

Section-IV

SPECIFICATION FOR TRAVERSER (PIT TYPE)-80T (MULTI TRACK)

KGPW Specification No : KGPW/Carr/22-23/Traverser/02

Reference : COFMOW/IR/MH/TRAV/2022 Rev - 01
Qty : 01 (One) Nos.

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 VI.
- 1.6 Bidder or his authorized agent, in their own interest, should visit the consignee with prior appointment with Controlling Officer of the consignee and acquaint themselves with existing process of site conditions, availability of material handling facilities etc.
- 1.7 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-VI) along with the offer.
- 1.8 The bidder who has not been placed with any order through IR/COFMOW for the tendered machine (any capacity) shall be considered as New Vendor. Wherever, technically & commercially responsive bid is received from a New Vendor, a technical team from ER shall carry out the Capability Assessment of the premises of the bidder to assess their capability to design and manufacture the tendered machine as per tender specifications. Based on the report of Capability Assessment the bidder will be considered as Suitable / Unsuitable for placement of order through purchaser. The bidder shall submit the information on Annexure-H of Section-VI in the original offer.
- 1.9 Bidder shall furnish Clause wise comments and information asked for against various clauses, wherever specified.

- 2 DESCRIPTION:**
The Electrically Operated Pit type Traverser as per specification no. KGPW/Carr/22-23/Traverser/02. Traverser for Hauling and traversing the specified Railway Rolling Stock.
- 2.1 Leading parameters (Schedule-1)**
Necessary information regarding the conditions under which the traverser is to be used, together with other particulars necessary for manufacture and erection of the traverser, are given in Schedule-I.
- 2.2 Performance Standards:**
The traverser shall be designed, manufactured, erected and tested generally in accordance with the following specifications:
(i) IS:3177-1999 (or latest) :- Indian Standard Code of Practice for electric overhead travelling cranes.
(ii) IS:807-2006 (or latest) :- Indian Standard Code of Practice for design, manufacture erection and testing (structural portion) of cranes and hoists.
- 2.3 Capability**
The traverser should be capable of:
(i) Hauling the specified Railway Rolling Stock and travelling in both fully loaded and unloaded condition.
(ii) Working in a hot, wet and dusty atmosphere in Railway Workshops/Sheds.
(iii) Hauling and traversing the specified Railway Rolling Stock with manual labour in case of power shut down, repairs etc.
- 2.4 Prove out at firm's premises:**
- 2.4.1** The traverser shall be inspected and tested during different stages of its manufacture, starting from raw materials till the completion of the traverser, by the Purchaser or his authorized representative, at the suppliers or his sub-suppliers works, as per the inspection procedure mutually agreed between the Purchaser or his authorized representative and the supplier. Inspection shall be regarded as a check and shall in no way be binding on the Purchaser in the event of any difference of opinion at any stage.
- 2.4.2** All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the traverser maker's or equipment manufacturer's works, and test certificates should be provided if required by the Purchaser or his representative.
- 2.5 Prove out at consignee's works:**
Tests shall be conducted at Purchaser's site to satisfy the operating requirements laid down in the technical specification.
- 2.5.1** The Contractor shall carry out the start-up and trial operation tests (commissioning test) on receipt of authorization from the Purchaser. The operational tests shall include but need not be limited to the following:
(i) Earthing of the traverser and control equipment to be tested as per Indian Electricity Rules.
(ii) Operation of brakes.
(iii) Test of inching control and creep speed as called for in the technical specification.
(iv) There is no skewness of the traverser during long travel.
(v) Presence of vibration and unusual noise in operation.
- 2.5.2** The trials should be carried out initially under no load conditions, and on satisfactory completion of these, trials should be repeated for various loads until the full rated load and operating range are covered.
- 2.5.3** 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 Specification.

3 QUANTITY & CONSIGNEE

S. NO.	CONSIGNEE	Qty. / Cap	Schedule No.
1.	SSE26/KGPW/SER	01 Nos./80T	Schedule-1

4 SCOPE OF SUPPLY:

- 4.1** The scope of supply shall include design, manufacture supply, installation, testing, commissioning and proving of traverser. It includes all the concomitant accessories/equipments as detailed in the specification and other concomitant accessories/ equipment, which the manufacturer considers essential to make the machine fully operational, when installed and commissioned. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine and supply of technical documentation.

4.2 CONCOMITANT ACCESSORIES:

- 4.2.1** Any other accessory/ equipment, which the manufacturer considers essential to make the machine fully operational, when installed and commissioned connected to power source and give the specified output/productivity. To be quoted separately, if any.

4.3 OPTIONAL ACCESSORIES:

Following optional accessories will be quoted by the tenderer. Cost of optional accessories shall be quoted separately and shall not be included in the basic price of the machine. Cost of optional accessories will not be taken for commercial evaluation of the firms.

- 4.3.1** Any other accessory which can improve the productivity, performance, reliability, efficiency, or enhance the capability of the machine as a whole or part thereof, should be quoted as optional accessory.

5. EVALUATION CRITERIA

Total value of the offer will be calculated based on

- (i) The cost of the basic traverser meeting the requirement of technical specification & DSL.
- (ii) Cost of Installation & commissioning of Traverser, DSL (as per requirement specified in schedule-1).
- (iii) Duties and taxes as quoted by the bidder, insurance and freight.

- 5.1** Format for price bid is as under:

SN	Description of item	Price (Schedule-1)
1	Ex works cost of traverser	
2	Cost of DSL (As per Schedule-1)	
3	Freight charges	
4	Insurance charges	
5	Training charges	
6	Installation & commissioning charges for Traverser	
7	Installation & commissioning charges for DSL	
8	Total without taxes	
9	GST @ 18% on SN 8 (To be paid against documentary evidence)	
10	Total FOR destination price including GST	

6 OTHER ITEMS TO BE QUOTED:

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

- (i) Optional accessories with break up of individual items as specified in clause 4.3 of section-IV.

7. DELIVERY SCHEDULE CHART:

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

Name of machine: ELECTRIC OPERATED TRAVERSER 80T PIT TYPE MULTI TRACK

Specification No. **KGPW/Carr/22-23/Traverser/02**

S.No.	Activity	Activity Code	Outer Limit of Time Schedule	Time Schedule offered by bidder
1.	Issue of LOA	D1	-	-
2.	Submission of PBG By Successful Bidder	D2	D1+28 days	
3.	Issue of PO / Contract (after verification of PBG)	D3	D2+30 days	
4	Submission of GA drawings to consignee by Successful Bidder/Supplier along with information on power and other utilities required formachine.	D4	D3 + 45 days	
5	Approval of GA drawings by consignee(to be governed by clause 11.2 of section-V)	D5	D4+ 45 days	
6	Confirmation of availability of clearsite by consignee	D6	By D5 (i.e. at the time of approval ofGA drg.	
7	Supply/ Delivery of machine	D7	D6 + 150 days	
8	Power connection for the machine and other on site requirement to be provided by railways	D8	D7 + 7 days	--
9	Railway to give call to supplier for the commissioning of machine	D9	D7 + 7 days	--
10	Installation, commissioning and proving out of machine by supplier	D10	D7 + 120 daysor D9 + 127 (whichever is later)	
11	Issue of commissioning certificate by consignee	D11	D10 + 30 days	
12	Warranty by supplier	D12	D10 + 2 years	

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

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Section-V

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
BHN	Brinell Hardness Numbers
PCME	Principal Chief Mechanical Engineer
PCMM	Principal Chief Material Manager
CNC	Computer Numeric Control
COFMOW	Central Organisation for Modernisation of Workshops
COS	Controller of Stores
Db	Decibel
DC	Direct Current
DIN	Dentsches Institute fur Normung/ German Institute for Standardization (DIN)
FA&CAO	Financial Advisor & Chief Accounts Officer
GA (Drawing)	General Arrangement (Drawing)
HRC	Hardness Rockwell 'C' Scale (value)
Hz	Hertz
IR	Indian Railways
I.S	Indian standard
ISO	International Organization for Standardization
IEC-Pub	International Electro technical Commission - Publication
JCN	Joint Commissioning Note
JIS	Japanese Industrial Standards
JRI	Joint Receipt Inspection
kW	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages
LOA	Letter of Acceptance
NC	Numeric Control
LT	Long Travel
NEMA	National Electrical Manufacturer's Association
NIT	Notice Inviting Tenders
OEM	Original Equipment Manufacturer
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 Organisation
SS	Stainless Steel
WBG	Warranty Bank Guarantee

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Specification No KGPW/Carr/22-23/Traverser/02**DESIGN FEATURES:****1.1 Safety features:**

The traverser should be rigid, robust and of sturdy construction.

- 1.1.1 The traverser should be of a simple and compact design with its major equipment and controls conveniently located to facilitate easy access and maintenance.
- 1.1.2 All controls should be conveniently located and should provide distinct speed zone for different notch positions. The various controls should be suitably interlocked to prevent accidental movement. The interlocking should be provided such that motor cannot be started during manual operation of traverser. All electrical controls & motors etc. should be well protected from rain and water logging in the pit.
- 1.1.3 Suitable limit switches should be provided to stop the over travel of various moving parts of the traverser.
- 1.1.4 A suitable interlock shall be provided to ensure that hauling winch shall operate only when long travel movement is locked.
- 1.1.5 Suitable spring loaded buffers should also be provided to prevent over travel.
- 1.1.6 Suitable guards or enclosures should be provided to prevent inadvertent contact with down shop leads or other exposed electrical conductors and cables.
- 1.1.7 Suitable isolation switches and stop buttons should be provided to isolate the electric supply for maintenance, or in the event of an emergency.
- 1.1.8 All wheels, couplings, gears etc. should be provided with covers, opening on strong hinges. All heavy covers should be provided with inspection windows. All the components and equipment provided below the platform shall be accessible by opening the hinged cover for maintenance. The open gears to be avoided in the wire rope handling area to prevent entangling of wire rope with moving parts.
- 1.1.9 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.
- 1.1.10 The traverser should comply with relevant safety regulations under the Factory Act, Indian Electricity Rules and other statutory regulations as applicable.
- 1.1.11 The traverser rail wheels should have a minimum diameter of 500mm.

1.2 Guiding Specifications

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

- i) IS:3177-1999 (or latest) :- Indian Standard Code of Practice for electric overhead travelling cranes.
- ii) IS:807-2006 (or latest) :- Indian Standard Code of Practice for design, manufacture erection and testing (structural portion) of cranes and hoists.

1.3 Class of Duty

- 1.3.1 The design of the structure as well as the component parts of the traverser 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 (or latest).
- 1.3.2 The stipulations in these technical specifications are complementary to those set out in the Indian Standard Specifications 3177 & 807 mentioned above. If any of the conditions mentioned in these specifications is at variance with those of the ISS, the technical specifications herein under shall prevail.

