

### EOT Crane specifications

The bidder shall Design, Manufacture, Supply, Erection, Testing & Commissioning of EOT Cranes as per latest IS 3177 & 807 with following indicative specifications.

#### **A. General Specifications**

- a. Span of the Crane per table below

Sl. No	Description	Span	Qty	Remarks
1	15 Ton EOT Crane for Bay 1	18m± 1.0 m	2	Bay width 20M and Span depends on the column and girder spacing as per PEB design

Actual measurement shall be taken after design & construction.

- b. Cranes shall be meant for the installation girders in Pre-Engineered Structure/Building.
- c. Capacity of Hoist: 15T
- d. Lift of the Crane: 8.5 M (approx.)
- e. Bay length :93 M (approx.)
- f. Type of service: Indoor
- g. Class (Mech/Elec): Class M7
- h. Head room: 3000mm
- i. Amp. Temp to be considered: 45°C
- j. Mode of operation: Independent pendent & Remote-control operation.
- k. Speed:
1. Hoisting speed: 6M/min, Micro hoisting speed: 0.6M/min.
  2. Cross Travel speed: 20M/min, Micro CT speed: 5M/min.
  3. Long Travel speed: 30M/min, Micro LT speed: 15M/min.
- l. Speed control: Through Variable Frequency Drives (VFDs) for Hoist, CT & LT.
- m. Material used for fabrication of crane: Steel plates conforming to IS 2062 Grade E250B or Equivalent.
- n. Name plate & identification: Crane shall have a permanent inscription in English on each side of Girder, readily legible from the floor level, stating the safe working load in Tones, Span, Make, Year, Manufacturer's name etc.
- o. Safety features: Comply with relevant safety regulations & IE rules, safety limits to avoid over travel, safety latch for the hooks, applicable covering for rotating parts, safety hand railings, isolation switches for power disconnection etc.

#### **B. Lifting equipment & Cross Travel**

Shall have following items

##### **1. Motors for Hoist & Cross Travel**

Crane duty Squirrel Cage Induction motor, Efficiency class: IE2 or above, Electrical supply: 415V+/-10%, 50+/-5%Hz, 3 Phase AC supply, Ingress Protection: IP 55 or above, suitable for VFD operation. Motor shall confirm to standard IS 325.

##### **2. Brakes for Hoist & Cross Travel**

EHT (Electro Hydraulic Thruster Brake) with Thrustor motor, brake shoe & liner, Material of Construction: Cast iron, Power supply: 3 Ph, 415V, 50Hz.

##### **3. Gear box**

Totally enclosed oil lubricated gear box of rigid construction suitable to connect between motor & other rotating mechanisms.

**4. Lifting Hook, Steel wire rope & Rope drum**

- a. 15T capacity, C type, 4 fall with spring actuated safety latch. Hook shall be engraved with "15 TON SWL".
- b. Steel wire rope with fibre core of 1960 N/Sq.mm tensile strength, Min. breaking force: 313KN, LAY-RHOL Un-galvanized conforming to IS: 2266 of latest version.
- c. Double Flanged Rope Drum fabricated out of Seamless tube or equivalent material and of suitable diameter, complying the relevant latest IS standard & matching the wire rope of 4-falls & lift of 8.5 M.

**5. Crab unit assy.**

Crab unit to be supplied with the above components mounted on frame fabricated with ISMA/ ISMB/ ISMC etc. Crab unit shall be provided with platform made of chequered plate of suitable thickness above 5/6mm. All components should be above the platform and no component should be fixed below the platform. The crab unit shall be provided with safety hand railings on four sides.

**6. Limit switches**

- a. Rotary type cam operated limit switch & Gravity limit switch for 15 T hoist for limiting over hoisting & over lowering.
- b. 2-way lever type shunt limit switch to be used for bi-directional operation (CT) of Crane.

**7. CT Wheels & Rail**

- a. 4 nos forged & hardened steel of suitable grade to be used as CT wheels.
- b. Suitable crane duty rails to be used.

**C. Long Travel**

Shall have following items.

**1. Twin Motors for Long Travel**

Crane duty Squirrel Cage Induction motor, Efficiency class: IE2 or above, Electrical supply: 415V+/-10%, 50+/-5%Hz, 3 Phase AC supply, Ingress Protection: IP 55 or above, suitable for VFD operation. Motor shall confirm to standard IS 325.

**2. Twin Brakes**

EHT (Electro Hydraulic Thruster Brake) with Thruster motor, brake shoe & liner, Material of Construction: Cast iron, Power supply: 3 Ph, 415V, 50Hz.

**3. Gear box**

Totally enclosed oil lubricated gear box of rigid construction suitable to connect between motor & other rotating mechanisms.

**4. Limit switches**

2-way lever type shunt limit switch to be used for bi-directional operation of Crane.

**5. LT Wheels & Rail**

- a. 4 nos forged & hardened steel of suitable grade to be used as CT wheels.

- b. Suitable crane duty rails to be used.

**D. Crane structure**

**1. Maintenance platform**

Full length Maintenance platform fabricated with suitable materials such as ISMC/ISMA & 5/6 mm chequered plate of IS 2062 on both side of Crane girder along the span to be provided. **Note:** Width of platform: 1.25M on control panel side & 1M on other side.

**2. Safety hand railings**

Safety hand railings with steel pipes with toe guard to be provided on both platforms and also on both end carriages/CT trolley as per the standard practice.

**3. DSL Maintenance cum Operator cabin**

Standard sized MS fabricated Operator's cabin to be provided with suitable materials such as ISMC/ ISMA & 5/6 mm chequered plate of IS 2062 on Crane structure at Busbar side with safety hand rail on four sides. A separate MS fabricated platform for maintenance of DSL Bus bars to be provided at rear side of Operator cabin and shall be provided with One-inch rubber mat over the platform.

**4. Buffer assembly & End stoppers**

- a. Spring loaded air shock absorber buffers shall be fitted on the four corners of the crane and crab.
- b. MS fabricated end stoppers of suitable size with web plates to be provided for the ends of CT rail and LT rails.

**5. Bridge Girders & End Carriages**

- a. Fabricated box type using MS plates. All Tension joints of the bridge girders should be 100% radiographed and butt welding shall be checked for Dye Penetration test. Test certificates in original to be submitted at the time of inspection.
- b. Fabricated box type using MS plates. All Tension joints of the End carriages should be 100% radiographed and butt welding shall be checked for Dye Penetration test. Test certificates in original to be submitted at the time of inspection.

**6. Cabling for Cross Travel**

All incoming & outgoing cables of CT trolley shall be through Polymer Drag type E-Chain system with necessary mounting accessories. Cables compatible to Drag chain applications only shall be used connection from Panel to CT crab unit.

**7. C rail system for pendent**

Galvanized/CRCA steel C rail (32 mm size) system to be installed for pendent with necessary metallic movable trolley, towing trolley, end stoppers, joints etc.

**8. Painting**

The entire structure of the Crane shall be painted with Two coats of Epoxy paint over 2 coats of suitable primer as per the recommendations given in the latest IS: 3177.

**E. Electrical and other Specifications**

- 1. Power supply for the Crane**  
Input power: 415V+/-10%, 3Ph, 50+/-5% Hz AC  
Control power: 110V, 1Ph, 50+/-5% Hz AC through Transformer
- 2. Switch gears (TPN/MCB/MCCBs/Contactors etc)**  
Suitable capacity Switch gears (TPN/ MCB/ MCCBs/ Contactors etc) to be provided for Power & Control circuit as per the following.
  - a. 160A MCCB switch with metal enclosure & rotary mechanism to be provided near control panel for Main power supply.
  - b. Rating of contactors shall be at least 50% higher than the respective motor full load current at the specified duty cycle.
  - c. The directional contactors in all motion should be suitably interlocked.
- 3. Variable Frequency Drives (VFDs)**  
Variable Frequency Drives (VFDs) to be used for speed control of Hoist, CT & LT Motors.
- 4. Transformer**  
Suitable capacity Transformers to be provided as per the following.
  - a. 415/ 220V Transformer for Crane lights, panel lights, bell etc.
  - b. 415/ 110V Transformer for control circuit.
- 5. Control panel with supporting frame**  
Control panel made of powder coated CRCA sheet vermin, water proof with lockable hinged doors. Control panel shall install over a suitable supporting frame. The control panel shall be neatly wired using suitable copper wires, necessary cable management system, identification ferrules etc.  
The control panel shall be suitable to accommodate following items.  
Switch gears, VFDs, Protective & control devices, Transformers, cables, cable glands, terminal strips, 3Ph indication lamps, Digital voltmeter & Ammeter, panel lights, Selector switches, CTs, SPP, O/L relays etc.  
Power & Control terminal shall be segregated. Terminal blocks should be robust and of such construction as to preclude possibility of cable connecting getting loose due to vibration of crane. A minimum of 20% spare terminal shall be provided in terminal strips.
- 6. Lighting & Gong bell**
  - a. 4 Nos of 220/ 230V, 150W LED flood lights to be provided at bottom of platform with a shock absorbing anti swing suspension with a provision to control from Pendant & RRC.
  - b. Suitable Electronic Gong Bell operating in 220/230V, 50Hz AC to be provided with a provision to control from Pendant & RRC.
- 7. Anti-collision device**  
Laser type Anti-collision device having adjustable range setting (3M to 10M approx.) shall be fixed in Crane to avoid collision of Two cranes in same bay.
- 8. Load cell & Digital display unit**  
Load cell to be provided for 15T hoist with big digital display unit visible from the shop floor and smaller digital display unit at Operator's cabin.  
**Note:** Test certificate for the Load cell & display unit from Manufacturer to be submitted.
- 9. Pendant & Cable**  
Pendant control station with following controls & features like Emergency lockable mushroom type push button, Start switch, Double speed controls for UP/ DOWN, FW/ REV, RIGHT/ LEFT, Selector switches for pendant/ cabin, light control, bell control etc.

