

**SOUTH CENTRAL**  
**RAILWAY**

**SECUNDERABAD DIVISION**  
**(MECHANICAL)**

**15/05T Capacity EOT Crane**  
**Tender Specifications**

**Specification**  
**No.Sr.DME/SC/EOT-**  
**15/05T/Remote/2023 Rev-0**  
**(Sanathnagar).**

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Bidders Should supply the crane as per following IS Standards i.e. IS:3177:2020 (or Latest), IS:807-2006 (upto amendment no.2 November 2020 or Latest), IS:800-2007 (upto amendment no.2 February 2024 or Latest).

Note: Bidders may please note that wherever IS specifications are suffixed with the phrase (latest / or latest) including those in the attachments enclosed to the tender document, the material shall be supplied strictly conforming to the latest IS specification only.

**Section-I****IMPORTANT FEATURES OF THE TENDER****1. INSTRUCTIONS TO TENDERERS FOR FILLING TECHNICAL BID:**

- 1.1. Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with international (CE/ISO/DIN/JIS) /National standards (IS) (wherever applicable).
- 1.2. Tenderers should offer and quote for all the specified concomitant accessories, as these are considered essential for commissioning and utilization of the machine. Even if bidder does not recommend the purchase of any of these accessories, the price must be quoted for comparison purposes and their recommendation/suggestion to be indicated in the offer. Tenderers should also quote for optional accessories, spares and consumable spares as asked in the specifications.
- 1.3. In case, any item is required in sets, please specify nos./pieces per set. This is essential for proper technical evaluation of the offer. Offers received without this may be considered as incomplete and liable to be rejected.
- 1.4. The bidder should quote only for the specified make of sub-assemblies and equipment wherever specified. In case, some other make is quoted, specific reasons for the same including its features/ advantages over specified makes should be submitted. Past performance of a same/similar machine from two or more end users may be submitted to evaluate performance of other items offered. Details of industries/ entities/Customers/products using the offered brand, details of manufacturer, should be submitted to evaluate the market presence of the make quoted; in case details are not submitted alternate brand/ item will not be considered & offer will be evaluated accordingly.
- 1.5. In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement under Annexure A of Section III, the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
- 1.6. Bidder or his authorized agent, in their own interest, should visit the consignees listed in clause 3 Section-I with prior appointment with Controlling Officer and acquaint themselves with existing process of manufacturing/remanufacturing, site conditions, availability of crane facility etc.

- 1.7. The tenderer shall provide satisfactory evidence, acceptable to the purchaser to show that he is a regular manufacturer and has adequate plant and manufacturing capacity and Quality Assurance Program, Information as per Annexure-L may please be furnished. The manufacturer shall have valid ISO-9001 certificate on the original date of closing of tender and a copy of same should be submitted along with bid (EOT Crane shall be in the scope of ISO certificate).
- 1.8. The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Purchaser in this regard shall be final. A copy of the alternative specifications offered should be sent along with the offer. The Tenderer should also furnish "Statement of Deviations" from tender specifications (as per Annexure A, Section-III) along with the offer.

Deleted

Eligibility & Performance Conditions can be seen in the Tender Document

- 1.11. The Statement of past supplies along with, (i) purchaser's name (ii) address, (iii) email address (iv) phone/fax number of purchaser, (v) purchase order (PO) or supply order number (vi) PO date (vii) along with the copies of purchase order (PO), (viii) quantity supplied (with proof of supply), (ix) date of supply (x) their commissioning date shall be submitted with the offer. Copies of POs/commissioning/performance certificate submitted shall also indicate the parameters/ specification of subject machine to prove same/ similarity aspect of the machine. Technical specifications of the machine from the related document of the PO may be attached to supplement the PO in regard to the respective parameters of similarity aspect of the machine. Specifications attached shall have linkages to the PO.
- 1.12. The performance certificate submitted by the tenderer shall have been issued by the actual end user organization of the machine, with their clear signature and address therein, in whose premises the machine is installed and commissioned. Performance certificates should be as per Annexure A1 given below.
- 1.13. Payment Terms : 80% payment will be made only after receipt of the plant in good condition at consignee's location against inspection certificate, issue of JRI, the supplier's delivery challan and submission of 10% WBG. 20% payment will be made after issuing PTC.

**All necessary information / documents required for establishing reference requirement above shall be submitted by the bidder along with original offer itself for establishing linkage of documents / entities such as manufacturer / PO / consignee / supply / Installation / Commissioning / Performance Certificate of the machine. No further clarification / correspondence shall be sought / entertained in this regard. In case, no information or incomplete information or illegible information is furnished by the bidder, their offer shall be summarily rejected.**

Important Note: i) The certificate shall not be older than one year from the original date of closing of tender. The performance certificate issued after original date of closing of tender (in cases where tender closing date has been extended) are also acceptable however the machine must have completed one year of satisfactory working after date of commissioning as on original date of closing of tender.

ii) Performance certificate shall contain following information.

**Letter Head of issuing authority**

See Important Note above) Date of issuance:

TO WHOMSOEVER IT MAY CONCERN

S. N	Head	Details
1	Name of the Supplier	
2	Name of End User	
3	Name of the machine / description of machine / Crane	
4	Purchase/Supply Order Number	
5	Date of Purchase/Supply Order	
6	Date of Supply of machine(s) /crane	
7	Quantity supplied	
8	Manufacturer's Serial Number(s) of machine(s)/ crane or Plant/system etc. number (or some mode to identify the machine/ Crane ) (Optional)	
9	Date of Commissioning (Give individual date for each machine /crane)	
10	Performance of the machine /Crane	Satisfactory / unsatisfactory
11	Any other information which user intends to append, for example a) aspects bringing out similar nature of machine, b) major / leading parameters of the machine /Crane.	

Name & Designation  
Contact Number  
Signature of the issuing authority  
Email id  
(Seal of the Organization)

**1. DESCRIPTION:**

Electric Overhead Traveling Crane of 15T capacity as per parameters specified in schedule-I conforming to specification no. **Sr.DME/SC/EOT-15/05T/Remote/2023 Rev-0** given in section-II. The crane shall be **Double girder** & with **VVVF** Drive.

**1.1. Leading parameters:**

1.1.1. Leading parameters and type of Crane have been specified in Schedule- I.

**1.2. Prove out at firm's premises:**

1.2.1. The crane shall be proved out at the firm's premises as per QAP enclosed as Annexure-I. The crane shall 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. The Quality Assurance programme will be as per Annexure-I. However, the purchaser or his authorized representative is free to institute any further checks also, if he so desires, and shall be in no way binding on the Purchaser.

**1.3. Prove out at consignee's works:**

1.3.1. Start up and trial Operations Test (Commissioning Test)

1.3.2. 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 shall also be shown:

- 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 creep speed as called for in technical specification.
- iv) There is no skewness in crane during long travel and cross travel motions, presence of vibrations and unusual noise in operation.

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

1.3.4. 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.

**2. QUANTITY & CONSIGNEE:****3.3.1 Quantity and consignee as specified in Schedule-I.****3. SCOPE OF SUPPLY:**

3.1. The specifications cover the design, manufacture, supply, installation, testing and commissioning of Electric Overhead Traveling cranes of 15T



Capacity as per parameters specified in Schedule-I.

- 3.1.1. The Scope of supply shall include but not be limited to the following along with necessary fittings, fixtures and ancillaries.
  - i) Bridge structure with platform and hand railing
  - ii) Track wheels for longitudinal and cross travel.
  - iii) Travelling mechanism for longitudinal and cross travel
  - iv) Hoisting mechanism.
  - v) Brake Mechanism separately for long travel, cross traverse and hoisting.
  - vi) Trolley.
  - vii) Service Platform (both sides)
  - viii) Cabin, Pendant and remote control
  - ix) Electrical motors, control gear and equipment.
  - x) Synchronized operation of cranes. (Refer clause 18 of Section-II)
- 3.1.2. Spares as per schedule-IV and other additional spares, Slings/Chains/ Lifting tackles as specified in schedule-I. Any other items of spares considered essential by the tenderer for two years normal maintenance, to cover the complete range of mechanical, hydraulic and electrical equipment, shall also be quoted for separately. Item-wise cost of spares as indicated in Schedule-IV shall be separately quoted.
- 3.1.3. A tool box containing all tools required for the maintenance of the crane should be supplied with the crane as per enclosed list at Schedule-V.

### 3.2. **CONCOMITANT ACCESSORIES:**

**The crane shall be conforming to Schedule-I.**

### 3.3. **OPTIONAL ACCESSORIES:**

- 3.3.1. Any other accessory/ equipment which in the opinion of the tenderer can contribute to better performance/operation shall be clearly indicated and quoted separately as optional accessory. The advantages should be clearly explained.

## 4. **EVALUATION CRITERIA:**

### 4.1. **Total value of the offer will be calculated based on:**

- i) The cost of basic EOT Crane.
  - ii) Cost of DSL (type and length of DSL as specified in schedule-I).
  - iii) Cost of spares as per schedule-IV and additional spares and items viz slings/lifting tackles as specified in schedule-I.
  - iv) Cost of maintenance tools as per schedule-V
  - v) Cost of any other accessory treated as concomitant accessory.
  - vi) Cost of Installation & commissioning of crane and DSL (length of DSL as specified in schedule-I).
  - vii) Duties, taxes, insurance, freight and packing charges.
  - viii) Cost of preventive maintenance during 1st & 2nd year of Warranty Period
- 4.2. All related erection material required for inspection and commissioning of crane and connecting up to electrical equipment with cable laying and fixing accessories shall be included in the cost of basic EOT crane.

## 5. **OTHER ITEMS TO BE QUOTED:**

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The following items will need to be quoted additionally though will not be part of commercial evaluation.

- i) Cost of Comprehensive AMC for five years after the warranty as per clause 17 of section-II.
- ii) Cost of any additional concomitant accessories items suggested by Bidders.

## 6. DELIVERY SCHEDULE:

In the event of acceptance of the offer, the machine(s) shall be supplied as per the following conditions:

**Name of Machine** : Electric Overhead Travelling Crane of 15T Capacity.

**Specification no.** : **Sr.DME/SC/EOT-15/05T/Remote/2023 Rev-0.**

Sl. No	Activity	Activity Code	Outer Limit of Time Schedule expected by Railways	Time Schedule- Offered by Bidder
1	Issue of PO by Railways	D1		
2	Submission of GA drawings to consignee by successful bidder/ supplier along with information on power & other utilities required for machine (to be governed by clause 11 of Section-II)	D2	D1 + 45 days (for the first four cranes under order thereafter subsequent cranes @ 2 cranes per week)	D1 + ____ days (for the first four cranes under order and thereafter subsequent cranes @ ____ cranes per week)
3	Approval of GA drawings by consignee. (to be governed by clause 11.2 of Section-II) *	D3	D2 + 45 days	D2 + 45 days
4	Handing over of crane site with gantry by consignee and joint note confirming readiness of site.	D4	By D3 ( at the time of approval of GA drawing)	By D3
5	Delivery of crane at site by supplier	D5	D3 + 180 days for the first four cranes under order thereafter subsequent cranes @ 2 cranes per month	D3 + ____ days
6	Power connection for the machine and other on site requirement to be provided by Railway	D6	D5 + 7 Days	D5 + 7 Days
7	Railway to give call to supplier for the commissioning	D7	D5 + 7 days	D5 + 7 days
8	Installation and Commissioning and Prove out of Crane by supplier	D8	D5 + 120 days	D5 + ____ days

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9	Issue of PTC by consignee	D9	D8 + 30 days	D8 + 30 days
10	Warranty	D10	D8 + 2 years	D8 + 2 years
11	Submission of performance appraisal report in form E by consignee	D11	D10 + 60 days	D10 + 60 days

\* In case drawing is returned unapproved by consignee suggesting some changes, it shall be resubmitted within 30 days (refer clause 11.2.3 of section II)

**NOTE:** Notwithstanding the delivery period indicated elsewhere in the tender document, the delivery indicated in this schedule shall be taken as overriding and final.

**Section-II****TECHNICAL SPECIFICATION ABBREVIATIONS**

A-1,A-2, A-3, A-4	Standard paper sizes
AC	Alternating Current
AMC	Annual Maintenance Contract
AT	Acceptance of Tender
BG	Bank Guarantee
CME	Chief Mechanical Engineer
CME/PCM	Chief Mechanical Engineer/Post Contract Management
CNC	Computer Numeric Control
COS	Controller of Stores
Db	Decibel
DC	Direct Current
FA&CAO	Financial Advisor & Chief Accounts Officer
GA (Drawing)	General Arrangement (Drawing)
HRC	Hardness Rockwell 'C' Scale (value)
Hz	Hertz
IEC-Pub	International Electro technical Commission - Publication
JCN	Joint Commissioning Note
JRI	Joint Receipt Inspection
kW	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages
LOA	Letter of Acceptance
NC	Numeric Control
NIT	Notice Inviting Tenders
PBG	Performance Bank Guarantee
PDF	Portable Document Format
PLC	Programmable Logic Controller
PTC	Proving Test Certificate
PU	Production Unit (Any of the six Railway Production Units e.g. RCF, ICF etc.)
RDSO	Research Design & Standards Organization
SS	Stainless Steel
WBG	Warranty Bank Guarantee
DG	Double Girder
VVVF	Variable Voltage Variable Frequency
LT	Long Travel
CT	Cross Traverse

**Specification No. Sr.DME/SC/EOT-15/05T/Remote/2023 Rev-0****NOTE:**

- i) These specifications cover double box girder EOT crane of 15T Capacity with VVVF drive.
- ii) The bidders are required to submit the quotations of cranes considering classifications and design wherever duty factors are involved as per IS-3177-1977. The mention of IS-3177-1999 (latest) elsewhere in technical specs. Should be considered for general mechanism and components as applicable where duty factor as per old classification are not involved.

**1. BASIC DESIGN FEATURES:****1.1. GENERAL MECHANICAL DESIGN:**

1.1.1. The crane shall be designed, manufactured, erected and tested generally in accordance with the following specifications:

- i) IS: 3177-1999 (latest) - Indian Standard Code of Practice for electric overhead travelling cranes.
- ii) IS: 807-2006 (latest) - Indian Standard Code of Practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.
- iii) IS: 800-2007 (latest) - Indian Standard code of practice for General Construction in steel.

The design of various components of the mechanism is dealt in detail in subsequent paragraphs.

1.1.2. The design of the crane structure as well as all the component parts of the crane mechanism shall conform to class of duty indicated in Schedule-I. The class of duty is based on design parameters stipulated in IS 807-2006 (latest).

1.1.3. The stipulations in these specifications are complementary to those set out in the Indian Standards Specifications IS: 3177, 807 & 3938 mentioned above. If any of the conditions mentioned in these specifications is at variance with that of the ISS, the technical specifications here under shall prevail.

1.1.4. The cranes shall be supplied complete in all respects. The tenderer shall furnish complete details regarding type, material of construction, specifications and special features, if any, for the main items. Any variations from the specifications shall be brought out with reasons for the same. Any variations involving lower standards of design, performance and rating are not acceptable.

1.1.5. Necessary information regarding the conditions under which the crane is to be used, together with other particulars necessary for manufacture and erection of the crane, are given in Schedule-I. The successful bidders should visit the actual site to assess local conditions that often affect manufacturer's programme for commissioning and installation and to ensure that various structural requirements are incorporated in the final design of the crane. Unfamiliarity with, or ignorance of, local conditions, will not be accepted later as adequate reason for delays in commissioning by successful bidder.

- 1.1.6. Manufacturer should supply with the offer, information regarding the construction of the crane according to the proforma laid down in Schedules-II & III. Separate Schedules II & III should be submitted for each crane.
- 1.1.7. The bidders should also submit details of structural calculations along with thickness of plate/sheet for girders, end carriage, crab and other load bearing structural members along with offer and got it duly approved by reputed organizations such as NPL, IIT, NIT or govt. approved engineering colleges or a Chartered Engineer along with breakup of weights of major assemblies/components before submission of GA drawings to consignee for approval.
- 1.1.8. Preferred number series should be used, as far as possible, at all stages of the design process. In particular, the hoisting and travel speeds as indicated at Schedule-I, if not already so indicated, should be rounded off while making the offer to the nearest figure in the R-10 Preferred Number Series, as given below for ready reference:
- Approx. 1.00, 1.25, 1.60, 2.00, 3.15, 4.00, 5.00, 6.30, 8.00 and 10.00.

## **1.2. PURPOSE FOR WHICH REQUIRED:**

### **1.2.1. Capability:**

The crane should be capable of:

- i) Hoisting, i.e., lifting and lowering of all loads up to the maximum specified limits of load and distance at different specified speeds.
- ii) Traveling and traversing at specified speeds in both loaded and unloaded conditions.
- iii) Working in the hot, humid and dusty atmosphere of Railway Workshops, Sheds and Depots.

## **1.3. ATMOSPHERIC CONDITIONS:**

- 1.3.1. The ambient temperature at the site at which the crane will be installed may vary from  $-5^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  over the year. The relative humidity may be as high as 100%. The atmosphere is expected to be dusty. The crane offered shall be suitably tropicalized to work under these ambient conditions without any adverse effect on its performance.

## **1.4. RIGIDITY, CONTROL AND SAFETY:**

- 1.4.1. The crane should be rigid, robust and of sturdy construction.
- 1.4.2. Crane controls should be conveniently located. Various controls should be suitably interlocked to prevent accidental movement of the crane.
- 1.4.3. Suitable limit switches, one each for long and cross travel and two each for main and auxiliary hoists, should be provided to stop the crane and prevent over-travel of various moving parts of the crane.
- 1.4.4. A speed sensing switch set for 1.5 times the maximum lowering speeds shall be fitted along with a separate brake caliper disc type on the main hoist drum, in order to cater to the unlikely but fatal eventuality should it occur, of the load falling due to a mishap beyond the motor output shaft on which the

regular hoist brake is fitted.

- 1.4.5. Electrical interlocks should be so provided that the two operations of traversing and traveling can be performed simultaneously, but while hoisting it is not possible to undertake either traversing or traveling.
- 1.4.6. Suitable buffers should be provided to prevent over travel of the crane mechanism in both longitudinal and cross traverse directions.
- 1.4.7. Suitable guards or enclosures should be provided on the crane to prevent inadvertent contact with down shop leads, or any other exposed electrical conductors and cables.
- 1.4.8. Suitable isolation switches and stop buttons should be provided to isolate the electric supply for maintenance, or in the event of an emergency. Dead man's handle must also be provided in cabin operated cranes.
- 1.4.9. A safety hand railing of tubular construction should be provided on bridge foot walks, end carriages, staircases, the landing in the cabin, trolley and at any other place where access has been provided. Railings should not be less than 1000 mm high with an intermediate member at a height of around 500mm.
- 1.4.10. Sheaves shall be provided with rigid guards to retain the wire ropes in the grooves. The guards shall fit close to the flange having a clearance not more than one-fourth of the diameter of the wire rope between the sheave and the inside of the guard. Bottom block sheaves shall be enclosed except for wire rope openings.
- 1.4.11. For outdoor cranes all electrical and mechanical equipment should be protected from the weather. All weather-proof covers should be easily removable. Details of protection provided should be indicated in the offer.
- 1.4.12. The fully commissioned crane should be rigid and robust to withstand the workshop environment of Indian Railway repair workshop with an ambient temperature ranging up to 50 degree centigrade and relative humidity of 100 %.