1.4 Maintainability

- 1.4.1 Easy access for maintenance and removal of all mechanical, electrical and structural components must be ensured. All parts requiring replacement, inspection and lubrication should be easily accessible without the need for dismantling any other equipment or structure. In addition to easy access for maintenance, the design and construction of the

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- traverser should provide adequate space wherever adjustments are necessary in the mechanism. 4 portable hydraulic jacks should also be provided for lifting at the four corners of the traverser bridge.
- 1.4.2 All electrical cables should be so laid that they are not liable to damage and can be easily inspected and maintained.
- 1.4.3 All components for traversers of identical parameters (Capacity, Span, Type, Operating speeds) and duty shall be interchangeable.
- 1.4.4 The design of Portal Truss Type Traverser shall provide a facility for adjustment of camber in future. The arrangement provided shall be indicated in the offer. For multi-track and 2 Track Box girders Type Traverser, this facility may be dispensed with
- 1.4.5 Full length chequered plate platforms should be provided on both the sides.-
- 1.4.6 Materials used for equipment/structure should be free from cracks, blow holes, laminations, pitting etc. The supplier should submit material test certificates for structural steel and mechanical components, such as couplings, gears, gear boxes, rope drums, pulleys, brake drums, shafts, draw hook, wire rope, wheels etc.
- 1.4.7 A tool box containing all necessary tools like torque wrenches, portable hydraulic jacks of suitable capacity, hand grease gun, set of spanners, screw drivers etc. as required for the maintenance of the traverser should be supplied with the traverser. A list of such tools should be furnished along with the quotation.
- 1.4.8 Fasteners for pedestal blocks, gear boxes etc. shall be easily removable from the top of the platform.
- 1.4.9 Standardization and unification shall be carried out to the maximum extent for the various subassemblies constituting the mechanism of various traversers. 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 like 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 ensure that inventory is kept low and down time becomes minimum.
- 1.4.10 The successful bidder shall submit test certificates for all electrical equipment and cables, and all parts used in handling loads, such as wire ropes, chains, load hooks etc.

1.5 SPECIFIC CHARACTERISTIC

1.5.1 BROAD DETAILS

- The traverser 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. The scope of supply shall include but not be limited to the following, along with necessary fittings, fixtures and ancillaries.
- 1.5.1.1 Bridge structure with platform, rail track and hand railing etc.
- 1.5.1.2 Hauling mechanism.
- 1.5.1.3 Travelling mechanism complete with required number of wheels and their mounting arrangement.
- 1.5.1.4 Limit switch gear for traveling and hauling.
- 1.5.1.5 Electrical motor control gear along with complete wiring.
- 1.5.1.6 Down shop leads complete with supporting masts brackets and insulators.(wherever required-See clause 4 of Schedule-I to Technical Specifications).
- 1.5.1.7 Earth wire on traverser portion and also the DSL and support masts to be provided with earthing connection as per IE rules.
- 1.5.1.8 Brake mechanism separately for long travel and hauling.
- 1.5.1.9 Alarm/Horn.

1.5.2. STRUCTURAL DETAILS

- 1.5.2.1.** The traverser shall be designed as per class of duty indicated in Schedule-I of these Technical Specifications. It shall preferably be of a box type structure, mounted on the required number of wheels with antifriction spherical roller bearings. Alternative structural designs with better features can also be considered. Along with their offer, tenderers shall submit broad details of structural design and general layout of the traverser along with necessary cross sectional views. The supporting construction shall be liberally dimensioned to carry the stipulated load. It shall run on rails as indicated in Schedule-I of the Technical specification.
- 1.5.2.2.** A suitable arrangement shall be provided on the traverser to ensure that wagons and coaches do not roll on their own. The system should be explained in detail in the offer. At the side of the driving gear, a walkway shall be provided to handle the hauling rope. The walkway platform should be provided with 5-7mm thick mild steel chequered plate.
- 1.5.2.3.** Suitable diaphragms should be inserted in the bridge structure wherever required to limit the stresses within safe permissible limits. Connections in general shall be as per Section-10 of IS:800-2007 (or latest). Black bolts should not be used in the main structure. Bolts used in shear should be fitted into reamed holes.
- 1.5.2.4.** The calculated strength of riveted joint or joints made by High Strength Friction Grip (HSFG) bolts should not be less than calculated net strength of member. The calculated strength of other bolted joints in structural members should not be less than the net strength of member plus 25%.
- 1.5.2.5.** The bridge girder shall be designed suitably to eliminate accumulation of water or oil inside them. Special care should be taken for outdoor use to eliminate crevices or openings, where water may accumulate and cause corrosion.
- 1.5.2.6.** Structural design should ensure rigidity with minimum deflection under load. Positive camber provided to neutralise the deflection under full load conditions should be clearly indicated in the offer. Provision of camber in multi track traverser can be dispensed with.
- 1.5.2.7.** The design of the structure shall ensure that the frame is rigid enough and designed so that one end is not lifted up when load is entering/leaving the other end of the traverser platform. Also the traverser should not twist or shift laterally or turn askew under rated hauling load.
- 1.5.2.8.** The supplier should have sound infrastructural facilities, good working system and practice for fabrication and machining of various structural components of traverser. Some of the important requirements are listed below
- 1.5.2.8.1** 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 & exact welding sequence to be followed for typical locations in accordance with IS:9595-1996 (or latest) "Recommendation for Metal Arc welding of Carbon Manganese steels". 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.
- 1.5.2.8..2** Welding Supervisor shall have received formal training from recognized institution having specialised courses for Supervisor
- 1.5.2.8..3** Details of edge preparation for welding shall be in accordance with IS:9595-1996 (or latest) "Recommendation for Metal Arc welding of carbon steel and carbon manganese steels."
- 1.5.2.8..4** Automatic/Semi Automatic submerged Arc/Gas shielded shall be carried out according to IS or other International Specification.
- 1.5.2.8..5** Welders engaged in fabrication shall be subjected to approval tests in accordance with IS: 7318-1 (latest) "Approval tests for welders when welding procedure approval is not required- Part I fusion welding of steel"
- 1.5.2.8..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 equipments and accessories being used meet these requirements.

- 1.5.2.8.7** Electrodes and wire flux combination used for fabrication should be from reputed makes of ESAB, Advani Orlikon, Philips and Modi.
- 1.5.2.8.8** 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.
- 1.5.2.8.9** 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.
- 1.5.2.8.10** All butt welds on structural members subjects to tensile stresses should be radiographically tested. All other welds should be subjected to magnaflux or Dye Penetration Test. A copy of the radiography/magnaflux or Dye penetration test should be produced.
- 1.5.2.9.** For Pit Traverser, approach tongues (ramps) shall be spring loaded for automatic lifting by about 40mm when the traverser is in motion and ramp is unloaded. Notwithstanding any indication of tractive force for the winch as indicated at item 3.14 of Schedule-I, the height of traverser track from runway rails, length and inclination of ramps when lowered, and tractive force available on the winch, shall be so designed as to ensure that rolling stock of gross weight equal to rated carrying capacity of traverser can easily be hauled onto the traverser track from approach rails. It is also to be ensured that while mounting and dismounting the coach on the traverser the bottom most part of a coach does not hit or slide against either the floor or any projection on the floor of the traverser.
- 1.5.2.10.** Bridge girders shall be carried on solid forged wheel. The minimum end clearance on each side of the wheel tread shall be 10mm for the Double flanged wheels for the long travel for 2 Track up to 4 track traverse. For wheel running on additional intermediate tracks wheels without flange may be provided so as to suit the site conditions. All wheels should be solid forged and heat treated to have a minimum hardness of 250 BHN on the rolling surface and flanges, to a depth not less than 10mm. The wheels should be mounted on suitable anti-friction spherical roller bearings inside the 'L' type or flat type bearing boxes for easy maintenance. The long travel wheel mounting arrangement should have ample strength to resist all stresses likely to be imposed upon them under severe conditions including collision with end stops. 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.
- 1.5.2.11.** Suitable jacking pads should be provided on each four corners of the bridge for jacking of the traverser when changing the track wheels. The jacking pads should not interfere with the replacement. The traverser bridge should be provided with substantial safety stops to prevent the traverser from falling more than 45mm in the event of breakage of track wheels bogie or axle. These safety stops should not interfere with the removal of track wheels.
- 1.5.2.12.** Suitable arrangement for fixing square bars/rectangular bar/rails on the bridge platform for placement of specified rolling stock should be provided. The arrangement provided should be described in the offer.
- 1.5.2.12.1** The Pit type traverser shall be provided with a double acting locking bolt arrangement for locking of traverser in position in the side wall. A suitable locking arrangement for Pit traverser should be provided. The locking arrangement should have interlocking facility with long travel control. The arrangement provided should be explained with the help of sketch/drawing in the offer.
- 1.5.2.13.** The cabin designed should provide unobstructed view of movement of coaches, lock position in travel rail to the driver and easy access from both sides. Cabin should also accommodate all electrical equipment, if required. The floor of the cabin and traverser should be covered with chequered plates.
- 1.5.2.14.** The cabin should be double walled construction for the roof and side panels (except for glass panel) with thermal insulation in between, to enable to offer better working environment. The cabin should be provided with ventilating fans. The cabin should have sufficient space for easy movement of the operator. The traverser should be capable of

operation from a sitting / standing position. The controller handles should be conveniently located within easy reach of the operator. 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. Suitable reflector mirrors shall also be provided to assist the operator in viewing the opposite side when rolling stock is standing on the bridge platform.

1.5.2.15. The driving gear shall be installed on a platform having machined plates welded to the main girder of the traverser structure inside the cabin to maintain proper level. A suitable mono rail lifting arrangement, with hoist of suitable capacity, should be provided in the cabin to cover all heavy equipment located inside the cabin to facilitate dismantling/lifting of equipment during repairs/maintenance. The floor of the machinery room should be covered with chequered plates.

1.5.2.16. The traverser platform should be so designed that adequate clearances are available on all sides after placement of rolling stock to be traversed. Signal discs should be mounted on approaches to indicate whether the line position is open or closed.

1.5.2.16.1 The design and manufacture of the structures should be of sound quality to with stand the expected service life of 30 years in double shift working without any damage to the structures.

1.5.3. Travelling & Hauling Mechanisms

1.5.3.1 The traverser shall be operated in long travel mode by a single motor for central drive/shaft mounted compact geared Motors. For twin drive, Motor/ compact geared motors shall be mounted so as to drive one set of wheels on either side. The arrangement proposed to drive the winch should be described in the offer. The mechanism used shall be robust and shock free. The arrangement provided shall be fully described in the offer, with the help of drawings, if required.

1.5.3.2 To take up mis-alignment between the motor & the gear box, and gear box & the drive shaft/rope drum, suitable flexible couplings preferably geared type shall be provided. The type of couplings provided with their special features, should be described in the offer. The coupling between main motor and gear box should be accessible to easy maintainability without disturbing the motor/gear box. The driving wheel and gear fixing should be of rigid bolt and nut type.

1.5.3.2.1 Compact geared motors shall be mounted on the drives wheel axle. Requirement of coupling between the Motor & gear box and drive shaft is dispensed with in such case.

1.5.3.3 Ball/roller bearings of reputed make only should be used for supporting all rotating components. The makes of ball/roller bearings proposed to be used should be indicated in the offer, and bearings nos. with sizes should be indicated for each location in Schedule-II item 13.

1.5.3.3.1 LT wheels should be provided with sealed bearings to avoid ingress of water, as traverser tracks are frequently under water during the rainy season.

