone is acceptable.

Approved vendor list for Power & Control Cable: Cord Cable Industries Ltd / Polycab wire Pvt Ltd / Toshniwal cable / Paramount Cable Crop / Associated Cables Pvt Ltd / Elkay Telelink Ltd / Reliance Engineers Ltd / Radiant Cables Pvt Ltd / Delton Cables Ltd / KEI Industries Ltd. Make of any one of these vendors alone is acceptable.

Control Supply Voltage: 230 V, 1Ph, 50Hz AC. This Voltage is should be derived from main power supply 400 V, 3Ph, 50Hz AC. These points may please be communicated to vendors suitably.

	PREPARED	CHECKED	APPROVED
NAME	S.RAJA RAJAN	P.S.PANDI	A.SWAMINATHAN
SIGNATURE	S. Rajaraja	P.S.Pandi	A.Swaminathan

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014

MATERIAL HANDLING SYSTEM / PE(BOILERS)

TITLE SHEET

SPECIFICATION FOR ELECTRICALLY OPERATED HANDLING EQUIPMENTS

(TWH, UHC, DSL and MALE & female interlock mechanisms)

Specification No. : MHS-HEQ/071 *REVISION No. : 02*

REV. No.	REV. DATE	CLAUSE No.	DESCRIPTION	APPROVED
00	25/11/97		Initial release	
01	30/12/98	General	Revised based on site feedbacks & task force committee recommendations	
02	20/12/99	General	Updated	

	Name	Signature	Date
Prepared	T.K.Prabhu		24/11/97
Checked	T.K.Prabhu		24/11/97
approved	A.Rajamohan		25/11/97

GENERAL SPECIFICATION FOR ELECTRICALLY OPERATED HANDLING EQUIPMENTS (TWH, UHC, DSL & INTERLOCK MECHANISMS)

Specification No. : *MHS-HEQ/073* REVISION No. 02

1.0 SCOPE : This specification covers design, manufacture, inspection, testing and supply of electrically operated Under Hung Crane(UHC), Trolley With Hoist (TWH), Down Shop Leads(DSL) and male & female interlock mechanisms.

2.0 CODES AND STANDARDS : In addition to the following latest revision of codes and standards, the equipment shall be designed to meet the other governing standards as applicable and also meet with the local standards where the equipment is installed.

2.1 IS 3938 ... Electric wire rope hoists.
2.2 IS 807 ... Code of practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.
2.3 IS 2758 ... Mild steel point hooks for use with wire rope thimbles.
2.4 IS 3815 ... Point hooks with shanks for general engineering purposes
2.5 IS 2266 ... Steel wire rope for general engineering purpose.
2.6 IS 3681 ... General plan for spur and helical gears.
2.7 IS 325 ... Three-phase induction motors.
2.8 IS 694 ... PVC insulator cables for working voltage upto and 1100V.
2.9 IS 4691 ... Degrees of protection provided by enclosures for rotating electrical machinery.
2.10 IS 2062 ... Weldable structural steel
2.11 IS 816 ... Code of practice for metal arc welding for general engineering construction in mild steel.
2.12 IS 2074 ... Ready mixed paint air drying red oxide-zinc chrome, priming.
2.13 IS 2932 ... Enamel synthetic, exterior (a) under coating, (b) finishing.
2.14 IS 3177 .... Code of practice for electric over head travelling crane and gantry crane other than steel work cranes.
2.15 IS 13947 (Part I) Specification for low-voltage switchgear & controlgear

3.0 DESIGN AND CONSTRUCTURAL REQUIREMENTS:

3.1 **Electrically operated Under Hung Crane & Trolley With Hoist** : All equipments shall be designed for OUTDOOR application suitable for ambient temperature range of 0 to 50° C. Purchaser will provide electric supply at one or more points near to the monorail/runways as required in the layout. Service class to be considered for design of trolley with hoist and under hung crane shall be as per class 2 of IS 3938 and IS 3177 / IS 807 respectively. All material used for construction of different components shall individually conform to standard in clause 2.0. All welds shall conforms to IS 1024 and welders shall be qualified to AWS D1.1

TROLLEY WITH HOIST & UNDER HUNG CRANE

3.1.1 **HOOKS** : Hooks shall meet the dimensional, material testing & inspection requirement of IS 3815. 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 forged along with the hook. Welding of lugs 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 (with minimum tensile strength 50-62 Kg/sqmm.) and made by controlled grain forging and normalised. All the hooks shall be tested for twice the safe working load. One hook for every batch shall be destructive tested for 5 times of SWL after proof load. All hooks shall be examined by MPI / LPI & UT for cracks after proof load test. The hook shall not distort or fracture. Ball & roller bearings shall not be used in these hooks. UT required for hooks >5.0T capacity.

3.1.2 **WIRE ROPE** : Shall have six strands of 37/36 wires per strand with an ultimate tensile strength of 180 Kg/sq.mm. The wire rope shall be galvanised as per IS 1835 type B. All wire ropes shall be proof load tested for 2 times of SWL/Fall. One sample for every batch of wire rope shall be tested for breaking. Breaking load shall not be less than five times SWL/Fall. The rope shall be of sufficient length to retain two full wraps on the drum at lowest hook position. Wire ropes shall meet the requirement of IS 2266.

3.1.3 **DRUM AND SHEAVE** : Drum shall be of welded steel or seamless steel and Sheave shall be of cast or welded steel. The drum shall accommodate all the length of rope required for the lift plus two dead wraps at each anchor point without overlap. 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.

3.1.4 **GEARS AND PINIONS** : Material of construction shall be conforming to relevant Indian Standard or equivalent and case hardened. Hardness for CT & LT shall be minimum 250BHN for pinions and 200BHN for gears. Hardness for hoisting shall be minimum 350BHN for pinions & 320BHN for gears shall be maintained. However vendor shall maintain and ensure that gear hardness is always less than pinion hardness by atleast 35BHN. Helical gears only shall be used for hoists and for CT & LT, spur / helical gears shall be used. All gears and pinions shall be examined by LPI/MPI for surface cracks after hardening.

3.1.5 **WHEELS**: Shall be made out of forged or low carbon steel/cast steel with heat treated to 200 to 250 BHN hardness. The drive gears, if any, integral with the wheel shall be of the same material and hardness. Trolley wheels for hoists shall be spur geared type, cast / forged 4 wheeled & driven by motor.

3.1.6 ROTATING AND 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/sqmm. and hardness shall be in the range of 225 to 250BHN. Shafts shall be tested with UT for more than 50mm. dia. UT acceptance norms shall be as per ASME section VIII; Division 2.

3.1.7 BEARINGS : Shall be reputed make (FAG/SKF/TATA/NBC) and shall meet relevant IS standards. All bearing shall be designed to give a minimum service life of 20 years.

3.1.8 BRAKES : Hoisting, cross travel and long travel shall be provided with electro-mechanical friction shoe type brake or conical disc type brakes. 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 load at any desired location with minimum slip. Slip with reference to speed shall be specified along with the offer.

3.1.9 TROLLEY : Shall be of 4 wheeled spur geared type and fabricated construction. Trolley shall be designed to suit the monorail size. (Which will be furnished by purchaser during drawing approval.)

3.1.10 FRAME : The frame shall be designed to proper strength, built from steel plates with bolted/welded construction.

3.1.11 END CARRIAGES : Shall be of 4 wheeled spur geared type and fabricated construction. Suitable wheel base shall be provided. End carriages shall be designed to suit the runway beam size. (Which will be furnished by purchaser during drawing approval.) End carriages shall be connected with crane girder by welding or by fasteners (For ease of transportation, if welding required, the same shall be done at site by purchaser).

3.1.12 CRANE GIRDERS : Crane girders shall be of rolled section. Fabricated beam and welded beam shall not be used for this purpose unless otherwise specified by the purchaser for special cases. For details refer annexure - I to this specification. Camber / deflection under load shall be within SPAN / 1000 mm.. In case vendor desires to provide higher camber, same shall be clearly specified in the drawing. In any case camber provided shall not exceed -

*** In case of double girder crane :**

Span/1000mm plus deflection under self load of trolley with hoist/2

*** In case of single girder crane :**

Span/1000mm plus deflection under self load of trolley with hoist.

Allowable bend shall be 1mm/metre and maximum bend shall not exceed 6mm of total span.

3.1.13 Buffers shall be provided for stopping the crane.

3.1.14 Suitable anti tilt, roller arrangement and anti topple arrangement shall be provided in between runway beam and crane girder to avoid toppling of the equipment while the hoist is at overhang side.

3.2 **DOWN SHOP LEADS(DSL) :** DSL system shall be designed to transfer the power supply from end user supply point to the equipment, which is moving on runway beams / monorails. The DSL system shall be of Cable trolley type or Taut wire loop type as per contract requirement.

3.2.1.0 **CABLE TROLLEY TYPE** : Cable trolleys shall run on "Tee" track.