## **1.5. MAINTAINABILITY**

- 1.5.1. Safe accesses for maintenance and easy removal of all mechanical, electrical and structural components to carry out repair and maintenance must be ensured. All parts requiring replacement, inspection and lubrication should be easily accessible without the need of dismantling other equipment or structures. Arrangements for access to important components must include a cradle for inspection and maintenance of DSL, such cradle being conveniently accessible from the cabin or, for pendant operated cranes, by step ladder attached to the gantry at one end of the bay.
- 1.5.2. All electrical cables should be so laid that they are not liable to damage and can be easily inspected and maintained. The cables should be weatherproof.
- 1.5.3. All components for cranes of identical capacity and duty shall be interchangeable unless otherwise required.
- 1.5.4. In order to have access to the operator's cabin (if provided), long travel drive, current collectors, trolleys, etc., full length chequered plate platforms should be provided alongside both bridge girders. Access to the cabin from the bridge

girder platform should be via a staircase. Minimum width of such staircase should be 600mm. Footwalks should be of sufficient width to give at least 500 mm clear passage at all points except between railing and bridge drive, where this clearance may be reduced to not less than 400 mm.

- 1.5.5. Materials used for equipment and structural members should be free from cracks, blow holes, laminations, pitting etc. Except for areas where a superior grade of materials is required, steel used throughout shall be conforming to IS: 2062 (latest) Grade E-250 BR or B0. The supplier should submit material test certificates for structural steel and mechanical component such as couplings, gears, gear boxes, rope drums, brake drums, shafts, wheels etc.
- 1.5.6. A tool box containing all tools required for the maintenance of the crane should be supplied with the crane as per enclosed list at Schedule-V.
- 1.5.7. Fasteners for pedestal blocks, gear boxes, etc., should be easily removable from the top of the platform.
- 1.5.8. Standardization and unification shall be carried out to the maximum extent for the various sub- assemblies constituting the mechanism of various cranes. Units shall be designed such that they can be dismantled quickly without disturbing the installation of the neighboring units with which they are connected. Units as a whole, such as wheel assembly gear box, brake, rope drum assembly, etc., shall be replaceable and interchangeable with other identical units. In design care shall be taken to see that spare parts inventory is kept low and up time of 95% will have to be guaranteed.

## **1.6. STRUCTURAL DETAILS:**

- 1.6.1. The crane bridge should comprise of double girders of the plate box type.
- 1.6.2. In the main bridge girders, in addition to the required full-length diaphragms, short diaphragms should 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 conforming to IS: 2062 (latest) Grade E-250 BR or B0.
- 1.6.3. Connections in general should be as per Section 10 of IS: 800-2007 (latest). Black bolts should not be used in the main structure of the crane, only bright bolts with ground stems are permissible. Bolts used which are under shear forces should be fitted into reamed holes.
- 1.6.4. The bridge girders should be connected to the end carriages by large gusset plates. Ground tight fit bolts in reamed holes should be used for bolted connections.
- 1.6.5. The calculated strength of riveted joints, or joints made by High Strength Friction Grip (HSFG) bolts should not be less than calculated net strength of the member. The calculated strength of other bolted joints in structural members should not be less than the net strength of the member plus 25%.
- 1.6.6. The supplier should have sound infrastructural facilities, good working system and practice for fabrication and machining of various structural components of EOT cranes. Some of the important requirements are listed below:



- 1.6.6.1. All welding shall be carried out under the overall supervision of a welding Engineer/Supervisor specially trained in welding. The welding engineer/supervisor shall prepare the welding procedure in accordance with IS:9595-1996 (latest) "Recommendation for Metal Arc welding of Carbon and Carbon Manganese steels". In addition, the correct welding sequence should be followed for typical locations. The welding engineer/supervisor shall obtain design engineer's approval to the same. The welding Engineer/ Supervisor shall also be responsible for actual implementation of the above mentioned approved welding procedure.
- 1.6.6.2. Welding Supervisor shall have received formal training from recognized institutions having specialized courses for welding Supervisor.
- 1.6.6.3. Details of edge preparation for welding shall be in accordance with IS:9595-1996 (latest) "Recommendation for Metal Arc welding of carbon steel and carbon manganese steels.
- 1.6.6.4. Automatic/Semi Automatic submerged Arc/Gas shielding shall be carried out according to IS or other International Specification.
- 1.6.6.5. Welders engaged in fabrication should have passed welder approval tests in accordance with IS specification no.7318(part-I) "Approval tests for welders when welding procedure approval is not required-Part-I fusion welding of steel"
- 1.6.6.6. All welding equipment and accessories should meet the requirements of the corresponding Indian Standard specification (or International Specifications where IS specification do not exist). The contractor shall be responsible for satisfying the Inspecting officer that all welding equipment and accessories being used meet these requirements.
- 1.6.6.7. Electrodes and wire flux combination used for fabrication should be from reputed makes of ESAB, Advani Oerlikon, Philips and Modi.
- 1.6.6.8. Welding shall be performed in an approved and workman like manner. All welds shall be homogenous and show physical properties similar to those of parent metal. Finished welds shall be perfectly free from all defects such as porosity, burnt metal, inclusion etc. and shall present a smooth appearance.
- 1.6.6.9. When the welded joints are inspected no defects specially due to use of equipment and /or filler material shall be accepted. After welding the welded parts or assemblies should correspond to the dimensions required as mentioned in drawings.
- 1.6.6.10. All butt welds on structural members should be radiographically tested. All other welds should be subjected to Magnaflux or Dye Penetration Test.
- 1.6.6.11. The box girders should be so constructed as to eliminate any possibility of accumulation of water or oil inside them. Special care should be taken with cranes for outdoor use to eliminate depressed areas or openings where water may accumulate and lead to

corrosion.

### **1.7. END CARRIAGES**

- 1.7.1. The crane bridge should be carried on end trolleys with double flanged solid forged wheels. The minimum end clearance on each side of the long travel wheels should be 10mm. The wheels should be mounted on fixed axle or suitable anti-friction spherical roller bearings which can be conveniently removed for maintenance.
- 1.7.2. End carriages should be designed to be strong enough to resist all stresses likely to be imposed upon them under varied service conditions, including collision with other cranes or stops. The length of the end carriages should be such that no other part of the crane is damaged in the event of a collision.
- 1.7.3. End carriages should be fabricated from rolled steel sections or plates, welded together to form a box. Suitable stiffening diaphragms should be provided wherever required. The material used shall be steel conforming to IS:2062(latest). Grade E-250 BR or B0. If more than two wheels are required, either compensating end carriage or suitable link and pin arrangement should be provided for connecting the two bogies.
- 1.7.4. Suitable jacking pads should be provided on each end carriage for jacking up the crane while changing track wheels. These jacking pads should not interfere with replacement of track wheels.
- 1.7.5. The end carriages should 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 should not interfere with the removal of track wheels.

### **1.8. BRIDGE RAILS (TROLLEY RUNWAY RAILS)**

- 1.8.1. New standard rail shall be used as bridge rail and should be fastened by suitable clamps spaced not more than 1000mm apart, with welded alignment blocks between every two clamps such that the distance of a clamp from any adjacent alignment block is not more than 500mm. Rail stops riveted or bolted or welded should be provided to prevent creep in the longitudinal direction.
- 1.8.2. Solid square bar of appropriate steel which can be directly welded are also accepted as an alternative only for cranes up to 10T capacity. For higher capacity cranes only new standard rail should be used. Bidder should indicate size of standard rails in the offer.

### **1.9. TROLLEY FRAME**

- 1.9.1. The trolley frame should be welded rolled steel box section, designed to transmit the load to the bridge rails without undue deflection. It should be made rigid by providing suitable diaphragms. The material used shall be conforming to steel IS: 2062 (latest) Grade E-250 BR or B0.
- 1.9.2. The drum bearings and supports for upper sheaves should be located so as to equalize the load on the trolley wheels as nearly as possible.
- 1.9.3. The trolley wheels should be double flanged. The axle bearings should be of spherical roller type. The bearing housing should be designed for easy removal of wheels and bearings for maintenance

- 1.9.4. The top of the trolley frame should be plated with chequered plate 5/6 mm thick all over, either at the top or bottom, except for opening(s) required for the ropes to pass through. The opening in the trolley frame should be such as to keep the ropes at a safe distance from any part of the trolley frame or equipment, to prevent damage at any position of the bottom block.
- 1.9.5. All the mechanical and electrical equipment should 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 should be provided. Where the clearance between bottom member of trolley frame and the CT rail is over 25mm. the trolley should be fitted with substantial safety stops to prevent the trolley from falling more than 25mm in the event of breakage of track wheel, bogie or axle.
- 1.9.6. These safety stops should not interfere with the removal of wheel. Details of the arrangement should be explained in the offer.

#### **1.10. RAIL WHEELS**

- 1.10.1. The rail wheels shall be double-flanged with straight tread. They shall be capable of taking misalignments in span as specified at clause 1.24 of these Specifications.
- 1.10.2. The wheels shall be of material C55Mn75, and shall be solid forged and heat treated to have minimum hardness of 300 to 350 BHN on the tread and flanges to minimum depth of 10mm. The method of heat treatment shall be described in the offer.
- 1.10.3. The wheels should be shrink-fit on the axles, rather than being keyed on.
- 1.10.4. Wheels diameter should be selected strictly as per IS: 3177-99 (latest).

#### **1.11. OPERATOR'S CABIN:**

- 1.11.1. The operator's cabin should be sufficiently rigid metal frame construction and should be connected to the bridge girder by means of bolts or rivets in shear.
- 1.11.2. The cabin should be fixed type, built from rolled steel angles, plates and M.S. Sheets welded together. Unless otherwise specified it should be fitted at one end of the crane opposite the down shop lead side, and shall be so placed that the operator has an unobstructed view of the load and surroundings.
- 1.11.3. The cabin should have sufficient space for easy movement of the operator, with minimum dimensions of 1.5 m x 1.5 m. Unless otherwise specified in Schedule-I, it should be of the open type.
- 1.11.4. The closed type cabin, where specified, should have hinged or sliding windows. Arrangements should be made to ensure that the whole exterior of the cab glazing can be of toughened plate glasses of at least 6mm thickness which should be installed from inside.
- 1.11.5. The cabin floor should be extended to form a landing platform with a steel stairway to provide access to the foot-walk above.
- 1.11.6. The layout of controls should be such that the crane can be operated from a seated position. The controller handles should be conveniently located within

easy reach of the operator.

- 1.11.7. Fully adjustable padded seat, rubber matting, suitable fan and lighting arrangement should be provided inside the driver's cabin. One fire extinguisher for extinguishing any electrical fire should be provided in the operator's cabin, or at a suitable location in the case of pendant control.

## 1.12. ROPE DRUMS

- 1.12.1. The rope drum shall be designed to withstand the compressive stresses caused by the wound on rope and the bending stress due to beam action of the drum.
- 1.12.2. Seamless Pipes will be an acceptable alternative. The steel used shall be to IS:2062-2011 (latest) The rope drum shall be stress relieved after fabrication. T-joints shall be radiographically checked.
- 1.12.3. The drum shall be designed to take the entire length of the rope in a single layer. Free extra turns as specified in IS:3177:1999 (latest) shall also be provided. The drum shall be flanged at both ends with adequate collar size as per IS to avoid slipping of wire rope outside the drum.
- 1.12.4. Cranes shall be designed with number of rope falls varying with lifting capacity as per details given below:
 

Up to 10.0 tonnes - 4 falls	Up to 75.0 tonnes - 12 falls
Up to 40.0 tonnes - 8 falls	Above 75.0 tonnes - 16 falls

## 1.13. WIRE ROPES

- 1.13.1. Hoisting ropes, if of the conventional type, should be of 6x36 construction and made out of the best plough steel having tensile strength of 180 Kg/sq. mm. Ropes should be parallel right hand lay as per IS:2266-2002 (latest). The wire rope shall comply to clause 8.3 of IS:3177-1999 (latest). **Tenderers should offer wire ropes of Usha Martin/Bombay wire rope/Mahadev makes.**

## 1.14. GEARING

- 1.14.1. The gear units in all motions should be light weight with silent running and made of case- carburizing low carbon alloy steels 20MnCr5/16MnCr5/17Mn1Cr95/EN353/SAE 8620 and should conform to relevant Indian/ International standards. They shall generally be in accordance with AGMA or IS:4460-1995 (latest). All gears and pinions must be made from forged blanks only. All gears should be hardened and profile ground for longer life and silent operation. The minimum surface hardness of pinions shall be between 50 to 60 HRC and shall be 2-3 HRC higher than hardness of gears.
- 1.14.2. Worm wheels and bevel gears must not be used. At all stages only helical gears should be used, except in planetary gearboxes, which can be spur type. Overhung or split gears and pinions should not be used.

## 1.15. GEAR BOXES

- 1.15.1. General: All gear boxes shall be compact, lightweight, completely enclosed and of splash lubricated type. All gear boxes shall be oil tight and sealed with compound or gasket. All gear shafts shall be supported in antifriction bearings mounted in the gear boxes. Gear boxes shall be cast or forged from

low/medium carbon alloy steel or cast iron and suitably heat treated or fabricated. The fabricated gear boxes shall be stress relieved before machining and the method of doing so shall be explained in details in the offer. The internal surfaces of the gear box shall be painted with oil and rust resisting paint. Gear boxes shall be provided with breather vents, easily accessible drain plugs, and a suitable oil level inspection glass or 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/pinions shall be at least 10mm.

- 1.15.2. **MH/AH LT and CT Gear boxes:** The motors shall be foot mounted. The foot mounted motors shall have split type gear boxes. These shall be of the conventional split type, designed to split horizontally at the shaft center line and fitted so that the top half can be removed for inspection and repair without disturbing the bottom half.

#### **1.16. DRIVE MOTORS:**

- 1.16.1. The wheels of each end carriage should be driven by independent synchronized drive motors mounted near each end carriage.
- 1.16.2. A separate cross traverse motor should be used for cross traverse drive through a suitable gear box.

#### **1.17. BRAKES:**

- 1.17.1. The hoisting, LT and CT motions shall be provided with fail safe Electro Hydraulic Thrustor brakes. For creep motion of hoist wherever this is specified as per schedule –I an independent brake must be provided.
- 1.17.2. Any crane working outdoors should be provided with an additional storm brake for anchoring when it is left unattended under stormy conditions. The storm brake together with the service brakes should be capable of holding the crane in position during stormy conditions. Wherever crane is working outdoor, the storm brake should be electro hydraulic thrustor type.
- 1.17.3. The maximum braking torque to arrest long travel and cross traverse motions should not be less than 100% of full load torque for each brake. For hoist motion, two brakes should be used and the braking torque for each brake should 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.
- 1.17.4. Double shoe brakes should be used for each drive. Brakes should be mounted on the input pinion shaft of all gear boxes. The brake shoe should be of hinged type. Brake levers should be forged and hinge pins should be provided with steel bushes at the bearing points.
- 1.17.5. Brake drums should be of forged or cast steel and should be completely machined. Brake drum diameter should be selected from preferred number series. Width of brake drum should be about 10 mm more than the width of brake shoe on each side. The brake lining should be environmentally sound.
- 1.17.6. The cabin operated crane shall be provided with an additional foot operated brake for long travel wheels.

### **1.18. COUPLINGS**

- 1.18.1. Motor shafts for MH/AH shall be connected to gear box input extension shaft through flexible gear coupling of low GD2 value. For driving the hoist drum gear type flexible coupling shall be used between the rope drum and hoist gear box, where the hub should not be integral with the output shaft, so as to avoid replacement of the whole shaft whenever there is wear and tear in the coupling.
- 1.18.2. All couplings shall be of medium carbon steel and shall be designed to suit the maximum torque that can be developed. Hardness of geared portion in the gear coupling shall be more than 250 BHN. Bolted connections shall be easily accessible for inspection and tightening.

### **1.19. ROPE SHEAVES**

- 1.19.1. All sheaves should be of cast/forged steel or Blackheart malleable iron castings. They should be identical, with the exception of the equaliser sheave. The equaliser sheave should be mounted above the trolley floor and should be easily accessible and removable from the trolley floor level. The equaliser sheave should be arranged to turn and swivel in order to maintain rope alignment under all circumstances. Sheave grooves should be smooth finished for getting increased rope life. The supplier should further ensure that wire ropes are parallel with each other.
- 1.19.2. A resilient low friction rope guide fixed around the grooves of the designed drum as an expanding ring to provide positive guidance to the rope may be provided to ensure correct rope lay.

### **1.20. BEARINGS**

- 1.20.1. Ball and roller anti-friction bearings shall be of reputed make. The acceptable makes will be NBC, SKF, FAG, NORMA, NRB, NTN and KOYO. In view of widespread use of spurious and reconditioned bearings, tenderers should explain in the offer how it is proposed to ensure that only new and genuine bearings of acceptable make are procured and fitted. Preferably, tenderers should confirm that they will submit, to the inspection agency, invoices from OEMs' or their authorized representative as proof of the use of genuine material.
- 1.20.2. For long and cross traverse wheels, spherical roller bearings shall be used. Bush bearings should not be used at any location.
- 1.20.3. Rated life of ball and roller bearings should not be less than the total life in working hours given in the IS Specification for a particular class of duty. Life of bearings should be calculated in accordance with manufacturer's recommendations.
- 1.20.4. Independent bearing housings on long shafts be split on the shaft center line to permit easy removal of the shaft. The bottom surface of all bearing pedestals should be machined, and should bear upon a machined surface.

### **1.21. LIFTING HOOK**

- 1.21.1. Standard plain shank type trapezoidal section hooks should be used unless otherwise specified. These hooks should conform to the relevant Indian Standard Specifications IS:15560 (latest), while the Ramshorn Hook (wherever

specified) shall conform to the relevant Indian Standard Specification IS:5749 (latest).

- 1.21.2. Hooks should be mounted on grease lubricated anti-friction thrust bearings and a protective skirt should be fitted to prevent rotation of the hook. Proof load test as per Indian Standard Specification shall be conducted, either in-house or from a recognised test house. The certificate of proof load test shall be furnished. The bottom block should have protective edging around the wire rope openings.

#### **1.22. BUFFERS**

- 1.22.1. Spring loaded or other suitable buffers should be fitted on the four corners of the crane also at the four ends of the bridge girders. Buffers should be rigidly bolted in place, preferably along the center line of the crane rail or trolley rail as the case may be. All buffers should have sufficient energy absorbing capacity to stop the bridge or trolley in either direction when traveling at a speed of at least 50% of the rated speed at full load. Bridge buffers should have a contact surface of not less than 125mm diameter.

#### **1.23. LUBRICATION**

- 1.23.1. Grease nipples one for each of the end carriage and one for the trolley platform, should be provided for all grease lubricated bearings, parts of the hoist and wheels for cross traverse and long travel. The grease battery nipples should be located to facilitate regular greasing by the operator with standard equipment.
- 1.23.2. Bottom blocks and pedestal bearings should have independent greasing points. All lubricating nipples should be protected from damage, and be accessible throughout.
- 1.23.3. A lubricating chart should be provided in the manual, indicating all lubrication points, the type of lubricants required and the recommended frequency of lubrication. These details should be repeated, and amplified if necessary, in the Maintenance Manual, which is to be supplied as per requirement indicated elsewhere in the specification.

#### **1.24. DIMENSIONAL TOLERANCES**

- 1.24.1. The contractor should ensure that the crane manufactured and erected to take the tolerances specified below:
  - i) Variation in Span  $\pm 6\text{mm}$
  - ii) Diagonal on wheels  $\pm 5\text{mm}$
  - iii) Long travel wheel alignment  $\pm 1\text{mm}$
  - iv) Tilt of wheels or Balance Axle  $\pm 1\text{mm}/1000\text{mm}$  (Horizontal & Vertical)
  - v) Trolley wheel gauge  $\pm 3\text{mm}$
  - vi) Trolley track gauge  $\pm 3\text{mm}$
  - vii) Difference in height between trolley rails [H] for different trolley track gauges shall be within the following limits

'S' (mm)	'H' (mm)
Upto 2500	4
2500 to 4500	6
Above 4500	8

## 2. GENERAL ELECTRICAL SPECIFICATIONS

### 2.1. SCOPE OF SUPPLY

- 2.1.1. The scope of supply relating to electrical portion shall cover the following components
- 2.1.1.1. Down shop leads (wherever required see clause 11 of Schedule – I of technical specification)
  - 2.1.1.2. Main current Collection
  - 2.1.1.3. Power disconnecting switch on the crane bridge walk way, to be provided, immediately after the main current collection gears.
  - 2.1.1.4. Motors
  - 2.1.1.5. Protective Switch gears
  - 2.1.1.6. Motor control panels.
  - 2.1.1.7. Resistors (For slipping motors only)
  - 2.1.1.8. Brakes
  - 2.1.1.9. Limit Switches
  - 2.1.1.10. Socket outlets
  - 2.1.1.11. Power and control cables
  - 2.1.1.12. Lighting distribution panels.
  - 2.1.1.13. Lighting fixtures and lamps
  - 2.1.1.14. Cross traverse flexible trailing unarmored cables mounted on roller clamps travelling over bottom flange of R.S. Joist provided for the purpose. Alternatively, drag link cable system is also acceptable.
  - 2.1.1.15. Indicating lamps
  - 2.1.1.16. Push Buttons
  - 2.1.1.17. Two step jockey switches or push button (ref clause 2.8.2.2) **(DG VVVF Drive Crane)**
  - 2.1.1.18. Earth wire on crane portion.
  - 2.1.1.19. Dead Man's Handle **(DG)**
  - 2.1.1.20. Alarms

### 2.2. STANDARDS

- 2.2.1. All equipment and material shall comply with appropriate Indian standards (latest). The equipment shall also comply with latest Indian Electricity Rules, as regards safety requirement and other essential provisions of the act applicable to the installation and operation of EOT cranes. All latest standards indicated in Annexure-G of IS:3177-1999(latest) shall be applicable in general.
- 2.2.2. The equipment shall be designed and selected to facilitate inspection, cleaning replacement and repair and for use where continuity of operation and safety are important considerations.

### 2.3. ATMOSPHERIC CONDITIONS

- 2.3.1. The ambient temperature at the site at which the crane will be installed may



vary from  $-5^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  over the year. The relative humidity may be as high as 100%. The atmosphere is expected to be dusty. The crane offered shall be suitably tropicalized to work under these ambient conditions without any adverse effect on its performance.

#### 2.4. **POWER SUPPLY CONDITIONS**

2.4.1. Power shall be available at 415 volts, 3 phase, 50 Hz

2.4.1.1. The following voltages shall be used in the crane

1.  $415 \pm 10\%$  volts. 3 phase  $50 \pm 3\%$  Hz, A.C For drive motors.
2.  $230 \pm 10\%$  volts. single phase  $50 \pm 3\%$  Hz, A.C For lighting
3. 24 volts  $\pm 10\%$ , single phase 50 Hz  $\pm 3\%$  A.C For hand lamp socket outlets
4. 110 volts  $\pm 10\%$  single phase 50Hz  $\pm 3\%$  A.C For control circuit and for floor operated crane as required by the consignee.

The voltage 2, 3 & 4 above shall be obtained through individual separate transformer units connected to 3 phase, 415 volts A.C. supply.

#### 2.5. **DOWN SHOP LEADS AND CURRENT COLLECTION GEAR**

##### **SHROUDED BUS BAR CONDUCTOR**

2.5.1. Insulated Shrouded Bus Bar Conductor shall be of M/s.INSUL-8 UK make or safe track brand of M/s.Sushil Engg. Corporation Mumbai or "Safeline" brand of M/s Stromag Engineers Limited, Mumbai or Silverline brand of M/s Sliver line Metal Engg. Pvt. Ltd., and shall conform to the following:

2.5.2. 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 up to 100Amps & copper above 100Amps) 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 moulding of the conductor system.

2.5.3. The conductor shall be in minimum 4 mtrs. Length to be jointed with moulded joint of the same material as the conductor and these conductors shall be supported by way of single piece moulding, 4 pole hanger with single bolt fixing.

2.5.4. The current collector arm should 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 supported by documentary evidence.

2.5.5. The Voltage drop in full length of DSL should not be more than **2%**

#### 2.6. **MOTORS**

##### 2.6.1. **FOR DOUBLE GIRDER CRANES:-**

2.6.1.1. All crane motors should be of ABB, Crompton, BBL, Marathon, Siemens, Kirloskar make and totally enclosed fan cooled (TEFC) squirrel cage type and designed for 150 starts / hour. The motor shall be suitable for heavy duty crane hoisting service having cyclic duty factor not less than 40 % for class III and 60 % for class IV cranes. The motors shall be suitable for  $50^{\circ}\text{C}$  ambient temperature and  $415 \pm 10\%$  50 Hz  $\pm 3\%$ , 3 phase, 3 wire AC supply. The

motor shall be generally conform to IS 325 (latest) and shall be 6 or 4 pole type. However, where IS specification is at variance with this specification, the provision made in this specification shall prevail.

2.6.1.2. The winding shall be of copper wire specially insulated and impregnated to with stand moist tropical climate and class of insulation shall not be less than 'B' class.

2.6.1.3. The motor shall be of adequate power, motor power requirement being computed as per Annexure 'C' of IS 3177-1999 (latest). Detailed motor power calculations shall be given in the offer. The motor should be rated for class S-4 duty. Derating factor for temperature and voltage variation if any shall be taken into consideration as per recommendations of the motor manufacturers. Technical details of motors along with control gear and electrical accessories shall be given as per schedule-III.

2.6.1.4. Type and routine test chart of motor selected shall be submitted to the inspecting authority during inspection.

2.6.1.5. Forced cooling shall be arranged by mounting suitably continuously run fan on all the motors for all motions.

#### 2.6.1.6. **Horse Power**

The torque factor of longitudinal travel and cross traverse motors should be of the range of 1.3 to 1.5. The frame size of motor should be indicated in the offer. For selection of LT & CT motor sizes, longitudinal and cross traverse acceleration will be taken as 15 cm/sec.<sup>2</sup> and 8cm/sec<sup>2</sup> respectively.

2.6.1.7. All motors should be provided with insulation of class 'B' for stator and class 'F' for rotor. The maximum permissible winding temperatures measured by thermometer and resistance method shall not exceed 120 deg. C and 130 deg. C respectively.

2.6.1.8. The pull out torque of the motors at rated voltage and frequency range shall be as per IS: 3177- 1999 (latest).

#### 2.7. **TERMINAL BOX**

The terminal box shall be provided on the top or front of the motor for easy accessibility. The cable sizes should be decided after considering derating due to grouping and ambient temperature of 50° C etc.

#### 2.8. **CRANE CONTROL**

##### 2.8.1. **FOR PENDANT CONTROL CRANES ONLY:-**

2.8.1.1. Pendant push button control station will be used 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 110V AC which shall be obtained through a suitable transformer. Necessary flexible multicore 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.

2.8.1.2. 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.

- 2.8.1.3. The pendant control station shall be capable of withstanding rough handling without being damaged. The cover shall be firmly secured.
- 2.8.1.4. The mass of the pendant shall be supported independently of the electric cable by means of wire rope/chain. If the pendant is of metal, it should be effectively earthed.
- 2.8.1.5. 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.
- 2.8.1.6. Adequate guards shall be provided to prevent accidental contact of pendant ropes or holding wire rope/chain with cross traverse.
- 2.8.1.7. Suitable arrangements shall be provided for automatically cutting off the resistances after a pre- selected time. The bidders shall explain the details in the offer.

2.8.2. **FOR CABIN OPERATED CRANES:-**

- 2.8.2.1. For all the motions spring return jockey switches or push button shall be used. **(Applicable for VVVF Drive Cranes)**
- 2.8.2.2. Two step two direction jockey switches in case of cabin control shall be used for all the motion.

- a) The rest position of jockey shall conform to zero position or off position.
- b) During running the rest position, means de-acceleration to stop.
- c) Step one at preset minimum speed of upto 10% of the maximum speed.
- d) Second step speed gradually accelerate to maximum speed.

Should a speed between minimum and maximum is desired, the operator shall return to step one and the same speed shall be maintained.

With the above system stepless speed shall be obtained.

Alternatively above features can be achieved by use of two push button control for each direction for all the motions. Tenderers to indicate the details of the proposed arrangement.

- 2.8.2.3. On all motions the circuit shall be so designed that brakes come into operation immediately in the event of tripping of motor main circuit breaks.
- 2.8.2.4. All controllers shall be so designed that the contacts and terminal arrangements are readily accessible for inspection and maintenance purpose.
- 2.8.2.5. Each controller shall be fitted with
  - i) Necessary steps for the forward and reverse motion to give smooth and stepless acceleration between each position.
  - ii) Auxiliary contacts to provide an interlock between the controller and circuit breaker, so that the circuit breaker cannot be closed unless the controller is in off position.
  - iii) Auxiliary contacts to provide an interlock with the limit switches, so that when the travel exceeds the safety limits, the motor circuit will be broken and the motor can only be allowed to reverse.

- 2.8.2.6. Controller in off position shall open all supply lines of the respective motors.
- 2.8.2.7. AC variable frequency control (VVVF) of adequate capacity for all the motions shall be used. Independent AC variable frequency control for main hoist, Aux. Hoist, CT & LT shall be used by using independent variable voltage variable frequency drives. However common controller for both the motors of LT may be used. Tenderer shall submit necessary details of the offered model as well as make confirmation for compliance as per clause 2.22 shall be submitted along with the bid.
- 2.8.2.8. Bidders shall submit the layout scheme of the operator's cabin showing the positions of various controls with respect to operator's seat.

## 2.9. **CONTACTORS**

- 2.9.1. All contactors shall be of AC-4 Class of duty or **AC-3 Class duty suitably derated for AC-4 class 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. Electrical & mechanical life of the contactors shall be indicated. For AC 4 Class of duty or AC 3 Class duty suitably derated for AC-4 class duty, Electrical life shall be minimum 2, 00,000 cycles of operations.
- 2.9.2. The contactors shall have high contact reliability with preferably double break parallel bridge contact and facility of time saving termination.
- 2.9.3. All contactors shall be of L&T, Schneider, C&S, Siemens and Cutler Hammer make. Test certificate of the manufacturers shall be submitted in support of life and rating of the contactors.

## 2.10. **RESISTORS (for slipping motors)**

- 2.10.1. Resistors shall be adequately protected to prevent accidental contact.
- 2.10.2. The resistors shall be air-cooled, robust, heavy duty, Corrosion resistant stainless steel punched grid type. The resistance boxes shall be placed in racks or on the platform and shall be capable of independent removal of any selected box. Spacing recommended by the resistor manufacturer shall be maintained. The racks shall be robust in construction to withstand vibration due to crane operation. Wire wound resistors shall not be used on any motion of the crane.
- 2.10.3. All resistors shall be rated for 10 minutes continuous loading.
- 2.10.4. Resistors housing on cranes working in open yards shall be weather proof and on all cranes they shall be adequately protected. The electrical clearance between resistors and earthed metal shall not be less than 100mm. Cable terminal arrangement shall be such that cable cores do not get loose due to vibration.
- 2.10.5. The temperature of resistors shall not exceed 275 °C at specified duty.

## 2.11. **CIRCUIT PROTECTIVE SWITCH GEAR**

- 2.11.1. One triple pole manually operated moulded case circuit breaker (MCCB) make L&T, Schneider, C&S, Siemens, Havells, Cutler Hammer and ABB serving as main incoming protective device, fitted with no volt, short circuit

and overload releases and rated to carry at least combined full load currents of the two motions of the crane having largest power should be provided. The circuit breaker shall have adequate rupturing capacity to withstand and clear fault current of the order of 30 KA. The circuit breaker shall have adequate rupturing capacity to withstand and clear fault near the protective panel, in such a way that adequate clearance is provided as per Indian Electricity Rules. In case of floor operated cranes instead of MCCB, push button operated contactor shall be provided, other provisions remaining unchanged.

- 2.11.2. The trip circuit of the circuit breaker shall be so designed such that it will prevent the circuit breaker from being enclosed when main contactor of any of the motions has failed to open, although the corresponding controller has been brought to OFF position. Suitable protective features to trip the circuit breaker with the operation of limit switches and emergency push buttons shall also be provided.
- 2.11.3. To indicate whether power and control sources are ON and whether any emergency switch has been operated, indicating lamps shall be provided in operator's cabin, in case of cabin operated cranes.
- 2.11.4. For protection of each drive motor against over loads adjustable inverse time lag manually reset electro-magnetic type relays shall be provided for each motor. Alternatively, electronic type relays shall be acceptable. These relays shall be mounted in respective contactor panels and shall be set to trip the circuit of motion being controlled when current exceeds 200% of normal value for more than 10 seconds. The control circuit of individual motions shall have off position interlock with respective master controllers.
- 2.11.5. Each motor feeder shall be protected with no volt trip device, HRC fuses against short circuit, and with instantaneous trip current sensitive type single phasing cum phase reversal preventor.
- 2.11.6. Isolating switches fitted with HRC fuses shall be provided for the following branch circuits:
  - a) Lighting and hand lamp socket outlets
  - b) Control circuit.

Both of the above mentioned isolators shall be installed in driver's cabin in case of cabin operated cranes.
- 2.11.7. 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.
- 2.11.8. A triple pole isolating switch without fuse shall be provided on the long travel bridge walkway, as close as possible to the main current collectors. This shall isolate all the circuits except the crane lighting circuit.

## 2.12. **LIMIT SWITCHES**

- 2.12.1. All hoist motions 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. 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. It can

also be of Proximity non-contact type. The second one shall be of gravity operated hand resetting type switch connected in the trip circuit of main incoming breaker. The second limit switch connected in the main incoming circuit breaker's control circuit shall operate and trip the breaker.

2.12.2. Any other limit switch viz. for slewing, skewing of crane etc. shall be provided if required.

2.12.3. Limit switch for hoist cross and long travel motion shall be supplied installed and wired by the manufacturer.

### 2.13. **EMERGENCY STOP PUSH BUTTONS**

2.13.1. 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. Further a mushroom head type of push button shall be provided in the operator's cabin in cabin operated crane so that the main incoming circuit breaker can be tripped under any emergency conditions by pressing the operating head. A pilot lamp incorporated in the control circuit shall glow when any of the switches is operated.

2.13.2. Pendant controls shall be provided with mushroom head type push button having in built key so that main incoming circuit breaker can be tripped under any emergency condition by pressing the push button (Applicable for Pendant Control cranes).

### 2.14. **CONTROL PANEL**

2.14.1. All power and auxiliary contactors, individual overload relay shall be mounted in a sheet steel cubical with lockable hinged doors. The 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 and the provision shall be confirmed in the bid. However, common panel with separate compartment for each motion should be provided. Interiors of panel shall be dust and vermin proof. For cranes working in open yards, all control panels shall be fully weather-proof type.

2.14.2. 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.

2.14.3. 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 terminal strips shall be at least 150 mm above the panel bottom cover to facilitate inspection and repairs.

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

2.14.5. 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.

- 2.14.6. 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.
- 2.14.7. 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.
- 2.14.8. The electrical clearance in air between all live parts of different polarity and voltage and between live parts and earth shall be not less than 75mm.
- 2.14.9. Contactor panels shall be well braced to the crane structure and each panel shall be provided with adequate number of lifting lugs.
- 2.14.10. The control system should include operating hour meter for crane, Mechanical load sensing device (for cranes up to 30T capacity), Electronic overload protection device (for cranes above 30 T capacity) and motor over current protection system (in case of VVVF drives cranes. Torque based protection is also acceptable).

## 2.15. **LIGHTING**

- 2.15.1. 10 Watt LED Lighting shall be provided in the driver's cabin and staircase. Bulk head fittings with dust proof coves shall be used for the above areas. 06 nos. underslung LED lights of minimum 80 watts with steel cage with shock absorbing and anti-swing suspension arrangement shall be provided for uniform floor illumination for the cranes having span upto 15mtrs and 02 nos. underslung LED lights of minimum 80 watts with steel cage with shock absorbing and anti-swing suspension arrangement for every 5mtrs span thereafter. e.g if span is 20 metres, LED bulbs =  $6 + 2 = 8$  nos., however if span is 22 meters, then still LED bulbs = 8 nos. but if span is 23 metres, then no. of LED bulbs =  $8 + 2 = 10$  nos. and so on. Lighting transformers shall have 50% reserve capacity. However, if required, the same arrangement shall be able to take load of LED bulbs of upto 120 Watts also.
- 2.15.2. Toggle Switches: Industrial toggle switches shall be used for lighting distribution

## 2.16. **SOCKET OUTLETS.**

- 2.16.1. Minimum of one socket outlets for hand lamps shall be provided at each driver's cabin, long travel side and in the area where control panel, resistors and transformers shall be installed. Hand lamps shall operate at 24 volts AC supply. Industrial type metal clad plug and socket which are easy to assemble and disassemble shall be provided.

## 2.17. **CABLING**

- 2.17.1. All wiring for power control & lighting circuit shall be carried out with 1.1KV 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.

2.17.2. Minimum size of power & control cables shall be 4mm<sup>2</sup> & 2.5mm<sup>2</sup> respectively.

2.17.3. All cables shall be systematically laid on G.I. trays & fixed with adequate number of G.I. clamps.

2.17.4. All cables shall be weather proof and shall be either of **LAPP/SIEMENS/POLYCAB/FINOLEX/UNIVERSAL/ICC** make.

## 2.18. IDENTIFICATION OF CIRCUIT CABLES ETC.

2.18.1. 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, resistors etc. shall be properly marked for each motion. All power control cable, lighting 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.

## 2.19. EARTHING

2.19.1. 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. The crane structure in turn shall be made electrically continuous by providing jumpers over riveted or bolted joints. Equipments fed by flexible cables shall be earthed by means of spare core provided in the flexible cable.

## 2.20. DEAD MAN'S HANDLE

2.20.1. For cabin operated crane suitable dead man's handle shall be provided which will stop the crane movement in case the operator neglects proper handling. Pendant control shall have spring loaded push buttons to return to off position to stop the crane movements as soon as the operator releases the thumb pressure on the button.

## 2.21. ALARMS

2.21.1. Sufficient provision shall be made for alarm during the crane working. A foot operated alarm bell shall be provided to caution to the workers in cabin operated cranes. A continuous ringing bell shall be provided for all motions of the crane. In case of pendant operated crane, alarm shall be provided for any of the motions operated from the pendant. Details of alarm system provided shall be explained in the offer.

## 2.22. FEATURES OF AC DRIVE

2.22.1. Inverter offered should be suitable for crane application for all motion.

2.22.2. Inverter rated O/P current should be at 45 °C ambient and maximum over temperature shall be 55 °C.

2.22.3. Drive sizing should be done accurately after considering the ambient temperature, type of panel, environment condition, etc. and deration on any account viz temperature/carrier frequency, or other factors should be considered and should not exceed 15% of rated O/P current of inverter



offered.

2.22.4. The drive should be capable of taking 125% overload for one minute at the creep speed of 20% and at full speed as per crane IS standard for crane.

2.22.5. Inverter offered should have slip compensation feature in both up/down motions (even during regeneration).

2.22.6. Inverter offered should be with built in modes of control strategies viz standard V/F, OPEN LOOP VECTOR (REAL SENSORLESS VECTOR) AND MAGNETIC FLUX VECTOR so that the same inverter is used for all motions selecting the control mode. This should minimize spares inventory and training costs. However for hoisting the drive should be operated in Magnetic flux vector control and open loop brake sequence system. Brake release should be through torque base sensing.

2.22.7. Inverter offered should be provided with accurate brake coordination signals.

In addition to above crane specific features the inverter shall offer for the following.

2.22.7.1. Overload current capacity : 150% of rated output current for one minute.

2.22.7.2. Maximum output voltage : 3 phase, 380/400/440/460V  
(Proportional to input voltage)

2.22.7.3. Maximum O/P frequency : 400 Hz (programmable)

2.22.7.4. Rated input voltage and frequency: 3Phase, 380 - 460V, 50/60 Hz.

2.22.7.5. Allowable voltage fluctuation : +10% to -15%

2.22.7.6. Allowable frequency fluctuation: +5% to -5%

2.22.7.7. Control Method : High carried freq. (low noise) sine wave PWM technique.

2.22.7.8. Starting torque : 150% below 1 Hz. (150% at 0 RPM with PG)

2.22.7.9. Speed control range : 100:1 (1000:1 with PG)

2.22.7.10. Speed control accuracy : +/-0.2% (+/-0.02% with PG)

2.22.7.11. Speed response : 20 to 30 rad. per sec.

2.22.7.12. Torque limit : Settable through programme (parameter)

2.22.7.13. Output freq. Resolution : 0.01 Hz.

2.22.7.14. Freq. Setting signal : +10 to -10 V, 0 to 10 , 4-20 mA, INC/DCR through PB (Programmable).

2.22.7.15. Acceleration/deceleration time: 1.1 to 6000 sec (Can be set independently)  
Four rates should be possible.

2.22.7.16. Braking torque : Approx. 20% (approx. 125%)

when using braking resistor)

2.22.7.17. Main control functions :Auto tuning  
Drop control  
DC injection braking  
Slip compensation  
S-curves  
Speed search  
Excess torque detection  
Torque limit  
Full range auto torque boost  
Multi step speed operation  
Accl/Decl time changeover operational  
3 wire sequence Speed/torque control  
switch operation Fault log.

2.22.7.18. Protective functions : Motor overload  
Instantaneous over current  
Fuse protection  
Over voltage  
Under voltage  
Power loss ride through FIN overheat  
O/P short circuit protection  
I/P & O/P open circuit protection  
Stall prevention  
Ground fault

2.22.7.19. Type of Enclosure :**IP:21** or better

## 2.23. **RADIO REMOTE CONTROL**

2.23.1. For Radio Remote Control operated EOT crane tenderers should quote in accordance with the following parameters: -

2.23.1.1. The wireless control facility shall incorporate control of movements in all directions, with speeds identical to those provided for the cabin/pendant control. The facilities shall be provided in the set for Radio Frequency adjustments within 335-336 M Hz or 865-866 M Hz range which are to be advised to the supplier by consignee on allotment of such frequency by the Department of Communications.

2.23.1.2. The facilities to be provided shall incorporate but need not be limited to the operations features listed below:

- i. Emergency stop.
- ii. Emergency Alarm.
- iii. Normal ON / OFF control.
- iv. Micro / Normal speed switches.
- v. Directional movement control switches.
- vi. Radio / Normal control selection switch.
- vii. Overall weight of equipment to be carried by operator not to exceed 2.5 kgs.

The system shall be so designed that in the event of its mal functioning it should be possible for the user to switch over to conventional

cabin/pendant control through suitable bypass switch facility

- 2.23.1.3. The general scope of supply of Radio Remote Control equipment shall be as per clause 2.23.2. The leading parameters of the crane are as per relevant Annexure
- 2.23.1.4. The equipment should incorporate all necessary interlocks to ensure safety under all conceivable operating conditions, including safeguards against independent operation while in tandem mode and vice-versa.
- 2.23.1.5. The supplier shall undertake to coordinate with Department of Communications for allotment of required radio frequencies, duly getting all actual user applications etc. filled in by the consignee and conducting all necessary liaison with (other than Railways) agencies for this purpose.

#### **2.23.2.SCOPE OF RADIO REMOTE CONTROL**

- 2.23.2.1. Scope includes supply and installation of Radio Remote Control system suitable to operate EOT crane as per particulars given in relevant schedule
- 2.23.2.2. The scope of supply shall consist of
  - i. Radio Remote Control
  - ii. 1 no. Transmitter-Joy stick type or Push button type.
  - iii. 1 no. Receiver.
  - iv. 1 no. Antenna and cable.
  - v. Two sets of Ni-Ah rechargeable batteries
- 2.23.2.3. 1 no. Battery Charger (suitable to charge one set of batteries at a time).
- 2.23.2.4. The remote control UNITS shall have following features for following motion :-
 

i.	MAIN POWER	ON / OFF
ii.	MAIN HOIST	ONE SET
iii.	AUXILIARY HOIST	ONE SET
iv.	LONG TRAVEL	ONE SET
v.	CROSS TRAVEL	ONE SET
vi.	EMERGENCY STOP	ON / OFF CONTROL
- 2.23.2.5. Each transmitter shall not weigh more than 2.5 kg and shall be provided with a shoulder belt and shall be in IP65 enclosure.
- 2.23.2.6. The system shall be microprocessor based.
- 2.23.2.7. The system shall have self-diagnostic feature with LED display.
- 2.23.2.8. For ease of maintenance the cards should be easily replaceable type.
- 2.23.2.9. The transmitter shall have indication for low battery. The battery should not be get discharged, have longer life and before reaching discharge level it should give visual indication.
- 2.23.2.10. The system shall be suitable for operation of 335-336 M Hz or 865-866 M Hz frequency range with a provision of fine adjustment.
- 2.23.2.11. The range of operation should be adjustable from 0 to 100 meters.
- 2.23.2.12. Frequency of operation of the Remote Control Units shall be indicated

in the offer.

2.23.2.13. Tenderer shall ensure adequate supply of spares and availability of maintenance support within country.

2.23.2.14. The tenderer shall be responsible for commissioning the above system.

2.23.2.15. Equipment supplied should be certified by internationally recognised international inspection agency.

### **3. GENERAL CHARACTERISTIC: Covered under para-1 above.**

#### **4. TECHNICAL LITERATURE:**

4.1. One copy of the printed illustrative catalogue showing features of the machine and its elements must be enclosed with each copy of the bid.

4.2. The technical literature shall be provided for the complete machine, including imported and indigenously purchased components/sub- assemblies. The successful tenderer will have to furnish 4 (four) copies each of the following manuals directly to the consignee along with the machine. Out of these **04** sets, the bidder shall be required to submit one set of all documents in best available condition one month prior to the training for the machine. One set of technical literature should cover the following details:

- i) Operational & Maintenance manual of the Crane.
- ii) Instruction & Maintenance manual for Hydraulic Oil Cooling Unit.
- iii) Technical & Maintenance manual for Lubrication System.
- iv) **Electric Circuit diagram, in which length of wires must be mentioned, hard copies in A-II size as well as soft copy in PDF format.** (which clearly shows the position of all type of electrical components in Crane).
- v) Mechanical drawings, hard copies in A-1 size as well as soft copy in PDF format.
- vi) Spare part manual including part lists no., hard copies in A-4 size as well as in PDF format.
- vii) Repair and trouble shooting guide.

**Note:** All manual and literature should be in English.

#### **5. SPARES & MAINTENANCE TOOLS**

5.1. Maintenance spares as per Schedule-IV.

5.2. Maintenance Tools as per schedule-V

#### **6. CONSUMABLES: Not Applicable.**

#### **7. SPECIAL FEATURES:**

7.1. Special features incorporated in the machine, if any, shall be indicated separately in the bid clearly indicating the advantages.

#### **8. DEVIATIONS:**

8.1. The tenderer shall certify that the offered machine fully meets the specification. Various design features incorporated in the machine to fulfill different technical performance requirements shall be fully explained in the offer. However, minor deviations from these specifications which do not affect

or in any way interfere with the stipulated performance standards or would result in improved safety/ reliability or would reduce recurring maintenance/operating cost of the machine, can be considered for acceptance. The tenderer in such eventuality shall clearly indicate the details of these deviations and their implications as per the following format given in Annexure-A at Section-III.

## **9. INSPECTION AND TESTING AT MANUFACTURER'S WORKS:**

- 9.1. The crane shall 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. The Quality Assurance programme will be as per Annexure-I. However, the purchaser or his authorized representative is free to institute any further checks also, if he so desires, and shall be in no way binding on the Purchaser.
- 9.2. 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 provided if required by the Purchaser or his representative.
- 9.3. Railway reserves the right for surveillance inspection of firm after placement of order to assess the ongoing process of manufacturing and facilities available with them. In case the inspection team observes the deficiencies/deterioration in infrastructure/manufacturing capability at the firm's premises, the action can be initiated as considered appropriate on merit.
- 9.4. The complete machine shall be inspected at manufacturer's premises as per approved GA drawing. Inspecting authority shall not carry out the final inspection in case GA Drawing is not approved by the consignee
- 9.5. The Manufacturer shall produce invoices of bought out items/sub-assemblies to ensure genuineness of such products/verification by the Inspecting agency.

## **10. TRAINING:**

- 10.1. Technical experts from manufacturer will fully and adequately provide training to operation and maintenance staff nominated by consignee at the time of commissioning of crane. Minimum 04 man days of training at consignee premises will be provided. This training shall include crane architecture, systematic methods for quick diagnosis of problems and quicker methods to solve them, domain knowledge and safety procedures to be followed while working with crane.

## **11. GENERAL ARRANGEMENT & RELATED DRAWINGS**

### **11.1. SUBMISSION OF GENERAL ARRANGEMENT & RELATED DRAWINGS FOR APPROVAL:**

- 11.1.1. The contractor shall depute their engineer to take accurate measurement of span and other fixed dimensions of gantry at site jointly with consignee before submission of GA drawing and incorporate the dimensions measured at site in the GA drawing to be submitted to consignee for approval.

- 11.1.2. The Contactor will be required to submit the following drawings in 2 copies to consignee as per time schedule after issuance of LOA/PO
- i) The general arrangement drawings containing all information as described at item 24 of Schedule -II.
  - ii) General lay out drawing of the trolley.
  - iii) Assembly drawings of individual drives like hoists, long travel, cross travel.
  - iv) Sub assembly drawings for wheels. Hook blocks and hoist drum.
  - v) Wiring diagram showing the wiring for the complete crane including the following:
    - a) Electrical equipment layout drawings along with rating of items used.
    - b) Current collection arrangement for the crane.
    - c) Power supply arrangement to the trolley and attachments
  - vi) Lubrication system for the complete crane.
  - vii) In addition to the above, the contactor will submit detailed calculations for selection of Motor, Reducer, Brake coupling, Bridge girder, End carriage and their connection to Consignee with their detailed drawings.

**The drawings mentioned at (i), (ii) and (iv) shall be got approved by the contractor from the consignee and cranes supplied by them shall conform to said approved drawings. The drawings should be legible and is minimum A3 size.**

- 11.1.3. The supplier shall furnish to the consignee five prints of all erection drawings showing the marked numbers with weights of various items to be assembled at site, schedule of site bolts, rivets and special welding electrodes, welding techniques and erection instructions.
- 11.1.4. Supplier shall give to the consignee the breakup of weights of different consignments of crane for the purpose of unloading at site.

#### 11.2. APPROVAL OF GA DRAWING

- 11.2.1. To be governed by Time Schedule in clause 7 of section-I and following stipulations. General Arrangement Drawings will be sent by the 'Contractor' to the Consignee as per Time Schedule. The 'Contractor' should ensure that drawings sent to consignee are complete in all respects as specified in technical specification. The GA drawings shall be approved by the consignee and given back to the contractor.
- 11.2.2. **Delays in submission of drawings by Contractor will be added to the delay in supply of machine** in case submission of GA drawing is delayed beyond stipulated time as per time schedule and LD will be levied **as per Stores condition**. Thus the number of days delay in submission of GA drawing plus the number of days delay in supply of machine together will be taken as the delay in supply of machine, However if the contractor supply the machine before original delivery period as per PO the number of days by which machine has been supplied earlier than original delivery period that many days will be subtracted from the delay in submission of GA drawings

and LD will be levied accordingly. Delays in approval of the drawings by consignee will not be because of Contractor, except as detailed below.

- 11.2.3. In case Consignee finds some deficiencies in the Drawings and returns the same for rectification to the 'Contractor', the contractor must return the rectified drawings within 30 days from the date of issue of letter by Consignee. This period will not be counted towards LD calculation. The consignee shall ensure that all deficiencies in the Drawings shall be pointed for clarifications to the firm together at one time only instead of piecemeal multiple reference.
- 11.2.4. A repeat back reference(s) by Consignee to Contractor pointing out further defects/deficiencies in the Drawings, will be considered a delay on account of the contractor, unless and until clearly certified by consignee as being on their own account, for special circumstances like change in location, review of arrangement etc. Thus, Contractors must take utmost care in ensuring completeness as per requirements of the Consignee.
- 11.2.5. Where GA Drawing cannot be prepared due to clear site not being available etc., the Consignee must inform Contractor, explaining the exact delay. However, initiative must be taken by Contractor to obtain such a certificate from Consignee.
- 11.2.6. In their own interest, contractor must maintain a log of events in this respect with clear dates and get this countersigned by consignee for submission along with his bills to avoid wrong levy of LD. Consignees must cooperate with Contractors by providing all assistance, including clear information about any expected delays in site availability, promptly and in writing.
- 11.2.7. If an order has been placed on the firm, the firm will have to advise the consignee well in advance regarding requirement of road permit and assistance required from the consignee, if any, so that delay on this account is avoided. Firm should also visit the site before dispatch of crane to assess the condition of path to be used for movement of trailer.

### 11.3. **DISPATCH OF CRANE FROM MANUFACTURER'S WORKS**

- 11.3.1. The supplier and consignee will ensure that facilities as defined in PO necessary at site for commissioning of crane e.g. clear site with gantry, electrical power from mains to DSL are ready before dispatch of crane. The crane shall be dispatched by the supplier only after all the on-site requirements from supplier side as well as consignee side, for commissioning the crane on arrival, have been made ready. The supplier and consignee shall record a joint note certifying this.
- 11.3.2. The packing of crane with all components, accessories should be supplied suitably packed.

## 12. **INSTALLATION, COMMISSIONING AND PROVING TESTS:**

- 12.1. **Joint Check** – The contractor or his agent would be required to carry out a joint check at consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & bidder's representative to avoid commissioning delays due to shortages/transit damages. After receipt of the

machine as above a Joint Receipt Inspection note (JRI) as per Annexure-C of Section-III shall be prepared by the consignee and the firms representative indicating the tentative time schedule for various activities of installation and commissioning.

## 12.2. **RESPONSIBILITY OF CONSIGNEE AND BIDDER**

### 12.2.1. **Consignee's obligation with regard to erection & commissioning will be limited to the following:**

- i) Supplying following free of cost at the site of work.
- ii) Electricity required for the purpose of erection/ lighting.
- iii) Test loads with slings and tackles for performing the load tests.
- iv) The provision of stepladder at gantry end, for going up the gantry rails.
- v) Supply and erection of cables from mains to DSL (Down shop leads) shall be provided by consignee.
- vi) Safe storing of the material supplied by manufacturer until erection of machine.
- vii) The inspection of foundation, structures etc. and installation of the machine shall be done by authorized representative of the consignee (wherever applicable).

### 12.2.2. Following items of work shall be performed by the Contractor

- i) Unloading and transporting materials free of cost from the manufacturer premises to the work site.
- ii) Checking of alignment of gantry rail at site. Any rectification required, however, will be done by the purchaser.
- iii) Installing of the crane structure and associated machinery in position.
- iv) Complete fitting and wiring of all electrical items.
- v) Fixing of down shop leads wherever required.
- vi) Commissioning of the equipment. The crane performance shall be demonstrated after successful commissioning.
- vii) Design & Construction of foundation, flooring of sufficient thickness, civil works (in line with scope of supply) suiting local soil conditions at the site.

12.3. The contractor shall arrange erection and commissioning of the cranes. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the crane has been received.

12.4. The contractor or his agent shall commission and prove out the crane as per time schedule.

12.5. In the interest of early commissioning, the supplier shall ensure that minimum amount of assembly is necessary at site. Site welding and riveting shall be avoided as far as possible. The supplier, before proceeding with design details, shall satisfy himself about the site conditions so as avoid any difficulty at the time of erection and also check the span of gantry rails.



12.5.1. The bidder shall be responsible for meeting all the criteria set by State Pollution Control Board and Central Pollution Control Board, wherever applicable, with respect to air, water, noise, land etc. The bidder shall be responsible for obtaining clearance/certificate for installation/commissioning/operation of the machine/system supplied. The consignee will provide the administrative help, wherever required, for establishment of communication with the Pollution Control Board.

12.6. Tenderer shall ensure that weights offered shall be as per information submitted vide schedule II. The bidder shall also ensure in its offer that range of variation in the total actual weight of the crane and quoted value in schedule II will be with in  $\pm 5\%$ . Purchaser reserves the right to verify the total weight of the crane offered by the bidder against information submitted under schedule II.

**12.7. Test on Purchaser's Premises.**

**12.7.1. Start up and trial Operations Test (Commissioning Test)**

12.7.1.1. 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 shall also be shown:

- 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 creep speed as called for in technical specification.
- iv) There is no skewness in crane during long travel and cross travel motions, presence of vibrations and unusual noise in operation.

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

12.7.1.3. 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.

12.8. A Joint Commissioning Note (JCN) to this effect shall be made as per the format at Annexure-D of Section-III. After issue of JCN the performance shall be watched for a period of one month, after which the PTC shall be issued as per format at Annexure-E. The issue of PTC cannot be delayed by more than 60 days from the issue of JCN. If some minor breakdowns are noticed after the issue of JCN, these shall be attended as per warranty obligations.

12.9. If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repair/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit BG of suitable amount. In case the entire machine has to be taken back, a Bank Guarantee for the cost of the machine would have to be submitted. The bank guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the machine.

### 13. SERVICE FACILITY IN INDIA AND TECHNICAL SUPPORT

- 13.1. The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period in the appropriate section of Annexure 'A'. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated. Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.
- 13.2. After the warranty period and AMC period, if any, the manufacturer or his agent shall agree to provide service supports for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the Purchasers for a period of 15 years from the date of delivery of the machine at the ultimate destination to safeguard against obsolescence.
- 13.3. Tenderer who are OEM, shall undertake to supply spare parts for a period of expected life of machine. Other tenderers shall submit undertaking from OEM for supply of spare parts for a period of expected life of the machine.
- 13.4. During warranty period, the supplier or his authorized agent shall attend for break down as soon as possible, but in no case later than 72 hours of receipt of intimation of the breakdown.

### 14. INFRASTRUCTURE FACILITIES AND BOUGHT OUT ITEMS

- 14.1. The bidder should have minimum infrastructure and manufacturing facilities detailed at Annexure-G of Schedule VI and shall provide information on infrastructure available with them.
- 14.2. The bidder shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc.

S. No.	ITEM	MAKE
1	Motors	ABB / CROMPTON / BBL / SIEMENS / KIRLOSKAR / MARATHON
2	Cables	KEI/LAPP/SIEMENS/POLYCAB/FINOLEX/UNIVERSAL /ICC/KabelSchlepp
3	Contactors	L&T / SCHNEIDER / C&S / SIEMENS / BCH
4	Time relays	SIEMENS / BCH / L&T / SCHNEIDER / C&S
5	Limit Switches	SPEED-O-CONTROL / CCE / ELECTROMAG / C&S / ANAND SYSTEM
6	Master controller	SPEED-O-CONTROL / CCE / ELECTROMAG / C&S / ANAND SYSTEM
7	Overload relays	SIEMENS / BCH / L&T / SCHNEIDER / C&S
8	Moulded case circuit breakers	L&T / SCHNEIDER / C&S/SIEMENS / HAVELLS / BCH / ABB
9	Resistors	SPEED-O-CONTROL / ELECTROMAG / CCE / C&S / ANAND SYSTEM

10	Drag Link Chain system	IGUS / RS COMPONENTS & CONTROL / SILVERLINE / CKS
11	Safe shrouded DSL conductors wherever applicable	INSUL-8 / SAFE TRACK / SAFE LINES / SILVER LINE / SAFE LINK
12	Thrustor brakes	SPEED-O-CONTROL / CCE / ELECTROMAG / GALVI / KATEEL / ANAND SYSTEM
12	Electrical isolators	SIEMENS / L&T / BCH / C&S
14	VVVF Drive	ABB / L&T / YASKAWA / SCHNEIDER / MITSUBISHI ELECTRIC / DANFOSS / FUJI ELECTRICS / TOSHIBA INDIA / CROMPTON GREAVES/ SIEMENS/ ALLEN BRADLEY
15	Bearings	NBC / SKF / FAG / NORMA / NRB / NTN / KOYO/ TIMKEN
16	Wire Rope	USHA MARTIN / BOMBAY WIRE ROPE / MAHADEV

14.3. Test certificates of motors, wire ropes, hooks, lifting tackles etc. should be provided by the supplier with proper identification.

#### **15. PAINTING AND COLOUR:**

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

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

15.3. All parts except motors, gears, thrusters etc. shall be painted with:

- i) Two coats of red oxide zinc chromate primer to IS:2074 and over the second primer coat, two coats of paint finishing Golden yellow with black strips (Ready mixed oil based paints as per the relevant IS code) shall be given before dispatch by the firm.
- ii) The contractor shall give touch-up paint wherever required, after erection and testing of crane at site.
- iii) The interior of all gear box housing shall be painted with two coats of oil resistant enamel paint.
- iv) All machined pads and bearings surfaces on structures or housing shall be painted with white lead.

#### **16. COMPREHENSIVE WARRANTY**

16.1. The machine shall be designed for a life of 36 years with regular maintenance and all the structural members of the machine and the foundation shall be guaranteed for 7 years against cracks and breakages etc. during the course of normal operations. Tenderer would submit suitable undertaking.

16.2. Foreign suppliers who do not have registered office / maintenance facilities in India may authorize an Indian agent, who shall be responsible for maintenance and break down support. In such case, Indian agent should have experience of maintaining any type of five machines after commissioning.

The tenderer should submit documentary evidence towards the experience of the Indian agent in maintaining the machines in India, along with the offer. The Indian agent should submit the details of infrastructure and manpower available with them in the bid.

- 16.3. The warranty period would also cover comprehensive preventive maintenance, which will be inclusive of all spares, material and labour cost. All maintenance consumables like lubricants and grease except hydraulic oil/plant coolants shall form part of the scope of the preventive maintenance during the warranty.
- 16.4. The firm shall ensure that in case a failure is reported by a consignee qualified service engineer of the contractor shall visit the site within the prescribed response time from the date and time of complaint for the machine. This response time shall be 48 hours, for upto 06 cases in entire 02 years (or extended warranty period) & Nil thereafter. 48 hours' response time shall be permitted only if 2 successive failures are staggered 3 months apart. Complaints shall be lodged by consignee by fax, phone, e-mail, WhatsApp or per bearer at address given by the tenderer.
- 16.5. The details of preventive maintenance to be provided during warranty period shall be indicated by the tenderer giving details of type of preventive schedule, periodicity on items to be checked, items to be replaced and expected plant down time. Preventive maintenance schedules shall be conducted on weekends as far as possible or any other day through mutual agreement with consignees. Total breakdown hours shall be calculated after discounting response time and preventive maintenance period.
- 16.6. Penalty will be levied on the contractor for breakdown period on hours' basis (including holidays) after discounting for the response time. Penalty will be calculated with full/partial deduction of amount of WBG, which shall be deducted from the WBG deposited with the Railway:

<b>Breakdown Period</b>	<b>Applicable Penalty</b>
Up to 500 hours in entire duration of warranty of 02 years (plus extended warranty period, if any)	Nil
Exceeding 500 hours to 1200 hours in entire duration of warranty of 02 years (plus extended warranty period, if any)	25% of WBG amount
Exceeding 1200 hours to 2100 hours in entire duration of warranty of 02 years (plus extended warranty period, if any)	50% of WBG amount

Exceeding 2100 hours in entire duration of warranty of 02 years (plus extended warranty period, if any)	Full encashment of Warranty Bank Guarantee besides other action like noting adverse performance of the bidder and/or agent for future tenders and their offer in the subsequent tenders will not be considered for placement of any order for next 02 years.
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**17. COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (CAMC): OPTIONAL**

The contractor shall be required to take CAMC of the entire machine supplied under the scope of contract.

- 17.1. Tenderers are required to quote for a comprehensive Annual Maintenance Contract for the various scope of work supplied post warranty on yearly basis giving the rates for each year i.e. first year, second year....so on., which will be inclusive of all spares, material and labour costs. The duties and taxes as applicable should be indicated separately. All consumables spares and materials shall form a part of the scope of CAMC excluding Diesel/Fuel, lubricating oils or coolant. Diesel / Fuel, Lubricating oil or Coolant.
- 17.2. CAMC shall be operated, managed and paid by the consignees. The consignee shall indicate the bill payment authority & custodian of the CAMC BG and will intimate to Firm for operating the CAMC after getting approval from Competent authority. No further agreement is required for operating CAMC at consignee end.
- 17.3. CAMC is a part of scope of supply, if included in commercial evaluation criteria vide clause 5 of Section-I.
- 17.4. The duration of CAMC shall be 5 years from the date of expiry of warranty. Rates for CAMC as quoted by the tenderer on yearly basis, will remain applicable during the duration of CAMC and not subject to any variation except any statutory changes in taxes and duties as compared to quoted rates.
- 17.5. The contractor must provide CAMC services at the consignee location without any precondition. The CAMC should include complete responsibility for the bought out sub-assemblies and components like CNC system, diesel engine, AC unit etc.
- 17.6. The details of preventive maintenance services to be provided under CAMC shall be provided by the tenderer in the following format.

S.No.	TYPE OF PREVENTIVE SCHEDULE	PERIODICITY	ITEMS TO BE CHECKED	ITEMS OF REPLACEMENT	EXPECTED PLANT DOWN TIME

- 17.7. Preventive maintenance shall preferably be conducted on weekends through

mutual agreement with the consignee. Each preventive maintenance schedule normally shall not exceed one day (24 Hours). The preventive maintenance regime offered must be aimed at achieving minimum 95% uptime of the plant excluding the plant down time for preventive maintenance schedules.

- 17.8. The tenderer shall ensure that in case a failure is reported by a consignee, qualified service engineer(s) of the contractor shall visit the site within the prescribed response time from the date and time of complaint for the machine. This response time shall be 48 hours for upto only one case per quarter during the period of CAMC & Nil thereafter. 48 hours response time shall be permitted only if 2 successive failures are staggered 3 months apart. Complaints shall be lodged by consignee by fax, e-mail, whatsapp or per bearer at communication given by the tenderer. The responsibility to keep the failure reporting address details current will rest with the tenderer.
- 17.9. Incase preventive maintenance is carried out along with breakdown maintenance schedule; preventive maintenance time will be deducted from breakdown time of the plant.
- 17.10. **Penalty Clause:** Penalty shall be levied on the contractor for maintaining up time below the limit of 95% calculated on working days basis, after discounting for response time and preventive maintenance period. Penalty shall be calculated as % age of quarterly payment and will be deducted from the respective quarterly payments. Penalty calculation will be done over quarterly payment period.

S.No.	Availability Slab	Applicable Penalty
1.	95% and above	Nil
2.	Below 95%	2.5% for every 1% (or part thereof) reduction in availability of plant below 95%.

- 17.11. For CAMC, a Bank Guarantee (BG) equivalent to 5% of the combined quoted cost of equipment including accessories, shall be deposited by the contractor to the consignee, 90 days before the expiry of warranty. BG will have the validity of 5 years and 6 months. In case, the contractor fails to provide CAMC services successfully, the CAMC BG will be forfeited. This will be in addition to penalty as per Clause 17.10 above.
- 17.12. Up time of less than 75% for two consecutive quarters will constitute complete failure of contractor to provide the CAMC services successfully and will result in forfeiture of CAMC BG, besides other action like noting adverse performance of the bidder and/or agent for future tenders and their offer in the subsequent tenders will not be considered for placement of any order for next 02 years. This will be in addition to penalty Clause 17.10 above for the period of actual performance.
- 17.13. Since CAMC is part of evaluation of offer, it is the sole responsibility of contractor to stock all spares and materials as required for smoother execution of CAMC in order to achieve up time in compliance to plant availability as per stipulated requirements.
- 17.14. In case of damage on account of any external factor, viz., floods, earthquake, fire, arson or sabotage, it shall be the responsibility of the Railways for restoration of the plant to the earlier working order prior to the external factor

and the entire cost for repair of the plant shall be borne by the railways.

- 17.15. In case of damage to the plant as mentioned in para 17.14, any spare parts and material necessary to restore the plant to proper working order shall be arranged by the contractor and charged on actual basis duly certified by authorized railway official in the next quarterly bills. The rates charged for such spare parts shall be based upon the spare part rate list provided by tenderer and supported by necessary documents.
- 17.16. In all cases of failure except as mentioned in Clause 17.14 any other spare part or material necessary to restore the plant to proper working order will be arranged by the contractor as a part of CAMC.
- 17.17. Normally quarterly payment (@ 1/4<sup>th</sup> of the annual quoted rates) under AMC will be made to the contractor within 30 days from the end of that quarter subject to submission of the following documents by the contractor to the paying authority assigned by the consignee:
  - a) Consignee's certificate for work done as per Annexure-G of Section-III with calculation of down time and penalty applicable.
  - b) A certificate by consignee that no spare part is due with the tenderer as per clause 17.13 above.
  - c) Bills submitted by the tenderer & accepted by consignee.
  - d) Attested photocopy of the AMC BG.
- 17.18. In case of failure of the contractor to provide CAMC services as defined in Clause 17.12, the CAMC BG shall be forfeited with levy of other penalties as applicable under advice to the contractor regarding termination of CAMC

#### **18. SYNCHRONIZED OPERATION OF EOT CRANES:**

The tenderer must ensure that both the cranes can be operated in synchronized mode of operation i.e., Tandem operation. Following conditions must be satisfied by the tenderer for the supply of EOT cranes to the consignee:

- 18.1. **Synchronization:** The cranes should be able to operate seamlessly together, with synchronized movements for lifting, lowering, and horizontal travel. This requires precise control systems that communicate effectively to maintain coordination.
- 18.2. **Master-Slave Configuration:** One crane is designated as the "master" and controls the overall operation, while the other crane acts as the "slave" and follows the master's movements. This ensures that both cranes work together harmoniously.
- 18.3. **Load Sharing:** The load distribution between the two cranes must be carefully managed to prevent overloading of one crane and ensure balanced lifting. Load-sharing mechanisms and sensors are often used to monitor and adjust load distribution.
- 18.4. **Communication:** Clear communication channels, such as radio communication or wired interlocks, are essential for operators to coordinate actions and ensure safe tandem operation.
- 18.5. **Safety Features:** Tandem operation requires enhanced safety features, including anti-collision systems that prevent the cranes from colliding with each other or with obstacles. Emergency stop buttons and alarms should also

be readily accessible.

- 18.6. **Operator Training:** Operators must be well-trained by experienced engineer in tandem crane operation. They need to understand the complexities of coordinating two cranes and be aware of potential risks.
- 18.7. **Site Planning:** The layout of the working area needs to accommodate the movement of both cranes without hindrance. Consideration should be given to clearances, obstructions, and the overall work environment.
- 18.8. **Load Monitoring:** Load sensors and indicators should be in place to provide real-time information about the load being lifted. This helps prevent overloading and ensures safe lifting.
- 18.9. **Maintenance and Inspections:** Regular maintenance and inspections are crucial to keep both cranes in optimal working condition. Any issues or malfunctions should be addressed promptly to prevent operational disruptions.
- 18.10. **Emergency Procedures:** Clearly defined emergency procedures should be established, covering scenarios such as power failures, communication breakdowns, or equipment malfunctions during tandem operation.
- 18.11. **Environmental Factors:** Consider environmental conditions such as wind, weather, and temperature, which can impact the stability and operation of the cranes during tandem lifting.



**SCHEDULE – I****SPECIFICATION No.: Sr.DME/SC/EOT-15/05T/Remote/2023 Rev-0****LEADING PARAMETERS for E.O.T. Crane 15/05 Tonne Capacity**

NO.	ITEM	DETAILS						
1.	Consignee	: SSE/C&W/Sanathnagar (SNF) /SCDivision SC Railway						
2.								
3.	(a) No. of Cranes required : 02Nos (Two Numbers)	<table border="1"> <tr> <td>Additional Account</td> <td>Replacement Account</td> </tr> <tr> <td>✓</td> <td></td> </tr> </table>	Additional Account	Replacement Account	✓			
Additional Account	Replacement Account							
✓								
	(b) Additional/Replacement account : ( ' ✓ ' one option)							
	(c) If on Replacement account. whether: replacement crane asked of lower, same or higher capacity vis-a-vis existing crane ( ' ✓ ' one option)	<table border="1"> <tr> <td>Lower</td> <td>Same</td> <td>Higher</td> </tr> <tr> <td colspan="3">NA</td> </tr> </table>	Lower	Same	Higher	NA		
Lower	Same	Higher						
NA								
	(d) If answer to 2(c) is 'Higher' than existing: crane, please enclose certificate that existing structure shall be able to take higher load (due to higher capacity crane) ( ' ✓ ' one option)	<table border="1"> <tr> <td colspan="2">Certificate of ability of existing structure to bear higher load enclosed</td> </tr> <tr> <td>Yes</td> <td>No</td> </tr> <tr> <td colspan="2">NA</td> </tr> </table>	Certificate of ability of existing structure to bear higher load enclosed		Yes	No	NA	
Certificate of ability of existing structure to bear higher load enclosed								
Yes	No							
NA								
(e)	If answer to 2 (d) above is 'No', crane procurement can not be processed : NA further							
(f)	If on Additional account, gantry : columns erected or not ( ' ✓ ' one option)	<table border="1"> <tr> <td colspan="2">Gantry columns erected</td> </tr> <tr> <td>Yes</td> <td>No</td> </tr> <tr> <td></td> <td>✓</td> </tr> </table>	Gantry columns erected		Yes	No		✓
Gantry columns erected								
Yes	No							
	✓							
(g)	If answer to 2(f) is 'Yes', then : gantry rails laid or not ( ' ✓ ' one option)	<table border="1"> <tr> <td colspan="2">Gantry Rails laid down</td> </tr> <tr> <td>Yes</td> <td>No</td> </tr> <tr> <td colspan="2">NA</td> </tr> </table>	Gantry Rails laid down		Yes	No	NA	
Gantry Rails laid down								
Yes	No							
NA								
(h)	If answer to 2(g) is 'No', then :							
	(i) Likely date of laying of gantry rails	: 31.12.2024						
	(ii) How has 'Span' in S.No.10.3 below been arrived at as gantry rails have not been laid down (please explain)	: As per Approved Drawing						
4.	Crane Nos.	: ----						
5.	Location (Sub Shop name with bay no.)	: C&W/Sanathnagar (SNF)						

6. Type :  
(‘√’ one option)

Conventional Double Girder	Single Girder	Underslung Single Girder
✓		

7. Capacity

6.1 Main Hoist (Tons) : 15 T

6.2 Auxiliary Hoist (Tons) : 05 T

8. Class of Duty :  
(‘√’ one option)

I	II	III	IV
		✓	

(Ref appended notes item iii)

9. Crane controls from :  
(‘√’ one option)

Cabin	Pendent	Remote	Cabin & Pendent	Cabin & Remote	Pendent & Remote	Cabin. Pendent & Remote
						✓

10. Speeds (metres/minute) (‘√’ one option each for MF, AH, LT & CT)

9.1	Main Hoist (MH)	2.0	3.15	4.0	5.0 ✓	6.3	Any other speed requirement may be indicated as per R 10 series.  1.0, 1.25, 1.6, 2.0, 3.15, 4.0, 5.0, 6.3, 8.0 and 10.0 for Main Hoist & Auxiliary Hoist (for MH, normally limited to 6.3 m/min & for AH, normally limited to 8 m/min  10, 12.5, 16, 31.5, 40, 50, 63, 80, 100 for Long Travel Cross Travel (for LT, normally limited to 63 m/min & for CT normally limited to 31.5 m/min)
9.2	Auxiliary Hoist (AH)	5.0	6.3	8.0 ✓			
9.3	Long Travel (LT)	40.0 ✓	50.0	63.0			
9.4	Cross Travel (CT)	16.0	20.0 ✓	31.5			

9.5	<b>VVVF drive (step less speed for all motions)</b> (‘√’one option) <b>Advantages of VVVF drive v/s Non VVVF drive</b>	YES  ✓	NO
1.	Energy efficient	If VVVF Drive is specified. then creep speed not be required in 9.6 below.	Please give detailed justification for Non-VVVF drive despite clear-cut advantages of VVVF drive especially being energy efficient.
2.	Improved load control i.e. no shock loading and load swing, no jerking load		
3.	Multiple speed arrangements for all movements i.e., stepless speeds ( <b>creep speed control is not required</b> )		
4.	Smooth start and stop		
5.	Enhanced motor life		
6.	Less electrical maintenance		

9.6	<b>If answer to 9.5 is No</b> Creep speed of MH (Normally kept as 10% of speed of MH) (‘√’ one option)	0.20 NA	0.315 NA	0.40 NA	0.50 NA	0.63 NA	Normally 8.0 & 10.0 meters/minute speed are not desirable for MH.
-----	---	------------	-------------	------------	------------	------------	---

(Ref. Item IV of Appended Note for creep speed)

11. Structural details : All dimensions are in mm unless otherwise indicated

10.1. Weigh/unit length of Gantry Rails : 52 Kg/m

10.2. Rail head width of Gantry Rails B : 67 mm

(Ref: Appended Note item v)

10.3 a. Span (Centre to Centre of Gantry Rail) S : 16100 mm

b. Gauge (Inner face to Inner face of Rail) W= (S-B) : 16033 mm

10.4 Top of Gantry Rail (or bottom flange of I-Beam C : 3005 mm

(In case of underslung crane) to lowest overhead obstruction

10.5 Top of Gantry Rail (or bottom flange of I Beam D : 10000 mm

(In case of underslung crane) to floor level

10.6.Lift of hook above floor level (MH) H1 (MH) : 9000 mm

10.7 Drop of hook below floor (MH) H2 (MH) : 1000 mm

10.8 Lift of hook above floor level (AH) H1 (AH) : 9000 mm

10.9 Drop of hook below floor (AH) H2 (AH) : 1000mm

10.10 Centre distance between hooks of : MH & AH('✓' one option)	R	<table border="1"> <tr> <td>0.800 M up to 20 T cap.</td> <td>1.00 M above 20 T cap.</td> </tr> <tr> <td>✓</td> <td></td> </tr> </table>	0.800 M up to 20 T cap.	1.00 M above 20 T cap.	✓	
0.800 M up to 20 T cap.	1.00 M above 20 T cap.					
✓						
10.11 Side clearance from center line of gantry rail/I-beam to nearest side obstruction	A1 : 600mm					
10.12 Side clearance from center line of gantry rail/I-beam to nearest side obstruction	A2 : 600 mm					
10.13 Vertical clearance from floor level to lowest structural member of crane (Ref: Appended Note item vii)	K : 10000 mm					
10.14 Vertical clearance from floor level to bottom of cabin (Ref: Appended Note item viii)	L : 8000 mm					
10.15 Runway I-beam section (For Underslung Single Girder crane only) (Not required for other types of cranes)	Top Flange (mm): NA Bottom Flange (mm): NA Web Height (mm): NA					
12. Bay length & Down Shop Leads (DSL)	: 50 meters					
11.1 Length of gantry on which crane is : 50 meters to operate (metres)						
11.2 Is DSL required? ('✓' one option)	:	<table border="1"> <tr> <td>Yes</td> <td>No</td> </tr> <tr> <td>✓</td> <td></td> </tr> </table>	Yes	No	✓	
Yes	No					
✓						
a. If Yes, Type of DSL required ('✓'one option)	:	<table border="1"> <tr> <td>MS Angle Type</td> <td>Shrouded Type</td> </tr> <tr> <td></td> <td>✓</td> </tr> </table>	MS Angle Type	Shrouded Type		✓
MS Angle Type	Shrouded Type					
	✓					
11.3 Length of DSL required (meters) meters	: 50					
11.4 If No, type of existing DSL to be indicated	: NA					
11.5 Whether removal of existing DSL is to be Included in scope of supply of firm ('✓'one option)	:	<table border="1"> <tr> <td>Yes</td> <td>No</td> </tr> <tr> <td></td> <td>✓</td> </tr> </table>	Yes	No		✓
Yes	No					
	✓					

13. Operator's Cabin

('one option)

:

Fixed and open	Fixed and closed (in case of outdoor)
✓	

14. Crane has to work in

('one option)

:

Indoor	Outdoor	Both (Indoor as well as outdoor)
✓		

15. Working environment

('one option)

:

General Workshop	General Workshop Dusty	Hot Shop (in case of Hot Shop, please indicate maximum temperature of metal to be handled)
	✓	

16. Requirements of lifting tackles/ lifting chains/ lifting wire ropes (capacity asked for shall not exceed capacity of Main Hoist/ Auxiliary Hoist) (Ref: Appended Note items xi & xii)

S. No.	Item description	Qty.	Capacity In Tons	Length In meters	Drawing No.	Drawing enclosed or not	
a.	Lifting Tackle (Drugs to be enclosed along with indent)	Nil	NA			Yes	No
						--	--
b.	Four legged wire rope slings (Drugs. to be enclosed along with indent)	Nil	--	--	--	Yes	No
						--	--
c.	Two legged wire rope slings (Drugs to be enclosed along with indent)	Nil	--	--	--	Yes	No
						--	--
d.	Four legged chain with hook (Drugs. to be enclosed along with indent)	Nil	--	--	--	Yes	No
						--	--
e.	Two Legged chain with hook (Drugs. to be enclosed along with indent)	2nos	7.5	5.0	--	Yes	No
						✓	--
f.	Any other (please	Nil	--	--	--	Yes	No

	specify)					--	--
g.	Any other (please specify)	Nil	--	--	--	Yes	No
						--	--

15.2. Type of Hook required (MH) :  
(✓one option)  
(Ref: Appended Note item xii)

C-Type	Ramshorn Type
✓	

15.3. Type of Hook required (AH) :  
(✓one option)  
(Ref: Appended Note item xii)

C-Type	Ramshorn Type
✓	

15.4. Is lifting tackle/wire rope sling/ chain :

with hooks asked for above having  
less capacity than maximum capacity

Yes	No
	✓

of MH (✓one option)

15.5. If 'Yes', then how will maximum : NA  
Crane capacity of be checked at  
consignee's premises at the time of  
commissioning.  
(Please explain alternatives available for this)

**15.6 Any other specific requirements shall be clearly specified such as:**

(i) In case, any specific diameter of LT/ CT :  
wheel is required, consignee must clearly  
indicate. However, LT/CT wheel diameter  
is acceptable only as per IS 3177  
(latest), as follows:

Any specific dia. Of LT/CT wheels required	
Yes	No ✓

(The tread diameter of wheels shall be  
Standardized to sizes 160 mm, 200 mm,  
250 mm, 315 mm, 400 mm, 500 mm,  
630 mm, 710 mm, 800 mm, 900 mm,  
1000 mm & 1250 mm.)  
(✓one option)

:	If yes, please specify
	NA

(ii) In case, there is any specific requirement :  
for 'C' Type & 'RAMSHORN' Type hooks,  
chain slings, Wire rope slings, hook blocks etc.,  
it must be clearly indicated.

Any specific requirement of hooks	
Yes	No ✓

Drawings submitted	
Yes	No ✓

Consignee is advised to submit drawings :  
of such items along with indent.  
(✓one option)

- (iii) If indented crane is on Additional :  
Account or under PH-4200/PH-1500  
(other than PH-4100), Consignee is

Is crane on additional account	
Yes ✓	No

advised to submit photographs of Shed/Site,  
where the crane is to be  
installed specifically showing layout  
of crane girder columns and girder rails.  
(✓one option)

Photographs enclosed showing crane girder columns & girder rails	
Yes	No ✓

- (iv) Standard list of spares asked along with :  
cranes is enclosed as Annexure- 1. In  
case, any spares over and above these  
spares are required, detailed justification  
is required to be submitted by Consignee.  
Additional Cost above Compendium Cost  
may also be required for these additional  
spares.  
(✓one option)

Additional spares required	
Yes ✓	No

Justification/ list enclosed	
Yes ✓	No

**(Annexure-1)**

**Additional spares and tools required**

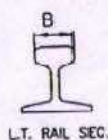
S l.	Item Description	Quantity required for 2 cranes	Justification
1	Dead man lever Buttons	10nos of each type (i.e.,Total 40 Nos)	These buttons damages frequently and it is difficult to find exact suitable button available in market
2	DSL bars	50 meters Each conductor type (i.e., R: 50m, Y: 50m, B: 50m, G: 50m)	Spare DSL lines are not included in Schedule –IV. Whenever a DSL line is found defective it should be replaced immediately to avoid further damage of nearby DSL lines. Hence, to reduce downtime caused by DSL lines, spare lines are required.

3	Drive unit	Two of each type  (One no. of drive (each capacity) per crane is required i.e., total MH-2 nos., AH-2 nos., LT-2 nos. CT-2 nos.)	Any internal short circuit or PCB failure leads to replacement of entire drive unit. Moreover, In Schedule IV only spares cards are provided. It will take some time to replace spare card in drive unit and to test it. Meanwhile down time of EOT crane increases and leads to loss of outturn. Hence unit replacement of drive is required. Since 2 nos of drives of different capacity are fitted with each crane totaling 4 drives needed replacement of entire drive unit during fault. Hence, one number of each capacity per one crane is required.
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**(Annexure-2)****SPECIAL CONDITIONS:**

1. Cabin operating control should be of lever type.
2. Operating levers should be provided with dead man switch buttons.
3. Anti-collision switch and proper buffers should be provided to prevent collisions.
4. Wire rope for main hoist should be diameter 18 mm or more
5. Hoist should be provided with double brake system. Double brake should be provided for Auxiliary hoist also.
6. Platform, railing and cabin should be provided robust and vibration free.
7. Entry into cabin from maintenance platform should be ergonomic and safe; cabin ladder should be stair case type.
8. EOT Crane should be provided with four speed control for each direction i.e., forward and reverse.
9. Cabin should be closed type and should be provided with mesh windows to open whenever required.
10. Shank hook of snatch box in EOT crane should be confirming to IS 15560:2005
11. Insulated Shrouded Bus Bar Conductor material shall be of suitable metal (Galvanized Iron up to 100Amps & copper above 100Amps) and detailed Calculations of current density inDSL and Currentcollector section selection calculations must be submitted
12. The Rail wheels shall be of material C55Mn75, and shall be solid forged and heat treated to have minimum hardness of 300 to 350 BHN on the tread and flanges to minimum depth of 10mm.The method of heat treatment shall be described in the offer.
13. The crane shall be designed, manufactured, erected and tested in accordance with the available Latest Indian Standards (IS) only
14. Footwalk should be minimum 600 mm with rigid supports and platform chequered sheet should be minimum 6mm





L.T. RAIL SEC.

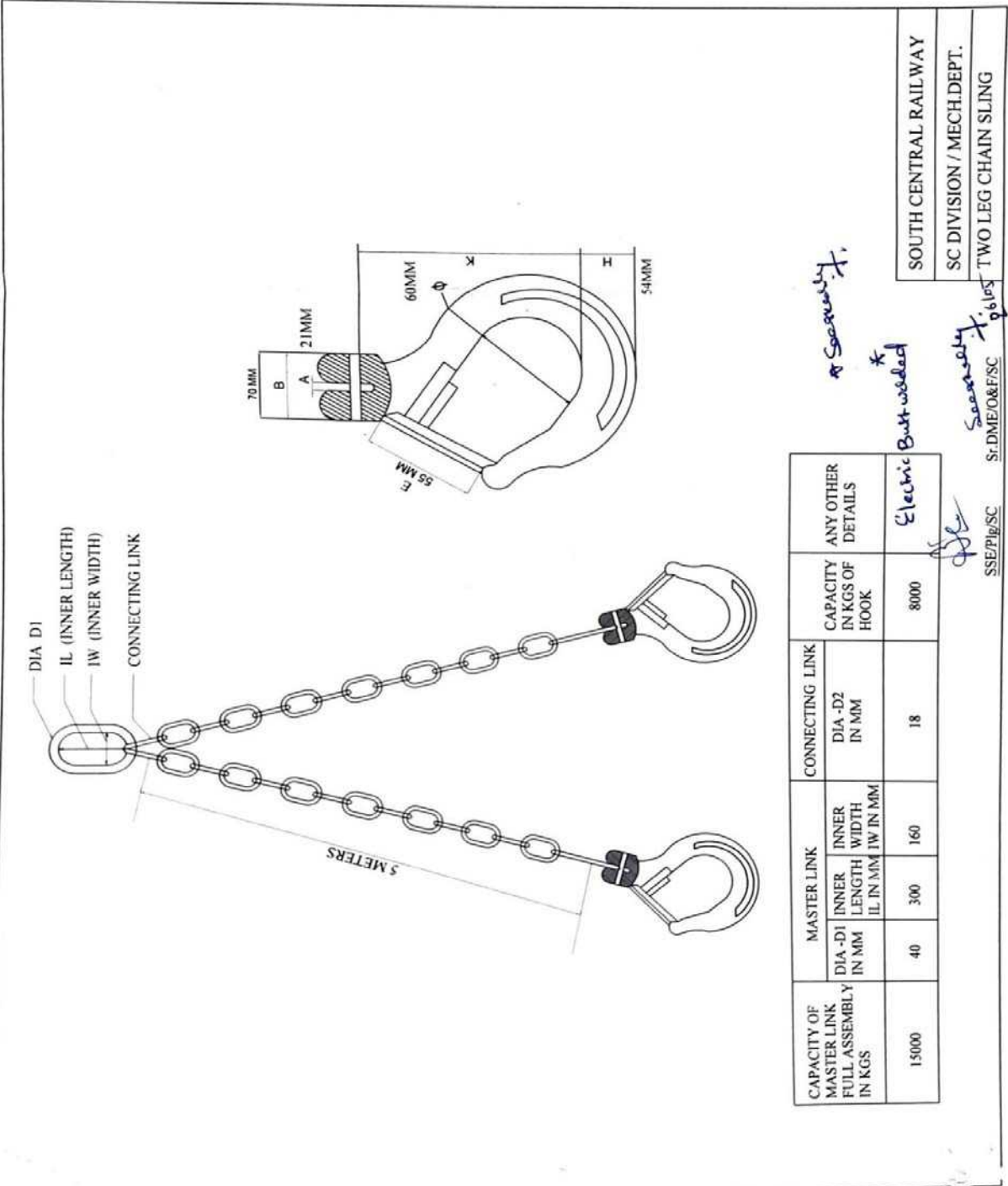
### Important Parameters of EOT Crane

S.No.	Description	
1.	Weight/unit length of Gantry Rails (Note: Supply & laying of rails is not in scope of supplier)	52 Kg/m
2.	Rail head width of Gantry Rails (Ref: Appended Note item v)	B : 67 mm
3.	a. Span (Centre to Centre of Gantry Rail)	S : 16100 mm
	b. Gauge (Inner face to Inner face of Rail) $W = (S-B)$	: 16033 mm
4.	Top of Gantry Rail (or bottom flange of I-Beam in case of underslung crane) to lowest overhead obstruction	C : 3005 mm
5.	Top of Gantry Rail (or bottom flange of I Beam in case of underslung crane) to floor level	D : 10,000 mm
6.	Lift of hook above floor level (MH)	H1 (MH) : 9000 mm
7.	Drop of hook below floor (MH)	H2 (MH) : 1000 mm
8.	Lift of hook above floor level (AH)	H1 (AH) : 9000 mm
9.	Drop of hook below floor (AH)	H2 (AH) : 1000 mm
10.	Centre distance between hooks of MH & AH	R : 0.8 mtr
11.	Side clearance from center line of gantry rail-beam to nearest side obstruction	A1 : 600 mm
12.	Side clearance from center line of gantry rail-beam to nearest side obstruction	A2 : 600 mm
13.	Vertical clearance from floor level to lowest structural member of crane (Ref: Appended Note item vii)	K : 10,000 mm
14.	Vertical clearance from floor level to bottom of cabin (Ref: Appended Note item viii)	L : 8000 mm
15.	Hook approach to center line of gantry rail (Cabin end) and hook approach to center line of gantry rail (at other end), dimensions E (MH) / E (AH) and F (MH) / F (AH)	

INDIAN RAILWAYS	
CENTRAL ORGANIZATION FOR MODERNIZATION OF WORKSHOPS	
SPEC: REF: COP/MW/IR/BOC/X/X/L-1-2000	DESIGNED
SSE/COP/MW/SNF	CHECKED
	APPROVED
REF: 113/3177/1999	OVERHEAD TRAVELLING CRANE CLEARANCE DIAGRAM
SCALE: 1:100	

(Annexure-3)

Double Legged Chain Sling Drawing



**SCHEDULE - II**  
(See clause 1.1.6 of section-II)

**(In respect of items 10, 14, 20.3, 20.6, 20.9, 21.2 & 21.6 of Schedule-II, non-submission of information / incomplete information / deviation in the offer is not acceptable. No clarifications / correspondence will be sought / entertained in this regard and the offer shall be summarily rejected.)**

**INFORMATION TO BE SUPPLIED BY THE TENDERER**

_____Tonnes Capacity	_____operated	EOT_____	Crane
S.No.	Description	:	Remarks
1.	Specification of the crane offered (class of duty/capacity in tonnes/span in metres)	:	
2.	Is it the tenderer's intention if awarded the contract, to comply fully and in all respects with purchasers specification covering the work ? if not, he shall state exceptions in details	:	
3.	Time in which tenderers will agree to deliver or complete all work covered by these specns	:	
4.	Break up weights of the crane as mentioned below should be furnished :		
4.1.	Total weight of crane including electrical equipment.	:	
4.2.	Total weight of trolley, including electrical equipment.	:	
4.3	Weight of each bridge girder assembled and ready for erection with and without mech. and electrical equipment.	:	
4.4	Weight of each end carriage assembled and ready for erection.	:	
4.5	Weight of operator's cabin together with all equipments mounted in it.	:	
5.	Type and class of crane and its mechanism	:	
6.	Safe working load in tonnes		
6.1	Main hoist	:	
6.2	Aux. hoist	:	
7.	Maximum speed with max. workload (MPM)		
7.1	Main hoist	:	
7.2	Aux. hoist	:	
7.3	Creep Speed of main hoist	:	
7.4	Long travel	:	

- 7.5 Cross traverse :
- 8. Speed steps and speed range in meter/min. at various steps. The remarks offered should be in accordance with single girder or double girder crane.
  - 8.1 Hoist Motion :
  - 8.2 Cross traverse :
  - 8.3 Long Travel :
- 9. Rope size and construction details (MH/AH) :
- 10. Number of rope falls supporting the load (MH/AH):
- 11. Diameter of drum (MH/AH) :
- 12. Material of drum :
- 13. Material of gear box :
- 14. Material and Hardness of gears (Indicate specifications) :
- 15. Material of sheaves :
- 16. Diameter of sheaves (MH/AH) :
- 17. Brakes, type make and size (MH/AH) :
- 18. Make and type of bearings :
- 19. Type of hook and its specification. :
- 20. Trolley
  - 20.1 Wheel span :
  - 20.2 Wheel base :
  - 20.3 C.T. Wheel Diameter, material and hardness:
  - 20.4 Maximum wheel load :
  - 20.5 Material of gear box :
  - 20.6 Material and hardness of gears (indicate specifications) :
  - 20.7 Make, type and size of brake :
  - 20.8 Make and type of bearings :
  - 20.9 Size of trolley runway rail (DG) :
  - 20.10 Bidder shall furnish Current Rating & Material of DSL : being offered. (i.e. M S, G.I. or Copper)
- 21. Bridge
  - 21.1 Wheel base :
  - 21.2 L. T. wheel Diameter, material and hardness:
  - 21.3 No. of wheels on each end of crane :
  - 21.4 Maximum wheel load :
  - 21.5 Material of gear box :
  - 21.6 Material and hardness of gears. (Indicate specifications) :

- 21.7 Make, type and size of brakes :
- 21.8 Make and type of bearings.:
- 21.9 Clear width of each foot walk.(DG) :
22. STRUCTURAL Details  
(Refer sketch NO. COFMOW/IR/EOTC/X/Y/Z/86
- 22.1 Centre to center of gantry/track :  
rail span (S) meters
- 22.2 Lift of Hook above floor level :  
(Exclusive of travel required to  
operate limit switch)
- 22.3 Drop of Hook below floor level :
- 22.4 Nearest position of hook to center  
line of gantry rail
- i. Main hoist
- cabin end (E) meters :
- other end (F) meters :
- ii. Auxiliary Hoist
- cabin end (E) meters :
- other end (F) meters :
- 22.5 Type of main girder Design drawings :  
showing overall dimensions, Size of  
each section and location and depth of  
diaphragms should be submitted for the girders.
23. Particulars of safety devices :
24. General arrangement drawing showing  
to scale elevation, cross section and  
plan which shall indicate the following information:
- a) Clearance diagram of crane :
- b) Construction of bridge structure
- c) Hook approaches.
- d) Wheel base
- e) Wheel loads
- f) Wheel diameter
- g) Outer buffer dimension
- Drawing should be offered along with the offer  
Drawing No. should be indicated.
25. Detailed wheel diameter calculation for :  
long travel and cross traverse wheels
26. Other information offered along with the tender.

- Note: 1. If above clauses are found inadequate for furnishing all necessary information of the crane offer, the tenderer may append further information separately.
2. Bidders should furnish information on Schedule-II & Schedule-III. In case of any discrepancy in the information submitted against Schedule-II and III and that furnished in clause wise comments, the information submitted against schedule-II & III shall over-ride that against the clauses.

**SCHEDULE -III**  
**(Refer to Clause 1.1.6 of Section II)**

**ELECTRICAL DETAILS OF CRANES**

The under mentioned electrical details should be furnished for each motor separate along with the offer. The particulars indicated below should be offered for each motor/control separately.

**1. MOTORS :**

- |   |   |
|---|---|
| 1.1 Manufacturer's Name                   | : |
| 1.2 Type and degree of enclosure          | : |
| 1.3 Type of duty                          | : |
| 1.4 Rating-continuous/intermittent        | : |
| 1.5 Output (KW/BHP)                       | : |
| 1.6 AC Voltage across phases & frequency  | : |
| 1.7 Speeds in RPM                         | : |
| 1.8 Class of Insulation of stator         | : |
| 1.9 Class of Insulation of rotar          | : |
| 1.10 Frame size                           | : |
| 1.11 Normal full load current             | : |
| 1.12 Starting current                     | : |
| 1.13 Motor type                           | : |
| 1.14 Temperature rise of windings & other | : |
- parts allowed above ambient temp. of 50 deg.C.
- |   |   |
|---|---|
| 1.15 Cyclic duration factor                             | : |
| 1.16 Max. starts per hour for which motor is suitable : |   |
| 1.17 Class of duty (S1,S2,S3,S4 Etc.)                   | : |
| 1.18 Ambient temp. for which motor is suitable :        |   |
| 1.19 Voltage range for which motor is suitable :        |   |
| 1.20 Motor horse power calculations                     | : |
| 1.21 Efficiency at                                      |   |
| a) full load  | : |
| b) 3/4 load   | : |
| c) 1/2 load   | : |
| 1.22 Power Factor at                                    |   |
| a) full load  | : |
| b) 3/4 load   | : |
| c) 1/2 load   | : |
| 1.23 Type of drive                                      | : |
| (Direct gear etc.)                                      |   |

## **2. CONTROL GEAR**

- 2.1 Rating of AC 4 / AC-3 Contactors suitably derated for AC-4 with minimum 2,00,000 cycles of operation.
- 2.2 Are the following provided for each motor.
  - 2.2.1 Short circuits protection by HRC fuses.
  - 2.2.2 No volt trip
  - 2.2.3 Overload trip
  - 2.2.4 Instantaneous trip current sensitive single phasing preventor.
- 3. Standard specifications to which the motor control gear and its ancilliary offered conform to
- 4. Any other special feature



**SCHEDULE – IV**  
**SPARES FOR CRANE**

S.No	Description of items	Qty for 02 No. of Cranes.				Total quantity to be indicated by the bidder	Remarks																													
1	Fixed & moving contact tips for contactors	<table><tr><td colspan="4">12 sets</td></tr><tr><td>Unit</td><td>No of units</td><td>No of contact tips per each unit</td><td colspan="2">Total In a set</td></tr><tr><td>Motor electric contactors (MH,AH,CT,LT)</td><td>4</td><td>4</td><td colspan="2">16 nos.</td></tr><tr><td>Lights set</td><td>1</td><td>1</td><td colspan="2">1 no.</td></tr><tr><td>Main Line contactor</td><td>1</td><td>1</td><td colspan="2">1 no.</td></tr><tr><td colspan="3">Total</td><td colspan="2">18 nos.</td></tr></table> Hence, minimum 216 nos. to be supplied				12 sets				Unit	No of units	No of contact tips per each unit	Total In a set		Motor electric contactors (MH,AH,CT,LT)	4	4	16 nos.		Lights set	1	1	1 no.		Main Line contactor	1	1	1 no.		Total			18 nos.			
12 sets																																				
Unit	No of units	No of contact tips per each unit	Total In a set																																	
Motor electric contactors (MH,AH,CT,LT)	4	4	16 nos.																																	
Lights set	1	1	1 no.																																	
Main Line contactor	1	1	1 no.																																	
Total			18 nos.																																	
2	For Contactors coils	<table><tr><td colspan="4">4 Sets</td></tr><tr><td>Unit</td><td>No of units</td><td>No of contact coil per each unit</td><td colspan="2">Total in a set</td></tr><tr><td>Motor electric contactors (MH,AH,CT,LT)</td><td>4</td><td>4</td><td colspan="2">16 nos.</td></tr><tr><td>Lights set</td><td>1</td><td>1</td><td colspan="2">1 no.</td></tr><tr><td>Main Line contactor</td><td>1</td><td>1</td><td colspan="2">1 no.</td></tr><tr><td colspan="3">total</td><td colspan="2">18 nos.</td></tr></table> Hence, minimum 72 nos. to be supplied				4 Sets				Unit	No of units	No of contact coil per each unit	Total in a set		Motor electric contactors (MH,AH,CT,LT)	4	4	16 nos.		Lights set	1	1	1 no.		Main Line contactor	1	1	1 no.		total			18 nos.			
4 Sets																																				
Unit	No of units	No of contact coil per each unit	Total in a set																																	
Motor electric contactors (MH,AH,CT,LT)	4	4	16 nos.																																	
Lights set	1	1	1 no.																																	
Main Line contactor	1	1	1 no.																																	
total			18 nos.																																	

3	Limit switches	2 sets of MH 2 sets of CT 2 sets of LT 2 sets of AH For each Hoist two types of Limit switches exist i.e., Rotary & Gravity Limit switches. Also, 02 nos for LT & 02 nos. for CT based on Design i.e., the firm has to supply MH-2set *2types =4 nos. CT-2set *2types =4 nos. LT-2set *2types =4 nos. AH-2set *2types =4 nos																																		
4	Current collectors	4 sets One set consists of 04 nos. (i.e., for R,Y,B,G) i.e., 04 sets implies 16 nos. has to be supplied																																		
5	MCB	2 Sets <table border="1"><thead><tr><th>Unit</th><th>No of units</th><th>No of contact coil per each unit</th><th>Total in a set</th></tr></thead><tbody><tr><td>Motor electric contactors (MH,AH,CT, LT)</td><td>4</td><td>1</td><td>4</td></tr><tr><td>Lights set</td><td>1</td><td>1</td><td>1</td></tr><tr><td>Control</td><td>1</td><td>1</td><td>1</td></tr><tr><td>Fan</td><td>1</td><td>1</td><td>1</td></tr><tr><td>Main supply Line</td><td>1</td><td>1</td><td>1</td></tr><tr><td>Cabin on/off</td><td>1</td><td>1</td><td>1</td></tr><tr><td>total</td><td></td><td></td><td>9</td></tr></tbody></table> Hence, minimum 18 nos. to be supplied	Unit	No of units	No of contact coil per each unit	Total in a set	Motor electric contactors (MH,AH,CT, LT)	4	1	4	Lights set	1	1	1	Control	1	1	1	Fan	1	1	1	Main supply Line	1	1	1	Cabin on/off	1	1	1	total			9		
Unit	No of units	No of contact coil per each unit	Total in a set																																	
Motor electric contactors (MH,AH,CT, LT)	4	1	4																																	
Lights set	1	1	1																																	
Control	1	1	1																																	
Fan	1	1	1																																	
Main supply Line	1	1	1																																	
Cabin on/off	1	1	1																																	
total			9																																	
6	Thrusters	4 sets <table border="1"><thead><tr><th>Unit</th><th>No of units</th><th>No of thrusters each unit</th><th>Total in a set</th></tr></thead><tbody><tr><td>Motor thrusters (MH,AH,CT, LT)</td><td>4</td><td>2</td><td>8</td></tr><tr><td>total</td><td></td><td></td><td>8</td></tr></tbody></table> Hence, minimum 32 nos. to be supplied	Unit	No of units	No of thrusters each unit	Total in a set	Motor thrusters (MH,AH,CT, LT)	4	2	8	total			8																						
Unit	No of units	No of thrusters each unit	Total in a set																																	
Motor thrusters (MH,AH,CT, LT)	4	2	8																																	
total			8																																	
7	Brake liners with rivets	12 pairs of each size  i.e., MH-12 pairs, AH-12 pairs, LT-12 pairs CT-12 pairs																																		

8	Main spring for thruster brakes used on crane	4 nos of each size i.e., MH-4 nos , AH-4 nos , LT-4 nos, CT-4 nos		
9	Brake shoes complete with lining	4pairs of each size i.e., MH-4 pairs, AH-4 pairs, LT-4 pairs CT-4 pairs		
10	Oil seals for grease cases	4nos. for each size of oil seal provided in the crane gear box and geared coupling.		
11	Spare cards for VVVF drive for all drives viz. MH, AH, LT & CT	4 nos. for each drive i.e.,total 16 nos		
12	A set comprising 4 nos of long travel and 2 nos. of cross travel motion wheel in assembled condition with axle bearing housing	4 sets i.e.,total 1) CT- 08 Nos 2) LT- 16 nos		
13	Master Control switches	80 nos		
14	Control transformers	2 nos. of each size i.e., for Lights -2 nos. & Control circuits- 2 nos.		

**SCHEDULE-V****LIST OF MAINTENANCE TOOLS**

<b>S.NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>
01.	CANVAS Tool bag (For storage tools from Sr.no.2 to Sr.no.10) or equivalent	1 No.
02.	D/E Spanners (8-32mm) Min. 10 nos	1 Set
03.	Grease gun	1 No.
04.	Oil can	1 No.
05.	Screw Driver of required sizes Min. 08 nos	1 Set
06.	Nose plier	1 No.
07.	Insulated plier	1 No.
08.	Hammer 2 kg	1 No.
09.	Allen Key required sizes Min. 10 nos	1 Set
10.	Hydraulic jack 10T	2 Nos.
11.	Wooden hammer	1 No.
12.	AC/DC Digital clamp meter 1000A	1 No.
13.	Megger 1000 Mega ohms	1 No.
14.	Bearing puller tool for suitable for motor bearings	1 No
15.	Chain Pulley 2T	1 No

**SECTION -III****ANNEXURE-A****FORMAT FOR SUBMISSION OF TECHNICAL BID**

1. a) We, M/s. \_\_\_\_\_ offer our \_\_\_\_\_ for crane nos. \_\_\_\_\_ as per the description given in Schedule of Requirements

b) We state that, except for the following, for which clause wise brief description and justification for deviation has been indicated, our machine fully complies with all the clauses as given in technical specification Section-II.

S.No.	Clause/Item	Brief description of Deviation	Justification for deviation

c) We also confirm the schedules given in the Delivery Schedule at para 7 of Section-I

**Note-1:** The Bidder shall mention all technical deviation only in the format enclosed above.

**Note-2:** The deviation mentioned elsewhere in the bid shall not be considered and the bid shall be evaluated based on the information provided against Annexure-A of Section-III.

**Note-3:** In case tenderer offers internationally accepted alternative specifications as per clause **1.7 of Instructions to tenderers for filling technical bid**. Complete details of alternative specification apart from filling above deviation statement, may be enclosed.

2. We further certify that we are meeting the reference clause as;

(A) We are the regular manufacturer of this type of machine.

Clause (B)

S. No	Name of purchaser with address	Purchaser's, telephone, email Address, Name of contact person	Purchase / Supply order no. and date (along with a copy of PO)	Quantity Supplied (with proof of supply) @	Date of Supply @	Date of installation and / or Commissioning @	Leading Parameters of machine(s) to be establish similarity as per clause 3 of qualifying Requirements (QR)
1.	2.	3.	4.	5.	6	7	8.

@ (along with copies of relevant documents to establish linkage of documents)

3. We are having following facilities available with us or our agent for providing adequate after-sales service in India during warranty period. Complete details of after sales service, availability of technically competent engineers and warehousing facilities for spares is indicated below:

- After sales service centers:
- Availability of technically competent engineers;
- Warehousing facilities for spares:

4. We have quoted for comprehensive Annual Maintenance Contract as per clause 17 of Section II. Details of preventive maintenance services including cleaning of machine to be provided under AMC is given in the following format. (The information shall be provided whether AMC is in Scope or not)

S.No.	TYPE OF PREVENTIVE SCHEDULE	PERIODICITY	ITEMS TO BE CHECKED	ITEMS OF REPLACEMENT	EXPECTED PLANT DOWN TIME

5. \*We hereby confirm that we are the OEM and undertake to supply spare parts for a period of expected life of machine.

\*We hereby confirm that we are not the OEM, but are submitting undertaking from OEM for supply of spare parts for a period of expected life of the machine to provide maintenance spares (as and when ordered) after the expiry of the Warranty/AMC for X years (life of machine - 7yrs) including the maintenance spares required for the bought out sub-assemblies and parts.

(\*Strike out which ever is not applicable)

6. It is certified that we are having suitable facilities at our works for carrying out various performance tests on the sub-assembly/assembly/machine and these shall be made available to the inspecting authority.
7. **BOUGHT OUT ITEMS:** We hereby furnish a list of all critical items/ sub-assemblies which are bought out by us and proposed to be used, along with the manufacturer's name, brand model etc.

Sr No.	Description	Item no.1	Item no. 2	Item no. 3
1.	Brief description of item			
2.	Model no.			
3.	Make			
4.	Quantity/machine			
5.	Manufacturer's name and complete address			
6.	Whether imported or indigenous			
7.	Country of origin			

8. We further submit the following information about the offered machine as per the technical specification section III and Important Features of the tender section I. We understand that any omission of any of the below mentioned information will render our offer incomplete to that extent.

**Note :-** Bidder shall photocopy the specification (Section-I & II) and furnish comments/ details against each clause or link to deviation statement. Any fraudulent change(s) made in specifications (while making photocopy) will lead to summarily rejection of offer. Appropriate punitive action may be initiated.

S. No	Information required	As per Clause No./ Schedule	Value /Write up/ Brochure
1	Information on schedule-I	Schedule-I (of section-II)	Values
2.	Information as per Schedule-II	Schedule-II (of section-II)	Values /write up
3	Information as per Schedule-III	Schedule-III (of section-II)	Values / write up
4	Information on quantity of each item offered under spares	Schedule-IV (of section-II)	Values
5	Structural calculations for girders, end carriage, crab and other structural members along with breakup of weights of major assemblies/components.	Clause 1.1.7 (of section-II)	Values/Details
6	Details of weather proof protection provide	Clause 1.4.11 of section-II	Write up
7	Safety stop details	Clause 1.9.5 of section-II	Write up
8	Details on heat treatment process of wheels	Clause 1.10.2 of section-II	Write Up
9	Details of method of stress relieving of gear boxes	Clause 1.15.1 of section-II	Write up
10	Calculations of current density in DSL	Clause 2.5 of section-II	Value / Write up
11	Current collector section selection calculations	Clause 2.5.1.3 of section-II	Value / Write up
12	Details of automatically cutting off resistances after a pre selected time	Clause 2.8.1.7 of section-II	Write up
13.	Details of control system	Clause 2.8 of section-II	Write up
14.	Details of alarm system provided	Clause 2.21 Of section-II	Write up
15.	Make and Model no. of VVVF drive	-	Write up
16.	Annexure F- Infrastructure requirements	Clause 14.1 Of section-II	Write up

**Signature of the  
Authorized representative of the bidder with company stamp**

ANNEXURE-B  
**FORMAT FOR INDEMNITY BOND**

This deed of Indemnity executed by M/s. \_\_\_\_\_ hereinafter referred to as Indemnifier' which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representative and assignees in favour of **SOUTH CENTRAL RAILWAY**, hereinafter referred to as the 'Indemnified' which expression shall unless repugnant to the context or meaning thereof, include its successors and assignees witnesses as to.

Whereas the Indemnifier herein had participated in a global tender for the supply of \_\_\_\_\_ (machine name) which is opened on \_\_\_\_\_ (date) on terms and conditions set out interalia in the Tender Document.

And whereas, clause of the above mentioned tender document described that the machine shall be designed for a life of 36 years with regular maintenance and all the structural members of the machine should be guaranteed for 7 years against cracks, breakages etc. during the course of normal operations from the date of commissioning whichever is earlier of the stores supplied by the Indemnifier to the indemnified.

The indemnifier hereby irrevocably agrees to indemnify the indemnified that in the event of the said machine not achieving the life guarantee, the indemnifier shall as may be deemed necessary repair the defective machine at site, free of cost, within a reasonable time specified by the indemnified or reimburse the pro-rata cost of the machine to the extent a life not achieved as per the guarantee, or supply a spare stores for the defective portion only free of cost at site.

Bidder's authorized signatory  
 With seal

Station:

Date:

Witness: 1. \_\_\_\_\_  
 (Signature with Name, Designation & Address)

2. \_\_\_\_\_  
 (Signature with Name, Designation & Address)



**JOINT RECEIPT INSPECTION NOTE**

**Note:** With the issue of JRI, payment is released to the contractor, as per the terms of contract. Consignee shall satisfy themselves that the conditions of contract are met before issue of the JRI.

**Date**.....

**Sub: Receipt of consignment for machine**.....

**Ref: PO No**.....

1.	Name of consignee / Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Consignment of the machine received on	
6.	The foundation & associated works essential for "Safe Installation of Machine" are ready (for turnkey contracts only) *	

*\*If there are Delays on account of Consignee such as clear site is not given, then the condition 6 will not be a valid ground for holding JRI.*

It is certified that the consignment of the machine has been received complete and in good condition as per specification shown in the contract.

**Tentative plan for installation and commissioning of the machine is as under:**

1.	Date of clear site provided	
2.	Contract	Turnkey/Non-turnkey
3.	<b>Status of readiness of foundation:</b>	
3(a)	Already constructed on	
3(b)	Under construction & likely date of its completion	
3(c)	Construction yet to be started from .....and likely date of its completion	
4.	Status of availability of electrical power, water and compressed air etc.	Available/Not-available
5.	Number of components to be proved out on the machine	
6.	Likely date for start of erection/installation	
7.	Likely date for switch-on the machine	
8.	Likely date of completion of commissioning of the machine	

**Representative of firm**

Designation

**Representative of consignee**

Designation

**(Minimum Gazetted level)**

**JOINT COMMISSIONING NOTE****Date:**.....**Sub:** Commissioning of (name of machine) .....**Ref:** PO No.....

1.	Name of consignee/Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Machine received on	

6. All the parameters of the machine are found okay. The proving test on the machine was conducted from ..... to ..... and machine is working satisfactorily.
7. Machine has finally been commissioned on..... . The machine has been handed over for regular use and kept under one month observation to watch its performance.
8. Following minor deficiencies (if any) found during joint observation trials are to be attended/rectified by the firm during one month observation and before issuing the PTC for the machine:
- a.
  - b.
  - c.

Representative of firm  
Designation

Representative of consignee  
Designation  
(Minimum Gazetted level)

**CERTIFICATE TO BE ISSUED BY THE CONSIGNEE AFTER SUCCESSFUL  
PROVE OUT OF MACHINE**

Sub: Certificate for Commissioning/Prove out of Machine.

Ref: Purchase order No:

1. This is to certify that the machine as detailed below has been received in good condition along with all the concomitant/ standard and special/ optional accessories & spares in terms of above referred PO (subject to remarks in item No.2) and the same has been installed and commissioned:

- |   |                           |
|---|---------------------------|
| (a) Description of the machine  | :                         |
| (b) Machine No.   | :                         |
| (c) Quantity  | :                         |
| (d) Bill of lading No. & dt.  | : (for imported contract) |
| (e) Name of the vessel  | :                         |
| (f) R/R. No/L.R/Dispatch particulars                                    | :                         |
| (g) Name of the consignee   | :                         |
| (h) Date of first submission of GA/foundation drawings (if applicable): |                           |
| Indicate delays in number of days:                                      |                           |
| On Railway account  | :                         |
| On Firm's account   | :                         |
| Total   | :                         |
| (i) Date of final approval of GA/foundation drawings (if applicable)    | :                         |
| Indicate delays in number of days:                                      |                           |
| On Railway account  | :                         |
| On Firm's account   | :                         |
| Total   | :                         |

Signature :

Name :

Designation :

Office Stamp :

- |   |   |
|---|---|
| (j) Date of receipt of machine  | : |
| (k) Date of Joint Verification  | : |
| (l) For machines ordered on non-turnkey basis   | : |
| i) Date of Power supply provided for the machine<br>by the Railway  | : |
| ii) Date of call to the contractor after site/ foundation/<br>installation etc. is ready by Railway   | : |
| (m) For machines ordered on turnkey basis:  |   |
| i) Date of intimation of readiness of the site for starting<br>foundation work (if relevant in terms of contract)   | : |
| ii) Date of readiness of foundation by the contractor   | : |
| iii) Date of readiness of other infrastructure facilities<br>like shed, track linkage etc. by the Railway/ Contractor<br>(Delete whichever is not applicable) | : |

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- iv) Date of power supply provided for the machine by the Railway :  
v) Indicate delays in No. of days :  
On Rly's account : .....days  
On Firm's account : .....days  
Total : .....days
- (n) Time allowed for commissioning after date of call as per L (ii) above or after date of readiness of site m (iii) above (as relevant in terms of contract) no of days allowed :  
(o) Date of commissioning of the machine :  
Indicate delays in commissioning in No. of days :  
i) On firm's account due to reasons such as non arrival of Engineer, problem in machine/ toolings etc. :  
----- ----- days during commissioning.  
----- ----- days during prove out  
ii) On Railway's account due to reasons such as non provision of Raw/ Trialmaterial, Crane, Staff, Measuring Tools/Gauges etc.  
----- ----- days during commissioning.  
----- ----- days during prove out
- (p) Whether delay in supply of the machine (if any), has caused any loss/ inconvenience to the Railways (Yes/No) :  
If yes, extent of loss in monetary terms of Rs. :  
(Details to be enclosed if loss is quantifiable.  
However, if loss is not quantifiable, then indicate "Non Quantifiable" in the space provided).

Signature :  
Name :  
Designation :  
Office Stamp :

- 2.** Details of Accessories/Spares not yet supplied and recoveries to be made on that account:

<u>S.No.</u>	<u>Description</u>	<u>Amount to be recovered</u>
a)	---	---
b)	---	---

- 3.** The proving test has been done to our entire satisfaction and the operators have been trained to operate the machine as per provisions of the contract. If not, the amount to be recovered on this account : Rs.

- 4.** You have failed to fulfil the contractual obligations with regard to the following:

- a) ---  
b) ---

5. The amount of recovery on account of non supply of accessories and spares is given under para No.2&3 above and Loss/ damage on account of your failure to fulfill the contractual obligations as given in para-4 above will be advised to you by Purchaser. These shall be recovered from your bills/ performance Guarantee Bond.
6. This issue of Commissioning/ PTC certificate proves only the technical acceptability and functioning of the machine on the date of issue of the Certificate. This issue of PTC does not amount to waiver of any of the terms and conditions of the contract or delay in supply of drawings, machine or commissioning thereof and it does not absolve the supplier of its liability for any loss or damages suffered by the Railways due to same.

Signature :  
Name:

Designation :  
Office Stamp:

**Explanatory Notes for filling up the certificate:****1. Authority to sign the certificate:**

To be signed by the Gazetted Officer not below the rank of J.A. Grade. May be signed by a Senior Scale Officer if he is in the independent charge of the shop. The officer must sign under his own seal and not on behalf of any Senior Officer. All page of PTC should be sealed & signed.

**2. Points to be considered while filling up item No.4 of the certificate on contractual obligations of the supplier:**

- a) The commissioning means that machine has been demonstrated and proved for specified capacities and capabilities indicated in the contract as also that all the components listed in the contract for which timings are obtained in the bid are demonstrated at consignee's end. Minor aberration can be accepted by consignee as long as the machine is fully acceptable where surface finish/accuracy specified are in microns and does not impair fitment of the components in the assembly line.
- b) Proving out means that the productivity claimed by the supplier to the accuracy specified of the components mentioned in the contract is demonstrated on batch size specified. No relation in this area is permissible subject to the raw material confirming to the required specifications.
- c) The firm has adhered to the item schedule specified in the contract in dispatching six (6) copies of the foundation drawings and related diagrams (Mechanical/Electrical) giving overall dimensions, foundation details, electrical load and circuitry to the consignee within the time specified in Specification.
- d) The firm has installed/commissioned the machine in time i.e. within the period specified in the contract. Total delay, if any, on the part of the firm in installation/commissioning should be chronologically indicated in a note to be signed jointly by the consignee and the firm's representative attaching copies of correspondence in support of the same to enable to decide whether delays are attributable to consignee or to the firm.
- e) Training of personnel by the supplier has been done. If not, part of the amount should be recovered on this account.

Separate PTC should be issued for each machine.

**PERFORMANCE APPRAISAL FORM**  
**APPRAISAL ON COMPLETION OF \_\_\_\_\_ YEARS OF WARRANTY PERIOD**

**To, M/s. ....****Dated: .....**

1.	Purchase order no.	
2.	Consignee/Railway	
3.	Name of supplier	
4.	Machine Name	
5.	Machine received on	
6.	Machine commissioned on	
7.	PTC issued on	
8.	Warranty period expired on	
9.	Performance during warranty period	
9(a)	Total no. of breakdowns	
9(b)	Total downtime in number of days	
10(a)	Any warranty complaint pending on date	
10(b)	If yes, then the date and nature of defect(s)	

11. In case of the machine with mandatory PMC during warranty period, following details of breakdown hours for preceding eight quarters must also be furnished.

Quarter	Period		Breakdown Hours
	From	To	
1			
to			
8			

**Signature:.....****Name:.....**

Designation :  
 DY.CME/Sr.DME/Dy.CEE/Sr.DEE

Office Stamp:

**MINIMUM MANDATORY INFRASTRUCTURE REQUIREMENTS**

<b>S. No.</b>	<b>Item Description</b>	<b>Information/Details to be furnished by the bidder</b>
<b>1.</b>	<b>Covered Area</b> - The firm should have adequate covered area in workshop for storage & manufacturing activities. 600 Sq.mt for manufacture of cranes upto 30 T capacity. 1200 Sq.mt. for manufacture of cranes above 30 T capacity.	
<b>2.</b>	<b>Design Office</b> : The design dept shall have dedicated qualified design engineer (minimum diploma holder) and should have dedicated PC/LAPTOP loaded with design analysis software/programmes for crane.	
<b>3.</b>	<b>Staff Strength</b> excluding MD/Owner/Partners/ /Stores staff /office staff/Peons & security staff : <b>10 (min) (list to be furnished)</b>	
<b>4</b>	<b>Stores</b> : Sufficient covered area for safe storage of items	
<b>5</b>	<b>Electrical</b> : Electrical design and assembly facility with demarcated area in workshop and a dedicated electrical engineer (minimum Diploma holder)	
<b>6</b>	<b>Quality Control/Assurance</b> : measuring tapes, scales, vernier calipers, micrometers, DPT testing facility, hardness tester, test load, test stand or pit for load testing of crane, control panel testing arrangement, Megger, Incoming/bought out material inspection, gear box test facility, Insulation resistance testing facilities, leveling test facility, Sound level test meter, stage inspection records, x-ray viewer, bore gauge, Tachometer, welding gauge etc. <b>(list to be furnished)</b>	
<b>7</b>	<b>ISO 9001 certification</b> , Good record keeping, traceability	
<b>8</b>	<b>After sales service facilities with dedicated staff. (list to be furnished)</b>	
<b>9</b>	<b>Inhouse manufacturing facilities</b> viz : Lathe machine, milling machine, Power saw, drilling machine, MIG/MAG welding sets, welding transformer, Preheating oven for electrodes, Cutting torches, Pug cutting machines, EOT crane for material handling and hand grinders, spray painting arrangement, as applicable. <b>(list to be furnished), CNC cutting machines, semi automated girder manufacturing fixtures.</b>	
<b>10</b>	<b>The firm shall either have in house arrangement or permanent reputed vendors for following activities.</b>	<b>In house /Name of vendor</b>
i.	Heat treatment	
ii.	Gear manufacturing.	
iii.	Radiography test of weld joints (The lab shall be NABL approved)	
iv.	Calibration arrangement of testing equipments	
v.	Raw material test arrangement	
vi.	Tensile test arrangement of hooks	
vii.	Welder approval test arrangement.	
viii	Load testing arrangement	



**ANNEXURE-H****Consignee's Certificate for Quarterly Work Done Under AMC**

1. Name of Plant:
2. Consignee
3. PO No.
4. Name of Contractor
5. Quarterly charges for AMC(Standard): Rs. \_\_\_\_\_  
As per PO no. \_\_\_\_\_ dt. \_\_\_\_\_
6. Quarter for which bills are preferred: \_\_\_\_\_  
From: \_\_\_\_\_ To: \_\_\_\_\_
7. No. of Breakdowns during the quarter:
- 8. Calculation of Penalty and Net AMC charges payable to Contractor for the quarter:**
  - i. Total Plant Down Time (in days):
  - ii. Standard down days for preventive maintenance (in days/quarter):
  - iii. Total grace period for break down:
  - iv. Net down time for the plant [= (i)-{(ii)+(iii)}] :
  - v. 100% Availability for the quarter (in days) :
  - vi. Actual availability [= (v)-(iv)] :
  - Actual availability in %age [= {(vi) / (v)}x 100]:
  - vii. Calculation of penalty:
    - a. %age availability below 90% to 80%:
    - b. %age availability below 80%:
    - c. Penalty[={(vii a)x(5)x0.005 +(vii b)x(5)x0.01)}]:
  - viii. Net amount payable as AMC charges to [= (5)-(vii c)]

It is certified that all spares borrowed by the contractor for the previous quarter have been returned in good condition.

**Signature of authorized representative of consignee**

**ANNEXURE-I****FORMAT FOR WARRANTY COMPLAINTS**

1. Machine name :
2. Consignee/Railway :
3. PO No :
4. Name of the supplier :
5. Machine commissioned on :
6. Machine PTC issued on :
7. Warranty period expires on :
8. Complaint details
  - a. Complaint No. :
  - b. Ref. of earlier similar complaint :  
if any
  - c. first call made on :
  - d. No. of letters/Fax/Calls made :  
with date
  - e. Service engineer reported on :
  - f. Action taken by the firm :
  - g. Machine made operational on :
  - h. Any defect is still pending :
  - i. Total Breakdown hours for :  
present complaint
  - j. remarks (if any) :

Signature:\_\_\_\_\_

Name:\_\_\_\_\_

Designation:\_\_\_\_\_

Office Stamp:\_\_\_\_\_

(Complaint lodged by)

**ANNEXURE-J****FORMAT FOR MILE STONE CHART**

Machine Name:

Consignee/Division.:

PO no.:

Name of Supplier:

Quantity:

Delivery period:

Expected date of Supply:

Expected Date of Commissioning:

S. No.	Name of Activity	Jan				Feb				March				April				May				Cont....				Dec			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Issue of Advance Acceptance (A/A)																												
2	Issue of PO																												
3	Preparation of GA/foundation drawings																												
4	GA drawings approved																												
5	Procurement of raw material (castings, forgings etc.)																												
6	Procurement of sub-assemblies and other bought out items																												
7	Procurement of electrical																												

[illegible]

Signature:\_\_\_\_\_

Name: \_\_\_\_\_

Designation:\_\_\_\_\_

Office Stamp:\_\_\_\_\_

Copy to:

1. Railway Stores department floated Tender
2. Railway Mechanical department
3. Consignee of the M&P.

**Note:** The supplier shall furnish mile stone chart duly filled in as per Annexure within one month of issue of PO and also submit monthly progress report thereafter.

**ANNEXURE-K**

<b>QUALITY ASSURANCE PLAN FOR EOT CRANE</b>								
SL NO.	COMPONENT & OPERATION	TYPE OF CHECK	QUANTAM OF CHECK	ACCEP TANCE NORM	FORMAT OF RECORD	SOURCE	REMARK	OTHER REMARKS
1	2	3	4	5	6	7	8	9
01.	<b>RAW MATERIAL</b>							
1.1	Structural material for Bridge Girders, End Carriage, Crab. Platform,	Chem. & Mech.	1 Sample per size of plate and Other Structural	<b>IS: 2062-2011, Grade E-250 BR or BO</b>	T.C. & Inv.	SAIL TISCO IISCO, ESSAR Jindal Steel, RIN vendor appd. lab	CHP	Identification and Tests to be carried out in the absence of Mill T.C and proper Co-relation chalk mark
1.2	Rope Drum Plate	Chem. & Mech.	1 Sample per size of plate	<b>IS: 2062-2011, Grade E-250 BR or BO</b>	T.C. & Inv.	-do-	CHP	-do-
	Seamless Steel Tubes of Gr. A106/ A53 of Gr. 'A', 'B', 'C' ASTM Standard	Acid Etching of end	100%	<b>ASTM A-106</b>	IR	Vendor	CHP	Check whether welded or seamless
1.3	Brake-Drum	Chem.	1 Sample	<b>IS:1875 Class 3A or above IS:1030 Grade 280-520W</b>	T.C	Manfr.	V	Forging or Cast steel
1.4	Gears	Chem.	1 per size per lot	<b>DIN17210 DIN 10084 IS: 9175 EN-353 SAE-8620</b>	T.C.	Vendor Appd. Lab	CHP	Case casburising low carbon alloy steel
1.5	Pinions	Chem.	-do-	-do-	-do-	-do-	CHP	-do-
1.6	Sheave/Pulleys	Chem.	1/lot	<b>IS: 2062-2011 Gr.E-250 BR or BO IS: 1030 GR 230-450 (for Cast Steel) IS: 1875 Class 2 or above (for Forged Steel) BM 320 of IS: 14329 (for Malleable Iron Casting)</b>	T.C.	Vendor/	V Lab Approve	-do-
1.7	Wheels	Chem.	1 Sample	IS:1570	-do-	-do-	CHP	C <sub>55</sub> Mn <sub>75</sub>

1	2	3	4	5	6	7	8	9
1.8	Hooks	U.T.	100%	IS: 3664 ASTM A 388	T.C. and Inv.	Vendor/ appd. agency	CHP	U.T. on shank portion only
1.9	Wire rope	Examination of reports for breaking load	100%	IS: 2266	T.C. and Inv.	Manf./ auth. Stockist	V	Wire ropes of Usha Martin Fort Stokst Williams & South India Bombay wire rope to be used
2.0	Rails	Visual	100%	Rail	Inv.	Manf./ auth. stockist	V	
2.1	Bearings	Visual	100%	Mfrs. Standard	Inv.	Manf./ auth. stockist	CHP	For Bearing mfd. in the country
02	<b>IN PROCESS INSPECTION</b>							
2.1	Welding Procedure/ Welder qualification	WPS PQR WQTR	TYPE test	As per IS:7318 IS:817 AWS D14.1 ASME Sec IX		Vendor	V	Proper welding / welders records maintained by as per ASME ix AWS D14.1 Inspecting Engineer to carry out the type test if he is not satisfied
2.2	Welding of Rope drum	MPI/DPT RT of Joint	100%	IS:4853	I.R.	Qualified/auth radiography Agency	V	To be conducted by ISNT/ASNT qualified personnels
a)	Rope drum (for seamless tube)	Flattening test	100%	ASTM-A-106 IS 2328	TC	Vendor	V	
2.3	Welding of Box- girder, crab, End carriage etc.	Visual  DPT	100%  Random	<b>IS: 822</b> <b>AWSD 14.1</b> <b>IS: 3658</b> <b>ASTM E-165</b>	I.R.  I.R.	Vendor  Vendor	CHP  CHP	Check of blow holes, size and waiviness
2.4	Welding (Soundness)	R.T. of Butt welds in tension	100%	<b>IS: 4853</b> <b>ASME SEC.</b> <b>V &amp; VIII</b> <b>ASTM-A-388</b>	I.R.	auth. Radographic agency	CHP	(Review of RT films - weld no. to be given by Inspector)
2.5	Gear & Pinions							
a)	U.T.	Ultrasonic testing	100%	IS:3664 when backwall echo set to 100% (a) defect shall not exceed 20% (b) Backwall echo	I.R.	IS:3664	CHP	for thickness >50 mm

				shall be minimum 80% in any area.				
b)	Dimensional accuracy	Measurement	Random	IS: 3681 (Grade- 8 DIN 8)	I.R.	Vendor	CHP	Min. 50% Qty. to be witnessed & other 50% to be verified.
c)	Hardness	Hardness	100%	pinion 50 – 60 HRC gears 2 to 3 HRC  lower than pinion		I.R.	-do-	CHP Difference in hardness of gears & pinion must not be less than 2-3 HRC
d)	MPI	Crack Detection	Random	<b>ASTM E-709</b>  No Linear Indication	I.R.	-do-	V	
e)	Surface finish	Surface	Random	1.6 microns max.	I.R.	-do-	CHP	1.6 microns max.
2.6	Gear Boxes:							
a)	Sound level	Sound	100%	COFMOW Specs. Sound Gear Box Practice	I.R.	-do-	CHP	85 db at a distance of 1 meter from Gear Box.
b)	Temp. rise	-do-	100%	<b>Maximum 20 deg. "C"</b> <b>above ambient temperature</b> <b>after 2Hours continuous</b> <b>Running.</b>	I.R.	Vendor	CHP	Maximum 20 deg. C. above ambient.
c)	Leakage	-do-	100%		I.R.	Vendor	CHP	No Leakage
d)	Backlash	Measurement	Random		I.R.	Vendor	V	
2.7	Hooks	Proof load	100%	<b>IS: 15560 for 'C' Hook</b> <b>IS: 5749 for Ramshorn Hook</b>		T.C.	Vendor/appd. Lab.	CHP
		DPT after Proof load	100%	<b>IS: 3658</b> <b>ASTM E165</b>	I.R.	-do-	CHP	

1	2	3	4	5	6	7	8	9
03	<b>FINAL INSPECTION</b>							
3.1	Motors	Review of routine test certificate	100%	IS:325 IEC:60034	T.C. & inv.	Manfr./ auth. stockist	V	In case of purchase from auth.-stockist, manufacturers invoice to auth. stockist should be available for verification by inspector.
3.2	Cables	Review of Type test/ Routine test	100%	IS:694 IS:1554 IS:9968	T.C. & Inv.	Manuf./ auth. stockist	V	-do-
3.3	Control Panel & Pendant wiring, marking, continuity Input, Output, sequence operation	Visual check of fitting of components	100%	Electrical Diagram	I.R.	Vendor	CHP	Component type/routine test certificate to be reviewed.
3.4	Components	Visual/rating	100%	-do-	I.R.	Vendor	CHP	
3.5	Complete Assembled EOT	Visual & Checking over-all dimensions alignment & completeness	100%	Appd. drgs./Sch. II	I.R.	Vendor	CHP	
		Load test/ overload test, Deflection test, Hoisting speed measurements, for LT & CT current measurement	100%	IS:3177 IS:800 IS: 807 IS:3938	I.R.	Vendor	CHP	
3.6	Painting	Surface preparation	100%	COFMOW SPEC.	I.R.	Vendor	V	Sand blasting will be preferred.
3.7	Lubrication		100%	-do-	I.R.	Vendor	V	Ease of lubrication without dismantling any component.
V = Verification					M = Major			
CHP = Hold Point-to be got cleared before further processing					Vendor = Crane Mfr.			
I.R. = Inspection Report					Appd. lab = Lab, approved by inspecting Engineer			
T.C. = Test Certificate					Cot.7 = If test facility is not available with Vendor test must be done in an approved lab.			
CR = Critical								



**ANNEXURE-L****PROFORMA FOR EQUIPMENT AND QUALITY CONTROL EMPLOYED BY THE MANUFACTURER**

Tender No. .... Date of Opening.....

1. NAME OF THE FIRM

2. LOCATION

i) Head Office

ii) Works/Factory

2.2 Telephone No.(with STD code)

i) Head Office

ii) Works/Factory

2.3 Telegraphic address & Telex/fax

i) Head Office

ii) Works/Factory

### 3. DESCRIPTION OF FACTORY/WORKS

i) Total Land area (in Sq. meters)

ii) Total covered area(in Sq. meters)

iii) Different Sub-units(with details of covered/uncovered area, etc.)

iv) Special features, if any:

### 4. NO. OF PERSONNEL EMPLOYED(CATEGORY-WISE)

i) Managerial\*

ii) Supervisory\*

iii) Skilled artisans

iv) Unskilled

\* The qualification may also be indicated.

## 5. GENERAL INFORMATION- TECHNICAL

5.1 Description of different departments in the Factory/Works and function of each

department, along with an organization chart

5.2 Detailed description of machinery and plant in each department (make and year of

procurement/commissioning to be provided. For special type of equipment copy of

pamphlets/write-ups to be furnished so as to supplement the description).

5.3 Details of raw-materials held in stock(state whether imported/indigenous).

5.4 Production capacity of the quoted items

i) Per month

ii) Per year

5.5 List of other items, which the firm regularly manufactures and corresponding production capacity.

## 6. DESIGN CAPABILITY

6.1 Details of Qualified Personnel(indicating qualification and experience)

6.2 Other facilities available.

## 7. MANUFACTURING PROCESS

7.1 Level of in-house facilities

7.2 Important items of work done by outside vendors.

7.3 Brief details of manufacturing process relevant to the items quoted.

## 8. AFTER-SALES-SERVICE

8.1 Facilities available at works and branch offices.

8.2 Assessment of quality of service including response times.

Signature.....

Name.....

Designation.....