1.5.4 Gearing

1.5.4.1 The gearing in power operated motions should be of suitable alloy or carbon steel and should conform to relevant Indian Standards/ International Standards. They should be designed in accordance with IS:4460-1995 (or latest) and as per international Standard for compact Geared Motors. All gears should be hardened and lapped in sets. The minimum surface hardness of the gears shall be in the range of 200-250 BHN. The hardness of gears should be less than that of pinion and difference in hardness should not be less than 20 BHN.

1.5.4.2 Worm wheels and bevel gears should not be used. First and high speed reduction should be through helical gears. Overhung or split gears and pinions should not be used.

1.5.5 Gear Boxes

- 1.5.5.1 All gears should be completely enclosed splash lubricated type. All gear boxes should be oil tight and sealed with compound or gasket. All gear shafts should be supported in bearings mounted in gear boxes. The gear boxes should be fabricated and should be made of minimum 8mm thick plate. All fabricated gear boxes should be stress relieved. Covers should split horizontally at each shaft centre line and fitted so that the top half can be removed for inspection and repair without disturbing the bottom half. The gear boxes should be provided with breather vents, oil level indicator, dip sticks and easily accessible drain plugs.
- 1.5.5.2 The radial clearance between the gear box inner surface and outside diameter of the gears should not be less than 20mm. The facial clearance between the inner surface of the gear box and the face of gear and pinion should be at least 10mm.
- 1.5.5.3 Vertical gear box should not be provided. All the gear boxes should be in horizontal position.
- 1.5.5.4 gear box shall be designed for optimized geometrics and corrections with precise shaft alignment through unicast principal suitable to be mounted directly on drive Axle with torque arm position, to suit for easy accessibility for mounting/ replacement of gear box, bearings and gears shall operate in an oil bath, shaft seals shall be provided to avoid loss of oil through leakage. The gear box shall be provided with breather vents, oil level indicator and easily accessible drain plugs

1.5.6 Couplings

- 1.5.6.1 Solid couplings should not be used.
- 1.5.6.2 The couplings should be designed to suit the maximum torque that can be developed.
- 1.5.6.3 In case gear couplings are used, these should be of cast or wrought steel. The hardness of gearing should be more than 250 BHN. Bolted connections of couplings should be easily accessible for inspection and tightening.

1.5.7 Hauling Equipment

- 1.5.7.1 The rope drum should be designed to withstand the compressive stresses caused by the wound-on-rope and bending stresses due to beam action of the drum.
- 1.5.7.2 The drum should be fabricated from mild steel. The steel used shall conform to IS: 2062-2011 (or latest). The rope drum shall be stress relieved after fabrication. T-joints should be radiographically checked.
- 1.5.7.3 The rope drum should be designed to take the entire length of rope in a single layer or multi layer. The rope fixing on drum surface shall be by clamp and bolts. An automatic coiling device shall be provided with necessary guide pulleys to avoid overlapping of the wire rope at the time of winding on the drum.
- 1.5.7.4 A suitable pulley arrangement shall be provided at the centre for changing wire rope direction for hauling ON/OFF of rolling stock from both ends of traversers.
- 1.5.7.5 Wire rope of adequate length (minimum 125 M long) shall be supplied. The wire rope shall be 6 x 37/6 x 36 construction of best plough steel having tensile strength of 180 Kg./mm². Ropes shall be parallel right hand lay as per IS: 2266-2002 (or latest).
- 1.5.7.6 The dimension of the draw hook fixed at the end of the wire rope will be specially suited for specified rolling stock. The draw hook will be forged type.
- 1.5.7.7 The guide pulleys and turn over sheaves shall be fabricated/ manufactured from mild steel as per IS: 2062 (latest) / Alloy Steel as per IS: 1570 (latest) / carbon Steel casting Gr.1/ Gr.2 as per IS: 2707 (latest). They will be mounted on antifriction bearings. Free wheel arrangement will be provided on the corner capstans to enable easy pulling of the wire rope.
- 1.5.7.8 The rope drum should be provided with lever operated brake.

1.5.8 Brakes

- 1.5.8.1 Suitable fail-safe electro hydraulic thruster brakes shall be used for all motions. The traverser shall also be fitted with built-in inching device for long travel and winch movement for accurate positioning of the traverser ramp and loading/unloading of the rolling stock. In

addition travel unit should be provided with additional hydraulic or pedal operated mechanical brake for instantaneous braking force.

1.5.8.2 The maximum braking torque should not be less than 100% of full load torque.

1.5.8.3 The brake drum 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 shall be about 10mm more than the width of brake shoe on each side. Hardness of brake drum should be nearly 300 BHN.

1.5.9 Jerks & Vibrations

Suitable arrangement shall be provided for isolating jerks/vibrations while travelling on cross tracks. The arrangement so provided should also take care of uneven long travel tracks which may lead to jerks or vibrations, and should be described in detail in the offer.

1.5.10 Ball & Roller Bearings

Ball & Roller bearings shall be of reputed make. The acceptable makes will be NBC, SKF, FAG, NORMA, NRB, NTN and KOYO. Rated life of ball and roller bearings should not be less than total life in working hours as per IS specification for a particular class of duty. Life of roller bearings should be calculated in accordance with manufacturer's recommendations. Tenderers should confirm that they will submit to the inspection agency, invoices from bearing OEM as proof of the use of genuine material.

1.5.11 Bush Bearings

Bush bearings should not be used at any location.

1.5.12 Bearing housings

All bearings should be supported on 4 bolts except for 'L' type, where boxes can be supported on at least two bolts. Bearing housings should split on the shaft center line to permit easy removal of the shaft. Bottom surface of each bearing pedestal should be machined and should bear upon a machined surface.

1.5.13 Buffers

Spring loaded buffers should be fitted on the four corners of the traverser. Buffers should be rigidly bolted in place. All buffers should have sufficient energy absorbing capacity to stop the bridge in either direction when travelling at a speed of at least 40% of maximum rated speed with full load. Buffers should have a contact surface of not less than 125 mm in diameter.

1.5.14 Lubrication

1.5.14.1 Suitable lubrication arrangement should be provided for all grease lubricated bearing parts. All gears and bearings enclosed inside gear boxes should be splash lubricated. All lubricating pipe work should be securely fixed, protected from damage, and accessible throughout. The arrangement provided should be fully described in the offer.

1.5.14.2 The successful tenderer should provide, along with the traverser, a lubricating chart indicating all lubricating points, the type of lubricants required and the recommended frequency of lubrication.

1.5.15 Dimensional Tolerances

The supplier should ensure that traversers are manufactured and erected to the tolerances specified below:

- | | |
|---------------------------------|---------|
| (a) Span over LT wheels | +/- 6mm |
| (b) Diagonal on wheels | +/- 5mm |
| (c) Long travel wheel alignment | +/- 1mm |

1.6 ELECTRICAL DETAILS (Applicable for VVVF Drive Traverser)

1.6.1 Scope of Supply

The scope of supply relating to electrical portion should cover the following components:

- 1.6.1.1 Down shop leads with supporting masts. (See Schedule-1).
- 1.6.1.2 Main current collection gear.
- 1.6.1.3 Power disconnecting switch immediately after the main current collection gear.
- 1.6.1.4 Master controllers.
- 1.6.1.5 Motors.
- 1.6.1.6 Protective switch gear.
- 1.6.1.7 Motor control panels.
- 1.6.1.8 Brakes.
- 1.6.1.9 Limit Switches.
- 1.6.1.10 Power and control cables.
- 1.6.1.11 Lighting distribution panel.
- 1.6.1.12 Lighting fixtures with lamps, ventilating fan.
- 1.6.1.13 Indicating lamps and push buttons socket outlets etc.

All sundry erection materials required for installation and connecting up electrical equipment with cable laying and fixing accessories should be included in the price of the traverser.

1.6.2. Standards

- 1.6.2.1 All equipment and materials should comply with appropriate Indian Standards(latest) or National Standards of the country of origin, provided the latter are equivalent to or better than the former. The equipment should 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 the electrically operated traversers. For items for which Indian Standards are not published, National Standard of the country of origin shall be applicable. All latest standards indicated in Annexure- 'F' of IS: 3177-1999 (or latest) should be applicable in general.
- 1.6.2.2 The equipment should be designed and selected to facilitate inspection, cleaning,, replacement and repair, and for use where continuity of operation and safety are important considerations.

1.6.3 Atmospheric Conditions

- 1.6.3.1 The ambient temperature at the site at which the traverser will be installed may vary from -5° C to + 50° C over the year. The relative humidity may be as high as 98%. The atmosphere is expected to be dusty. The traverser offered shall be suitably tropicalised to work under these ambient conditions without any adverse effect on its performance.

1.6.4 Power Supply Conditions

- 1.6.4.1 Power shall be available at 415 Volts 3 Phase 4 Wire 50 Hz. The following voltages should be used in the traverser.
 - (i) 415 +/-10% volts, 3 Phase, 50 +/-3% Hz AC - For drive motors.
 - (ii) 230 +/-10% volts, Single Phase, 50 +/-3% Hz AC - For control circuits and lighting.
 - (iii) 24 +/-10% volts, Single Phase, 50 +/-3% Hz AC - For hand lamp socket outlets.
- 1.6.4.2 The voltages (ii) & (iii) above shall be obtained through individual separate transformer units connected to 3-phase, 415 volts A.C. supply.

1.6.5 Down Shop Leads And Current Collection Gear

1.6.5.1 M.S. Angle DSL

- 1.6.5.1.1 M.S. angle down shop leads shall consist of 4 conductors 3 for three phases and one for earth conductor supported on existing structure with suitable brackets and insulators. The leads shall be adequate size so that the current density on the lead does not exceed 0.42 amp per sq.mm. Minimum size of M.S. angle iron shall be 50 x 50 x 6mm. Phase colour code should be used i.e. red, yellow and blue. The earth shall be marked green. The calculations of current density in the leads shall be given with the offer.

- 1.6.5.1.2** The DSL shall be at suitable height to allow free movement of Traverser for all required motions. The leads shall have uniform even contact surface throughout its length. The DSL shall be at safe clearance from electric lines and structure members and shall be adequately insulated as required. Successful tenderer shall visit the site for installation for study of local conditions and designing of DSL suitable for the place.
- 1.6.5.1.3** The current collectors shall be graphitic cast iron having self lubricating and good contact conductivity to suit DSL as provided or as existing. The conductors shall be of self aligning type having full face contact to collect the current to meet maximum electrical load of the Traverser. The collectors shall be mounted on a suitable brackets on the Traverser on DSL side and it should not infringe with any adjoining members. Collectors shall be designed for ease of maintenance and replacement so that they are readily accessible. Calculations to show that section of collector is adequate shall be furnished along with the offer.
- 1.6.5.1.4** The current carrying shunts on all collectors shall be designed so that there is no danger of contact with adjacent collectors and it shall be suitable for rainy season also. Armoured weather proof 1.1 KV grade copper cable of adequate size shall carry current from collectors to the isolating switch on the control panel of Traverser. All electrical connections shall be through crimped sockets/thimbles of adequate size. The cables shall be of reputed make and its size and current carrying capacity shall be indicated.
- 1.6.5.1.5** The Traverser for which DSL are not included in the scope of supply, suitable collectors to suit existing DSL should be provided in the Traverser during erection. The provision should be confirmed in the offer.
- 1.6.5.1.6** Bare conductors shall not be mounted on the Traverser bridge. Only flexible Festoon type cable made of copper multi standard conductor of adequate size, elastomer grade insulation in flat/round configuration shall be used as bridge conductors. Well designed trolleys and supporting cable clamps shall be used. Festoon cables for free movement for longer lift. This is applicable for each type of current collection system.