The system shall consist of :

3.2.1.1 "Tee" track

3.2.1.2 Cable Trolleys

3.2.1.3 Flexible power cable (Fixed & Trailing)

3.2.1.4 Switch fuse units / Isolators

3.2.1.5 Supports for Auxiliary girder or "Tee" track

3.2.1.6 Link chain.

3.2.1.7 Fasteners

3.2.2.0 **CONSTRUCTION :**

3.2.2.1 **"Tee" TRACK** : The system shall be provided with rolled sections suitable for cable trolley wheels as per the relevant Indian Standard.

3.2.2.2 **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.

3.2.2.3 **FLEXIBLE POWER CABLE** : 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 and other relevant Indian standard for the equipment under supply. For sub-vendor list refer clause no 3.12.0. Vendor shall indicate the weight of total cable in the drawing.

3.2.2.4 **SWITCH FUSE UNITS or ISOLATORS:** The system shall be supplied along with suitable switch fuse units / isolators to take the full load current, when the equipment(trolley with hoist and under hung crane) is working with maximum safe working load. For sub-vendor list refer clause no 3.12.0

3.2.2.5 **SUPPORTS** : The system shall be provided with suitable supports to take the load of "Tee" track, cable trolleys, power flexible trailing and other materials.

3.2.2.6 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 5mm diameter carbon steel wire.

3.2.2.7 FASTENERS : Suitable fasteners shall be provided. Fasteners shall be electro - galvanised / Hot dipped.

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

3.2.3.1 Bracket
3.2.3.2 End hook
3.2.3.3 Flexible power cable (Fixed & Trailing)
3.2.3.4 Switch fuse units/Isolators
3.2.3.5 Reel insulator
3.2.3.6 Steel wire rope
3.2.3.7 Rope clamp & thimble
3.2.3.8 Leather belt or nylon wire rope
3.2.3.9 Fasteners.

3.2.4.0 CONSTRUCTION :

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

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

3.2.4.3 Flexible power cable (Fixed & Trailing): 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 (all motors running simultaneously) for the equipment under supply. The power supply flexible trailing cable shall comply with latest revision of IS 694 and other relevant Indian standard for the equipment under supply. For sub-vendor list refer clause no. 3.12.0

3.2.4.4 SWITCH FUSE UNITS or ISOLATORS: The system shall be supplied along with suitable switch fuse units/isolators to take the full load current, when the equipment (trolley with hoist and under hung crane) working with maximum safe working load. For sub-vendor list refer clause no. 3.12.0

3.2.4.5 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.

3.2.4.6 Steel wire rope : Steel wire rope shall be of minimum 6mm diameter as per latest revision of IS 2266. Steel wire rope shall be suitably sized for load of cable without sagging for the total travel length.

3.2.4.7 Rope clamp & thimble : Suitable rope clamps and thimbles shall be provided to tie the rope with bracket through end hook.

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

3.2.4.9 Suitable fasteners shall be provided wherever required. Fasteners shall be electro-galvanised / hot dipped.

INTERLOCK MECHANISM (Male & Female)

3.3.0 Interlock mechanism (male & female) : Male & female interlock mechanism shall be designed to transfer the trolley with hoist with rated safe working load from master crane to slave crane or master crane to fixed monorails and vice versa. The interlock mechanism shall be capable of withstanding the forces when one of the cranes is being operated by mistake. The cross travel stoppers should give way to the hoist when interlock mechanism is coupled. Dimensional tolerance for the male & female component of the interlock mechanism shall be very close which will ensure proper locking without play and smooth transfer of trolley from one crane to the other.

3.3.1 Hand wheel with chain of suitable length shall be provided to operate the male & female mechanism manually from operating floor.

3.3.2 Male and female interlock mechanism shall be designed suitably to take the axial load and safe working load.

3.4 LUBRICATION : Grease nipples shall be provided at all lubrication points. The lubrication points shall be easily accessible. Frequency of lubrication shall be minimum. Oil bath lubrication shall be preferred.

3.5 FASTENERS : All fasteners shall be made of precision grade high tensile steel (Grade 8.8 class) and galvanised as per relevant Indian standard. Load bearing fasteners shall be of specially machined bolts with suitable material and preservatives applied on it. For special bolts / fasteners, vendor shall furnish material, tensile strength and hardness in the arrangement drawing.

3.6.0 ELECTRICALS AND CONTROLS

3.6.1 CT, LT AND HOISTING MOTORS (AC; NON-FLAME PROOF)

3.6.1.0 Site condition

3.6.1.1 Altitude above sea level	:	Less than 5000m.
3.6.1.2 Ambient temp. Condition	:	50°C
3.6.1.3 Relative Humidity	:	100%
3.6.1.4 Atmosphere	:	Dusty, salty, corrosive and highly polluted.
3.6.2 Standard (Latest revision)	:	IS 325
3.6.3 Application	:	Trolley with hoist and Under Hung Crane
3.6.4 Duty cycle	:	Continuous S3/S4 ; Duty factor : 40% CDF.
3.6.5 Rated voltage, frequency	:	415V, ±10%; 50 Hz±5% and combined 10% absolute
3.6.6 Minimum starting voltage	:	80% of the rated voltage (Cl. 3.6.5).
3.6.7 Capacity to restart (at Voltage specified point no. 3.6.5)	:	No limitation on no. of starts. Application calls for many starts at frequent intervals. Vendor to specify on any limitation.
3.6.8 Direction of rotation	:	Bi-directional
3.6.9 Class of insulation	:	Class 'F' temp. rise limited to class 'B'
3.6.10 Winding treatment	:	The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot humid and tropical climate.
3.6.11 Temperature raise	:	With in specified limits. vendor to specify
3.6.12 Starting current	:	Vendor to specify.
3.6.13 Method of motor starting	:	DOL
3.6.14 Type of enclosure	:	IP 55 as per IS 4691. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.
3.6.15.0 Terminal Box	:	
3.6.15.1 Type	:	Weather proof IP 55
3.6.15.2 Cable gland	:	Double compression type.
3.6.15.3 Cable entry	:	Suitable for both, top and bottom entry.
3.6.16 Type of terminals	:	stud type with plain washers, spring washers / check nuts & Lugs.
3.6.17 Fault level	:	50 KA at 415V.
3.6.18 Painting	:	Epoxy based paint with grey colour & 40 microns DFT (Minimum).

3.6.19 Terminals	:	Separately terminated with clear identification in main terminal box with double compression type glands.
3.6.20 Lifting device	:	Eye bolt or lugs to facilitate safe lifting.
3.6.21 Documents to be furnished along with offer	:	1. Technical data sheets as per annexure -III to this specification. 2. Motor characteristic curves.
3.6.22 Inspection & Testing	:	Vendor to submit Quality plan

NOTE: Motor shall conform to IS 325 and the additional specific requirements brought out above. If motors are of special design other than standard, the same shall be witnessed during testing by BHEL or its appointed representative (Type & Routine test).

3.7.0 CONTROLS/INTERLOCKS :

The control system shall envisage a control cabinet and a push button operating station. The push button control shall have control for power switching to the motors and forward/reverse motion. The control voltage of both cabinet and push button station shall be 110V AC 50 HZ., single phase. The control stations shall have enclosure protection of IP 55. Necessary electrical interlocks shall be included in control cabinet for fail safe operation. Vendor shall clearly bring out all the interlocks in the control wiring drawing and submit the same for approval. Limit switches / Torque switches shall be provided for long travel, cross travel and hoist. These switches shall be interlocked to cut off power to the motor and restrict further movement when the limits are crossed. Crimping tool shall be used for fitting lugs.

3.8.0 CONTROL CABINET

3.8.1 APPLICATION :To house all the power contactors, control transformers, control relays, fuses, indicating lamps, switches and protection circuits of all motors of hoist.

3.8.2 TYPE : Wall mounting type. Normally mounted on a frame work of the hoist. The cabinet shall be made of minimum 1.5mm thick cold rolled sheet.

3.8.3 MOTOR PROTECTION : All motor shall be protected against under voltage, over load and short circuit condition.

3.8.4 ISOLATOR : Input power to the cabinet through switch fuse unit is required.

3.8.5 CONTROL RELAYS : Shall be provided suitably wherever required.

3.8.6 INDICATING LAMPS : Shall be provided wherever required.

3.8.7 TERMINAL BLOCKS : Clip on type. Suitable for 1.5 sqmm. copper conductor. 20% of additional terminal blocks shall be supplied as spares along with the supply.

3.8.8 CUSTOMER SUPPLY VOLTAGE : 415V 50 Hz. 3 phase

3.8.9 CONTROL VOLTAGE : 110V 50 Hz.

3.8.10 ENCLOSURE PROTECTION : IP 55 as per IS 13947(part I). Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

3.8.11 GLANDS : Shall be double compression type. To be included in vendor scope as per requirement.

3.8.12 INTERNAL WIRING :

1. PVC 650/1100V Grade 1.5 sqmm. multistrand/copper conductor.
2. All control power wiring with red and black.
3. All control wiring are to be with grey wire & shall be marked with ferules as per wiring diagram.

3.8.13 PAINTING : Exterior : Grey ; Interior : Brilliant white - glossy finish with enamel paint. For special painting if any, refer annexure - II to this specification.

3.8.14 PAINT THICKNESS : Exterior - 120 microns ; Interior - 80 microns - minimum

3.8.15 DIMENSION : Vendor to specify. The dimensional drawing, internal layout, wiring drawings shall be submitted for approval prior to manufacture.

3.9.0 CONTROL BOX

3.9.1 TYPE : Pendant station to house all start/stop/forward/reverse/up & down push button for all motors.

3.9.2 LOCATION : Hanging from equipment.

3.9.3 PUSH BUTTON : For all start green push button and for stop red push button shall be used. Make shall be of Siemens/L&T/EE. Push button shall return to "off" position when released. One stop push button shall be lockable to enable switch off power supply when equipment in not in use.

3.9.4 CONTROL VOLTAGE : 110 V AC 50 Hz. Single phase.

3.9.5 ENCLOSURE PROTECTION : IP 55 as per IS 13947 Part I. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

3.9.6 BOX MATERIAL : Cold rolled sheet steel with 1.5mm thickness minimum.

3.10.0 **CABLING** : Vendor shall include all the power and control cables necessary for the system. The cable shall comply with IS 694. The power cable shall be (FRLS) of copper PVC flexible and vendor shall indicate the conductor size and over all size in the offer for all the motors. The control cable shall be armoured of 1.5 sqmm copper conductor only. The no. of cores, cable size etc shall be indicated in the offer. There shall be 20% spare cores available for all control cables offered.

3.11.0 **EARTHING** : The total earthing shall comply with Indian electricity rules. All motor cabling shall be earthed at both ends through a copper conductor of suitable size. All the control cabinets / push button stations shall be earthed through a copper conductor of suitable size. All the earth leads shall lead to the existing earth bus.

3.12.0 ***Electrical & Control Items Shall Be Of As Per The Approved Sub-Vendor/Make List Given Below.***

3.12.1 CONTROL & OVER LOAD RELAYS	:Siemens / BCH / L&T / EE Telemechanic
3.12.2 PUSH BUTTONS	:Siemens / L&T / BCH / EE Cands / Vaishno
3.12.3 FUSES	:Siemens / L&T / EE
3.12.4 TRANSFORMERS	:SE / Kappa / Ind Coil
3.12.5 MOTORS	:NGEF / Kirloskar / Siemens Crompton Greaves
3.12.6 CONTACTORS	:Siemens / BCH / L&T / EE Telemechanics
3.12.7 LIMIT SWITCHES	: BCH / Omron / Nucon / Festo
3.12.8 LUGS	:Dowells / 3D
3.12.9 POWER & CONTROL CABLE (FRLS)	:CMI LTD. / Delton Cables / Fixwell Pushincords / Asian cables / Cable corporation of India / Finolex /Incab
3.12.10 CABLE GLANDS	:Comet brass products Power engineering co. Standard metal industries.
3.12.11 TERMINAL BLOCKS	:Elmax / Essun / Asia
3.12.12 ISOLATOR / SWITCH FUSE UNITS	:Siemens / L&T / EE
3.12.13 POWER SWITCHES	:Siemens / L&T / EE
3.12.14 SELECTOR & CONTROL SWITCH	:Siemens / L&T / kaycee
3.12.15 INDICATION LAMPS	:Siemens / Cands / EE

4.0 PAINTING, PROTECTION, PACKING, SUPPLY and IDENTIFICATION:

4.1 SURFACE PREPARATION : Weld slag & spatter shall be removed and the surfaces to be coated shall be free from contamination. Surface defects shall be removed by suitable methods. Sharp edges shall be smoothened by grinding. Prior to surface preparation oil, grease, drilling emulsions, cutting emulsions and preservative agents shall be carefully removed by suitable solvents. The surface shall be carefully dried with clean cloths to prevent the dissolved impurities from spreading over the entire surface. The surface shall be cleaned by wire brush and shot blasting if required. Proper adhesiveness of paint to the surface shall be ensured.

4.2 PAINTING: Two coat of red oxide with minimum 40 microns DFT as per IS 2074 and two coats of synthetic enamel paint with minimum 40 microns DFT as per IS 2932. For special requirements if any refer annexure -II.

4.2.1 COLOUR SCHEME

4.2.1.1	Under hung crane	:	Golden Yellow
4.2.1.2	Trolley with hoist	:	Golden Yellow
4.2.1.3	Interlock mechanism	:	Ash grey
4.2.1.4	DSL Components	:	Ash Grey
4.2.1.5	Hook	:	Black

4.3 All the despatchable units shall be packed in a wooden case with water proof material.

4.4 The material shall be despatched with clear bill of material for each system.

4.5 Each and every despatchable items shall be identified with item no, Purchase Order reference number and tagged properly for easy identification.

5.0 INSPECTION AND TESTING :

5.1 Purchaser's(BHEL) 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.

5.2 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 / Sub-vendor's works.

5.3 The Trolley with hoist shall be run 5 times at manufactures works. All the 5 runs shall be tested with 125% safe working load with out 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.

5.4 The brakes for hoisting, long travel 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.

5.5 Test shall be conducted for effectiveness of automatic devices for hoist to limit the upward/downward & travel of hoist and to limit the forward & reverse travel of crane. Top 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.

5.6 Over load relay shall be tested for lift & cross travel and sustain 125% safe working load. Long travel with 125% SWL shall be tested at site by purchaser / end user and if found defective, the same shall be replaced at free of cost by vendor.

5.7 Trolley with hoist and under hung crane gears shall be tested with & without load for alignments and smooth operation.

5.8 Equipment shall be tested for hoisting and cross travel with 125% SWL.

5.9 Hoisting, and cross travel speed shall be tested and shall ensure the tolerance with in 10%. Hoisting and CT shall be tested for minimum 2.0m. for hoisting height & cross travel length. Long travel speed shall be tested at site. 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 resolve by the vendor at site at his cost.

5.9.1 Long travel shall be tested at site with and without safe working load by purchaser / end user and if found defective, the same shall be replaced at free of cost by vendor.

5.10 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.

5.11 HOOKS :

5.11.1 Raw material test certificate shall be submitted from manufacturer.

5.11.2 Proof load test 200% of SWL on each hook irrespective of capacity.

5.11.3 Chemical composition and destructive test shall be carried out on one sample per batch.

5.11.4 After proof load test, hook shall be examined for cracks, deformation, flaws and other defects with LPI / MPI & UT. No linear indications or cracks are acceptable while carrying-out LPI / MPI. Acceptance norm for UT shall be as per ASME - Section VIII - Division 2.

5.12.0 UNDER HUNG CRANE

5.12.1 Check the dimensions of the under hung crane as per relevant standard.

5.12.2 DEFLECTION TEST : Under hung crane shall be tested for deflection with safe working load at the middle point of the span. Datum line for deflection is obtained by placing hoist at one extreme of the span with hook approach. The deflection with SWL at centre of span compared with this datum should be less than SPAN/1000.

5.13 DOWN SHOP LEAD SYSTEM (DSL)

5.13.1 Cable trolley shall be tested for smooth running on "Tee" track with cable load.

5.13.2 Cable reel insulator shall be tested for smooth running on steel wire rope with cable load.

5.14 ELECTRICAL COMPONENTS

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

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

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

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

5.14.5 Degree of protection test report shall be submitted. (type test report)

5.14.6 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.

5.14.7 TC for control panel, pendant stations and motors shall be provided. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

6.0 DOCUMENTS BY VENDOR

6.1.0 **Documents along with the offer : (Three sets)**

6.1.1 Quality plan, General arrangement and cable trolley arrangement drawings with complete bill of materials. All despatchable components / assemblies shall be indicated in detail. Sub-vendor items. make also shall be indicated in the drawing.

6.1.2 Wiring circuit diagram with details of make, type and rating of all components.

6.1.3 Spares list for 3 years trouble free operation with price.

6.1.4 Duly filled-in and signed General Data Sheet (Annexure - III) for trolley with hoist, under hung crane and down shop lead system with all required details .

6.1.5 Write up on special features if any.

6.1.6 Technical specification for equipment.

7.0 DOCUMENTS AFTER PLACEMENT OF PURCHASE ORDER. :

7.1 **Quality plan is to be submitted by vendor for purchaser's approval.**

7.2 Dimensional drawings of Under Hung Crane, Trolley With Hoist, Down Shop Leads, cable trolley, control panel and wiring diagram with B O M for approval.

7.3 **Following test certificates shall be provided during supply.**

7.3.1 Physical, Chemical, NDE and hardness test certificates shall be provided wherever applicable for trolley / crane wheels, wire ropes, pulleys, hook, gears, pinions, and shafts.

7.3.2 Test certificates for having carried out the tests as per clause 5.0 of this specification under purchaser and end user (if required) presence.

7.3.3 Test reports for wire rope and hooks.

7.3.4 Test reports for NDT examination of gears, wheels, pinions and hooks.

7.3.5 Type test and routine test certificates for motors and as per IS 325.

7.3.6 Performance test certificates for UHC, TWH, safety devices and other electrical items.

7.3.7 TC for control panel, pendent stations and motors shall be provided. Weather protection type test certificate shall be furnished. Drawing showing constructional features of item subjected to weather protection test should form part of test certificate and drawing no. shall appear on TC.

7.3.8 26 sets of operation and maintenance manuals shall be provided with details for storage, installation, erection procedures, drawings, motor data sheet, operating and trouble shooting, lubrication schedule, spares data, spares identification drawings, spares replacement procedure and special requirements if any. All copies are to be sent to BHEL / Tiruchirappalli.

7.3.9 Floppies copied with arrangement drawings for equipment under supply to be provided to purchaser.

8.0 DRAWINGS AND O & M MANUALS :

8.1 The drawings furnished with the offer shall clearly indicate the items (bill of materials) that go to make the trolley with hoist, under hung crane, DSL system and interlock mechanism. The drawings shall clearly indicate the weight particulars of such items/sub assembly that will be despatched as loose items in cases / packings. The bill of material shown in the drawing shall match with that of the despatchable unit as indicated in the packing slip. The drawing shall be prepared in AUTOCAD and vendor shall forward both hard copies(3 numbers each) and floppy(Copied with drawing files) to the purchaser.

8.2 Catalogues and other details of the product shall be submitted along with the offer.

8.3 The vendor check list shall be filled up at the manufacturer's works and shall be duly signed by inspection engineer and manufacturer's representative.

8.4 O & M MANUALS

8.4.1 Number of copies required is 26

8.4.2 Manuals should be in printed form only.

8.4.3 The size of manuals should be in correct A4 size with drawings in A3 size. Large size drawings (greater than A3 size) should be reduced in A3 size and inserted.

8.4.4 Drawings shall be of printed or laser printed only.

8.4.5 Spiral or comb bound copies should be totally avoided.

8.4.6 If manuals are supplied in folders, the folder shall have 3 hole punching system.

8.4.7 O & M manuals, shall be submitted to BHEL / Tiruchirappalli prior to despatch of the equipment.

8.4.8 Manual, generally should contain the following :

8.4.8.1 Data sheet

8.4.8.2 Brief description

8.4.8.3 Operation

8.4.8.4 Maintenance (including lubrication, where necessary) and service, recommended spares for 2/3 years trouble free service.

8.4.8.5 Trouble shooting

8.4.8.6 Assembly drawings with part list, dimensional drawings & other applicable drawings.

8.4.9 Manuals should pertain only to the types or model supplied for the particular contract. Copies are to be sent to BHEL / Tiruchirappalli only.

9.0 GUARANTEE REQUIRED: 18 months from the date of commissioning or 24 months from the date of supply.

10.0 REMARKS :

10.1 Operating instruction manuals, certificates etc. shall be despatched to BHEL / Tiruchirappalli only.

10.2 Two sets of asbuilt arrangement drawings and electrical circuit drawings shall be sent along with the consignment.

10.3 It is suggested that vendor shall prepare all the O & M manuals in electronic media which will be the requirement in the days to come.

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :
Enquiry No.:

The following data sheet is to be filled by the vendor and submitted along with the offer. This data sheet shall form part of ordering specification and shall be approved by Engineering On acceptance of the offer.

TECHNICAL DATA SHEET FOR ELECTRICALLY OPERATED UNDER HUNG CRANE & TROLLEY WITH HOIST

CR1.0	Under hung crane					
CR1.1	Capacity - in tons					
CR1.2	Span - in m					
CR1.3	Overhang on either side - in mm					
CR1.4	Runway beam size (User / Purchaser) Will be furnished during vendor drawing approval.					
CR1.5	Operating floor - in m					
CR1.5.0	Wheels					
CR1.5.1	Wheel shape whether match with runway beams	Yes / No				
CR1.5.2	Wheel material					
CR1.5.3	Wheel diameter - in mm					
CR1.5.4	Wheel base - in mm.					
CR1.6.0	Brakes					
CR1.6.1	Operation	Electrical / Mechanical				
CR1.6.2	Shoe Material					
CR1.6.3	Type					
CR1.6.4	Make					
CR1.7.0	Crane girder					
CR1.7.1	Type	Single / Double / Box				
CR1.7.2	Size					
CR1.7.3	Material					
CR1.8.0	Wheel bearing					
CR1.8.1	Type					
CR1.8.2	Size					
CR1.8.3	Make					
CR1.9.0	Crane speed					
CR1.9.1	Maximum speed in m/min					
CR1.9.2	Minimum speed in m/min					
CR1.10.0	Weight of the crane - in Kgs.					
CR1.11.0	Dimensions of crane					

Vendor Name :
Signature :
Date :

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :
Enquiry No.:

CR1.12.0	Shaft					
CR1.12.1	Material					
CR1.12.2	Hardness					
CR1.13.0	Gears / Pinions					
CR1.13.1	Material					
CR1.13.2	Hardness					
CR1.14.0	Limit switch					
CR1.14.1	Type					
CR1.14.2	Make					
CR1.14.3	Rating					
CR1.15.0	Crane Motors					
CR1.15.1	Rating					
CR1.15.2	Type					
CR1.15.3	Make					
CR1.15.4	Power factor of motor					
CR1.15.5	Quantity					
CR1.16.0	Power supply					
CR1.16.1	Power supply rating for equipment					
CR1.16.2	Power supply rating for control					
CR1.17.0	End stopper					
CR1.17.1	Provided	Yes / No				
CR1.17.2	Type					
CR1.18.0	Clearance between Runway beam bottom & Crane girder top - in mm					
HOI.1.0	Trolley With Hoist					
HOI.1.1	Capacity - in tons					
HOI.1.2	Lift - in m					
HOI.1.3	Headroom - in mm					
HOI.1.4	Approximate Hoist dimension					
HOI.1.5	Operating floor - in m					
HOI.1.6	Approximate weight - in Kgs					
HOI.2.0	Hoist brake					
HOI.2.1	Type					
HOI.2.2	Shoe material					
HOI.2.3	Make					
HOI.3.0	Cross travel brake					
HOI.3.1	Type					
HOI.3.2	Shoe material					
HOI.3.3	Make					

Vendor Name
Signature
Date

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :

Enquiry No.:

HOI.4.0	**Hoist speed**					
HOI.4.1	Maximum speed - in m/min					
HOI.4.2	Minimum speed - in m/min					
HOI.5.0	**Cross travel speed**					
HOI.5.1	Maximum speed - in m/min					
HOI.5.2	Minimum speed - in m/min					
HOI.6.0	**Trolley wheels**					
HOI.6.1	Wheel diameter - in mm					
HOI.6.2	Material					
HOI.6.3	Hardness					
HOI.6.4	Quantity					
HOI.7.0	**Rope**					
HOI.7.1	Rope construction					
HOI.7.2	Rope diameter - in mm					
HOI.7.3	Number of falls					
HOI.7.4	Ultimate tensile strength					
HOI.7.5	Whether wire rope has sufficient extra length to retain two full wraps on the drum	Yes / No				
HOI.7.6	Rope / Core material					
HOI.8.0	**Rope drum**					
HOI.8.1	Diameter - in mm					
HOI.8.2	Material					
HOI.9.0	**Gears & Pinions for Hoisting**					
HOI.9.1	Material					
HOI.9.2	Hardness					
HOI.10.0	**Gears & Pinions for Cross travel**					
HOI.10.1	Material					
HOI.10.2	Hardness					
HOI.11.0	Hook					
HOI.11.1	Material					
HOI.11.2	Hardness					
HOI.11.3	Capacity - in tons					
HOI.11.4	Safety latch provided in the hook	Yes / No				
HOI.11.5	Bearing in the swivel hook					
HOI.11.6	Locking arrangement of hook	Yes / No				
HOI.12.0	**Bearing for Cross Travel**					
HOI.12.1	Type					
HOI.12.2	Size					
HOI.12.3	Make					

Vendor Name

Signature

Date

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :
Enquiry No.:

HOI.13.0	Bearing for Hoist					
HOI.13.1	Type					
HOI.13.2	Size					
HOI.13.3	Make					
HOI.14.0.	Hoist motor					
HOI.14.1	Rating					
HOI.14.2	Type					
HOI.14.3	Make					
HOI.14.4	Power factor of motor					
HOI.14.5	Quantity					
HOI.15.0	Cross travel motor					
HOI.15.1	Rating					
HOI.15.2	Type					
HOI.15.3	Make					
HOI.15.4	Power factor of motor					
HOI.15.5	Quantity					
HOI.16.0	Limit switch for Hoist					
HOI.16.1	Type					
HOI.16.2	Make					
HOI.16.3	Rating					
HOI.17.0	Limit switch for Cross travel					
HOI.17.1	Type					
HOI.17.2	Make					
HOI.17.3	Rating					
HOI.18.0	Power supply					
HOI.18.1	Power supply rating for equipment					
HOI.18.2	Power supply rating for Control					
HOI.19.0	Type of Control					
HOI.19.1	Location of Control					
DSL.1.0	DSL system for Long Travel - in m.					
DSL.1.1	Travel length - Wire / Cable trolley					
DSL.1.2	Type					
DSL.1.3	Cable size & rating					
DSL.1.4	Loop size					
DSL.1.5	Link chain size / diameter					
DSL.1.6	Pitch between two cable trolleys					
DSL.1.7	Pendent switch					
DSL.1.8.0	Isolators / Switch fuse units					
DSL.1.8.1	Type					
DSL.1.8.2	Rating					
DSL.1.9	Earthing conductor					

Vendor Name
Signature
Date

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

Project :
Enquiry No.:

DSL 2.0	**DSL system for Long Travel - In m.**					
DSL 2.1	Travel length - Wire / Cable trolley					
DSL 2.2	Type					
DSL 2.3	Cable size & rating					
DSL 2.4	Loop size					
DSL 2.5	Link chain size / diameter					
DSL 2.6	Pitch between two cable trolleys					
DSL 2.7	Pendent switch					
DSL 2.8.0	Isolators / Switch fuse units					
DSL 2.8.1	Type					
DSL 2.8.2	Rating					
DSL 2.9	Earthing conductor					

DATA SHEET - AC MOTORS
TECHNICAL DATA SHEET FOR NON-FLAME PROOF MOTORS

EL.1	Application					
EL.2	Manufacturer					
EL.3	Type, frame size & degree of protection					
EL.4	Rated output in Kw & rated speed					
EL.5	Full load current					
EL.6	Full load efficiency & power factor					
EL.6.1	Duty cycle					
EL.7	Rated torque					
EL.7.1	Starting current					
EL.8	Starting torque in % of full load torque					
EL.9	Pull up torque in % of full load torque					
EL.10	Pull out torque in % of full load torque					
EL.11	No load starting time					
EL.12	Stator winding connection					
EL.13	Type & no. of terminals brought out					
EL.14	Resistance / phase					
EL.15	Qty. & power consumption of space heaters					
EL.16	Gland size for space heaters					
EL.17	Cable entry					
EL.18	Cable gland - Double compression					
EL.19	GD^2 of motor					
EL.20	Total weight of motor					
EL.21	Anticipated bearing life					
EL.22	Method of connection to driven equipment					

Vendor Name
Signature
Date

Annexure-III to Specification MHS-HEQ/073 - Rev. 02

roject :

nquiry No.:

TC.1.0 Test certificates to furnished along with the supply

TC.1.1	Hoist load test					
TC.1.2	Crane load test					
TC.1.3	Over load relay test					
TC.1.4	Deflection test for crane					
TC.1.5	Long Travel movement test					
TC.1.6	Cross travel movement test					
TC.1.7	Dimensional checks					
TC.1.8	Insulator test on electrical circuit					
TC.1.9	High volt test on electrical circuit					
TC.1.10	Hook type & load test					
TC.1.11	Wire rope load test					
TC.1.11.1	Individual Hooks are identified	Yes / No				
TC.12	NDT for gears, wheels, shafts & hooks					
TC.13	NDT as per Quality plan & Specification					
TC.14	Material test certificates					
TC.15	Motor routine, type & weather protection TCs					
TC.16	Control panel & Pendent FR, HV & physical inspection record and weather protection TC					

D.1.0 TYPICAL DRAWINGS / DOCUMENTSTO BE FURNISHED ALONG WITH THE OFFER

D.1.1	Genl. arrangement / Assy. of Cranes	
D.1.2	Genl. Arrangement / Assy of Hoists	
D.1.3	Genl. Arrangement / Assy for DSL system	
D.1.4	Genl. Arrangement / Assy for Male & Female interlock mechanism	
D.1.5	Errection drawings for Cranes, Hoists & DSL system	
D.1.6	Electrical Wiring / Circuit diagram	

Vendor Name

Signature .

Date

OFFER WITHOUT CE MARKING WILL NOT BE ACCEPTABLE

SPEC NO.: FBL&HRSG : 99100 : 012 / REV 00

Bharat Heavy Electricals Limited
BOILER AUXILIARIES PLANT, RANIPET-632406

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TECHNICAL SPECIFICATION FOR

ELECTRICALLY OPERATED HOIST

PROJET KONIAMBO
l'Usine du Nord
Nouvelle-Calédonie

KONIAMBO HATCH Technip

Requisition Number:	319000-00420-MR-0150-0003
Purchase Order Number:	
Equipment / Item Tag:	Electrically Operated Hoist
Equipment / Item Description:	
HT Document Number:	319000-00420-A0103-0150-0003-7117
Document Category:	

Stamp

Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.

Rev	Date	Written By	Checked By	Approved By	Status
0A	06-12-2008	REMYA	S RANGARAJAN	S RANGARAJAN	

02	63A FSU WITH ENCLOSURE SUITABLE FOR OUTDOOR INSTALLATION	NO	1
03	TRAILING FLEXIBLE COPPER CABLE FOR POWER SUPPLY	MR	30
04	GALVANISED LINK CHAIN	MR	22
05	CABLE TROLLEY ASSEMBLY	ST	10
06	AUXILIARY GIRDER ASSEMBLY FOR TRAILING CABLE FOR A CROSS TRAVEL LENGTH OF	MR	20
07	RAIN HOOD FOR HOIST MOTOR, CROSS TRAVEL MOTOR AND CONTROL BOX	ST	1
08	GREASE GUN WITH GREASE	NO	1
09	COUNTER WEIGHT FOR HOIST (IF APPLICABLE)	ST	1

6.0.0 DESIGN REQUIREMENT

Electrical hoists and trolley shall be complete with hoist and cross travel motor, electromagnetic fail safe brakes for hoisting & cross travel, wire rope drum, wire rope, hook, gear box for cross travel & hoist, wheels with trolley for the hoist, necessary gearing, sheaves, guides, weather and dust proof pendant push button station, FSU, control panel, all wiring, 4 core trailing cable for power supply connection, complete supporting arrangement for flexible trailing cable including Auxiliary Girder assembly, cable trolleys, galvanised drag (link) chain, pendant cable with chain, limit switches for over hoisting & over lowering and limits switches for extreme right & left positions, earthing terminals, Rain Hoods (for Hoist motor, CT motor & Control Panel), Grease Gun with grease and other accessories to make system complete and ready for installation. The hoist assembly shall be fully balanced. Counter weight, if any, required shall also be supplied as a part of the system. The materials selection shall be suitable for transportation through sea.

7.0 FEATURES OF CONSTRUCTION (MECHANICAL SYSTEM)

7.1.0 DRUM

Rope drum shall be cast/ seamless/ welded fabricated to sustain concentrated loads resulting from the rope pull. Drum shall be machine grooved right or left or both with grooves of a proper shape to suit the ropes used. Drum shall accommodate all the length of the rope required for the lift plus two dead wraps at each anchor point, without over lapping.

7.2.0 SHEAVES

Rope sheaves shall be of rolled or cast steel. Grooves shall be machined to the proper shape for the rope used. Sheaves shall be equipped with sheave guards to retain the rope in groove. Sheaves shall be fully guarded so that the rope cannot come off.

7.3.0 GEARS & PINIONS

Gears and pinions shall be cut from good quality alloy steel of chromium & nickel and shall be heat-treated suitably.

7.4.0 BEARINGS

Bearings shall comply with relevant IEC/ International Standards. Depending upon the capacity and loading conditions the manufacturer shall design suitable grease lubricated or oil lubricated bearings.

7.5.0 ROTATING AND STATIONERY SHAFT

Shafts and axles shall be of EN8 or equivalent material.

SPEC NO.: FBC&HRSG : 99100 : 012 / REV 00

Bharat Heavy Electricals Limited
BOILER AUXILIARIES PLANT, RANIPET-632406

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TECHNICAL SPECIFICATION FOR

ELECTRICALLY OPERATED HOIST

PROJET KONIAMBO
l'Usine du Nord
Nouvelle-Calédonie

KONIAMBO HATCH Technip

Requisition Number:	319000-00420-MR-0150-0003
Purchase Order Number:	
Equipment / Item Tag:	Electrically Operated Hoist
Equipment / Item Description:	
HT Document Number:	319000-00420-A0103-0150-0003-7117
Document Category:	

Stamp

Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.

Rev	Date	Written By	Checked By	Approved By	Status
0A	06-12-2008	REMYA	S RANGARAJAN	S RANGARAJAN	

SPEC. NO.: FBC A HRSG : 99100 : 012 / REV 00

Table of Contents

1.0.0 SCOPE:

This specification covers the design, manufacture, testing, inspection, packing and supply of Electrically operated hoist assembly hereinafter called as EOH, along with cross travel arrangement, complete in all respects including control box, pendant push buttons, cable trolleys, galvanised link (drag) chain, auxiliary girder, flexible trailing cable, rain hood, FUSE-SWITCH unit, Grease gun with grease, Counter weight (if applicable) etc. The assembly shall be complete in all respects & shall be ready for installation. Operation & maintenance manual in required copies shall be supplied.

2.0.0 SITE CONDITIONS

2.1.0	Ambient temperature	: 6 deg.C to 40 deg.C
2.2.0	Design ambient temperature	: 50 deg.C
2.3.0	Relative humidity	: 99.2 % (max) at 40 deg. C
2.4.0	Location	: Outdoor
2.5.0	Environmental condition	: Heavily dusty with abrasive ash / dust and coal particles. Climate is tropical, conducive to fungus growth.

Koniambo Project is located in the Northern Province of New Caledonia at approximately Latitude 21° South, Longitude 164° 40' East, approximately 1500 kilometers from the Australian east coast and about 270 kilometers northwest of Noumea.

3.0.0 APPLICABLE CODES AND STANDARDS

All equipment shall carry the CE Marking (European Conformity), as per the 'Council of the European Communities' Directive. The Supplier is responsible for CE Marking conformity.

Unless or otherwise mentioned, the Electrical Hoist and its accessories shall meet the requirements of the following standards. If there is a conflict between the standards and this specification, the most onerous condition shall apply. The applicable codes and standards are as given below should comply with relevant IEC/ International Standards.

4.0.0 APPLICATION

The electrical hoist and trolley is meant for lifting up the cover sheet of the Bag Filter and placing it back at position.

5.0.0 TECHNICAL PARTICULARS:

The Electrically Operated Hoist shall be designed to take care of safety requirement suitable for CE marking. The instrument shall be supplied with CE marking as per relevant IEC

Input supply at SFU of EOH	: To be suitable for 400V AC, 3 phase, 50Hz.
Voltage variation	: ±10%
Frequency variation	: ± 5%
Combined voltage & frequency variation	: 10% (Absolute sum)
Capacity	: 3 tonnes
Speed of the hoist (range)	: 1 metres per minute
Speed of cross travel (range)	: 5 metres per minute
Quantity	: As per Enquiry / Purchase order

One set of EOH consists of the following:

SL. NO.	DESCRIPTION	UNIT	QTY/EOH
01	3T EOH ASSEMBELY INCLUDING BRAKES, DRUM WITH ROPES SUITABLE FOR 5 MR HEIGHT OF LIFT. ELECRICAL CONTROL PANEL, PENDANT PB WITH CONTROL CABLE WITH LINK CHAIN	ST	1

02	63A FSU WITH ENCLOSURE SUITABLE FOR OUTDOOR INSTALLATION	NO	1
03	TRAILING FLEXIBLE COPPER CABLE FOR POWER SUPPLY	MR	30
04	GALVANISED LINK CHAIN	MR	22
05	CABLE TROLLEY ASSEMBLY	ST	10
06	AUXILIARY GIRDER ASSEMBLY FOR TRAILING CABLE FOR A CROSS TRAVEL LENGTH OF	MR	20
07	RAIN HOOD FOR HOIST MOTOR, CROSS TRAVEL MOTOR AND CONTROL BOX	ST	1
08	GREASE GUN WITH GREASE	NO	1
09	COUNTER WEIGHT FOR HOIST (IF APPLICABLE)	ST	1

6.0.0 DESIGN REQUIREMENT

Electrical hoists and trolley shall be complete with hoist and cross travel motor, electromagnetic fail safe brakes for hoisting & cross travel, wire rope drum, wire rope, hook, gear box for cross travel & hoist, wheels with trolley for the hoist, necessary gearing, sheaves, guides, weather and dust proof pendant push button station, FSU, control panel, all wiring, 4 core trailing cable for power supply connection, complete supporting arrangement for flexible trailing cable including Auxiliary Girder assembly, cable trolleys, galvanised drag (link) chain, pendant cable with chain, limit switches for over hoisting & over lowering and limits switches for extreme right & left positions, earthing terminals, Rain Hoods (for Hoist motor, CT motor & Control Panel), Grease Gun with grease and other accessories to make system complete and ready for installation. The hoist assembly shall be fully balanced. Counter weight, if any, required shall also be supplied as a part of the system. The materials selection shall be suitable for transportation through sea.

7.0 FEATURES OF CONSTRUCTION (MECHANICAL SYSTEM)

7.1.0 DRUM

Rope drum shall be cast/ seamless/ welded fabricated to sustain concentrated loads resulting from the rope pull. Drum shall be machine grooved right or left or both with grooves of a proper shape to suit the ropes used. Drum shall accommodate all the length of the rope required for the lift plus two dead wraps at each anchor point, without over lapping.

7.2.0 SHEAVES

Rope sheaves shall be of rolled or cast steel. Grooves shall be machined to the proper shape for the rope used. Sheaves shall be equipped with sheave guards to retain the rope in groove. Sheaves shall be fully guarded so that the rope cannot come off.

7.3.0 GEARS & PINIONS

Gears and pinions shall be cut from good quality alloy steel of chromium & nickel and shall be heat-treated suitably.

7.4.0 BEARINGS

Bearings shall comply with relevant IEC/ International Standards. Depending upon the capacity and loading conditions the manufacturer shall design suitable grease lubricated or oil lubricated bearings.

7.5.0 ROTATING AND STATIONERY SHAFT

Shafts and axles shall be of EN8 or equivalent material.

7.6.0 LUBRICATION

The Hoist shall be supplied with all required Lubricant.

7.7.0 HOIST ROPE

Hoist ropes shall be of extra flexible steel rope with a well-lubricated core and having six strands of minimum 36 wires per strand. The rope shall be of sufficient length so that two full wraps shall remain on the drum at the extreme low position of the hook. Number of falls shall be two. Braking loads for the hoist rope shall not be less than six times the calculated load in the ropes at the drum, based on rated load on hook plus the weight of the bottom block plus the weight of the rope. Hoisting rope shall confirm to IS 2266.The rope shall be hot dip galvanised. The rope shall be free from kinks and shall be continuous.

7.8.0 HOOK

Hooks shall be made of EN-8 or equivalent material. It shall be solid, forged, heat-treated, high tensile steel of tough construction and shall be provided with a standard depress type safety latch. It shall have swivels and operate on bearings with hardened race. Lock to prevent hooks from unscrewing shall be provided.

7.9.0 BRAKES

Hoisting motor and cross travel motor shall be equipped with electrically released, spring set shoe type/ disc type /electromagnetic type brakes. The brakes shall apply when either the motor starter or the main power switch is in OFF position or in the event of "power failure". The braking capacity of the brakes shall be 150% of the rating of the hoist.

7.10.0 ROPE GUIDE

Rope guides shall have wear resistant property. It shall prevent slack rope, and retain the wire rope in the barrel grooves.

7.11.0 LINK (DRAG) CHAIN

Hot dip Galvanized Link (drag) chain shall be provided for the Flexible Trailing cable, to avoid direct loading on the cable.

7.12.0 AUXILIARY GIRDER FOR TRAILING CABLE

Auxiliary girder system shall be provided for the support of Flexible Trailing cable. The Trolleys for the trailing cable shall be supported by the Auxiliary Girder. The Auxiliary Girder will be supported by the main Beam (main beam of size ISMB-450 will be supplied by the Purchaser). The hoist supplier shall provide necessary support materials to support the Auxiliary Girder on the main beam at intervals not exceeding 750 mm. Complete structural materials required for Auxiliary Girder system shall be included in the scope of supply of the hoist supplier.

8.0.0 FEATURES OF CONSTRUCTION (ELECTRICAL SYSTEM)

8.1.0 Electrical system comprises of 63A Fuse Switch Unit, Control panel, Pendant Push Button Station, Pendant cable, Hoist & Cross travel motors with electromagnetic brake, limit switches, trailing cable etc., to make the system complete. All these items are included in the scope of supply of the vendor.

8.2.0 CONTROL PANEL

8.2.1 Control panel shall be provided to house the electrical components like fuses, contactors, over load relays, isolators, switches, control supply transformers etc., along with necessary wiring. The components shall be clearly identified by labels. The panel shall be made of sheet steel of minimum 2mm thick CRCA and shall be dust and vermin proof, suitable for outdoor location. The control panel shall be designed for IP 55 degree of protection. Adequate number of DOUBLE COMPRESSION type cable glands (heavy duty) of brass with nickel plating and Annealed Tinned Copper lugs shall be provided for incoming and outgoing power and control cables. The cable glands shall be provided with dummy plugs. The door, removable cover plates, and metal-to-metal joints shall be fully neoprene gasketted.

8.2.2 Indoor panels of mild carbon steel shall be painted internally and externally according to the RAL standards. External and internal surfaces shall be finished to an agreed project standard e.g., mild grey external (RAL 7035) and internal. Escutcheons shall be white. Powder coating is preferred. Any painted equipment approved by the Owner for installation outdoors shall be two pack epoxy coated to prevent corrosion. Suitable touch up paint of each colour used by the Supplier shall be delivered with the equipment. Satin finish 316 stainless steel panels shall not be painted internally or externally.

8.2.3 Dry type, step down control supply transformer of 400V / 110V AC rating shall be provided to derive control supply for starter operation & 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 relevant IEC/ International Standards.

8.2.4 Space heater with thermostat shall be provided for the control panel.

8.2.5 **Lifting Points**
All cabinets and panels shall be provided with suitable lifting points complete with removable eyebolts. Roof fixing screws shall be supplied to replace lifting eyes at site. Where deemed necessary by the Supplier, panels may also have 50 mm holes with covers in the base plinth for pipe inserts to assist in slinging and lifting heavy equipment.

8.2.6 **Panel Doors**
Panel doors shall be full height, suitably reinforced to prevent distortion, and provided with seals to prevent dust or moisture ingress. Subject to approval, single doors shall be hinged on the left, unless otherwise specified. All doors shall be of the lift off type, and lockable. Keys shall be identical for all associated indoor panels. All doors shall be capable of opening at least 120° and shall be equipped with mechanical stops suitable for the location. Large floor standing panel doors shall be retained by a three-point latching system operated by a key lock. Neoprene gaskets held in place shall seal doors. The inside of each door shall be equipped with a pocket suitable for A4 documents, with a minimum depth 25 mm in small wall mounted panels. Doors shall have a flexible earth to the main safety (equipotential) earth bar.

8.3.0 MOTOR

8.3.1 The hoist & cross travel motors shall be Squirrel cage induction motor, suitable for 400 Volt AC and shall meet relevant IEC/ or equivalent international standards. The motors shall be designed for frequent reversal, braking and acceleration similar to crane duty. Frequency of reversal shall be minimum 125 times/hour. The motor shall be rated for S4 duty 40% cyclic duration factor. Maximum continuous rating shall have at least 10% margin over maximum load demand including voltage and frequency variations, temperature rise and other variations. The body shall have two earthing points on opposite sides.

8.3.2 The motors shall be provided with an enclosure fully meeting the requirements of IP 55 as per relevant IEC/ International Standards meant for outdoor service. In addition rain-hood shall be provided for the motors. The motors shall be Totally Enclosed Fan Cooled (TEFC) type or Totally Enclosed Surface Cooled (TESC) type.

8.3.3 Motors shall have minimum class "F" type insulation. The winding shall be suitable for successful operation in hot, humid, & tropical climate with the ambient temperature of 50 degree centigrade. The temperature rise shall be limited to class B insulation. The insulation shall be given fungicidal and tropical treatment as per relevant IEC/ International Standards.

8.3.4 The motor frame shall be cast and rigid.

8.3.5 All Gears and motors shall be designed for both directions of rotation.

8.3.6 The motor terminal box shall be weather and water tight and suitable for outdoor service, having a degree of protection of IP 55. It shall be provided with removable front cover for making connections. Neoprene gaskets at cover joints shall be provided. The terminal box shall be suitable to withstand 31 MVA for 0.25 seconds without damaging the box with HRC fuse protection. Nickel-plated brass double compression cable glands and ATC lugs shall be provided to receive the

power cables. If the hoist motor is placed inside the rope drum, then the motor lead wires can also be taken out without necessity of a terminal box.

8.3.7 The motor vibration and noise shall be within the limits specified in relevant IEC/ International Standards. The noise level shall be limited to 80 Db(A) when measured at a distance of 1 m plus IEC tolerance from the Hoist assembly.

8.3.8 Motors shall be of high efficiency, class EFF1 in accordance with EU/CEMEP, as applicable. Motors shall be of Squirrel Cage type. Double cage rotors are unacceptable.

8.3.9 For Motors up to & including 200kW, the starting current shall be seven times full load current exclusive of IEC tolerance.

8.3.10 Motors shall have a permissible locked rotor withstand time of not less than two seconds than the starting time of load (i.e time required by the driven equipment to come to full speed) from cold without exceeding the allowable temperature rise. Exact values for safe stall time from hot and cold shall be specified.

8.3.11 Fasteners
Metric Standards shall apply. All fasteners shall be stainless steel with hexagonal or socket heads. Bolts are to be used for fixing the terminal box to the motor.

8.4.0 SWITCHES

Heavy-duty power switches with quick make and break mechanism meeting relevant IEC/ International Standards requirements shall be provided. The switches shall be adequately rated to get complete protection even under abnormal operating conditions.

8.5.0 CONTACTOR

8.5.1 All Contactors shall be suitable for DOL application with coils suitable for the control voltage provided by the supplier. Contactor construction shall be rugged.

8.5.2 For control purpose, only Auxiliary contactors shall be used. Relays are not acceptable in place of Auxiliary Contactors.

8.5.3 The power contactors shall have Mechanical interlocking in addition to Electrical interlocking so that at any point of time only any one of the two Power contactors (either Up or Down, Left or Right) will be energized.

8.6.0 THERMAL OVER LOAD RELAYS

8.6.1 Thermal over load relays shall be ambient temperature compensated with suitable setting ranges. The relay shall be auto reset type. The O/L relay shall have single phasing protection as built-in feature.

8.7.0 FUSES

8.7.1 Only HRC fuses of plug-in type with Class-4 AC duty shall be provided.

8.7.2 Fuse base shall be rugged. Adequate shrouding shall be provided for live accessible parts and it shall be possible to replace any fuse without damages of contacts when the circuit is alive.

8.8.0 INDICATING LAMPS

8.8.1 LED type indicating lamps of low watt consumption shall be used. LED and lenses shall be inter-changeable and easily replaceable from the front. The indication lamps shall be properly shrouded so as to prevent dust and water entry. Indicating lamps shall be provided for SUPPLY ON, HOIST MOTOR ON, CT MOTOR ON, HOIST MOTOR TRIP AND CT MOTOR TRIP

8.9.0 WIRING

8.9.1 The control panel wiring shall be complete in all respects and ready for connection of external cable for receiving external power. Necessary double compression type Nickel-plated Brass cable glands,

Annealed tinned copper lugs along with suitable terminal blocks to receive the Flexible trailing cable, Limit Switch cables, pendant push button cable shall be provided. The cable glands, lugs and terminal blocks shall not be supplied loose. Point to point wiring shall be adopted. Not more than two wires shall be terminated at each terminal. Wiring shall be neatly laid out and bunched together suitably. The wiring shall be done with min. 2.5 SQ.MM multi stranded copper, PVC insulated 650V wires.

8.10.0 TERMINATION

8.10.1 All power and control wires shall be terminated on terminal block/component using crimping type Annealed Tinned copper lugs.

8.10.2 Terminal block shall be used for control wiring. The terminal blocks shall be complete with insulated barriers, terminal studs, washers, nuts, lock nuts and identification strips with terminal numbering.

8.11.0 PENDANT PUSH BUTTON STATION:

8.11.1 The Pendant Push Button station shall have the following Push Buttons:
Hoist, Lower, Forward, Reverse & Emergency Stop. The Emergency stops Push Button shall be lockable type.

8.11.2 The Pendant Push Button station shall have the following LED type indicating lamps:
SUPPLY ON, HOIST MOTOR Raise/Lower, CT MOTOR Forward/Reverse, HOIST MOTOR TRIP AND CT MOTOR TRIP.

8.11.3 The Pendant Push Button station shall be supported from the Control Panel with hot dip galvanized Link Chain.

8.11.4 The Pendant Push Button Station shall be connected to the Control Panel using multi -core copper flexible control cable of 10 m length.

8.11.5 The Enclosure of Pendant Push button station shall be designed for IP 55 degree of protection.

8.11.6 Push buttons shall be spring return type with 2NO+2NC self-reset contacts rated for 5A at 400 volts AC. The push buttons for different operations like "HOIST / LOWER, FORWARD / REVERSE", "STOP" shall have different colours. All Push buttons shall be as per relevant IS.

8.11.7 The Push buttons shall be properly shrouded so as to prevent water & dust entry.

8.12.0 LIMIT SWITCHES

8.12.1 Heavy duty Limit switches shall be provided for over hoisting, over lowering, extreme left and extreme right positions.

8.12.2 Necessary Limit switch actuating arrangement shall be provided to actuate the limit switches at the above positions.

8.12.3 The Limit switches shall have enclosures designed for IP 65 degree of protection.

8.12.4 Proximity switches are not acceptable in place of Limit switches.

8.13.0 FUSE SWITCH UNIT

Metal enclosed, FOUR POLE fuse switch unit of 63A, 400 V, AC, rating suitable for outdoor location to receive the Purchaser's power supply, shall be provided. The enclosure shall be designed for IP 65 degree of protection. Suitable Nickel-Chromium plated brass DOUBLE COMPRESSION cable glands and crimp type ATC lugs to receive purchaser's 3c-16 sq. mm AL armoured power cable or the size as indicated during vendor drawing approval stage & the Flexible Trailing cable shall be provided. The FSU shall be provided with 2 Nos. of earthing terminals with M12 screws, nuts and washers. The FSU shall be located at a fixed location about 5m away from the start position of the hoist.

8.14.0 CABLES

8.14.1 The trailing cable shall be 1100 V grade extra flexible having 4 cores. The trailing flexible cable shall carry the power supply to the Hoist from the Fuse Switch unit. The conductor cross section shall be minimum 4 SQ.MM multi-stranded tinned copper of class 5 of relevant IEC/ International Standards. The cable shall comply with the requirements of relevant IEC/ International Standards. The insulation shall be extruded PVC. The inner sheath be extruded PVC and the outer sheath shall be extruded PVC. In addition, the outer sheath shall have FRLS (Flame Retardant Low Smoke) property. The outer sheath shall be marked with cable size, voltage and the word FRLS at every 5 meters & sequential marking of length at every one meter. The sheath shall be black in colour.

8.14.2 The power cable between HOIST / CT MOTORS to control box, the pendant cable and other control cables shall be as per relevant IEC/ International Standards. The conductor shall be multi-stranded PLAIN ANNEALED copper with minimum cross section of 1.5 SQ.MM for control. The insulation shall be extruded PVC. The inner sheath shall be extruded PVC and the outer sheath shall be extruded PVC. In addition, the outer sheath shall have FRLS (Flame Retardant Low Smoke) property. The outer sheath shall be marked with cable size, voltage grade, and the word FRLS at every 5 meters and sequential marking of length at every one meter. The sheath shall be black in colour.

9.0.0 EARTHING

The structure, motor frames and enclosures of electrical equipment shall be effectively connected to earth complying with Indian Electricity rules and relevant IEC/ International Standards. The earthing materials from hoist to FSU shall be in supplier's scope. Customer will provide the earthing material from the Fuse Switch Unit to the nearest Earth Grid.

10.0.0 MAKE OF COMPONENTS

Only one of the following makes shall be used. Mix up of make for same item is not acceptable. Any deviation with respect to the makes given below is not acceptable.

Hoist/Cross travel motor	:	AUTOLEC/ SIEMENS/ KEC / ABB/ CROMPTOGREAVES/ BHARAT BIJLEE
Cable	:	INCAB/CCI/DELTON/ INDUSTRIAL CABLES TER/UNIVERSAL CABLES /KEI/ ASIANCABLES/NICCO/IACL
Fuse switch unit	:	L&T/ SIEMENS/Controls &Switch gear/ Schneider
Power switch	:	L&T/ SIEMENS/Controls &Switch gear/ Schneider.
Power contactor	:	L&T/SIEMENS/TELEMECHANIQUE/BCH/ CONTROL &SWITCHGEAR
Auxiliary contactor	:	L&T/SIEMENS/TELEMECHANIQUE/BCH/ CONTROL &SWITCHGEAR
Thermal overload relay	:	L&T/SIEMENS/TELEMECHANIQUE/BCH / CONTROL &SWITCHGEAR
Fuse	:	L&T/ SIEMENS / CONTROL &SWITCHGEAR / BUSMAN
Push button	:	L&T/SIEMENS/BCH/TEKNIC/VAISHNO CONTROL & SWITCHGEAR / CANDS
LED type Indicating lamp	:	L&T/SIEMENS/TEKNIC/BCH/BINAY/VAISHNO / CONTROL &SWITCHGEAR
Internal wiring	:	BIS (IS) CERTIFIED MAKE
Glands	:	COMET/SUNIL & CO /ARUP ENGG/ QUALITY PRECISION.
Lugs	:	DOWELS/ LOTUS
Terminal block	:	ELMEX/TOSHA/CONNECTWELL /

SPEC. NO: FBC & HRSG : 99100 : 012 / REV 00.

Control switch	:	CONTROL &SWITCHGEAR L&T/SIEMENS/KAYCEE / CONTROL &SWITCHGEAR
Selector switch	:	L&T/ SIEMENS/KAYCEE
Fuse carriers	:	L&T/ SIEMENS /CONTROL &SWITCHGEAR.
Auxiliary transformer	:	AE/KAPPA/IND COIL/LOGIC STAT/GPDL / JE/VIKAS/PACTIC/PRAGATI/KANIVEY
Neutral link	:	L&T/ SIEMENS/ CONTROL &SWITCHGEAR.
Hoist Brake	:	EMCO / PRETHE / PRECIMA
CROSS TRAVEL Brake	:	EMCO / PRETHE
WIRE ROPE	:	Usha martin
Limit Switch	:	BCH/JAI BALAJI/SIEMENS/KAYCEE
Bearings	:	SKF/FAG/NORMA

11.0.0 PAINTING

The paint colour shade shall be RAL 1023 C Traffic Yellow Colour). For coating refer. PCS-4 of Doc. No. 319000-00000- SP-2300-001 / Rev 04 (42 PAGES).

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12.0.0 DOCUMENTS TO BE SUBMITTED DURING BID STAGE

12.1.0 The bidders are instructed to submit only the following documents during Bid stage:

a. Schedule A (Schedule of Technical Confirmations to this specification)
b. Schedule B (Schedule of Technical deviations to this specification)
c. Schedule C (Schedule of Bill of materials)

12.2.0 The bidders are instructed not to submit bidder's own technical specification and any other technical details.

13.0.0 DOCUMENTS TO BE FURNISHED AFTER PLACEMENT OF ORDER:

13.1.0 Immediately on placement of order, the supplier shall submit the following documents in BHEL / CUSTOMER APPROVED FORMAT to BHEL for approval within 2 weeks. Manufacturing shall be initiated only after obtaining approval from BHEL. The format details will be furnished to the prospective vendor during drawing approval.

1) General Arrangement drawing of Hoist, Cross Travel arrangement, Auxiliary Girder & Trailing cable system, Control Panel, Pendant Push button station etc.
2) Bill of materials for the Hoist, Cross travel arrangement, Auxiliary Girder system, all cables under the scope etc.
3) Power and Control scheme
4) Bill of material indicating description of the item, rating, make, quantity, type reference etc., for:
    a) Panel mounted components,
    b) Pendant mounted components,
    c) Items covered in the system like trailing cable, trolley etc.,
5) Hoist mounting arrangement.
6) Justification for:
    a) Motor rating selected,
    b) Rope selected,
7) List of items mounted in the assembly and list of loose item supplied along with weight.
8) Packing drawings

9) Data sheet for Hoist, Data sheet for Hoist motor & cross travel motor.
10) Cable schedule for hoist indicating size, termination between which equipment, rating, quantity, make etc.
11) Shipping list-indicating items, quantity, and weight and package number to be submitted before inspection call is given. Despatch shall be maintained in line with the shipping list.

14.0.0 INSPECTION:

14.1.0 The inspection will be carried out based on the following documents.
a. BHEL Purchase order
b. BHEL Technical specification
c. Quality plan or Quality checklist indicated in the Enquiry.
d. BHEL approved supplier drawing/ data sheets.

15.0.0 O&M MANUAL:

15.1.0 O&M instruction manual shall be supplied in required numbers, as per Enquiry, immediately after the despatch of the Hoist, directly to BHEL Ranipet. The O&M manual shall also be submitted in CD apart from hard copies.

15.2.0 The O&M manual shall include but not limited to the following.
a) Do's & Don'ts during receipt, storage, erection & commissioning.
b) Instruction to be following on receipt, storage & erection.
c) Construction details of the hoist assembly.
d) Drawing indicating various parts of EOH assembly with part numbers.
e) Recommended lubrication & maintenance schedule.
f) Cut view drawing for the Gearbox assembly.
g) As Built drawings, BOM & Cable schedule.

15.3.0 The O&M manual shall be in both English and French.

16.0.0 PACKING:

16.1.0 The ELECTRICAL HOIST and accessories shall be properly packed so as to avoid damage during transit and storage.
16.2.0 Wooden crate shall be used for packing various equipment / items as per shipping list. Lining with plastic sheet shall be provided inside the crate to avoid water entry during transit / storage.
16.3.0 Packing drawing shall be submitted for BHEL approval.
16.4.0 Two sets of manual (Hard copies) with drawing & data sheet shall be sent along with the packing box.
16.5.0 Each packing shall be accompanied with packing slip and all relevant drawings.
16.6.0 The packing shall be sea worthy packing. The materials will be taken through ship to reach the destination. The packing shall be suitable for long storage at port / in ship.