

**BHARAT HEAVY ELECTRICALS LIMITED
J H A N S I**

<u>ITEM</u>	:	Electric Over head Traveling Crane ✓ Class-II/M5 duty as per IS: 3117/ 1965
<u>ITEM NO.</u>	:	SP/CRJ/9564
<u>SPECIFICATION NO.</u>	:	CRJ/9529 R1
<u>LOCATION</u>	:	BOGIE SHOP
<u>QUANTITY</u>	:	1 No.

1.0 GENERAL :

Electric Over Head crane of capacity indicated below is required for loading, unloading of unfinished, finished components from Machine Tools as well as assembly of Locomotives in Loco manufacturing shop. The crane will also be used for mounting and removing of various accessories of loco bogies. The same has to work on a prepared gantry in Loco shop.

2.0 CAPACITY AND LEADING DIMENSIONS ARE GIVEN HEREUNDER:

2.1	Safe Working Load Main Hoist	:	10 Tones
2.2	Duty as per I.S.3177/1965	:	Class 2/ M5
2.3	(a) Normal Span	:	25 Meters
	(b) Rail Center to Center	:	24 Meters (Provided)
2.4	Gantry Rail Height above floor level	:	08.00 Meters (Provided)
2.5	Length of Bay	:	102 Meters
2.6	Type of Hook	:	Shank Type
2.7	Available Head above Gantry Rail	:	2.8 Meters
2.8	Available side clearance from Gantry Rail Center	:	0.38 Meters
2.9	Operation	:	Cabin & Radio Remote
2.10	Location	:	Indoor
2.11	Hook lift above floor level to be provided	:	7.75 Meters
	Hook lift below floor level	:	-----
2.12	Electric Power Supply	:	415V, 3 Phase, 50 C/S, A.C. Supply
2.13	Gantry Rail	:	105 lbs (Provided)

2.14 Full Geared Speed :

- a) Main Hoist : 3.00 M /Min.
- b) Traverse : 18.32 M / Min.
- c) Travel : 45.00 M / Min.

2.15 All the speed should be controlled in four steps both in forward & reverse direction. All four steps should have gradual increase in speed from minimum to maximum. Speed specified above are maximum speeds.

2.16 Speed control system shall be elaborately and clearly mentioned by the tenderer in their offer. Minimum speed, at various steps to be clearly mentioned.

2.17 Speed for hoisting / lowering at the 1st step shall be micro speed through planetary gear system. Detail of system to be submitted.

2.19 Firm to indicate following explicitly in their quotation:

- (a) Weight of each bridge (2 Nos.)
- (b) Weight of each carriage.(2 Nos)
- (c) Weight of complete trolley.(1 No.)
- (d) Weight of complete assembled crane
- (e) No. of wheels on LT & CT, Wheel diameter and material specification.
- (f) Wheel Load on each wheel
- (g) Horse Power of various motors, their duty cycles, rating, make etc. Motor calculation to be submitted with offer.
- (h) Make Type, size of thrusters and E.M. Brakes.
- (i) Make of all electrical items like relays, contactors, resistance, timer, limit switches etc.
- (j) Size of Brake drum for each motion.
- (k) Complete specification of wire rope.
- (l) Number of falls of wire rope in main hoist.
- (m) Erection & commissioning charges to be quoted separately.

3.00 GENERAL :

3.1 The crane shall be generally of box type construction and to be designed for class 2/ M5 duty in accordance with BSS: 466/1960 and or IS:3117/1965. Material shall be of tested quality as per relevant I. S.

3.2 BRIDGE CONSTRUCTION :

- 3.2.1 The bridge should comprise of two main girders with two out riggers and the end carriage built up from mild steel channel with adequate diaphragms or stiffing plates. Each bridge girder shall be fabricated and dispatched without any spliced joints.
- 3.2.2 Bridge girder should have riveted / bolted connection with end carriages.
- 3.2.3 M.S Chequered plate platform shall be provided along with full length on both side of the crane along with toe board.
- 3.2.4 Hand railing shall be fitted on both sides of the end carriages and through out the length of the platform on the bridges. Size of the hand rail shall not be less than 25 mm. bore heavy gauge steel pipe. The vertical pipes to have flanges at the bottom for proper support.

4.0 TRACK WHEEL:

- 4.1 The end carriages shall be of approved design, substantial construction and of ample stiffness built up of M.S. section securely riveted or welded with each other. They shall be projected over the run way rails and shall be so arranged that in the event of derailment the drop should not exceed 25 mm.
- 4.2 The end carriage of the crane should be mounted on double flanged wheels of the approved diameter in accordance with B.S.S.466. Each wheel shall be fitted with two numbers roller bearings SKF/NBC/FHP make mounted on a fixed steel sleeve and carried by a hard steel pin. Grease nipple should be provided at suitable place for convenient greasing and the grease be retained, dirt excluded by means of suitable seals.

5.0 TRAVELLING MECHANISM:

- 5.1 One wheel in each carriage is to be driven by a machine out forged steel gears by a motor mounted on or adjacent to the carriage. Motors of both the end carriage travel would be connected to one controller but the rotor circuit should be entirely independent to avoid synchronization and to permit the variation of speed, which is necessary to run the crane freely and smoothly on a track which deviates slightly from perfect straightness.

6.0 TRAVELLING MOTION BRAKE

- 6.1 A thruster brake to be fitted on each individual drive of the track wheels. These brakes should be arranged to be operated from the control desk as well as remote control. The brakes to be of post type with hinged shoes, lined with good quality reinforced bonded brake lining and arranged for easy adjustment for the necessary wear on lining time to time.
- 6.2 An independent additional brake is to be provided in LT motion to stop the crane immediately in case of power failure. This should also be operated from Radio remote on emergency condition.

7.0 CRABE FRAME :

- 7.1 This should be built up of steel sections and plates to proper thickness and the upper surface of the frame should be plated over wherever required in order to give great lateral rigidity and maintenance facility. The lubricating points for all moving parts should be provided at the top conveniently for easy maintenance below the surface of the trolley i.e. balancing sheaves etc.

8.0 CRABE TRAVERSE :

- 8.1 The wheel should be of forged steel material of approved diameters duly secured to hard shaft steel axles and to run on sturdy roller bearing of SKF make. The bearings to be enclosed in a housing and arrangement for grease lubrications should be provided. One axle should be driven by a motor through an enclosed good design harden spur gears of good quality. A thruster brake should be provided.
- 8.2 The cross travel gear box should be well secured at least by four bolts two on each side opposite the each other.

9.0 HOISTING MECHANISM :

- 9.1 This shall consist of heavy duty cast iron drum driven by totally enclosed gearing. The drum shall be of ample diameter and of sufficient length to take full amount of rope without overlapping when the hook is in the highest position. When the hook is in the lowest position, there should be at least two full turn of rope remaining on drum. The method of attachment of the rope shall be such that in the event of rope un-winded completely there shall be no danger of its becoming freed from the drum. The drum should have right and left hand spiral grooves machined to suit the required size of wire rope, should be spigotted and bolted to the final driving gear. The whole gear box should be of standard design, having SKF/NBC/FHP make bearings and should be smooth and noiseless in operation.
- 9.2 The gearing should be of heat treated alloy steel pinions and carbon steel gears the larger gears having forged carbon steel rim shrunk and secured by bolts on heavy duty cast iron or cast steel. All gears will have machine cut teeth. High speed gears must be of helical type teeth and all gears should be free from noise and with smooth operation. The drum shaft and pinion shaft shall be mounted on ball & roller bearing of SKF/NBC/FHP make and complete gear train shall be enclosed in a heavy duty cast iron gear box. The gear box must having jointing surface machined and should be made leak proof. All the extended shaft and end covers on gear box must be provided with good quality oil seal to prevent any leakage.

10.0 HOIST BRAKE :

- 10.1 A thruster creep brake to be fitted on the high speed shaft. The brake to be of the post type with hinged shoes. Shoe must be lined with best quality reinforced bonded asbestos industrial brake lining and arranged for easy adjustment. The brake should be normally held on by a balance weight and released by a thruster in the circuit of hoist motor.

11.0 OTHER BRAKES & LIMIT SWITCHES

- 11.1 There should be heavy duty double limit switch for hoisting and lowering motions.
- 11.2 Gravity type limit switch must be provided for hoisting operation in order to provide additional safety.
- 11.3 Series type limit switches with single arm spring loaded allen west type should be provided for traverse motion.
- 11.4 Anti - collision type limit switches should be connected only in interlock circuits.
- 11.5 All limit switches should be connected only in interlock circuits.

12.0 ROPE HOOK AND SHEAVES:

- 12.1 The hoist shall have the factor of safety being not less than 6. Hook for all loads should be supported on 4 falls.
- 12.2 Sheaves are to be of heavy duty cast iron mounted on Ball bearings. Guards to be fitted to prevent the rope leaving the sheaves, even when the hook is lowered to the rest on the ground and rope allowed falling slack. The hook guard should be secured in such a manner that there should be no bolt protruding in the inner side of the hook.

13.0 MOTORS:

- 13.1 The all motors should be one hour rated crane duty. These should be totally enclosed type fitted with Ball / Roller bearings.
- 13.2 The motor should have class 'B'/F' insulation and to comply with IS: 325 according to manufacture standard. All motor should be slip ring induction type and suitable for use of 415 V, 3 phase, 50 cycles, AC supply. The motor should be of GEC Alstom/ ABB/ Crompton make only.

14.0. CONTROL GEAR

- 14.1 The hoist motor, long travel motors and cross travel motor should be controlled by semi automatic reversing contactor panel with a cam operated master controller.

15.0 CRANE PROTECTIVE PANEL:

- 15.1. The design & construction of this panel must be of high standard. The equipment should comprise of contactors circuit breakers and magnetic oil dashpot type over current relay connected in all the phases of each motor. An emergency stop and a reset push button and an indicating pilot lamp should be incorporated. All connections internal & external should be accessible from front of the panel for inspection & maintenance. The contactor should be of SIEMENS/ L&T, overload relay of electrogear make/ thermal relay of Siemens/ L&T make and timer of CUTTLER - HAMMER.
- 15.2 The relay & contactors should be of robust design. The contactor should be suitable for class IV duty. Over load relay should have arrangement with adjustable current setting and with self reset mechanism. Auxiliary contacts of magnetic overload should be robust in construction.
- 15.3 Isolator switch fuse unit should be capable of load breaking and mechanically robust. Isolation to be of quick brake type and it should be of GE Control (EE) make. Main Isolating switch should be mounted on the operator's cabin.
- 15.4 All fuses should be of HRC / GE Control (EE) make only.
- 15.5 Suitable rating control transformer should be provided for the control of the circuit.

16.0 RESISTANCE BOX

- 16.1 All resistances should be of 10 minutes rating. The resistance should be rust less unbreakable S.S. grid type.
- 16.2 All resistance box should be mounted on the crane bridge.

17.0 CONTROL CABIN:

- 17.1 The depth of crane cabin should be limited to 2150 mm. Opening to be cage on the platform should be approximately 750 mm x 750 mm. A ladder should be provided between the cage and the inspection platform of the crane. The controllers should be so positioned as to facilitate easy operation & maintenance. A warning bell (Electrically operated industrial type with 6" gong) and Fire extinguisher of 4.5 litre capacity with long discharge nozzle should be provided in operator's cabin. One more bell is to be provided sturdy conventional pendulum type made of good bell metal and to be well secured inside the cabin in a convenient position for easy operation. A revolving type cushioned seat is to be provided in the cabin for the crane operator. A 2 feet 20 watt fluorescent tube fitting, one 16" sweep cabin fan with guard should be provided.
- 17.2 An inspection lamp with 20 meter 3 core flexible cable is to be provided with 240 V plug point in the cabin.
- 17.3 The total depth of control cabin should be such that it should not interfere with any other structure / semi gantry crane / machines in the entire bay. For this supplier must check all the available clearances at the side before finalizing/ designing of the crane dimension.

18.0 RADIO REMOTE CONTROL SYSTEM:

- 18.1 Radio remote control system shall be provided to operate the crane from shop floor in all motion and control. The radio remote control system shall consist of a portable transmitter and receiver along with the necessary relay logic for interfacing to the crane motors. The transmitter shall consist of push buttons. A selector switch shall be provided in the operator cabin for remote / manual operation.
- 18.2 Details of Radio remote control system to be furnished with the offer. Make of Radio Remote control system shall be Lotus/ Acropolis only.
- 18.3 The system shall be following designated controls:

Main Power	ON/OFF	
Hoist Micro speed	UP/DOWN	1 - 0 - 1
Hoist	UP/DOWN	1 - 0 - 1
CT	FORWARD/REVERSE	1 - 0 - 1
LT	LEFT / RIGHT (SLOW)	1 - 0 - 1
LT	LEFT / RIGHT (HIGH)	1 - 0 - 1
Alarm	ON/OFF	
Emergency stop	ON/OFF	
Under bridge lights	ON/OFF	

19.0 CRANE BRIDGE LIGHTING :

- 19.1 Four Nos. 300 watt flood lights with fitting or four Nos. 100 Watt HELOGEN lights with fitting should be provided below the bridge girder.
- 19.2 Separate ON/OFF switches for all four lights shall be provided in the operator's cabin.
- 19.3 A lighting transformer of suitable rating shall be provided for lights, fan etc.

20.0 WIRING:

20.1 The crane shall be supplied complete with all wiring and materials. Collectors on the crane bridge and on the crab shall be provided where applicable. Moveable type flexible cable with necessary trolleys and festooned system shall be provided for supply of trolley. LONGITUDNAL GANTRY LEADS ARE ALREADY PROVIDED IN THE BAYS.

20.2 All wiring shall be with PVC insulated and or armored cables having copper conductor. Wire and cable should be of 1100V grade in trunking. Trunking should be used instead of conduit pipe.

20.3 All electrical wiring and installation should strictly confirm to IS Act, 1910 and I.E.E. Rules. 1956 and other standard practice as adopted by the I.S.I.

20.4 All control terminations should be ferruled such that the numbers are clearly visible from out side, crimped terminations should be provided for control cables and as far as possible for main cables. A set of suitable current collector shoe should be provided to suit the angle iron down shop leads. Details of existing down shop lead and current collector system can be checked at site before finalizing the supply of current collector system.

21.0 MAINTENANCE:

21.1 We would stress the need of adequate maintenance facility for all gearboxes and working mechanism which shall be located above platform level and shall be easily approachable for good maintenance.

22.0 SPARES :

22.1 Recommended spares for two years normal working of the equipment is to be furnished with the estimate, separately quoted for each items. Details of bearings, oil seals used should be supplied along with location of each item.

23.0 MISCELLANEOUS :

23.1 All gear boxes should have oil level indicator to show the level and condition of the oil in gear box.

23.1 All material used should be of the best of their respective kinds and should of the appropriate I.S. Specification & all workman ship should be of best quality.

23.2 The structural steel work in the bridge and the crab frame should be given one coat of suitable primer during fabrication. Gear boxes and similar parts to be given coat of oil paint. After erection at site, the crane should be given two coats of light orange synthetic enamel paint.

23.3 First fill oil, grease etc. for the commissioning of the crane shall be provided by the supplier.

23.4 Tool box with standard tools shall be supplied with the crane.

23.5 List of bought out items should be furnished with names of makers and complete literature about the items should be supplied.

23.6 Crane to be fabricated for its satisfactory performance for a period of 24 months from the date of commissioning with guarantee certificate.

23.7 Lifting hook, wire rope and crane to be tested to IS standard and test certificate to be provided (4 copies each). Test certificate of hook should from a recognized Govt. Test House.

23.8 Four copies of manual of Operation and servicing to be with erection drawings. G.A. drawing, wiring diagram etc. to be supplied along with the crane.

- 23.9 Four copies of structural drawing, wheel assembly, maximum crane wheel load etc. H.P. rating of motor, hook approach, gear box details, weight of crane to be supplied.
- 23.10 Mechanical drawings, electrical wiring and schematic diagram should be sent in triplicate for approval before finalizing the design. Make and technical specification of all items is also to be submitted for approval.
- 23.11 Supplier shall inform BHEL in advance to witness assembly and load test.
- 23.12 The crane is to be erected by the supplier at site with their own labour, tools and tackles, winch. The crane is to be commissioned and tested before handing over.
- 23.13 All motions at various steps of speed shall be checked along with current being taken by respective motion motors.
- 23.14 After test but before crane is put to use, it shall be tested with overload of 125 percent of the S.W.L. when load is located at the center of span. During testing the overload test each motion shall be measured in both direction and the crane shall sustain the load under full control.
- 23.15 Erection / commissioning charges to be quoted separately.

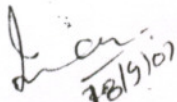
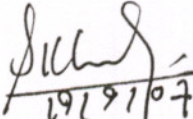

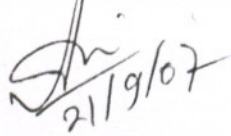
DETAILS MENTIONED BELOW SHALL BE PROVIDED COMPULSORILY ALONG WITH TECHNICAL BID.

S.No.	Description	Requirement	Offer	Remarks
1	Hook lift above floor level	7.75 Meter		
2	Hoist speeds	Max. 3.00 Meter / Min		
3	Hoist micro speed on 1st step from master controller & remote control	10% of Max. speed		
4	Cross Traverse speed	Max. 21.32 Meter/ Min.		
5	Long Travel speed	Max. 76.2 Meter / Min.		
6	Weight of each bridge (two Nos.)	Supplier to quote		
7	Weight of each carriage (two Nos.)	Supplier to quote		
8	Weight of compete trolley	Supplier to quote		
9	Weight of compete assembled crane	Supplier to quote		
10	Over all width of crane	Supplier to quote		
11	Wheel load on each L.T.wheel	Supplier to quote		
12	HP of various motor, duty cycle , rating , make & speed	Supplier to quote		
13	Size of brake drum Hoist , CT & LT	Supplier to quote		
14	Wheel dia LT & CT	Supplier to quote		
15	Size and capacity of thruster brakes Hoist , CT & LT	Supplier to quote		
16	No. of falls in hoist	4 Fall		
17	Size, make & Specification of wire rope	Supplier to quote		
18	Maximum hook approach from LT rail center Cabin end Far end	Supplier to quote		
19	Type & make of main hook	Shank type make to quote		
20	Make of Radio Remote	Supplier to quote		

24. QUALIFYING CONDITIONS

Only those vender, who have supplied and commissioned up to 10 T or higher Capacity EOT crane minimum 10 Nos. for similar application in the past ten years and such crane is presently working satisfactorily for more than one year (more than six month if supplied to BHEL) after commissioning should quote. The following information is to be submitted by the vender about the companies where similar cranes have been supplied. This is required from all venders for qualifications of their offers.

1. Name of the customer/ company where similar machine/ crane is installed
2. Complete postal address of the customer
3. Year of commissioning
4. Name and designation of the contact person of the customer
5. Phone , Fax No. and e.mail address of the contact person of the customer
6. Performance certificate from the customer regarding satisfactory performance of the machine/ crane supplied to them

Drafted by	Checked by		Approved by
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