Material of Construction: Thermoplastic Self-extinguishing material, Double column type push button arrangement with necessary cable sleeve, hook for suspension etc.

Pendent control station shall be suspended in C rail system using 1.5 Sq.mm PVC insulated multi core/multi strand copper round cable with dual strain relief steel wires of size  $\phi 2$ mm.

**10. Radio Remote Control for crane**

RRC system with hand held type Transmitter with antenna, Receiver with antenna, Operating Range: 100Meters (approx.) with all controls same as that of in Pendent control station with rechargeable batteries & battery charger.

**11. Earthing**

- a. Rail Girder are to be grounded on either side using 25 x 6 Cu. flats to the nearest earth pit.
- b. Minimum 4 nos of Earth pits to be provided for earthing of Crane rail/girders.
- c. All Electrical & metallic equipments/structures shall be earthed as per Latest IS 3177.
- d. Pendant control station should be separately earthed.

**12. Spares to be supplied along with crane**

The bidder/OEM shall supply the following spares.

- a. Brake shoes with liners for 15T hoist (2 sets), CT (1 set) & LT (2 sets).
- b. Current Collector Assy -3 sets.

**13. Lifting chain along with crane**

The bidder/OEM shall supply the following lifting chains with Test certificates from any Govt. approved sources along with each crane.

- a. Steel chain with 4 legged sling having SWL of sling 15T at 90 degree, dia: 18 mm, effective length: 5M with oblong master link at top, joining links & Std eye hooks at bottom suspension of grade 80 as per latest IS 2760 & IS 3822. (Qty: 1 No / Crane)
- b. Steel chain with 4 legged sling having SWL of sling 10T at 90 degree, dia: 18 mm, effective length: 5M with oblong master link at top, joining links & Std eye hooks at bottom suspension of grade 80 as per latest IS 2760 & IS 3822. (Qty: 1 No / Crane)

**F. Bus Bar arrangement (DSL).**

**1. DSL Bus bar & current collector to be used**

200A capacity, safe track, SF-2 model, PVC insulated bolted type Shrouded Copper conductor 4 lines (R, Y, B & G) with necessary accessories, 125A current collector assy., supporting frame etc to be provided in each bay. The bus bars shall be vertically arranged with end power feeding. Single pole insulated holding clamps to be used for fixing Bus bars.

**2. Power supply feeding for the DSL Bus bar**

- a. Power supply for DSL Bus bars shall be provided at both ends with 3Ph indication lamps.
- b. 200 A isolating TPN switch with rotary mechanism, HRC fuses in metallic enclosure to be provided for power isolation at both ends at suitable height operatable from floor level.

- c. 50 Sq. mm 4 Core Armoured Copper XLPE cable to be connected & terminated from DSL Bus bars to Isolating switch at both ends with suitable cable glands, lugs etc. Cable to be suitably clamped in cable tray at sufficient intervals.

#### G. Gantry Rail arrangement

Total Length of bay is 140M.

- a. **Rail:** CR 80 or higher size, 12M length Rail. Only new rails shall be supplied with crane.
- b. **Rail clamping and Jointing:** Rail shall be clamped on both side using suitable rail fixing clamps at least every 1M distance with stoppers in between clamps.
- c. Rails shall be installed without Gaps and undulations and shall ensure smooth movement of crane without any sound/ vibrations at rail joints. The bidder/OEM shall follow Rail alignment & fixing of rails in the girder as per relevant IS and safety standard.

#### H. Approved makes/brands for materials used in EOT Crane

Sl. No	Item description	Make
1	Geared coupling	Hicliff/Flextron/Allflex/LoveJoy/Fennar
2	Bearings	SKF/FAG
3	Steel wire rope	Usha Martin/Desh wire rope/Fort William
4	Contactors	Schneider Electric/L&T/Siemens/ABB
5	MCCB/ MCB/ OL relay/ SFU/ SPP/ Pushbuttons/ Rotary switches	Schneider Electric/L&T/Siemens/ABB/Havells
6	Drag chain system	IGUS/LAPP/KABELSCHLEPP or any reputed CE certified brands.
7	Cables for Cross Travel assy. (Motors, EHT brakes, Limit switches, Load cell etc	IGUS/LAPP or any reputed CE certified Cables compatible to Drag chain applications only shall be used for connection from Panel to CT crab unit.
8	Cables for Pendent, internal wiring, LT limit switches, lighting etc	Lapp/IGUS/Polycab/Finolex/RR Kabel
9	VFDs	Fuji Electric/Yaskawa/Schneider Electric
10	Hoist/CT/LT motors	Marathon/Bharat Bijilee/Crompton Greaves
11	Limit switches/Brakes	Speed O Control/Electromag/ Speed N System
12	Anti-collision device/Load cell & display unit	Speed O Control/Speed N System/Electromag or equivalent.
13	Meters	Schneider Electric/Siemens/L&T/AE
14	Lighting	Bajaj/Philips/Havells/Crompton Greaves
15	Radio Remote Control (RRC)	TELECRANE or Equivalent
15	Single phase preventer	GIC

**Note:** If any makes/brands are not specified for any items, the bidder/ OEM shall supply only reputed make/brands with concurrence of BEML.

**I. Drawings for approval**

The bidder shall submit following Drawings & Documents in A1/A3 size for BEML approval before manufacture of the Crane.

- a. GA drawing with technical characteristic chart and showing clearances.
- b. Design calculations & drawing of bridge girders, end carriage, gear boxes, Motors, crab wheel, wheel bearing hook block, wire rope drum and wire rope.
- c. Sub assy. drawings of Wheels, Hook block assy. Hoist drum, Gear box, Rail etc. with internals.

**Note:** These documents shall be verified and approved by BEML. Bidder shall only take up the production of Crane after getting the clearance from BEML.

**J. Pre-Dispatch Inspection & Load Test**

- a. Pre-dispatch inspection to be carried out at OEM works site. All facility for testing the crane has to arranged by the bidder/OEM.
- b. Proof (125 % of full load) & SWL Load Test on Crane will be carried out during Pre-dispatch inspection at OEM works site as per latest IS: 3177.
- c. BEML reserves the right for inspection and cross verification/stage wise inspection in case required.

**K. Test certificates to be submitted during Pre-dispatch inspection**

- a. The bidder/OEM shall submit the test certificates for all brought items like Motors, Limit switch, Load cell & display unit, Brakes, Hook, Gear box, Wire rope etc during inspection.
- b. The bidder shall produce Inspection Certificates for having carried out 'X' Ray and Ultrasonic Test on Welding joints as per latest IS: 3177.

**L. Inspection, Documents submission during commissioning of Crane**

**1. Inspection & Tests to be done during commissioning**

The bidder shall do performance testing as per latest IS 3177 & IS 807 and relevant standards as per following.

- a. The bidder shall ensure smooth LT & CT movements without any abnormal sound, tripping issues etc for the complete length of the bay.
- b. Ensuring the functioning of safety devices such as all limit switches, Anti-collision devices (with various ranges), Load cell & display unit etc.
- c. Proof load (125 % of full load) & SWL Load Test on Crane. Necessary loads will be provided by BEML.
- d. The bidder shall make their own arrangements for carrying out Examination & Certification of the Crane by 3<sup>rd</sup> party recognized by Inspectorate of Factories and Boilers, Govt. of Kerala and issue the Fitness certificate as per the relevant rule at the time of commissioning of the Crane.

**2. Documents to submitted along with each Crane**

The bidder shall submit following documents/certificates (3 Copies) with each Crane.

- a. GA drawing showing all leading dimensions & details (in A-1 size).
- b. Cross sectional drawings with part numbers and list of parts (in A-1 size).
- c. Sub assy. drawings of Wheels, Hook block assy., Hoist drum, Gear box, Rail etc. with internals (in A-1 size).
- d. Electrical Circuit diagram: Control and Power circuit.
- e. O&M manual with Spare parts/ Components & consumables used in Crane.
- f. Material test certificates for Rail, Hooks, Girder, Load cell & display unit, lifting chains (from any Govt. approved agencies), DSL Bus bars etc from supplier to be submitted.
- g. Data sheets and literatures of important items- makes, capacity with address of suppliers.
- h. Inspection, Load test certificates of Crane manufacturer as well as from 3<sup>rd</sup> party recognized by Inspectorate of Factories and Boilers, Govt. of Kerala.

**Note:**

Above are minimum specifications of crane to be followed. However Contractor shall use materials of higher grade or superior grade as per Crane design as per IS standards.