OR

ALTERNATE-I

1.6.5.2 SPECIFICATION FOR SHROUDED BUS BAR CONDUCTOR

- 1.6.5.2.1** The DSL shall be at suitable height to allow free movement of traverser. The leads shall have uniform even contact surface throughout its length. The DSL shall be at safe clearance from electric lines and structural members and shall be adequately insulated as required. Successful tenderer shall visit the site of installation for study of local conditions and design of DSL suitable for the place.
- 1.6.5.2.2** The current carrying shunts from all collectors shall be designed so that there is no danger of contact with adjacent collectors and it shall be suitable for rainy season also. Current collectors shall be provided with multistrand 1.1 KV grade PVC insulated cables. All cables from the current collector shall be terminated in a junction box. Armoured weather proof. 1.1 KV grade copper cable of adequate size shall carry current from collectors to the isolating switch on the control panel of traverser. All electrical connections shall be through crimped sockets/thimbles of adequate size. The cables shall be of reputed make and its size and current carrying capacity shall be indicated.
- 1.6.5.2.3** Shrouded Bus Bar conductor shall conform to the following.
- 1.6.5.2.3.1** The conductor system shall be finger safe to IP-21 with necessary supporting technical evidence of same. The conductor material shall be of Electrolytic copper, 250A capacity insulated by a high impact compound material which shall have a step/groove shrouded all along its length for effective holding of the conductor system. PVC should withstand 2.5 KV for one minute duration and flashover voltage of more than 7.5 KV.
- 1.6.5.2.3.2** The conductor shall not be less than in 4m length to be jointed with joining pins of the same material as the conductor. These conductors shall be supported by way of a single piece moulding, hanger clamps with bolt fixing of unipole design. The conductor should be at an interval, not more than 1000mm.

- 1.6.5.2.3.3** The current collector shoe should be of sintered copper Graphite material mounted on insulated covering of high grade electrical and mechanical strength.
- 1.6.5.2.3.4** Current collector should have stainless steel arms and stainless steel spring for pressurised contacts and should be able to withstand variation of + 100mm in the vertical plane \pm 100 mm in the horizontal plane.
- 1.6.5.2.3.5** Shrouded bus bar system should be complete with all accessories e.g. end caps, joint covers, power feed kit, jointing tool etc.
- 1.6.5.2.3.6** Shrouded busbar should be suitable for use in the dusty atmosphere of shop floor and should be suitable to withstand traverser vibrations. The maintainability must be extremely good.
- 1.6.5.2.3.7** The shrouded bus bar should be protected by metallic hood on the top to protect from rain water and sun rays. The hood should be made of mild steel and shall be protected by hot dip galvanising. The hood should be assembled at site by making use of stainless steel hardware and no welding/brazing should be done for assembly. The top surface of the hood shall be curved to prevent water stagnation
- 1.6.5.2.4** The current collector arm should be made from aluminium 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.
- 1.6.5.2.5** Shrouded system shall be covered under extended warranty for a period of 36 months from the date of supply or 24 months from the date of commissioning as against the standard warranty clause.
- 1.6.5.2.6** Prices for necessary wearing components for maintenance shall also be quoted by the bidders.
- 1.6.5.2.7** The current carrying shunts on all the collectors should be designed so that there is no danger of contact with adjacent collectors.
- 1.6.5.2.8** The collectors should have adequate current carrying capacity. All collector should be mounted on rigid steel masts erected on one side of the bay, suitably spaced but not less than 15 meters apart, without infringing the existing feeding lines and tracks, and suitable insulated therefrom. Collectors should be designed for ease of maintenance and fitment so that they are readily accessible. Calculations to show that section of the collector is adequate should be furnished along with the offer.
- 1.6.5.2.9** Tenderer shall quote separately for current collection systems as per clauses 1.6.5.2.1 to 1.6.5.2.9. Any length depending upon user's requirement will be procured along with the traverser.
- 1.6.6 Motors**
- 1.6.6.1** All motors should be of Siemens, A.B.B., Crompton, NGEF, Marathon make, totally enclosed Squirrel cage motors suitable for VVVF drive with minimum 150 starts per hour. The type of enclosure should be IP-55 for terminal box. The motors should be suitable for 50° C ambient temperature and 415 +/- 10%, 50 cycles +/-3%, 3 phase, 3 / 4 wire AC supply. The motors should generally conform to IS-325 (latest) and should be of 6 or 8 pole type. However, where the IS specification is at variance with this specification the provisions made in this specifications shall prevail.
- 1.6.6.2** The winding should be of electrolytic copper wire specially insulated and vacuum impregnated to withstand moist tropical climate i.e. temperatures up to 50° C and humidity up to 100% and to work with VVVF drives.
- 1.6.6.3 Horse Power**
- The torque factor of motor should within the range 1.3 to 1.5. Detailed calculation for the Horse Power of the motor selected should be submitted by tenderer with the offer. The frame size of motor should be indicated in the offer and it should take into account de-rating required for 50° C ambient temperature and voltage range of 415 V +/-10%. For calculation of motor power, derating factor for both these operating conditions should be taken as 0.8.

Catalogues of the manufacturers of motors proposed to be supplied should be furnished with the offer.

- 1.6.6.4 All motors should be provided with insulation of Class 'H'.
- 1.6.6.5 The pull out torque & starting torque requirement of the traverser for worst condition.
- 1.6.6.6 Type and routine test charts of the motors selected should be submitted to the inspecting authority during inspection.
- 1.6.6.7 The terminal box should be provided on the top or front of the motor for easy accessibility. The terminals should be large enough to accommodate aluminum conductor cables, if necessary. The cable sizes should be decided after considering derating due to grouping and ambient temperature of 50°C.

1.6.7 Traverser Controls

- 1.6.7.1 Traverser controls will be operated through master controller using VVVF drive control.
- 1.6.7.2 Cam type master controllers with joy stick type levers should be used and should be provided with dead man push button. Controller should be provided with off-position interlock. Stepless from zero speed to full speed in 6 seconds. The operating lever of the controller should move freely between the notches, should locate definitely, and should remain in position on each notch unless pushed to another position.
- 1.6.7.3 The circuit should be so designed that brakes come into operation immediately in the event of tripping of the main circuit breaker.
- 1.6.7.4 Controllers should be so arranged that the contacts and terminal arrangements are readily accessible for inspection and maintenance purposes.
- 1.6.7.5 Auxiliary contacts to provide an interlock between the controller and circuit breaker so that circuit breaker can not be closed unless the controller is in off position, should be provided.
- 1.6.7.6 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, should also be provided.
- 1.6.7.7 Controller in off position should open all supply lines of the motor.

1.6.8 Contactors

- 1.6.8.1 Rating of contactors should be higher than rating of the drive, which in turn should be higher the respective motor full load current at the specified duty cycle. All contactors should be AC-4 class of duty and of Siemen's, A.B.B., L&T, BCH, Schneider make only. Necessary test certificates of the manufacturer shall be submitted to the inspecting authority in respect of its life & rating.

1.6.9 Circuit Protective Switch Gear

- 1.6.9.1 One triple pole manually operated moulded case circuit breaker (MCCB) serving as main incoming protective device, fitted with no volt, short circuit and overload releases and rated to carry full load currents, should be provided. The circuit breaker should have adequate rupturing capacity to withstand and clear fault current of the order of 30 KA. The circuit breaker should be located inside the cabin, in such a way that adequate clearance is provided as per Indian Electricity Rules.
- 1.6.9.2 MCB's should be provided for the following branch circuits:
 - (i) Lighting and hand lamp socket outlets.
 - (ii) Control circuits.
 Both the above mentioned MCB's should be installed in the driver's cabin or near the control panel.
- 1.6.9.3 To indicate whether power and control sources are 'ON' indicating lamps should be provided in the operator's cabin.
- 1.6.9.4 A mushroom head type 'OFF' push button should be provided in the operator's cabin so that the main incoming breaker can be tripped under any emergency conditions by pressing the mushroom head. A pilot lamp incorporated in the control circuit shall glow when any of these switches is operated.

1.6.10 Control Panel

- 1.6.10.1 All power and auxiliary contactors, relays (make –Siemens, ABB, L&T) should be mounted in a sheet metal cubicle with lockable hinged doors. The door hinges should be of such type that while undertaking repair work inside the panel the entire door can be lifted off and removed for better access inside the panel. Interior of the panel should be dust and vermin proof. All control panels should be fully weather proof type. One tube light lamp interlocked with panel door should be provided which shall switch on when panel doors are opened.
- 1.6.10.2 Panels should be front wired with readily accessible terminal blocks for making connection to the external equipment. Panels should be pre-wired up to the terminal strip. Single core multi-strand copper conductor should be used for control circuit wiring in the panel.
- 1.6.10.3 All contactors etc. should be mounted securely in a vertical arrangement, with due consideration for the vibration encountered in traverser operation. The bottom-most row of equipment mounted inside the panel, except terminal strips, should be at least 200mm above the panel bottom cover to facilitate inspection and repair.
- 1.6.10.4 All the equipment should be so mounted in the panel as to enable easy removal and replacement from the front.
- 1.6.10.5 A terminal strip should be fixed inside the panel, and preferably horizontal, leaving enough space underneath the panel for termination of cables in a convenient manner. Power terminals blocks should be separated from each other by means of replaceable insulated spaces. Terminals blocks should have enough clearance to avoid tracking. A minimum of 20% spare terminals should be provided in terminals trips.
- 1.6.10.6 Power terminals blocks should be segregated (phase-wise) and all blocks should be separated from each other by means of replaceable spacers.
- 1.6.10.7 All equipment inside the panel should have permanent identification labels in accordance with the circuit diagram, as also the power and control terminals.
- 1.6.10.8 Terminals blocks and spaces should be epoxy moulded (fire retardant) material, should be robust in construction and mounted in such a way that there is no possibility of cable connectors getting loose due to vibrations.
- 1.6.10.9 Sheet steel used for fabrication of panels should have minimum thickness of 2.0 mm. Panel support should be such that the vibrations generated by movement get damped.
- 1.6.10.10 The electrical clearance in air between all live parts of different polarity and voltage, and between live parts and earth, should not be less than 75mm.
- 1.6.10.11 Enclosure should have IP-55 Protection.
- 1.6.10.12 Contactor panels should be well braced to the structure and each panel should be provided with adequate number of lifting lugs.
- 1.6.10.13 One ammeter (0-150A) of reputed make should be fitted in each phase and a volt meter (-) 500V with rotary switch to read voltage between the phases, should be provided.

1.6.11 Socket Outlets

- 1.6.11.1 Minimum of four socket outlets for hand lamps to be provided in the driver's cabin. Industrial type metal clad plug and socket should be provided in the panel also.

1.6.12 Lighting, Cabling & Identifications of Circuits

- 1.6.12.1 Lighting should be provided in the driver's cabin, and areas where control panels and resistors will be installed. MCB's of reputed make should be used for lighting distribution.
- 1.6.12.2 All wiring for power, controls, lighting etc. should be carried out with 1.1 KV grade PVC armoured cables except trailing flexible cables on which armouring should not be provided. Power cables should be minimum 4 mm² copper. Cable cores should be of standard construction, Control cables should be minimum 2.5 mm² copper.
- 1.6.12.3 Labels of a permanent nature made of etching/engraving on aluminum plate of minimum 1.0 mm thickness should be provided on supports of all switches, fuses, contactors, relays, etc. to facilitate identification of circuits and replacement. All panels, controllers, resistors, etc. should be properly marked for each motion.

- 1.6.12.4 All equipment terminals and all power, control, lighting and other cables should be ferruled at both ends with cable code markers and heat shrinking sleeve on top, as per cable numbers indicated in the suppliers drawing.
- 1.6.12.5 All equipment, terminals leads and all power control, lighting and other cables should be crimped with Dowell's make insulated ring tongue terminals on both sides.
- 1.6.12.6 Red lights on both the directions of motion of traverser should be provided outside the driving cabin on top, which shall be interlocked with the drum controller. The light shall switch on whenever the drum controller is on any notch in either direction. Siren (24V) with spring loaded control switch in the cabin should be provided.
- 1.6.12.7 24V lighting arrangement should be provided at both ends of the traverser to facilitate locking of rails.

1.6.13 Earthing

- 1.6.13.1 Earthing should be effected through track, rails and structure. As such all the electrical equipment mounted should be connected to the structure by means of electrical earthing links. The structure in turn should be made electrically continuous by providing jumpers over rivetted or bolted joints. Equipment fed by flexible cables should be earthed by means of spare cores provided in the flexible cables.
- 1.6.13.2 All armoured cables should be terminated using cable glands for holding the cable firmly as well as for ensuring earth continuity of the armours. Earth continuity should be ensured by providing copper cable up to the current collector of the shrouded earth conductor (identified by green colour). Earth continuity cables between structures, electrical equipments etc. are to be made by providing non ferrous contact surface.

1.6 ELECTRICAL DETAILS (Applicable for Non VVVF Drive Traverser)

1.6.1 Scope of Supply

The scope of supply relating to electrical portion should cover the following components:

- 1.6.1.1 Down shop leads with supporting masts. (See Schedule-I).
- 1.6.1.2 Main current collection gear.
- 1.6.1.3 Power disconnecting switch immediately after the main current collection gear.
- 1.6.1.4 Master controllers.
- 1.6.1.5 Motors.
- 1.6.1.6 Protective switch gear.
- 1.6.1.7 Motor control panels.
- 1.6.1.8 Resistors.
- 1.6.1.9 Brakes.
- 1.6.1.10 Limit Switches.
- 1.6.1.11 Power and control cables.
- 1.6.1.12 Lighting distribution panel.
- 1.6.1.13 Lighting fixtures with lamps, ventilating fan.
- 1.6.1.14 Indicating lamps and push buttons socket outlets etc.

All sundry erection materials required for installation and connecting up electrical equipment with cable laying and fixing accessories should be included in the price of the traverser.

1.6.2 Standards

- 1.6.2.1 All equipment and materials should comply with appropriate Indian Standards (latest) or National Standards of the country of origin, provided the latter are equivalent to or better than the former. The equipment should 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 the electrically operated traversers. For items for which Indian Standards are not published, National Standard of the country of origin shall be applicable. All latest standards indicated in Annexure- 'F' of IS: 3177-1999 (or latest) should be applicable in general.

- 1.6.2.2 The equipment should be designed and selected to facilitate inspection, cleaning,, replacement and repair, and for use where continuity of operation and safety are important considerations.

1.6.3 Atmospheric Conditions

- 1.6.3.1 The ambient temperature at the site at which the traverser will be installed may vary from -5° C to + 50° C over the year. The relative humidity may be as high as 98%. The atmosphere is expected to be dusty. The traverser offered shall be suitably tropicalised to work under these ambient conditions without any adverse effect on its performance.

1.6.4 Power Supply Conditions

- 1.6.4.1 Power shall be available at 415 Volts 3 Phase 4 Wire 50 Hz. The following voltages should be used in the traverser.
- (i) 415 +/-10% volts, 3 Phase, 50 +/-3% Hz AC - For drive motors.
 - (ii) 230+/-10% volts, Single Phase, 50 +/-3% Hz AC - For control circuits and lighting.
 - (iii) 24 +/-10% volts, Single Phase, 50 +/-3% Hz AC - For hand lamp socket outlets.
- 1.6.4.2 The voltages (ii) & (iii) above shall be obtained through individual separate transformer units connected to 3-phase, 415 volts A.C. supply.

1.6.5 Down Shop Leads And Current Collection Gear

1.6.5.1 M.S. Angle DSL

- 1.6.5.1.1 M.S. angle down shop leads shall consist of 4 conductors 3 for three phases and one for earth conductor supported on existing structure with suitable brackets and insulators. The leads shall be adequate size so that the current density on the lead does not exceed 0.42 Amp per sq.mm. Minimum size of M.S. angle iron shall be 50 x 50 x 6mm. Phase colour code should be used i.e. red, yellow and blue. The earth shall be marked green. The calculations of current density in the leads shall be given with the offer.
- 1.6.5.1.2 The DSL shall be at suitable height to allow free movement of Traverser for all required motions. The leads shall have uniform even contact surface throughout its length. The DSL shall be at safe clearance from electric lines and structure members and shall be adequately insulated as required. Successful tenderer shall visit the site for installation for study of local conditions and designing of DSL suitable for the place.
- 1.6.5.1.3 The current collectors shall be graphitic cast iron having self lubricating and good contact conductivity to suit DSL as provided or as existing. The conductors shall be of self aligning type having full face contact to collect the current to meet maximum electrical load of the Traverser. The collectors shall be mounted on a suitable brackets on the Traverser on DSL side and it should not infringe with any adjoining members. Collectors shall be designed for ease of maintenance and replacement so that they are readily accessible. Calculations to show that section of collector is adequate shall be furnished along with the offer.
- 1.6.5.1.4 The current carrying shunts on all collectors shall be designed so that there is no danger of contact with adjacent collectors and it shall be suitable for rainy season also. Armoured weather proof 1.1 KV grade copper cable of adequate size shall carry current from collectors to the isolating switch on the control panel of Traverser. All electrical connections shall be through crimped sockets/thimbles of adequate size. The cables shall be of reputed make and its size and current carrying capacity shall be indicated.
- 1.6.5.1.5 The Traverser for which DSL are not included against clause 10, Schedule-I in the scope of supply, suitable collectors to suit existing DSL should be provided in the Traverser during erection. The provision should be confirmed in the offer.
- 1.6.5.1.6 Bare conductors shall not be mounted on the Traverser bridge. Only flexible Festoon type cable made of copper multi standard conductor of adequate size, elastomer grade insulation in flat/round configuration shall be used as bridge conductors. Well designed trolleys and supporting cable clamps shall be used. Festoon cables for free movement for longer lift. This is applicable for each type of current collection system.

OR

ALTERNATE-I**1.6.5.2 SPECIFICATION FOR SHROUDED BUS BAR CONDUCTOR**

- 1.6.5.2.1** The DSL shall be at suitable height to allow free movement of traverser. The leads shall have uniform even contact surface throughout its length. The DSL shall be at safe clearance from electric lines and structural members and shall be adequately insulated as required. Successful tenderer shall visit the site of installation for study of local conditions and design of DSL suitable for the place.
- 1.6.5.2.2** The current carrying shunts from all collectors shall be designed so that there is no danger of contact with adjacent collectors and it shall be suitable for rainy season also. Current collectors shall be provided with multistrand 1.1 KV grade PVC insulated cables. All cables from the current collector shall be terminated in a junction box. Armoured weather proof. 1.1 KV grade copper cable of adequate size shall carry current from collectors to the isolating switch on the control panel of traverser. All electrical connections shall be through crimped sockets/thimbles of adequate size. The cables shall be of reputed make and its size and current carrying capacity shall be indicated.
- 1.6.5.2.3** Shrouded Bus Bar conductor shall be of M/s INSUL-8 UK make or 'SAFE TRACK' brand of M/s Sushil Engineering Corporation, Mumbai or 'Safeline' brand of M/s Stromag Engineers Ltd, Mumbai and shall conform to the following.
- 1.6.5.2.3.1** The conductor system shall be finger safe to IP-21 with necessary supporting technical evidence of same. The conductor material shall be of Electrolytic copper, 250A capacity insulated by a high impact compound material which shall have a step/groove shrouded all along its length for effective holding of the conductor system. PVC should withstand 2.5 KV for one minute duration and flashover voltage of more than 7.5 KV.
- 1.6.5.2.3.2** The conductor shall not be less than in 4m length to be jointed with joining pins of the same material as the conductor. These conductors shall be supported by way of a single piece moulding, hanger clamps with bolt fixing of unipole design. The conductor should be at an interval, not more than 1000mm.
- 1.6.5.2.3.3** The current collector shoe should be of sintered copper Graphite material mounted on insulated covering of high grade electrical and mechanical strength.
- 1.6.5.2.3.4** Current collector should have stainless steel arms and stainless steel spring for pressurised contacts and should be able to withstand variation of ± 100 mm in the vertical plane ± 100 mm in the horizontal plane.
- 1.6.5.2.3.5** Shrouded bus bar system should be complete with all accessories e.g. end caps, joint covers, power feed kit, jointing tool etc.
- 1.6.5.2.3.6** Shrouded busbar should be suitable for use in the dusty atmosphere of shop floor and should be suitable to withstand traverser vibrations. The maintainability must be extremely good.
- 1.6.5.2.3.7** The shrouded bus bar should be protected by metallic hood on the top to protect from rain water and sun rays. The hood should be made of mild steel and shall be protected by hot dip galvanising. The hood should be assembled at site by making use of stainless steel hardware and no welding/brazing should be done for assembly. The top surface of the hood shall be curved to prevent water stagnation
- 1.6.5.2.4** The current collector arm should be made from aluminium 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.
- 1.6.5.2.5** Shrouded system shall be covered under extended warranty for a period of 36 months from the date of supply or 24 months from the date of commissioning as against the standard warranty clause.
- 1.6.5.2.6** Prices for necessary wearing components for maintenance shall also be quoted by the bidders.

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- 1.6.5.2.7** The current carrying shunts on all the collectors should be designed so that there is no danger of contact with adjacent collectors.
- 1.6.5.2.8** The collectors should have adequate current carrying capacity. All collector should be mounted on rigid steel masts erected on one side of the bay, suitably spaced but not less than 15 meters apart, without infringing the existing feeding lines and tracks, and suitable insulated therefrom. Collectors should be designed for ease of maintenance and fitment so that they are readily accessible. Calculations to show that section of the collector is adequate should be furnished along with the offer.
- 1.6.5.2.9** Tenderer shall quote separately for current collection systems as per clauses 44.1 to 44.8 above. Any length depending upon user's requirement will be procured along with the traverser.

1.6.6 Motors

- 1.6.6.1** All motors should be of Siemens, A.B.B., Crompton, NGEF, Marathon or Bharat Bijlee make, totally enclosed slipring type and designed for S4 class of duty with 150 starts per hour. Suitable for continuous duty rating for traverser application. The type of enclosure should be IP-55 for terminal box. The motors should be suitable for 50° C ambient temperature and 415 +/- 10%, 50 cycles +/-3%, 3 phase, 3 / 4 wire AC supply. The motors should generally conform to IS-325 (latest) and should be of 6 or 8 pole type. However, where the IS specification is at variance with this specification, the provisions made in this specifications shall prevail.
- 1.6.6.2** The winding should be of electrolytic copper wire specially insulated and impregnated to withstand moist tropical climate i.e. temperatures up to 50° C and humidity up to 98%.

1.6.6.3 Horse Power

- The torque factor of motor should within the range 1.3 to 1.5. Detailed calculation for the Horse Power of the motor selected should be submitted by tenderer with the offer. The frame size of motor should be indicated in the offer and it should take into account derating required for 50° C ambient temperature and voltage range of 415 V +/-10%. For calculation of motor power, derating factor for both these operating conditions should be taken as 0.8. Catalogues of the manufacturers of motors proposed to be supplied should be furnished with the offer.
- 1.6.6.4** All motors should be provided with insulation of Class 'B' for stator and Class 'F' for rotor. The maximum permissible winding temperatures measured by resistance method should not exceed 115°C and 135°C respectively.
- 1.6.6.5** The pull out torque of the motors at rated voltage and frequency range should be as per IS: 3177 (latest).
- 1.6.6.6** Type and routine test charts of the motors selected should be submitted to the inspecting authority during inspection.
- 1.6.6.7** Brush holder assembly should be complete unit which can be easily replaced as a whole.
- 1.6.6.8** The terminal box should be provided on the top or front of the motor for easy accessibility. The terminals should be large enough to accommodate aluminum conductor cables, if necessary. The cable sizes should be decided after considering derating due to grouping and ambient temperature of 50°C.

1.6.7 Traverser Controls

- 1.6.7.1** Traverser controls will be operated through master controller and actuated through contactors, time delays and rotor resistors.
- 1.6.7.2** Cam type master controllers with joy stick type levers should be used and should be provided with dead man push button. Controller should be provided with off-position interlock. A minimum of seven steps in either direction should be provided. The operating lever of the controller should move freely between the notches, should locate definitely, and should remain in position on each notch unless pushed to another position.

- 1.6.7.3 The circuit should be so designed that brakes come into operation immediately in the event of tripping of the main circuit breaker.
- 1.6.7.4 Controllers should be so arranged that the contacts and terminal arrangements are readily accessible for inspection and maintenance purposes.
- 1.6.7.5 Auxiliary contacts to provide an interlock between the controller and circuit breaker so that circuit breaker can not be closed unless the controller is in off position, should be provided.
- 1.6.7.6 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, should also be provided.
- 1.6.7.7 Controller in off position should open all supply lines of the motor.

1.6.8 Contactors

- 1.6.8.1 Rating of contactors should be higher than the respective motor full load current at the specified duty cycle. The directional contactors of all motions should be suitably interlocked. All contactors should be AC-4 class of duty and of Siemen's, A.B.B., B.C.H, L&T, Schneider make only. Necessary test certificates of the manufacturer shall be submitted to the inspecting authority in respect of its life & rating.

1.6.9 Resistors

- 1.6.9.1 Resistors should be adequately protected to prevent accidental contact.
- 1.6.9.2 The resistors should be air-cooled, robust, heavy duty, corrosion resistant, stainless steel, punched grid type. The resistance boxes should be placed in racks and it should be possible to remove independently any selected box. Spacing recommended by the resistor manufacturer should be maintained. The racks should be robust in construction to withstand vibration due to traverser operation.
- 1.6.9.3 All the resistors fitted should have 10 minutes rating.
- 1.6.9.4 Resistor housings shall be weather proof and they shall be adequately protected. The electrical clearance between resistors and earthed metal shall not be less than 100mm. Cable ends should be crimped with Dowell's make copper tubular terminal ends.
- 1.6.9.5 The temperature of resistor elements should not exceed 275° C at specified duty.

1.6.10 Circuit Protective Switch Gear

- 1.6.10.1 One triple pole manually operated moulded case circuit breaker (MCCB) serving as main incoming protective device, fitted with no volt, short circuit and overload releases and rated to carry full load currents, should be provided. The circuit breaker should have adequate rupturing capacity to withstand and clear fault current of the order of 30KA. The circuit breaker should be located inside the cabin, in such a way that adequate clearance is provided as per Indian Electricity Rules.
- 1.6.10.2 The trip circuit breaker should be designed such that it should prevent the circuit breaker from being closed when the main contactor fails to open, although the controller has been brought to OFF position.
- 1.6.10.3 For protection of motor against over-loads, adjustable inverse time lag manually re-settable magnetic relays of the oil-dashpot type should be provided. These relays should be mounted in the contactor panel and should be set to trip the circuit of the motion being controlled when current exceeds 200% of normal value for more than 10 seconds.
- 1.6.10.4 Motor Feeders should be protected with manually operated manually operated MCB for short circuit and over load protection. No volt trip device and under voltage protection and single phasing-cum-phase reversal preventor should also be provided.
- 1.6.10.5 MCB's should be provided for the following branch circuits:
 - (i) Lighting and hand lamp socket outlets.
 - (ii) Control circuits.
 Both the above mentioned MCB's should be installed in the driver's cabin or near the control panel.

- 1.6.10.6 To indicate whether power and control sources are 'ON' indicating lamps should be provided in the operators cabin.
- 1.6.10.7 A mushroom head type 'OFF' push button should be provided in the operator's cabin so that the main incoming breaker can be tripped under any emergency conditions by pressing the mushroom head. A pilot lamp incorporated in the control circuit shall glow when any of these switches is operated.

1.6.11 Control Panel

- 1.6.11.1 All power and auxiliary contactors, individual over load relays, time relays etc. should be mounted in a sheet metal cubicle with lockable hinged doors. The door hinges should be of such type that while undertaking repair work inside the panel the entire door can be lifted off and removed for better access inside the panel. Each motion should have its individual panel. Interior of the panel should be dust and vermin proof. All control panels should be fully weather proof type. One tube light lamp interlocked with panel door should be provided which shall switch on when panel doors are opened.
- 1.6.11.2 Panels should be front wired with readily accessible terminal blocks for making connection to the external equipment. Panels should be pre-wired upto the terminal strip. Single core multistrand copper conductor should be used for control circuit wiring in the panel.
- 1.6.11.3 All contactors etc. should be mounted securely in a vertical arrangement, with due consideration for the vibration encountered in traverser operation. The bottom-most row of equipment mounted inside the panel, except terminal strips, should be atleast 200mm above the panel bottom cover to facilitate inspection and repair.
- 1.6.11.4 All the equipment should be so mounted in the panel as to enable easy removal and replacement from the front.
- 1.6.11.5 A terminal strip should be fixed inside the panel, and preferably horizontal, leaving enough space underneath the panel for termination of cables in a convenient manner. Power terminals blocks should be separated from each other by means of replaceable insulated spaces. Terminals blocks should have enough clearance to avoid tracking. A minimum of 20% spare terminals should be provided in terminals trips.
- 1.6.11.6 Power terminals blocks should be segregated (phase-wise) and all blocks should be separated from each other by means of replaceable spacers.
- 1.6.11.7 All equipment inside the panel should have permanent identification labels in accordance with the circuit diagram, as also the power and control terminals.
- 1.6.11.8 Terminals blocks and spaces should be epoxy moulded (fire retardant) material, should be robust in construction and mounted in such a way that there is no possibility of cable connectors getting loose due to vibrations.
- 1.6.11.9 Sheet steel used for fabrication of panels should have minimum thickness of 2.0mm. Panel support should be such that the vibrations generated by movement get damped.
- 1.6.11.10 The electrical clearance in air between all live parts of different polarity and voltage, and between live parts and earth, should not be less than 75mm.
- 1.6.11.11 Contactor panels should be well braced to the structure and each panel should be provided with adequate number of lifting lugs.
- 1.6.11.12 One ammeter (0-150 A) of reputed make should be fitted in each phase and a volt meter (-) 500V with rotary switch to read voltage between the phases, should be provided.

1.6.12 Socket Outlets

- 1.6.12.1 Minimum of four socket outlets for hand lamps be provided in the driver's cabin. Industrial type metal clad plug and socket should be provided in the panel also.

1.6.13 Lighting, Cabling & Identifications of Circuits

- 1.6.13.1 Lighting should be provided in the driver's cabin, and areas where control panels and resistors will be installed. MCB's of reputed make should be used for lighting distribution.

- 1.6.13.2 All wiring for power, controls, lighting etc. should be carried out with 1.1 KV grade PVC armoured cables except trailing flexible cables on which armouring should not be provided. Power cables should be minimum 4 mm² copper. Cable cores should be of standard construction, Control cables should be minimum 2.5 mm² copper.
- 1.6.13.3 Labels of a permanent nature made of etching/engraving on aluminum plate of minimum 1.0 mm thickness should be provided on supports of all switches, fuses, contactors, relays, etc. to facilitate identification of circuits and replacement. All panels, controllers, resistors, etc. should be properly marked for each motion.
- 1.6.13.4 All equipment terminals and all power, control, lighting and other cables should be ferruled at both ends with cable code markers and heat shrinking sleeve on top, as per cable numbers indicated in the suppliers drawing.
- 1.6.13.5 All equipment, terminals leads and all power control, lighting and other cables should be crimped with Dowell's make insulated ring tongue terminals on both sides.
- 1.6.13.6 Red lights on both the directions of motion of traverser should be provided outside the driving cabin on top, which shall be interlocked with the drum controller. The light shall switch on whenever the drum controller is on any notch in either direction. Siren (24V) with spring loaded control switch in the cabin should be provided.
- 1.6.13.7 24V lighting arrangement should be provided at both ends of the traverser to facilitate locking of rails.

1.6.14 Earthing

- 1.6.14.1 Earthing should be effected through track, rails and structure. As such all the electrical equipment mounted should be connected to the structure by means of electrical earthing links. The structure in turn should be made electrically continuous by providing jumpers over rivetted or bolted joints. Equipment fed by flexible cables should be earthed by means of spare cores provided in the flexible cables.
- 1.6.14.2 All armoured cables should be terminated using cable glands for holding the cable firmly as well as for ensuring earth continuity of the armours. Earth continuity should be ensured by providing copper cable upto the current collector of the shrouded earth conductor (identified by green colour). Earth continuity cables between structures, electrical equipments etc. are to be made by providing non ferrous contact surface.

2. GENERAL ELECTRIC SPECIFICATION

- 2.1 The provision of this General Specification shall apply, where ever relevant.
- 2.2 All equipments and material shall comply with appropriate Indian Standards (latest), International Standards or National Standards of the country of origin provided the latter are equivalent to or better than the former. The tenderer shall indicate the Standards applicable. The following standards are applicable in particular.
(Corresponding International Standards like ASA, NEMA, BSS, DIN etc. may also be quoted).
- | | |
|-----------------------|--|
| IS :325-1979 (latest) | - Three phase induction motors (corresponding to IEC pub-34-1) (Latest). |
| IS :1248 (Latest) | - Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest). |
| IS :1231 (Latest) | - Dimensions of three phase induction motors (corresponding to IEC Pub-72-1) (Latest). |
| IS :1271 (Latest) | - Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub-85) (Latest). |
| IS :6875 (Latest) | - Push Buttons and related control switches corresponding to IEC |

Pub/73) (Latest).

- | | |
|-------------------|---|
| IS :375 (Latest) | - Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring. |
| IS :996 (Latest) | - Single phase small AC and universal electrical motors. |
| IS :1356 (Latest) | - Electrical equipment of machine tools. |
| IS :2516 (Latest) | - Circuit breakers (corresponding to IEC Pub-56) (Latest) |

- 2.3** Unless specified in the main specification, the AC motors and starters shall be of the following type. Tenderer is, however, free to give alternative proposal along with justification, if in his view alternative proposal is warranted by site conditions. Type of motor type of starter.

	TYPE OF MOTOR	TYPE OF STARTER
2.3.1	Any type of AC motor starting current of which does not exceed 75 amps.	Direct on line.
2.3.2	AC squirrel cage, introduction motors, starting current of which is above 75 amps. if started direct on line	Star delta or Auto transformer type.
2.3.3	AC slipring type motor	Resistance type air/fan Cooled
2.3.4	AC synchronous or synchronous induction motor.	Suitable makers standard.
2.3.5	DC motor	Resistance type/Thyristor type.

- 2.4** The control gear for AC/DC motors shall incorporate the following protection devices as concomitant accessories.

- 2.4.1 No Voltage Protection** - No voltage protection shall be provided so that machine will not start up again by itself when, following an interruption the supply is restored.

- 2.4.2 Short Circuit Protection** - To protect against short circuits due to insulation failure of faulty connections HRC fuses shall be provided for each motor. The rating of the fuse shall be such as to take care of the over current due to motor starting.

- 2.4.3 Over Load Protection** - To prevent motors from overloading, overload protection shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.

- 2.4.4 Single Phasing Protection** - A separate current sensitive delayed action single phasing preventor shall be provided for each motor separately. Overload protection shall not be treated as single phasing preventor.

- 2.5** Control equipment shall be mounted in separate drip proof enclosures. Control enclosures and compartments are to be so designed as to give adequate protection against ingress of dust, oil, coolant or chips. All control devices like contractors etc. shall be front mounted on a rigidly fabricated metal panel for ease of operation. All other electrics shall be installed that they are readily accessible when the doors and covers are opened. Hinged covers shall be interlocked with the machine tool control to prevent operation of the machine when cover is open.

- 2.6** The motor shall be totally enclosed with or without fan cooled frame. Screen protected drip proof type motor may be provided if it is mounted inside protective enclosures.

- 2.7** The electrical equipments shall comply with the requirement of Indian Electricity Act and Rules (latest).

- 2.8** All instruments shall be better than Industrial Grade "A" switch board. The range of the instrument shall be such that the maximum load expected in the circuit shall produce a

deflection of 60% to 80% of the full scale.

2.9 The supplier shall furnish 3 sets of complete electrical and electronic wiring diagrams in full details to enable the maintenance staff to locate faults in the circuits, 3 sets of part catalogues, maintenance manuals operating instructions with details of coils and windings, used in the equipment to facilitate repairs and maintenance should also be supplied.

2.10 For main motor class minimum "B" Class insulation shall be provided. If any other class of insulation is proposed, detailed justification for providing different class of insulation shall be given.

2.11 Motors shall be designed to withstand frequent starts, stops and reversals as demanded in the operation of the machine.

2.12 Two earthing terminals shall be provided on all electric motors including the control gear.

2.13 POWER SUPPLY

2.13.1 The machine shall be suitable for operation on 415 volts 3 phase 50 cycles AC 3 wire or 4 wire system with neutral solidly earthed. The supply voltage may vary up to $\pm 10\%$. The frequency may vary up to $\pm 3\%$. However, full rated power of the motor shall be available at the lower voltage. Firm should confirm satisfactory performance of the machine at incoming power supply in the range 415V $\pm 10\%$ and 50HZ $\pm 3\%$ frequency or should provide voltage stabilizer as specified against clause 2.13.2 below of required capacity.

2.13.2 The voltage stabilizer, if required, shall conform to :

- i) Input Voltage - 320 to 460 volts 3 phase 4 wire supply.
- ii) Out put Voltage - 415 volts
- iii) Regulation - $\pm 1\%$ from No load to Full load.
- iv) Rate of correction - 20 volts per second per phase.
- v) Wave form distortion - NIL
- vi) Efficiency - Not less than 97%.
- vii) Winding and class of insulation - Copper wire wound with "B" class of insulation or better.

2.13.3 In case of machines equipped with NC, SS, CNC, Thyristor controlled devices and other sophisticated electronic gadgets including microprocessors etc. which are susceptible to power line spikes and surges, a suitable voltage stabilizer and ultra isolation transformer of adequate capacity to cover for the entire electrical load of the machine shall be offered as a concomitant accessory conforming to Specification for voltage stabilizer as mentioned in clause 2.13.2 above and isolation transformer to the parameters mentioned below.

- i) Transformer ratio - 1:1
- ii) Winding - Copper wire wound with "F" class insulation or better.
- iii) Protection - To arrest spikes and surges to the order of 3 KV for 200-400 micro seconds duration.
- iv) Common mode rejection ratio - 120 dB
- v) Isolation - Capacitance 005 Pf: resistance greater than 1000 Mega Ohms.

13.4 Voltage stabilizer shall be equipped with a protective relay to trip to trip the AC power supply to the machine instantaneously with audio and visual indication to the operator. Settings of the protective relay for low and high voltage shall be 320 volts and 460 volts respectively.

2.14 ATMOSPHERIC CONDITIONS

2.14.1 The ambient temperature at the site at which the machine will be installed may vary from -4°C to $+50^{\circ}\text{C}$ over the year. The relative humidity may be as high as 98%. The atmosphere is

expected to be dusty. The machines offered shall be suitably tropicalised to work under these atmospheric conditions without any adverse effect on their performance.

- 2.15 The temperature rise shall not reach such a value that there is a risk of injury to any insulating material or adjacent parts.
- 2.16 The drive shall be capable of operating at any one of the speed required independent of the load in accordance with the requirements of the machine.
- 2.17 Information/data shall be furnished as per the format of submission of technical bid Annexure– A.

3. GENERAL CHARACTERISTIC (Wherever Applicable)

3.1 RIGIDITY AND STABILITY

- 3.1.1 The machine shall be robust, rigid and of sturdy construction. It shall be designed to meet heavy duty demands of various operations on the machine under normal Workshop environment for such machines. It shall be free for vibrations even when working at full capacity.
- 3.1.2 All machine castings shall be made of close grained high grade cast iron like Mechanite or equivalent materials meeting IS-210 Standards to ensure durability and rigidity. The casting shall be thermal stress relieved to ensure stability and continued accuracy.
- 3.1.3 All machine fabrications of critical load bearing assemblies like beds, columns etc. shall be adequately strengthened and stress relieved.
- 3.1.4 Change in ambient temperature shall not affect the performance of the machine.
- 3.1.5 There shall be no change in the performance of the machine either on switching on the machine or after continuous running.
- 3.1.6 There shall be no resonant vibrations throughout the working range of the machine at all load levels.

3.2 SAFETY CONTROLS

- 3.2.1 The machine shall incorporate safety devices to provide protection to the operator and machine against all possible operational and machinery failures.
- 3.2.2 Suitable interlock shall be provided to prevent machine operations in the event of:
 - 3.2.2.1 Faulty sequence of operation.
 - 3.2.2.2 Fluctuation in supply voltage.
 - 3.2.2.3 Resumption of power supply after power failure.
 - 3.2.2.4 Non-positioning of safety guards.
 - 3.2.2.5 Failure of hydraulic system (where applicable)
 - 3.2.2.6 Failure of lubricating system (In case of automatic including drop in pressure lubrication)
- 3.2.3 A fault or damage in the control circuit or interruption re-establishment after an interruption of fluctuation in whatever manner in the power supply to the machinery must not lead to dangerous situations in particular.
 - 3.2.3.1 The machinery must not start unexpectedly.
 - 3.2.3.2 The machinery must not be prevented from stopping if command has already been given.
 - 3.2.3.3 No moving part of the machinery or piece held by the machinery shall fall or be ejected.
 - 3.2.3.4 The protection devices must remain effective.
- 3.2.4 The machine shall be fitted with an emergency stop device to enable actual or impending danger to be averted. This device must be:-
 - 3.2.4.1 Conveniently located.
 - 3.2.4.2 Clearly identifiable.
 - 3.2.4.3 Stop the machine as quickly as possible without causing additional hazards.
 - 3.2.4.4 The emergency stop must remain engaged. It should be possible to disengage it only by

appropriate operation. Disengaging the control must not restart the machinery but only permit restarting.

3.2.5 Safety features shall also include.

3.2.5.1 Safety device against overload for all mechanical and electric items to the extent possible.

3.2.5.2 Safety stops against over-running of slides.

3.2.6 Guard and protection devices shall protect exposed persons against risks related to moving transmission parts (such as pulleys, belts, gears, rack and pinion, shafts etc.) and moving parts directly involved in the process to the extent possible. This shall meet the following requirements:-

3.2.6.1 Be of robust construction

3.2.6.2 Not give rise to any additional risk

3.2.6.3 Not be easy to by pass or render non-operational

3.2.6.4 Be located at an adequate distance from danger zone

3.2.6.5 Cause minimum obstruction to the view of the production process.

3.2.6.6 Rigidly connected and not prone to rattling

3.2.6.7 Enable essential work to be carried out without the guard or protection device having to be dismantled

3.2.7 A load meter shall be provided to indicate the load on the machine. The meter shall have a suitable mark to indicate the maximum load the machine can take. Full details of the above and other safety features indicating how each one functions must be explained in the offer.

3.3 OPERATIONAL CONTROLS

3.3.1 The operation of the machine shall be by push buttons or levers. The basic rules for the direction of operation of controls and the corresponding direction of movements of the machine tools shall be as per IS: 2987-1985 (or latest).

3.3.2 The control devices shall be

3.3.2.1 Clearly visible and identifiable.

3.3.2.2 Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity.

3.3.3 CNC Controls (where applicable) - The general requirements of CNC controls are given at Schedule-IV.

3.4 LIGHTING

3.4.1 Integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity shall be provided.

3.4.2 The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to lighting provided by the manufacturer.

3.4.3 Integral parts requiring frequent inspection and adjustment and maintenance areas must be provided with appropriate lighting.

3.4.4 The machine lighting should be of low voltage so as to prevent any hazard to the operator.

3.5 MACHINE MAINTAINABILITY

3.5.1 The machine shall be so designed as to require minimum possible maintenance and to give trouble free service.

3.5.2 All assemblies/parts of the machine shall be easily accessible for maintenance.

3.5.3 The machine shall not require major dis-assembly for checking and replacement of a particular part, especially for parts requiring periodical check up and replacement.

3.5.4 The manufacturer must provide means of access e.g. stairs, ladders, cat walks etc. to allow access safely to all areas used for production, adjustments and maintenance operations.

3.6 WEAR COMPENSATION ADJUSTMENT

3.6.1 The original built in accuracy of the machine shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings

and load screws. The system of adjustments incorporated shall be explained in the offer.

3.7 COOLANT SYSTEM (WHERE APPLICABLE)

- 3.7.1 Suitable coolant system with pump, motor, tank, filter etc. shall be provided. The coolant pump shall be as per IS: 2161-1962 (or latest). The filter shall be of reusable type and indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare. Details of the coolant system shall be indicated in the offer.
- 3.7.2 The supply of coolant shall be in ample volume. Provision to re-circulate the coolant shall be available. A chip and coolant tray shall be provided. The volume of coolant flow shall be indicated. It shall be adjustable.
- 3.7.3 An enclosure shall be provided to prevent the coolant from splashing outside the machining zone. Details of enclosure shall be provided. Specific requirements of coolant system for grinding machines etc. shall be clearly indicated.

3.8 LUBRICATION SYSTEM (WHERE APPLICABLE)

- 3.8.1 The machine shall be provided with an automatic lubricating system for ensuring delivery of adequate quantity of lubricant to areas requiring continuous lubrication. Suitable arrangements must be provided for indication of failure of the lubricating system.
- 3.8.2 The system shall be provided with interlock to prevent machine operating/starting in the event of the failure lubrication system.
- 3.8.3 Reusable filters capable of filtering chips, dust particles etc. shall be provided. Indicators for showing clogged condition of filters shall be available. The filters shall be indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
- 3.8.4 Lubrication and filter cleaning chart shall be displayed on a metal plate at a conspicuous location on the machine indicating :-
- Specific location of points on the machine to be oiled lubricated/greased.
 - Periodicity of lubrication of these points.
 - Filter to be cleaned.
 - Periodicity of cleaning filters.
 - Periodicity of replenishing lubricating oil for the centralized system.
 - Any other similar relevant information.
- 3.8.5 Points where manual lubrication is needed shall be separately indicated. Frequency of lubrication shall be also clearly mentioned.
- 3.8.6 Lubricating oils used in the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils manufactured by various Indian Oil Companies.
- 3.8.7 First fill of lubricating oils used in the machine shall be provided with the machine. Details of lubricating system provided shall be indicated.

3.9 PNEUMATIC SYSTEM (WHERE APPLICABLE)

- 3.9.1 The compressed air supply will be provided by the customer at the machine within pressure range of 4.5-7.5 kg/cm² and a moisture content or 1000 ppm. The pneumatic system of the machine should be designed accordingly. An alarm shall be provided for low air pressure.
- 3.9.2 Suitable filter/moisture trap shall be provided by the contractor in the system of pneumatic air intake. The filter shall be reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be easily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
- 3.9.3 Air pressure regulator, if necessary, shall be provided by the tenderer.
- 3.9.4 The make of pneumatic control equipment shall be of reputed make. The makes shall be

indicated.

3.10. HYDRAULIC SYSTEM (WHERE APPLICABLE)

- 3.10.1 Hydraulic circuit must be equipped with the following safety and inspection equipments:
- (a) Pressure gauges at all places, where pressure has to be set up or inspected.
 - (b) Safety valves for hydraulic circuit if relief valve does not fulfill this function.
 - (c) Equipment for checking of temperature in the circuit or in the pump wherever necessary.
 - (d) Arrangement to show if the filters (including those in the pump set) are choked and need cleaning. The filters shall be of reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
 - (e) Alarm for low oil level.
- 3.10.2 The sump aggregate shall have the following:
- (a) Oil level sight gauges or any other equipment showing the minimum and maximum oil levels in sump.
 - (b) A drain plug at the lowest portion of the tank.
 - (c) It shall be possible to drain the oil from the tank without disconnecting any pipes or other fittings.
- 3.10.3 The temperature of oil in hydraulic circuits shall not exceed 60 degrees C in any case. Suitable arrangement shall be incorporated to ensure that the oil is not overheated under local weather conditions at continuous normal working of the machine.
- 3.10.4 Facilities for bleeding of air in case of air lock shall be provided.
- 3.10.5 The hydraulic reservoir, pump and allied equipment shall be suitably segregated from the machine in order to remove major source of heat.
- 3.10.6 Hydraulic oils used on the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils supplied by various Indian Oil Companies.
- 3.10.7 First fill of hydraulic oils used on the machine shall be provided with the machine.

4.0 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 traverser, 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 traverser. 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 & maintenance instructions for both electrical and mechanical equipment, trouble shooting guide for the traverser.
 - ii. Technical & Maintenance manual for Lubrication System.
 - iv. Wiring diagram, in which length of wires must be mentioned, hard copies in A-3 size as well as soft copy in PDF format.
 - 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. Lay out drawings in A-1 size, which clearly shows the position of all type of electrical/mechanical components in machine.

Note: All manual and literature should be in English/Hindi.

5.0 SPARES

5.1 Two lists of recommended perishable and non-perishable spares required for normal maintenance to cover complete range of mechanical, hydraulic and electrical equipments including controls on double shift working basis for two years should be furnished and quoted separately. The quantities should relate to, in case of non-perishable spares, to two years normal maintenance. And in case of perishable spares to the duration of its shelf life or two years whichever is less. Shelf life should be indicated with the quotation for spares. It may be noted that it is the responsibility of the bidder to ensure that exhaustive list of spares is quoted which will form part of evaluation. In case any spare other than those quoted or quantity of any spare more than that quoted in their bid is consumed double, the cost of same will be deducted from their pending bills. The WBG will be released only after clearance of the cost implication as above.

5.2 Spares shall be supplied along with the machine, if ordered.

6.0 CONSUMABLES:

6.1 The list of consumable spares shall be furnished and quoted along with their unit rate.

6.2 Consumables shall be supplied along with the machine or as per agreed time table, if ordered.

7.0 SPECIAL FEATURES

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

8.0 DEVIATIONS:

8.1 The tenderer shall certify that the offered traverser fully meets the specification. Various design features incorporated in the traverser 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 traverser, 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:

8.2 All Deviations shall be clearly indicated in the deviation statement as per the format of submission of technical bid Annexure-A.

9.0 INSPECTION AND TESTING AT MANUFACTURER'S WORKS:

9.1 The machine shall be inspected and tested during different stages of its manufacture starting from raw material till the completion of machine, by the purchaser or his authorized representative at the supplier's or his sub-supplier's works. The Quality Assurance Programme as per Annexure-I shall be submitted along with the bid. The bidder must submit the exhaustive QAP incorporating the tests as given in Annexure-I along with other tests /stage inspection as followed by them.

9.2 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the traverser maker's or equipment manufacturer's works, and test certificates should be provided if required by the Purchaser or his representative.

9.3 Manufacturers must have suitable facilities at their works for carrying out various tests on the sub-assembly/assembly/Traverser. The tenderer shall clearly confirm that all facilities exist and shall be made available to the inspecting authority.

9.4 A Sample Inspection Chart for inspecting the equipment shall be supplied along with the bid. The inspection chart should indicate all the tests that are carried out during the machine manufacture and also the tests to be offered to inspecting agency. The standard to which this inspection chart conforms should be clearly indicated. Against each test, acceptable limit/ range of values shall be indicated.

9.5 The manufacturer shall produce invoices of bought out item/sub-assemblies to ensure genuineness of such products / verification by the Inspecting agency.

9.6 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.

10. TRAINING:

10.1 Free training by the firm shall be imparted in operation and maintenance of the machine. The training to be imparted shall cover operation, troubleshooting and repair of all mechanical, hydraulic, electrical & electronics equipment.

10.2 Technical experts from manufacturer will fully and adequately provide training to operation and maintenance staff nominated by consignee at the time of commissioning of Traverser. Minimum 4 man days of training at consignee premises will be provided. This training shall include Traverser architecture, systematic methods for quick diagnosis of problems and quicker methods to solve those, domain knowledge and safety procedures to be followed while working with Traverser.

Note: All training should be imparted in English/Hindi only.

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

11.1.1 The contractor shall depute their engineer to take accurate measurement of span of tracks and to assess the local conditions within 15 days of issue of LOA and incorporate the dimensions measured at site and any special requirement that come to light at site, in the GA drawing to be submitted to consignee for approval.

11.1.2 The contractor will be required to submit the following drawings in 2 copies to consignee as per delivery schedule chart specified in Clause 7 of section IV

- (i) The general arrangement drawings containing all information regarding the traverser. These drawings shall be got approved by the Contractor from the consignee and the traverser supplied by them shall conform to the said approved drawings. However, the contractor will be solely responsible for satisfactory performance of the traverser, notwithstanding approval of drawings by consignee.
- (ii) Assembly drawings of equipment for individual drives for long travel, haulage etc.
- (iii) Layout of cabin showing the location and fixing of all the equipment inside it. Such as controllers, operator's seat, protective panel, isolating and control switches, fire extinguishers, exhaust and circulating fans etc.
- (iv) Circuit diagram showing the wiring for the complete traverser including the following:-
 - (a) Electrical equipment layout drawings.
 - (b) Current collection arrangement for the traverser.
 - (c) Lubrication arrangement for the complete traverser.
 - (d) In addition to the above the consignee and /or purchaser may ask for submission of other drawings or documents and structural mechanical and electrical calculations of the traverser, if required.

11.1.3 The supplier shall furnish to the consignee five prints of all erection drawings showing the mark numbers with weights of various items to be assembled at site, Schedule of site bolts, rivets, special welding electrodes, notes on welding technique and erection instructions.

11.1.4 Supplier should give to the consignees the break-up of weights of the traverser for the purpose of unloading at site.

11.2 APPROVAL OF GA & RELATED DRAWINGS:

To be governed by delivery schedule chart specified in Clause 7 of section IV and following stipulations.

11.2.1 General Arrangement Drawings will be sent by the 'Contractor' to the Consignee as per Time Schedule annexed in LOA/PO. The GA drawings shall be approved by the consignee and given back to the contractor, under advice to purchaser, as per the Time Schedule in the LOA/PO.

- 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 IRS terms & conditions. 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 for the purpose of calculations of LD as per IRS terms & conditions. 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 on account 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 clarification 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, except 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 approved by consignee due to clear site not being available etc., the Consignee must inform Contractor and purchaser, 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 regularly inform consignee and purchaser 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 machine to assess the condition of path to be used for movement of trailer.
- 11.3 DISPATCH OF THE MACHINE FROM MANUFACTURER WORKS:**
- 11.3.1 The supplier should normally dispatch the machine only after the site is ready for installation and commissioning of the machine on arrival.
- 11.3.2 In case of delay on part of consignee in providing the clear site or any other facility as specified in the contract to the supplier, the supplier will report the matter to purchaser and consignee. In case of delay in readiness of site on part of consignee, purchaser shall take up the matter with concerned Railway/ PU, and advise supplier accordingly.
- 12.0 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-VI shall be prepared by the consignee and the firms representative indicating the tentative time

schedule for various activities of installation and commissioning. For Indian manufacturers, JRI note shall accompany the bill for 80% payment.

12.1.1 The inspection of foundation, structure etc. and installation of the machine shall be done by authorized representative of the consignee.

12.2 RESPONSIBILITIES OF CONSIGNEE AND BIDDER

12.2.1 The **consignee** shall be responsible for-

- i. Provision of a clear site before arrival of traverser at site.
- ii. Electricity, water and compressed air for installation and commissioning of machine shall be provided free of cost.
- iii. Wherever a road mobile crane has to be arranged by the supplier for material handling, a clear approach for it up to the site has to be provided.
- iv. