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BHARAT HEAVY ELECTRICALS LIMITED
RAMACHANDRAPURAM, HYDERABAD – 32

(A GOVERNMENT OF INDIA UNDERTAKING)

PURCHASE DEPARTMENT (CG)

TENDER SCHEDULE

TENDER NO : M2/07/CG7A0187/BRK

DESCRIPTION : 80 TON DOUBLE GRINDER E.O.T CRANE

QUANTITY : TWO NUMBER

LAST DATE FOR SALE OF DOCUMENTS: 06.11.2007

DUE DATE : 07.11.2007, 14.00Hrs

COST OF TENDER DOCUMENTS : Rs.5000/-

FORWARDED TO:



BHARAT HEAVY ELECTRICALS LIMITED
RAMACHANDRAPURAM :: HYDERABAD – 502 032

**TERMS & CONDITIONS DURING INSTALLATION
OF LIFTING MACHINES AT BHEL WORKS**

Ref: M&S/Cranes/Terms/E&C

Rev: 00

Dt: 14/11/2003

Page: 1 of 4

TERMS AND CONDITIONS TO BE FOLLOWED

Obligations Of The Contractors

1.01 The contractor shall fully comply with the following enactments:

- (a) Contract Labour (R & A) Act, 1970 and rules formed there under in A.P.
- (b) Wage Rates not less than that notified by State Labour Department/from time to time.
- (c) Payment of Wages Act.
- (d) ESI Act, 1948
- (e) EPF Act, 1952
- (f) Workmen's Compensation Act, 1923.
- (g) BHEL instructions as issued from time to time in regard to working hours, holidays, or any other statutory provision.

1.02 The contractor shall obtain License from the Assistant Labour Commissioner (Central), or appropriate government if he engages twenty or more workmen only.

1.03 The Contractor shall produce the following Registers and forms before commencement of work, for verification by the Executing Officer.

- (a) Form XII - Register of contractors
- (b) Form XIII - Register of workmen employed by contractor (Rule 75)
- (c) Form XIV - Employment card issued by contractor (Rule 76)
- (d) Form XVI - Muster Roll (Rule 78(1)(a)(i))
- (e) Form XVII - Register of wages (Rule 78(1)(a)(i))
- (f) Form XVIII - Register of wages-cum Muster Roll (in case of weekly payment)
- (g) Form XIX - Wage Slip (Rule 78(b))
- (h) Form XX - Register of deduction for damages or loss (Rule 78(1)(a)(ii))
- (i) Form XXI - Register of files (Rule 78(1)(a)(ii))
- (j) Form XXII - Register of advances (Rule 78(1)(a)(ii))
- (k) Form XXIII - Register of overtime (Rule 78(1)(a)(iii))
- (l) Form XXIV - Return to be sent by the contractor to licensing officer (Rule 82(1))


The contractor shall maintain the above neatly, completely and legibly for inspection by various authorities even at short notice. The Executing officer of BHEL shall periodically inspect these registers and forms, and shall send his inspection note to Industrial Relations (IR) section of personnel department.

1.04 The contractor shall observe


- (a) Weekly rest day
- (b) BHEL List of Holidays.

1.05 Contractor shall obtain complete bio-data, of the labour, employment certificate and Antecedent verification in the prescribed form for each labour and supervisor engaged by him, and shall submit the same to the personnel department/IR section through the contract executing officers before commencement of the work.

1.06 The entry permits are to be issued to the contract labour by Assistant Commandant/Plant (CISF), based on the requisition submitted by Contract Executing Officer and forwarded by DGM / Personnel.

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- 1.07 Every contractor shall submit a notice regarding commencement and completion of work in Form-VI A&B [Rule 25(viii) & 81(3)] to personnel department, IR Section through his contract executing officer, for forwarding the same to State Labour Department.
- 1.08 The contractor shall make himself or his representative available at the work spot everyday during execution of work, for effective supervision.
- 1.09 The contractor shall attend to all inspections notified/conducted by the personnel department, Labour department, P.F. authorities, Factory Inspectors, ESI inspectors, or any other such authorities.
- 1.10 Non-compliance of any provisions under the act/rule/instructions/guidelines shall make the contractor liable for penal action including termination of contract.
- 1.11 Contractor shall furnish in a separate letter his place of residence and postal address. The delivery at the above named place or posting in a Post Box regularly maintained by the Post and Telegraph Department or sending letters registered for acknowledgement of any notice, letter or other communication to the contractor shall be deemed sufficient service thereof upon the contractor. Change in address shall come into force at any time by an instrument executed by the contractor and delivered to the BHEL official who has signed the contract.
- 1.12 The contractor must satisfy himself by personal study and examination of the drawings/specifications furnished and understand thoroughly the scope of proposed work in detail and all conditions affecting the work before entering into the contract. There shall not be at any time, dispute/complaint of any nature regarding scope of work and interpretation of specifications or any misunderstanding with regard to nature or omission of the work to be done nor shall any application for compensation in terms of time and money shall be accepted by BHEL regarding the above.
- 1.13 Contractor shall in his absence keep competent agent constantly on the works and any directions or explanations given by the "Contract Signing Officer" or his representative to such agent shall be held to have been given to the contractor himself.
- 1.14 Contractor on the advice of BHEL official shall immediately remove any person employed by him, who may in the opinion of the BHEL official, is incompetent or involves himself in misconduct. Such persons shall not be again employed on the works with out written permission of the BHEL official.
- 1.15 The contractor shall erect and maintain at his own cost, temporary weather proof sheds at such places approved by the BHEL for keeping materials under cover.
- 1.16 The contractor shall give all notices required by the acts, regulation, by laws, legal acts and pay all fees in connection therewith unless and otherwise arranged and decided in writing with BHEL. He shall also ensure that no attachments are made against materials or work forming part of or for the use of the contractor. In all such cases, contractor shall protect and indemnify BHEL against any claim or liability arising from or based on the violation of any such laws, ordinances, regulations, orders, decrees or attachment either by himself or by his employees.

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- 1.17 It shall be contractor's sole responsibility to protect the public and his employees against accident from any cause and provide required safety equipments and shall indemnify BHEL against any claims for damages for injury to the person or property resulting from
- any such accidents and shall, where the provisions of the workmen's compensation Act apply, take steps to properly insure against any claims thereunder.
- 1.18 In the event of any accident in respect of which compensation may become payable under the workmen's compensation Act VIII of 1923 whether by the contractor or by BHEL as principal, it shall be lawful for BHEL to retain out of monies due and payable to the contractor such sum or sums of money as may, in the opinion of BHEL shall be final in regard to all matter arising in this clause.
- 1.19 No work shall be done on Sundays or on other declared Holidays of BHEL without the written permission of BHEL officer incharge of the work. The contractor shall comply with the provisions of the factory act if the same are applicable.
- 1.20 The contractor shall keep his work place clean and safe to avoid injuries to men and damage to finished products/equipments.
- 1.21 On the occurrence of an accident, which results in the death of any of the workmen employed by the contractor or which is so serious as to be likely to result in the death of any such workmen, the contractor shall within 24 hours of the happening of such an accident intimate in writing to the BHEL official incharge of the work.
- 1.22 The contractor shall indemnify BHEL against all losses or damages sustained by BHEL resulting directly or indirectly from his failure to give intimation in the manner aforesaid including the penalties or dues if any and become payable by BHEL, as a consequence of failure, BHEL to give notice under the workmen's compensation Act or otherwise confirm to the provisions of the said Act in regard to such accident.
- 1.23 The contractor shall ensure adherence to all statutory requirements applicable to BHEL.
- 1.24 The contractor shall ensure abidance by all the labour laws especially including contract labour (R&A) Act, payment of wages Act, workmen's compensation Act, minimum wages Act, ESI Act and provident fund act as amended from time to time.
- 1.25 The contractor shall comply with Provident Fund Act either through PF code allotted to him or by the code provided by PF Department to work centres in the FACTORY/Township Civil of BHEL, R.C.Puram.
- 1.26 Notwithstanding the above clause, in case of any financial loss incurred by company on account of contravention of the Provident Fund regulations or any regulations of rule touching the same by the contractor, the contractor shall submit an undertaking to indemnify the company to the extent of the loss incurred by the company.
- 1.27 The contractor should engage only those labourers who shall be more than 18 (eighteen) years of age.



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- 1.28 The contractor shall not resort to subcontracting under any circumstances. If found sub-contracting at a later date, BHEL reserves the right to take whatever action it deems fit, including cancellation of the Contract.
- 1.29 The contractor shall provide the required safety equipment to the labours engaged by him.
- 1.30 Contractor shall issue "Employment Card" as per statute to all labour and supervisors covered under the job work contract.
- 1.31 The contractor shall be responsible to settle any grievances of the labour deployed by him.

BHARAT HEAVY ELECTRICALS LIMITED
RAMACHANDRAPURAM :: HYDERABAD - 502 032
SPECIFICATIONS FOR 80 TONS EOT CRANE

	DESCRIPTION	BHEL SPECIFICATIONS	SUPPLIER OFFER	DEVIATIONS/COMMENTS
A	MAIN PARAMETERS			
1.0	Type of Crane	Double girder EOT as per IS 3177-1999 for Indoor use		
1.1	Class & duty	M5 as per IS 3177-1999		
1.2	Main Hoist capacity	80 Tonnes		
1.3	Auxiliary Hoist capacity	20 Tonnes		
1.4	Span	28.5 meters		
1.5	Operation Speeds (maximum)			
1.51	Main Hoist	4 meters/minute		
1.52	Inching Speed (Micro for main hoist)	0.4 meters/minute		
1.53	Auxiliary Hoist	6 meters/minute		
1.54	Inching Speed (Micro Auxiliary hoist)	0.6 meters/minute		
1.55	Long travel	30 meters/minute		
1.56	Cross travel	20 meters/minute		
1.6	Working clearance distance from centre of gantry rail to nearest obstruction (sideways)	500 mm		
1.7	Vertical distance from top of gantry rail to lowest overhead obstruction (maximum)	4.4 metres		
1.8	Distance from floor to top of gantry rail	12.0 meters		
1.9	Lift Height			
1.91	Main Hoist (above ground)	12.0 meters		
1.92	Main Hoist (below ground)	2.0 meters		
1.93	Auxiliary Hoist (above ground)	12.0 meters		
1.94	Auxiliary Hoist (below ground)	2.0 meters		
2.0	Hook Approach (minimum)			
2.01	Main Hoist	DSL side 2000 mm, Opposite side 2300 mm		
2.02	Auxiliary Hoist	DSL side 2800 mm, Opposite side 1500 mm		
2.1	Size of gantry rail (Long Travel) - Rail is part of BHEL scope	90 lbs / yard as per IS - 3443		
2.2	Size of CT Rail	CR-80 as per IS - 3443		
2.3	LT wheel load in Tonnes	Indicate		
2.4	Number of Trolleys	One		
2.5	Width of Crane	Supplier to indicate actual value in meters		
2.6	Maximum clearance from rail to bottom of cabin	Supplier to indicate actual value in meters		
B	CONSTRUCTION/STRUCTURAL DETAILS			
3.1	Main Hoist hook type	Ramshorn Hook		
3.2	Auxiliary Hoist hook type	Shank Hook		

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SPECIFICATIONS FOR 80 TONS EOT CRANE

	DESCRIPTION	BHEL SPECIFICATIONS	SUPPLIER OFFER	DEVIATIONS/COMMENTS
3.3	Hook latches for Aux hoists	Required		
3.4	Hoist wire ropes	6/36 or 6/37 construction as per IS:2266-1989		
3.5	Number of falls Main Hoist	8		
3.6	Number of falls Auxiliary Hoist	4		
3.7	LT Drive	Twin corner drive with horizontal type gear box		
3.8	Number of wheels for LT drive	8		
3.9	Diameter of wheels for LT drive	> = 400 mm		
3.10	Number of driven wheels for LT drive	25% or more		
3.11	CT Drive	With vertical gearbox		
3.12	Pump with motor with starter and timer for automatic lubrication of CT gearbox	To be provided		
3.13	Platform for approach for maintenance of CT gearbox	Required		
3.14	Number of wheels for CT drive	4		
3.15	Diameter of wheels for CT drive	> = 400 mm		
3.16	Type of bearings for LT/CT wheels	Anti-friction		
3.17	Type of mounting of LT/CT wheels	"L" type brackets		
3.18	Variable speed control			
3.18.1	LT Drive	Through VVVF drive		
3.18.2	CT Drive	Through VVVF drive		
3.18.3	AH Drive	Through VVVF drive		
3.18.4	MH Drive	Through VVVF drive		
3.19	Cabin details	Cabin shall be provided in the centre of the bridge with 360 degrees visibility. The following items shall be provided in the cabin - revolving chair, fan, light, fire extinguisher, bell, floor matting, etc.		
3.20	Pendent	Shall be movable type		
3.21	Duty cycle	40% CDF all motions		
3.22	Brakes	Electro Hydraulic operated brakes are to be provided for all motions and hoists.(Totally enclosed) conforming to IP:54.		
3.23	Gear Boxes for LT, CT and Hoists	Completely enclosed M.S fabricated and stress relieved split type		
3.24	Couplings between motor and gearbox	Geared couplings		
3.25	Couplings between gearbox and rope drum for hoists	Geared couplings		
3.26	Mounting	All the gearboxes, motors, brakes, bearing pedestals, etc. shall be mounted on machined surfaces		
3.27	Lubrication of Crane	Automatic centralised lubrication system (with motor, pump and timer) should be provided at three areas - two end carriages and at trolley.		

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3.28	Toeguards	Toeguards shall be provided for all openings including for trolley		
3.29	Railings	Safety hand railings of tubular construction shall be provided across full length of the bridges and end carriages, staircases and in any other places where openings have been provided.		
3.30	Jacking pads	Suitable jacking pads should be provided on end carriages and crab for jacking up the crane and crab for changing track wheels		
3.31	Safety Pads	Suitable reinforced safety pads should be provided under the end carriages and crab to prevent the crane from falling more than 25mm in the event of breakage of a track wheel/bogie/axle. These safety stops shall not interfere with the removal of wheels		
3.32	End buffers	Spring-loaded buffers are to be provided for long travel and cross travel.		
3.33	Measurements	All components including fasteners should be in metric system only		
3.34	Locking of Parts	Bolts and screws in rotating parts shall be locked.		
3.35	Painting	The cranes should be painted with two coats of deep orange paint confirming to IS 2932 : 2003, ISC No 591 (as per IS 5) after giving primary coat. Girders and trolley frame shall be shot blasted/ Chemically treated before painting.		
3.36	Plates used for fabrication	To be of rolled steel as per IS 2062 plates. Test certificates to be furnished		
3.37	End carriages	To be bogey type design with suitable balancing beam.		
3.38	Butt joints	All butt joints shall be 100% X rayed both compression and tension and both flanges / Webs		
3.39	Girder	No splice joint - to be of single piece only. No of weldable joints along the total length of the girder should not exceed three		
3.40	Platform	Full length chequered platform shall be provided on both bridges and wherever access is necessary for operation and maintenance. The platforms shall be bolt jointed. Width of the platform shall be >750 mm.		
3.41	Ladders	Approach ladder to cabin shall be staircase type and inclined at 30 degrees from horizontal (base line)		
3.42	DSL	In BHEL scope		
3.43	DSL guard	To be provided		
3.44	DSL maintenance cabin	To be provided at suitable height		

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SPECIFICATIONS FOR 80 TONS EOT CRANE

	DESCRIPTION	BHEL SPECIFICATIONS	SUPPLIER OFFER	DEVIATIONS/COMMENTS
3.45	Operations required through			
3.45.1	Cabin	MH, AH, LT & CT. 5 speed steps for all motions.		
3.45.2	Pendent	MH, AH, LT & CT. 2 speed steps (10% and 100%) for all motions		
3.45.3	Radio Remote Control	MH, AH, LT & CT. 3 speed steps for all motions.		
C	ELECTRICAL EQUIPMENT			
4.1	Power Supply at DSL	415 volts \pm 10 %, 3 phase, 50, \pm 2 Hz, 4 wires, one conductor earthed. Isolator switch should be provided for isolating the total supply to the crane		
4.2	Control voltage	110 Volts AC		
4.3	Power distribution to trolley	Trailing cable supported on anti-friction wheel cable		
4.4	Connection to pendent	Trailing cable supported on anti-friction wheel cable		
4.5	Panels	a. The panels shall be painted with grey color as per IS 2932:2003 b. The total number of panels shall be a minimum of four c. MH drive shall be housed in one panel d. AH drive shall be housed in one panel e. CT and LT drives shall be housed in one panel f. Protective panel shall be housed in one panel g. Ferrules to be provided for cable connections as per circuit diagram. h. Individual isolating switches / breakers should be provided for MH, AH, CT & LT power circuits i. Seperate isolating switch / breaker should be provided for control circuit j. Individual contactors should be provided for all the		
4.6	Mounting of panels and resistance boxes	To be mounted on supporting boxes		
4.7	Electrical Motors	Crane duty, one hour rated, class B or F insulation, IP54 protection, 40 % CDF, 150 starts/hour squirrel cage motors for all motions/traverses		
4.8	Contactors	Siemens make contactor 3 TA 22-30 Amps or equivalent rating to be provided as minimum size contactor in the power circuit.		
4.9	Overload relays	To be provided for all the motors.		
4.10	Cables	P.V.C armoured, copper multistrand conductors, minimum size 4 mm sq. in power circuit and 2.5 mm sq in control circuit. All inter connecting wiring to be done neatly through perforated trays fixed in suitable places.		

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4.11	Limit Switches for traverses	Limit switches to be provided for all the motions		
4.12	Limit Switches for Main & Auxiliary hoists	One series limit switch with counter weight type and one rotary shunt limit switches for each hoist		
4.13	Earthing	Double earthing are to be provided for all the electrical equipment. A common electrical earthing bus bars to be installed on the cranes covering the entire span and trolley etc.		
D	MATERIALS			
5.1	Gears	EN 9 Helical type		
5.2	Hardness of Gears	225 to 280 BHN		
5.3	Pinions	EN 19/EN 24 helical type		
5.4	Hardness of Pinion	250 to 300 BHN		
5.5	Heat treatment of gears/pinions	Hardened, tempered		
5.6	Pulleys	Cast Steel IS: 1030 grade 4		
5.7	Gear Box	IS: 226/IS: 2062 fabricated casing duly stress relieved		
5.8	Wheels	C 55 Mn 75 / forged steel with hardness of 300-350 BHN		
5.9	Rope Drum	Rolled steel plate fabricated (IS-2062) duly stress-relieved with flanges at both ends. Rope drum to be machine grooved in hoisting direction. Dia of drum/rope ratio to be as per IS: 3177-1999. 100% X-ray quality welding for circumference joint to be done		
5.10	Hooks	Made of mild steel/EN3A or wrought iron/20Mn2 to IS:6294/1971 with a hardness of 150-180 BHN and Nut to be forged from C45 material		
5.11	Makes of other bought out components	To be as per annexure M&S/Cranes/Makes, Rev 03, dated 25/01/2007 (enclosed)		
E	GENERAL			
6.1	Environment	All equipment shall be tropicalised to operate in normal shop floor conditions of temperature 10 to 40 ° C and maximum relative humidity of 95 %.		
6.2	Guarantee			
6.3	Oils & grease	First filling of oils and grease are in supplier's scope		

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6.4	Manufacturer's reference list	The manufacturer should have manufactured, at least five cranes of 80 tons or higher capacity and with span >20 meters (of Class M5 or higher as per IS 3177/1999 or equivalent), in the last 10 years as on date of enquiry. List of these cranes to be furnished with names of contact persons, telephone and FAX nos. and e-mail IDs. The supplier should furnish copies of the purchase orders or commissioning reports or performance certificates issued by the customers as documentary proof of the above.		
F	DOCUMENTATION			
7.1	List of documents to be submitted with offer (offer will be rejected unless these are submitted)	Point-wise clarifications to all points of this specification including deviations, if any		
7.2		Sketches showing full details of cranes with dimensions / end clearances (between centre of LT rails to column face of building), overhead clearance from LT rails, hook approach limits, lift height, etc.		
7.3		Total weight of crane in Tonnes	Indicate	
7.4		Weight of assembled trolley in Tonnes	Indicate	
7.5	Weight of crane girder in Tonnes	Indicate		
8.1	List of drawings/documents for approval before manufacture of crane. Note: It is the responsibility of the supplier to get the drawings/documents approved. No extension of delivery will be accepted in case of any delay in submission/approval of	General Arrangement (GA) drawing of crane		
8.2		GA Drawing of Trolley		
8.3		GA Drawing of individual mechanism		
8.4		Drawings of bridges, end carriage, and their connections		
8.5		Sub-assembly drawings for wheels, hook blocks, gearboxes, and rope drums		
8.6		Calculation for selection of motor, gearbox and brake		
8.7		Calculation for bridge girder, end carriage and selection of wheels		

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8.8	drawings	Total weight of structural, mechanical and electrical equipment separately		
8.9		Weight of operator's cabin (if any) together with all equipment mounted in it.		
8.10		Quality Plan		
8.11		Electrical/electronic circuit diagrams for total crane		
9.1	List of drawings/documents to be submitted at the time of inspection of crane at supplier's works and at BHEL	Test certificates of all boughtout items like hooks, steel plates, wire ropes, etc and for crane (certified by "Competent person" as per as per AP Factories Rules/Acts/Laws		
9.2		4 Nos. Cranes operation and maintenance manuals.		
9.3		1 No. spare parts manual		
9.4		Drawings of all wheels		
9.5		3 sets of drive manuals		
9.6		Cabling scheme / interconnection diagram		
G	TESTING/INSPECTION			
10.1	During manufacture	Will be checked/inspected by BHEL/third party appointed by BHEL		
10.2	After manufacture	Will be checked/inspected by BHEL/third party appointed by BHEL. The crane will be checked for all functions and operations.		
10.3	Crane span	Check of Crane span and diagonal - 10Kg pull should be applied while checking		
10.4	Clearance for despatch	The equipment shall be despatched only after testing/inspection at supplier's works and on written clearance from BHEL		
H	ERECTION & COMMISSIONING			
11.1	At BHEL works	Part of supplier's scope.		
11.2	Material (lifting equipment, lifting tackles, etc) required during erection and commissioning	Part of supplier's scope. All lifting machines/tackles to be inspected and certified by "Competent Person" as per AP Factories Rules/Acts/Laws before use.		
11.3	Load test	To be done as per relevant IS standards. Load will be provided by BHEL		
11.4	Test certificate for crane	Part of supplier's scope. To be inspected and certified by "Competent Person" as per AP Factories Rules/Acts/Laws before use.		

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	DESCRIPTION	BHEL SPECIFICATIONS	SUPPLIER OFFER	DEVIATIONS/COMMENTS
11.5	Terms and Conditions during installation	During installation, the terms and conditions to be followed by the contractor are as per document M&S/Cranes/Terms/E&C enclosed.		

BHARAT HEAVY ELECTRICALS LTD
CRANES SECTION
LIST OF SUPPLIERS FOR BOUGHTOUT ITEMS

	ITEM	MAKE	OTHER DETAILS
1	Bearings	SKF / FAG / Timken	
2	Cables	ISI approved	Cables with copper conductors only
3	Connectors	Elmex / Wago	
4	Contactors	SIEMENS	
5	Master Controller	Siemens / SOC / WMI	
6	Couplings	Hi-Cliff / WMI	
7	Fuse / Fuse holders	English Electric	
8	Hooks	Herman Mohatta / Hercules / Steel forgings	
9	Isolator Switch	SIEMENS	
10	Isolators	SIEMENS	
11	Limit Switches	Siemens / SOC / OMEGA	IP54 or better
12	Lubrication Pump/motor	CENLUB	
13	MCB	SIEMENS	
14	MCCB	SIEMENS	
15	Motors (Auxiliary)	BBL / CROMPTON GREAVES / ALSTOM	IEC Frame sizes, IP54 or better
16	Motors (Squirrel cage)	BBL / CROMPTON GREAVES / ALSTOM	IEC Frame sizes, IP54 or better, Crane duty, 1 hour rated, 40% CDF
17	Overload relay (Electrical)	SIEMENS	
18	Overload relay (Mechanical)	ELECTROGEAR	
19	Panels	SIEMENS / GODAVARI ELECTRICALS / DANDAPANI / Original equipment manufacturer	Should be made from 18 G sheet steel, Powder coated and should be provided with panel locking facility.
20	Pendent pushbutton station	HANSU	With colour coded pushbuttons and name plates
21	Pneumatic timers	Bharatia Cutler Hammer	
22	Push Buttons	SIEMENS	
23	Radio Remote Control	Stromag / SNT	3-0-3 step operation, Hand held / Joy stick type with rechargeable batteries and charger
24	Rails		CR-80 / CR-100 / CR-120 / Square bar as per IS-3443
25	Resistance Box	BCH / SOC / WMI / OMEGA	IP11 or better
26	Thruster Brakes	SOC / WMI / OMEGA	IP54 or better
27	Squirrel cage induction motors (suitable for crane duty application and to run with VVVF drives)	ABB / SIEMENS / ALSTHOM	IEC Frame sizes, IP54 or better, Crane duty, 1 hour rated, 40% CDF.
28	Variable frequency drives with regenerative braking resistance	ABB drives - Type : ACS800 / ACC 800 Siemens - Type : Master drives Schneider - Type : Altivar 71	Digital type
29	Wire Rope	Usha Martin / Fort William / Bharat wire ropes	

Ref: M&S/CRANES/MAKES

Rev: 03

Dt: 25/01/2007