SPECIFICATION FOR DOUBLE GIRDER 10 TON ELECTRIC OVERHEAD TRAVELLING (EOT) CRANE FOR ACDFS BUILDING

1. INTRODUCTION

This crane will be installed in the newly constructed ACDFS building of Raja Ramanna Centre for Advanced Technology, Indore (MP). This Centre is situated at a distance of 14 km from Indore Railway Station. The specifications of Double Girder Electric Overhead (EOT) crane with Duty Class M7 are as given in Annexure I. The end view of the high bay where the crane will be installed is as shown in Annexure-II.

2. SCOPE OF SUPPLY

The scope of supply of 10 Ton EOT crane will includes its design, manufacturing, assembly, testing & inspection at manufacturer’s works, packing, dispatch, transportation, safe delivery at site, required fabrication at site, installation, testing & commissioning, performance testing, final painting at site and handing over to RRCAT. The Scope of supply shall also include but not be limited to the following, along with necessary fittings, fixtures and accessories.

a. Bridge structure with platform and hand railing
b. Traveling mechanism for long travel and cross travel
c. Track wheels for long and cross travel
d. Trolley
e. Hoisting mechanism
f. Service Platform on both sides of crab girder
g. Brake Mechanism separately for long travel, cross travel and hoisting
h. Pendant Control and wireless remote operation for all movements
i. Electrical motors, control gear and equipment
j. AC variable frequency controls for all motions of the crane.
k. Rails.

Exclusions:

a. Civil work including grouting.
b. Long travel supporting girder structure.

3. FOLLOWING ITEMS ARE ALSO INCLUDED IN BIDDER'S SCOPE.

a. Consumables like first fill of lubricating oils etc. for the initial operation of the Equipment till handing over.
b. Commissioning spares and start-up spare parts.
c. Special tools & tackles, if any required.
d. All drawings / documents along with operation and maintenance manuals as per requirement mentioned elsewhere in the tender document.
e. Getting approval of design/drawings and design calculation related to the equipment (crane), from RRCAT. After the approval of design/drawing the bidder shall check physical dimensions of span, alignment and leveling of girder before start of manufacturing of crane.
f. 3 Ph, 415V, 50 Hz power supply at Isolator shall be provided at one point for EOT Crane. Further distribution including supply, laying & termination of cables shall be in Bidder’s scope.
g. Trailing / Flexible Cables as required for the crane shall be in bidder’s scope.
4. BIDDER’S QUALIFICATION

a. The quotations are invited and accepted only from crane manufacturers with ISO-9001- 2008 or equivalent QA management program certification.

b. The bidders shall provide satisfactory evidence of fabrication and testing facilities available at their works and proof of valid documents for QA management program certification, acceptable to the Purchaser, to prove that they are licensed manufacturer and possess adequate plant and manufacturing capacity/facilities and also have quality assurance programme. They shall furnish a statement that they have manufactured and supplied at least 5 nos. of similar EOT cranes of 10 MT capacities and above with minimum of 20 meter span and higher supplied by him during the last 5 years. Purchaser’s name and address, order number, date and quantity supplied, performance report, and whether the supplies were made within the delivery period etc, must be enclosed. In the absence of the above information, the offer is liable to be rejected. **Purchaser reserves right to evaluate bidders fabrication facility, to see its competence to carry out the work.**

5. DESIGN

The cranes shall be designed, manufactured, erected and tested in accordance with the following or their latest versions of IS Codes:


b. IS:807- 2006 - Indian Standard Code of Practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.


d. IS 13834 (Part 1) Cranes: General

e. IS 13834 (Part 5) Overhead Travelling and Portal Bridge Cranes

f. IS 325 Specification for Three Phase Induction Motors

g. IS 5749 Specification for Forged Ramshorn Hooks

h. ISO 12488-1, Cranes - Tolerance for wheels and travel and traversing tracks.

i. IS 800-2007, Design of steel structures.

The EOT crane to be primarily designed for the parameters indicated in the table below.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item</th>
<th>Parameter</th>
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<tbody>
<tr>
<td>1)</td>
<td>Hoisting Capacity</td>
<td>10 Ton</td>
</tr>
<tr>
<td>2)</td>
<td>Crane Span</td>
<td>20 meters (approx.)</td>
</tr>
<tr>
<td>3)</td>
<td>Longitudinal Travel of crane</td>
<td>56 meters (approx.)</td>
</tr>
<tr>
<td>4)</td>
<td>Lifting Range</td>
<td>8.0 meters (Hook Height)</td>
</tr>
<tr>
<td>5)</td>
<td>Main Hoist Speed</td>
<td>3.0 m / min (Max.)</td>
</tr>
<tr>
<td>6)</td>
<td>Long Travel Speed</td>
<td>20.0 m / min (Max.)</td>
</tr>
<tr>
<td>7)</td>
<td>Cross Travel Speed</td>
<td>16.0 m / min (max.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Max. 10% variation in LT, CT and 5% variation in hoisting speed is acceptable)</td>
</tr>
<tr>
<td>8)</td>
<td>Creep speed</td>
<td>Presetable min. 10 % to 100% in steps of 10% by</td>
</tr>
</tbody>
</table>
6. CAPABILITY OF THE CRANE
The crane shall be capable of:
  a. Hoisting
  b. Longitudinal travelling
  c. Cross traversing at specified speeds in both loaded and unloaded conditions

7. RIGIDITY, CONTROL & SAFETY
   a. The crane shall be rigid, robust and of sturdy construction
   b. Crane controls shall be conveniently located. Various controls shall be suitably
      interlocked to prevent accidental movement of the crane.
   c. Suitable limit switches, one each for long and cross travel and two for main hoists,
      shall be provided to stop the crane and prevent over-travel of various moving
      parts of the crane.
   d. Suitable buffers shall be provided to prevent over travel of the crane mechanism
      in both longitudinal and cross traverse directions.
   e. Suitable guards or enclosures shall be provided on the crane to prevent
      inadvertent contact with down shop leads (DSL) or any other exposed electrical
      conductors and cables.
   f. Suitable isolation switches and stop buttons shall be provided to isolate the
      electric supply for maintenance or in the event of an emergency.
   g. A safety hand railing of tubular construction shall be provided on bridge footwalls,
      end carriages, trolley and any other places where access has been provided. Railings
      shall not be less than 1000 mm high with an intermediate member at a
      height of around 300 mm.
   h. All sheaves shall be provided with rigid guards to retain the ropes in the grooves.
      Guard shall fit close to the flange and shall have a clearance between the sheaves
      and inside the guard of not more than 3 mm or 1/4th the diameter of rope,
      whichever is less.
   i. The crane shall comply with the relevant safety regulations under the Factories
      Act, Indian Electricity Rules and other statutory regulations as applicable.

8. MAINTAINABILITY
   a. Safe accesses for maintenance and removal of all mechanical, electrical and
      structural components must be ensured. All parts requiring replacement,
      inspection and lubrication shall easily be accessible without the need of
      dismantling other equipment or components. Arrangements for access to
      important components must include a cradle for inspection and maintenance of
      DSL, such cradle being conveniently accessible.
   b. All electrical cables shall be so laid that they are not liable to damage and can
      be easily inspected and maintained.
   c. Access walkways (wherever required) of minimum 500mm clear inside width
      with hand railings on both sides of girders for the full span length for inspection
      and maintenance of the crane shall be provided. Walkways shall be of chequered
      plate or non-slip steel surface of minimum 6mm thick. Walkways shall be of rigid
construction and designed to sustain a distributed live load of not less than 3 kN/m² (0.3 kg/cm²).

d. Materials used for equipment and structural shall be free from cracks, blow holes, laminations, pitting etc. Except for areas where a superior grade of materials is required, steel class shall be as per IS: 2062 (latest).

e. A tool box containing all tools required for the maintenance of the crane shall be supplied with the crane.

f. Fasteners for pedestal blocks, gear boxes, etc., shall be easily removable from the top of the platform.

9. STRUCTURAL DETAILS

a. The crane bridge shall comprise of double girders of plate box type. Camber in the box girder shall be as per the relevant IS code.

b. All welded subassemblies of box girder shall be stress relieved before final welding of the box girder.

c. Position of the Weld joints in top plate, side plate and bottom plate of the box girder assembly shall be specified with respect to the maximum deflection plane (i.e. plane passing through the centre point of the box girder).

d. In the main bridge girders, in addition to the required full length diaphragms, short diaphragms shall be inserted wherever required to transmit the trolley wheel load to the web plates and to limit the maximum stress in the trolley rail to safe permissible limits. All diaphragms must bear against the top flange. Steel plates used for bridge girders and diaphragms shall be as per IS:2062 (latest).

e. All fasteners shall be hot dip galvanized. All load bearing fasteners shall be of high tensile grade, and it shall be of reputed make (Unbrako). Manufacturer shall submit a test report for mechanical testing for the same.

f. The bridge girders shall be connected to the end carriages by large gusset plates. Ground tight fit bolts in reamed holes shall be used for bolted connections.

g. The calculated strength of joints made by High Strength Friction Grip (HSFG) bolts shall not be less than calculated net strength of the member. The calculated strength of other bolted joints in structural members shall not be less than the net strength of the member plus 25%.

h. All butt welds on structural members of bridge girders subjected to tension shall be radio graphically tested. All other welds shall be subjected to Magna flux or Dye Penetration Test.

i. The box girders shall be so constructed as to eliminate any possibility of accumulation of water or oil inside them.

10. END CARRIAGES

a. Crane bridge shall be carried on end trolleys with solid forged wheels. The minimum end clearance on each side of the long travel wheels shall be 10mm.
The wheels shall be mounted on fixed axle or suitable anti-friction spherical roller bearings which can be conveniently removed for maintenance.

b. End carriages shall be designed to be strong enough to resist all stresses likely to be imposed upon them under varied service conditions, including collision with stops. The length of the end carriages shall be such that no other part of the crane is damaged in the event of a collision.

c. End carriages shall be fabricated from rolled steel sections or plates, welded together to form a box. Suitable stiffening diaphragms shall be provided wherever required. The material used shall be steel as per IS: 2062 (latest).

d. Suitable **jacking pads** shall be provided on each end carriage for jacking up the crane while changing track wheels. These jacking pads shall not interfere with replacement of track wheels.

e. The end carriages shall be fitted with suitable **safety stops** to prevent the crane from **falling more than 25mm** in the event of breakage of track wheel, bogie or axle. These safety stops shall not interfere with the removal of track wheels.

**11. CRANE RAILS**

Square bars of 50mm X 50 mm as crane rails for longitudinal and cross travel shall be supplied, installed and tested by the supplier.

**12. TROLLEY FRAME**

a. The trolley frame shall be welded rolled steel box section, designed to transmit the load to the bridge rails without undue deflection. It shall be made rigid by providing suitable diaphragms. The material used shall be steel as per IS: 2062 (latest).

b. The drum bearings and supports for upper sheaves shall be located so as to equalize the load on the trolley wheels as nearly as possible.

c. The trolley wheels shall be suitable to the crane rails. The **axle bearings** shall be of **spherical roller type**. The bearing housing shall be designed for easy removal of wheels and bearings for maintenance. The wheel assembly shall be fitted in **L-type housing**, for easy removal of wheel assembly.

d. All the mechanical and electrical equipment shall be placed above the trolley top plate as far as practicable. For any parts placed below the trolley top plate, access for maintenance, repairs and replacement shall be provided. Where the clearance between bottom member of trolley frame and the CT rail is over 25mm, the **trolley shall be fitted with substantial safety stops to prevent the trolley from falling more than 25 mm** in the event of breakage of track wheel, bogie or axle. These safety stops shall not interfere with the removal of wheel. Details of the arrangement shall be explained in the offer.

**13. RAIL WHEELS**

a. The rail wheels shall be suitable to the crane rails mentioned at sr. no. 10.

b. The wheels shall be manufactured from medium carbon alloy steels, and shall be solid forged and heat treated to have minimum hardness of 34HRC (320 BHN) on the tread and flanges to a depth of not less than 8mm.
c. The wheels shall be shrink-fit on the axles. Hardness of the machined rail wheel (for both CT and LT) shall be checked with portable hardness tester and value to be verified with the test reports during factory acceptance test.

14. ROPE DRUMS
   a. The rope drum shall be designed to withstand the compressive stresses caused by the rope wound on it and the bending stress due to beam action of the drum.
   b. The steel used shall be conforming to IS: 2062-1984 (or latest) quality. The rope drum shall be stress relieved after fabrication. T-joints shall be radiographically checked.
   c. The drum shall be designed to take the entire length of the rope in a single layer. Free extra turns as specified in IS: 3177 shall also be provided. The drum shall be flanged at both ends.
   d. Cranes shall be designed with number of rope having 4 falls.
   e. Weld joint of the web with rope drum shaft and inner diameter of the rope drum shall be radio graphed. This shall be applicable seamless rope drum.

15. WIRE ROPES
   Wire rope in the crane shall be of galvanized type and of reputed make. Preferably “Hyflex” type wire ropes shall be used. If it is conventional type; then it shall be 6 x 36 construction and made from best plough steel of tensile strength 180 kg/mm²
   Preferred Make: Usha Martin/ Kennedy Wire Rope and Sling

16. GEARING
   Only helical gears shall be used. Gearing in all motions shall be of suitable case carburizing low carbon alloy steels and shall conform to relevant Indian/International standards. They shall generally be in accordance with IS: 4460-1967 (or latest). All gears shall be hardened and profile ground for longer life and silent operation. Minimum surface hardness of pinions and gears shall be in the range of 55-60 HRC. The hardness of gears shall be at least 2 - 3 HRC less than that of pinions.

17. GEAR BOXES
   a. All gear boxes shall be of completely enclosed splash lubricated type. All gear boxes shall be oil tight and sealed with neoprene ‘O’ rings of suitable section. All gear shafts shall be supported in bearings mounted in the gear boxes. Gear boxes shall be made of graded C.I./M.S. fabricated. All gear boxes shall be stress relieved and the method of doing so shall be explained in detail in the offer. Gear boxes shall be provided with breather vents, easily accessible drain plugs, and a suitable oil level indicator such as a dip stick. Adequate radial clearances between the gear box inner surface and outside diameter of the gears shall be ensured and clearance proposed to be provided shall be indicated in the offer. The facial clearance between the inner surface of the gear box and the face of the nearest gear/pinion shall be at least 10mm. All gears and pinions shall be of ground type so as to reduce noise levels to the minimum.
b. All gear boxes shall have drip pans to avoid oil falling on shop floor.

c. LT/ CT gear boxes-- These shall be of a modular, integral design. Motors may be either flange-mounted or foot mounted, or a combination of the two.

Preferred Make: Nu-Teck/ Indiana Machine Tools, India/ DEMAG

18. MOTORS : Three phase squirrel cage crane duty TEFC induction motor

For Long Travel:

The wheels of each end carriage shall be driven by independent synchronized drive motors mounted near each end carriage.

40% CDF, S4 duty Class-F insulation, 150 starts/ stops per hour

Preferred Make: Siemens, ABB, Crompton Greaves, BBL

For Cross Travel:

A separate cross traverse motor shall be used for cross traverse drive through a suitable gear box.

40% CDF, S4 duty Class-F insulation, 150 starts/ stops per hour

Preferred Make: Siemens, ABB, Crompton Greaves, BBL

For Hoist:

A separate hoist motor shall be used for Hoist drive through a suitable gear box.

40% CDF, S4 duty Class-F insulation, 150 starts/ stops per hour

Preferred Make: Siemens, ABB, Crompton Greaves, BBL

19. BRAKES

A. For L T & C T motions; The maximum braking torque to arrest long travel and cross traverse motions shall not less than 100% of full load torque for each brake. The L T & C T motions brake shall be provided with

Fail safe DC disc type --- 01 no. (for each)

Preferred Make: Pethe, Stromag

B. For hoist motion, two brakes shall be used and the braking torque for each brake shall not be less than 125% of full load torque. One of the two hoist brakes shall be applied with a time lag of 3 seconds in relation to the first. The hoisting motion shall be provided with

Electro Hydraulic Thruster Brake --- 01 no.
Fail-safe D.C. Disc brakes --- 01 no.

Preferred Make: Pethe, Stromag
Brake release shall be dependent on motor torque. The brake shall be released only if 100% torque is developed in the motor.

20. ROPE SHEAVES

All sheaves shall be of cast/ forged steel. They shall be identical, with the exception of the equalizer sheave. The equalizer sheave shall be mounted above the trolley floor and shall be easily accessible and removable from the trolley floor level. Sheave grooves shall be smooth finished for getting increased rope life. The supplier shall further ensure that wire ropes are parallel with each other.

21. BEARINGS

a. Ball and roller anti-friction bearings shall be of reputed make. The acceptable makes will be NBC, SKF, FAG, NORMA, NRB, NTN and KOYO.

b. For long and cross traverse wheels, spherical roller bearings shall be used. Bush bearings shall not be used at any location.

22. LIFTING HOOK

Standard plain shank type trapezoidal section hooks shall be used. These hooks shall conform to the relevant Indian Standard Specifications IS: 3815(latest) and IS: 8610 (latest). Certificate of test and examination to be submitted by the bidder. Certificate shall indicate sr. no. and date of testing.

Preferred Make: Eusuf Eli Karachwala (EEK)/ JDT, shank type with locking arrangement with Dockyard certificate

23. BUFFERS

Spring loaded or other suitable buffers shall be fitted on the four corners of the crane also at the four ends of the bridge girders. Buffers shall be rigidly bolted in place, preferably along the centre line of the crane rail or trolley rail as the case may be. All buffers shall have sufficient energy absorbing capacity to stop the bridge or trolley in either direction when traveling at a speed of least 40% full load rated speed. Bridge buffers shall have a contact surface of not less than 125mm diameter.

Preferred Make: Hi-Tech/ Ankit Engineering

24. LUBRICATION

a. All gears and bearings enclosed inside gear boxes shall be splash lubricated. Bottom blocks and pedestal bearings shall have independent greasing points.

b. A lubricating chart shall be provided in the manual, indicating all lubrication points, the type of lubricants required and the recommended frequency of lubrication. These details shall be repeated, and amplified if necessary, in the Maintenance Manual to be supplied along with the crane minimum two nos. of hard copies.

25. SCOPE OF SUPPLY FOR ELECTRICAL COMPONENTS
All accessories and auxiliary electrical equipment including drive motors, electrically operated brakes, controllers, AC variable frequency controls, conductors, protective devices, operating devices, cables, conduits etc. necessary for the safe and satisfactory operation and maintenance of the crane shall be included in the Vendor’s scope of supply. **Electrical equipment shall be adequately rated to permit simultaneous operation of any combination of motions of the crane for its duty service.**

The scope of supply relating to electrical portion shall cover:-

a. **Indicating lamp and sound alarms:** All indicating lamps shall be LED type with appropriate protection. Sound alarm shall have sufficient dB level such that it would be audible in the crane operating area.

   **Preferred Make** Siemens, Technik, BCH

b. Shrouded down shop leads with LED lamps for three phase power indication.

c. **Main current Collectors (one in forward and another in rear)**

d. Power disconnecting switch on the crane bridge walk way, to be provided, immediately after the main current collection gears.

f. Protective Switch gears
g. Motor control panels.
h. Socket outlets

i. **Power and control cables CT motion cables shall run in cable drag chain.**

j. **IGUS Drag link cable system.**

k. **Pendant & Wireless remote:** Double step push buttons of Telemechanique, Siemens, Group Schneider, L & T, Bhartia Cutler Hammer, ABB, Allen Bradley, make pendant and **two numbers** of wireless remote control having 100 meters range of operation shall be either of Stromag, Siemens, ABB make. There shall be override provision on the pendant for the remote. A **master key** control on the pendant shall be provided. **An emergency PUSH BUTTON to complete shutdown shall be provided.** The control pendant shall have separate movement in CT direction independently from trolley.

l. **MCBs shall only be used in the crane in lieu of HRC fuses.**

m. Earth wire on crane portion as per relevant IS and IE rules.

n. Shrouded bus bar GI conductor along with Isolator switch at the ground level. Cabling from the Isolator to the shrouded bus bar shall be in vendor’s scope.

o. Three 250 W Metal Halide luminaries under the crane, operable from pendant as well as from the wireless remote control.

   **Preferred Make** – PHILIPS, Osram, GEC, Schreder

All sundry erection material required for installation and connecting up of electrical equipment with cable laying and fixing accessories shall be included in the price of the crane.

p) **A load cell conforming to IS 3177 shall be provided in the crane for the online measurement of the weight of the load hoisted.**
26. POWER SUPPLY CONDITIONS

Power shall be available at 415 ± 10% volts, 3 phase, 50 ± 3% Hz

27. SPECIFICATION FOR SHROUDED BUS BAR CONDUCTOR

Shrouded Bus Bar Conductor shall be of M/s. STROMAG, Siemens, ABB, Allen Bradley, Group Schneider make or safe track brand and shall conform to the following:

a. The conductor system shall be finger safe to IP-21 with necessary supporting technical evidence of same and the conductor and material shall be of suitable metal (Galvanized Iron) insulated by a high impact gloss finish VR 935/2 PVC compound which shall have a step/groove shrouded all along its length for effective molding of the conductor system.

b. The conductor shall be in minimum 4 mtrs. length, to be jointed with molded joint of the same material as the conductor.

c. Conductors shall be supported by way of a single piece molding, four pole hangers with single bolt fixing.

d. The current collector arm shall be aluminum die cast totally insulated and the connection cable shall be fully enclosed and double insulated within the collector arm with a proven performance. Two sets of current collectors shall be used, one in forward and another on rear, on DSL.

28. CRANE CONTROL

a. Pendant push button control and wireless remote control for long travel, cross travel and hoist motions. For switching ON and OFF the motor of a particular motion, the supply voltage to the pendant control shall be 24V AC/DC which shall be obtained through a suitable transformer. Necessary flexible multi core cable with sufficient length shall be supplied to enable the crane to be operated from floor level. Pendant shall be moving type and the movement of pendant will be independent of trolley via a separate track along girder length. On all the motions the circuit shall be so designed that brakes come into operation immediately in the event of tripping of motor main circuit breaker.

b. The pendant control shall be capable of withstanding rough handling without being damaged. The cover shall be firmly secured.

c. The mass of the pendant shall be supported independently of the electric cable by means of wire rope/ chain. The pendant shall be Telemechanique make and the push buttons shall be double step type.

d. On all pendant cranes safety means shall be provided to prevent inadvertent operation from floor while maintenance work is being carried out on the crane.

e. Adequate guards shall be provided to prevent accidental contact of pendant ropes or holding wire rope/ chain with cross traverse.

f. Along with the push button pendant; a wireless remote control of a reputed make shall also be offered for operation of LT, CT, hoist motion and luminaries under the crane

g. Wireless remote control shall have two transmitters and one receiver. The wireless remote control transmitter shall be impact resistant.

Preferred Make: Stromag/ Siemens/ ABB
h. Selector switch on pendant for pendant operation or remote control operation.

29. AC variable frequency control drives

Independent AC variable frequency control drives of adequate capacity for main hoist, CT & LT shall be used by using independent variable voltage variable frequency drives suitable for crane application. However common controller for both the motors of LT may be used.

Preferred Make:- L&T, Bhartia Cutler Hammer (BCH), Danfoss, Siemens make

30. CONTACTORS

a. All contactors shall be of AC 4 Class of duty with rating sufficiently higher than the full load current of the respective motors at the specified duty cycle. The directional contactors of all motions shall be suitably interlocked for correct sequence of operation.

b. The contactors shall have high contact reliability.

c. All contactors shall be of Siemens / L&T /Cutler Hammer make.

31. CIRCUIT PROTECTIVE SWITCH GEAR

a. In the crane; push button operated contactor shall be provided for circuit protection.

b. Each control circuit branch to every contactor panel shall be provided with facility for isolation and protection against short circuits and sustained high overloads by means of appropriately rated miniature circuit breaker.

c. MPCB (Motor protection circuit breaker) shall be used for each drive motor.

Preferred Make:- Siemens, Group Schneider, L & T, Bhartia Cutler Hammer, ABB, Allen Bradley, Telemechanique

32. LIMIT SWITCHES & LOCKS

a. Hoist motion shall be provided with limit switches to prevent crane from over hoisting and over lowering. Two limit switches shall be provided for proper back up protection. One of the limit switch shall be based on Gravity. The first limit switch shall act in the event of over hoisting and over lowering shall be of snap action/ pin type self resetting feature and incorporated in the control circuit of respective drive motor.

Make: Siemens/ SOC/ BCH

b. Other limit switch for slewing, skewing of crane etc. shall be provided

c. Long travel and cross travel motions shall be provided with two limit switches at each end.

First limit switch :- To change the travel speed to creep speed.

Second limit switch :- To stop supply to relevant motor for further motion. This action shall be accompanied with an alarm sound and light indicting that maximum limit has been reached.

d. Limit switch for hoist cross and long travel motion shall be supplied installed and wired by the manufacturer.
e. Limit switches shall be set such that there would be a gap of 20 to 30 mm between crane ends and buffers. In any case crane shall not touch the buffers.

f. Audio & Visual Alarm for all the limit switches shall be provided.

g. Safety latch and swiveling lock shall be provided for hook.

33. EMERGENCY STOP PUSH BUTTONS

Safety switches of sustained contact type shall be provided at each end of Crane Bridge so that under any emergency conditions, by operating anyone of the switches, the incoming circuit breaker is tripped thus cutting power to all motions. One number of emergency stop push button shall also be provided on pendant.

34. CONTROL PANEL (IP 55 class protection)

a. All power and aux contactors shall be mounted in sheet steel cubical with lockable hinged doors. Door hinges shall be of such type that during the repair works inside the panel the entire door can be lifted out and placed away enabling better access inside the panel. Each motion shall have its individual Panel. However, common panel with separate compartment for each motion shall be acceptable. **Interiors of panel shall be dust and vermin proof.**

b. Panels shall be front wired with readily accessible terminal blocks for making connections in the external equipment. Panels shall be pre wired into terminal strip. **Single core, copper conductor shall be used for control circuit wiring in the panel.**

c. All contactors etc. shall be mounted securely in a vertical arrangement with the consideration of the vibrations encountered in the operation of cranes. The bottom most row of the equipment mounted inside the panel except terminals strips shall be at least 150 mm above the panel bottom cover to facilitate inspection and repairs.

d. All the equipments shall be so mounted in panel as to enable its easy removal/ replacement from the front.

e. The terminal strips shall be fixed inside the panel preferably in a horizontal manner leaving enough space underneath the strip for termination of cables in a convenient manner. Power and control terminals shall be segregated. Power terminals blocks shall be separated from each other by means of replaceable insulated spacers. Terminal block shall have adequate clearance to avoid tracking. A minimum of 20% spare terminals block shall be provided in terminals strips.

f. All equipments inside the panel shall have permanent identification labels in accordance with circuit diagram as also the power and control terminals. Terminal blocks shall be of robust and of such construction as to preclude possibility of cable connections getting loose during vibration on crane.

g. Sheet steel used for fabrication of panels shall have a minimum thickness of 2.0 mm. Panels shall be mounted such that bottom of panel is at least 150mm above the floor.

h. Contactor panels shall be well braced to the crane structure and each panel shall be provided with adequate number of lifting lugs.
i. All the panels and cabinets shall also be provided with CFL luminaires for interior illumination.

Panel enclosure Preferred Make:- Rittal, Elsteel, Group Schneider, Bhartia Cutler Hammer (BCH)

35. CABBING
a. All wiring for power control circuit shall be carried out with 1.1 KV grade Flame Retardant Low Smoke (FRLS) PVC insulated copper cables as per IS 694 and IS 1554 Pt. I with smoke index and typical index corresponding to ASTM-2843 & IEC332-I.

b. Minimum size of cables for control circuits shall be 2.5 sq mm and minimum size for power cables shall be 4 sq mm copper.

c. All cables shall be systematically laid on G.I. trays or in cable drags of suitable type.

d. All cables shall be of reputed make and approved ISI brands.

e. CT cables of the crane shall run on cable drag chain.

36. IDENTIFICATION OF CIRCUIT CABLES ETC.

Labels of permanent nature shall be provided on supports of all switches, fuses, contactors, relays etc, to facilitate identification of circuits and replacement. All panels, controllers etc. shall be properly marked for each motion. All power control cables and other cables shall be ferruled at both ends as per cables numbers indicated in the supplier’s drawing. All equipment terminals shall also to be marked likewise.

37. Climatic Conditions.

The ambient temperature will be + 50° C(max).

38. EARTHING

Earthing to the crane shall be effected through track rails crane structure. As such, all the electrical equipments mounted on crane shall be connected to the crane structure by means of earthing links complying with Indian Electricity Rules (IS 3043). Equipments fed by flexible cables shall be earthed by means of spare core provided in the flexible cable.

39. TESTING AND QUALIFICATION OF THE SPECIFICATION:

Tolerances of crane rail installation and operation like span of crane, horizontal and vertical straightness of travelling track, height of traversing track (lateral slope) shall be as per International standard ISO 12488-1. Tooling required for qualification of the crane shall be arranged by the supplier. The crane shall be designed for a minimum life of 30 years.

The crane manufacturer must submit a detailed quality assurance programme indicating quality assurance plan (QAP) applicable at various stages of crane fabrication starting from raw material to final crane testing. Manufacturer shall use reputed make welding rods like L&T/D&H/Advani or Philips for all weld joints. Manufacturer shall also submit detailed test reports for radiography and mechanical testing for all the batches of welding rods used.
A detailed QAP with necessary drawings documentation and calculation for obtaining necessary approval shall be submitted to the purchaser before taking up crane fabrication.

40. PRE DISPATCH INSPECTION:

Pre dispatch Inspection as per latest version IS:3177-1999 codes: The crane will be inspected and tested during different stages of its manufacture, starting from raw materials till the completion of the crane, by the Purchaser or his authorized representative at the supplier’s or his sub-supplier’s works. However, the purchaser or authorized representative is free to institute any further checks at any stage of the work.

41. ERECTION, COMMISSIONING AND PROVING TESTS

a. The contractor shall arrange erection and commissioning of the cranes. Adequate number of teams of technical experts shall be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as we call upon for erection after receipt of crane at our site and site preparedness. All material handling equipments and any other equipment required for the installation and commissioning shall be arranged. Safety norms shall be followed during commissioning and testing at site as per Industry standard safety norms.

b. The contractor or his agent shall commission the crane within 60 days from the date of intimation by the consignee in respect of readiness of site/ gantry etc.

c. Following items of work shall be performed by the Contractor

i) Checking of alignment of gantry rail at site. Any rectification required, however, will be done by the purchaser.

ii) Installing of the crane structure and associated machinery in position.

iii) Complete fitting and wiring of all electrical items

iv) Fixing of down shop leads.

v) Commissioning of the equipment. The crane performance shall be demonstrated after successful commissioning.

d. Consignee’s obligation with regard to erection & commissioning will be limited to the following:

i. Unloading and storing until taken over by the supplier for erection.

ii. Supplying following free of cost at the site of work.

   a. Electricity required for the purpose of erection/ lighting.

   b. Test loads with slings and tackles for performing the load tests.

   c. Ladder for going up the gantry rails.

e. In the interest of early commissioning, the supplier shall ensure minimum amount of assembly is necessary at site. **The supplier, before proceeding with design details, shall check (at site) the span of gantry rails and its details from the purchaser.**

g. All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the crane maker’s or equipment
manufacturer’s works and test certificates shall be provided by the Purchaser or his representative.

h. Test of the crane at Purchaser’s Premises.

i. Start up and trial Operations Test of the crane (Commissioning Test)

j. The contractor shall carry out the start up and trial operation tests (commissioning test) on receipt of authorization from the Purchaser. In addition to tests indicated in IS: 3177 (latest), the following tests shall also be carried.

   i) The earthing of the crane and control equipment, to be tested as per Indian Electricity Rules.

   ii) The operation of brakes on long travel, cross traverse and hoisting motions.

   iii. Inching control and speed as specified in Annexure-I.

   iv. Operation of the crane with no skewness in crane during long travel and cross travel motions, presence of vibrations and unusual noise in operation.

   v. The trials shall be carried out initially under no load conditions and on satisfactory completion of above, trials shall be repeated for various loads until the full rated load and operating range are covered.

   vi. During the trial operation, all necessary adjustments shall be made so as to ensure compliance with the operating characteristics for the complete equipment as stipulated in the technical specifications.

42. TRAINING

Technical experts of the manufacturer during erection & commissioning of cranes will fully and adequately train operators/ maintenance staff nominated by the consignees.

43. PAINTING & COLOUR

The crane shall be epoxy painted (golden yellow colour) after obtaining surface finish better than or equal to SA 2½. All motors, brakes and panels shall also be epoxy painted.

   a. All parts of the crane shall be thoroughly cleaned of all loose mill scales, rust or foreign matter.

   b. All parts inaccessible after assembly shall be painted before assembly.

   c. The interior of all gear box housing shall be painted with two coats of oil resistant enamel paint.

   d. Surface finish of all the surfaces which are to be painted, shall be measured before painting.

   e. All structural parts of crane including girder, carriage etc shall be painted with at least two coats.

   f. Final coating thickness of the painted surface shall be 120 to 150 μm and same will be checked with DFT meter after final painting during factory acceptance test.

   f. Bidder shall do final painting at site before handing over to RRCAT, Indore

44. WARRANTY
Supplier shall guarantee for the EOT crane for the period of 24 months from the date of commissioning at RRCAT. Supplier has to submit performance bank guarantee (PBG) of 10% of the ordered value valid for full warranty period.

45. UP GRADATION OPTION

The crane shall have capability/option to increase the long travel length in future.

46. IMPORTANT NOTES TO THE BIDDERS:

a. The quotations are invited and accepted only from crane manufacturers with ISO-9001-2008 or equivalent QA management program certification.

b. The bidders shall provide satisfactory evidence, acceptable to the Purchaser, to prove that they are licensed manufacturer and possess adequate plant and manufacturing capacity/facilities and also have quality assurance programme. They shall furnish a statement that they have manufactured and supplied similar 5/10 nos. of EOT cranes of 10 MT capacities and above with minimum of 20 meter span and higher supplied by him during the last 5 years. Purchaser’s name and address, order number, date and quantity supplied, comments on their performance, and whether the supplies were made within the delivery period etc, must be enclosed. In the absence of the above information, the offer is liable to be rejected. Purchaser reserves right to evaluate bidders fabrication facility, to see its competence to carry out the work.

c. The following shall accompany the offer:

i) General Arrangement (GA) drawing to scale (showing elevation, cross-section and plan of the crane) indicating clearances, hook approaches, lift, location & direction of view of operator, wheel base, and wheel loads etc. of the crane being offered along with the quotation. Offer with generalized details is liable to be rejected.

ii) Submission of duly filled ‘Guaranteed Technical Particulars’ (technical data sheet) as per Annexure -III

iii) Deviations from this specification, if any, with a comparative statement.

iv) The offer shall include all the transportation expenses of crane.

v) Installation and commissioning charges if any shall be quoted separately.

vi) The validity of offer shall be at least 5 months from the date of opening of tender.

vii) Successful bidder shall furnish and get approval the following prior to manufacture of the crane for Purchaser’s approval.

- Assembly drawing -inclusive of gearbox details, individual drives like hoist, long travel and cross travel.
- Pendant controls with functional details.
- Circuit diagrams showing the wiring for the complete crane.
- Final design calculations of the crane components/parts and selection (with rating and make etc) of bought out items shall be submitted at the time of approval of GA drawings.
- Submission of a detailed quality assurance programme (QAP) indicating QAP applicable at various stages of crane fabrication starting from raw material to final crane testing. The essential elements of QAP are given in Annexure –IV.
- All the certificates related to guarantee/warrantee of the bought out items shall be transferred to the purchaser

vii) The successful bidder can inspect the site prior commencement of work.

ix) Incomplete offers shall be rejected.

x) **Pre-bid meeting will be arranged for technical clarification.**

xi) Performance bank guarantee (PBG) shall be provided.

xii) **Delivery Schedule:** The item shall be delivered to RRCAT premises within 05 months of placement of purchase order and settlement of commercial terms.

xiii) **Packing and transport:** Packaging shall provide adequate protection against shocks, vibrations, corrosion and handling forces during transport. The Vendor will be responsible for replacement of transit damage and loss.

xiv) **Documentation:** The vendor shall provide the quality control records, test certificates, operating manuals and maintenance manuals for the Double Girder EOT Crane, operation and maintenance manual of VVVF drives, Electrical and Mechanical drawings (Each 3 sets Hard copy) along with the supply.

xv) **Acceptance:** RRCAT will accept the item on the basis of test certificates, QC records, in-situ tests for qualifying its rated load capacity and functionality as per the provisions of the relevant IS codes and vendor’s compliance certificate that establishes conformance to the relevant IS codes.
## Data Sheet for 10 Ton Double Girder EOT Crane

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>10</td>
<td><strong>Location</strong></td>
<td>ACDFS Building</td>
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<tr>
<td>11</td>
<td><strong>Designation</strong></td>
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<td>12</td>
<td><strong>Duty Class of Crane (As per IS:807-2006)</strong></td>
<td>M7 (Class-III)</td>
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<td><strong>Quantity</strong></td>
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### Crane Classification as per IS 13834

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<td><strong>Type of Girder</strong></td>
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### Capacity

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<tr>
<td>18</td>
<td><strong>Main Hoist</strong></td>
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<tr>
<td>19</td>
<td><strong>Span</strong></td>
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<tr>
<td>20</td>
<td><strong>Longitudinal Travel</strong></td>
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### Lifting Range

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<tr>
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### Type of Hook

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<tr>
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### Speeds

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<td>23</td>
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<tr>
<td>24</td>
<td><strong>Long Travel</strong></td>
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<tr>
<td>25</td>
<td><strong>Cross Travel</strong></td>
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<tr>
<td>26</td>
<td><strong>Creep speed</strong></td>
</tr>
<tr>
<td>27</td>
<td><strong>Speed variation range</strong></td>
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### Operating Mode

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<tr>
<td>28</td>
<td><strong>Pendant</strong></td>
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Guaranteed Technical Particulars (Annexure-III)
(Technical data sheet to be submitted along with the tender by manufacturer)

<table>
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<th>Sl. No.</th>
<th>Description</th>
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<td>1.2.0</td>
<td>Type/ Model</td>
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<td>1.4.0</td>
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<td>1.7.0</td>
<td>Lowest position of hook</td>
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<td>1.8.0</td>
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<td>Speeds</td>
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<td>Cross travelling speed (Main &amp; Creep)</td>
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<td>Hoisting speed (Main &amp; Creep)</td>
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<td>Location</td>
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<td>Clearances and Hook approaches as per Tender</td>
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<td>Rope material</td>
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<td>6.5.0</td>
<td>Rope strength</td>
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<td>Hook material</td>
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<td>Safety latches provided</td>
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<td>Brake Drum</td>
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<td>9.3.1</td>
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<td>Hoist Make and model</td>
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<td>C.T. Make and model</td>
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<td>L.T. Make and model</td>
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<td>Hoist Make and model</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>L.T. Make and model</td>
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</tbody>
</table>

NOTE: If above clauses are found inadequate for furnishing any important information of the offered crane, the supplier may append additional sheets.

Signature of the Bidder
Annexure: IV

**Quality Assurance:** The essential elements of quality assurance plan are suggested in the following table. The Bidder shall submit a complete quality assurance plan along with the offer.

**Quality Assurance Plan**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Essential Elements of QAP (Tender Specification)</th>
<th>Vendor’s Confirmation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Submission of design data file, listing of all bought out components along with their catalogue and test plan. Approval of the design file by the Purchaser before starting manufacturing and procurement of bought out components.</td>
<td></td>
</tr>
<tr>
<td>Procurement</td>
<td>Material sourcing shall be done only from reputed material manufacturers / traders on the basis on mill certificate / test certificate from reputed labs. Purchaser’s approval shall be obtained before finalization of order. Copies of Purchase orders giving technical details of material and all bought out components shall be given to the Purchaser.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In general, the bought out components and materials shall be procured on the basis of test certificates. Copies of test certificates shall be given to the Purchaser.</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>All welding shall be done by welders qualified as per section IX of ASME B&amp;PV Code. Weld joints shall be tested by visual examination, radiography, ultrasonic examination, DP test and magnetic particle test and relevant reports shall be made to satisfy the requirements of the applicable compliance standard.</td>
<td></td>
</tr>
<tr>
<td>Testing</td>
<td>The item will go through the stipulated tests for ascertaining its rated load capacity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The item will go through a functionality test at site for satisfactory operation.</td>
<td></td>
</tr>
</tbody>
</table>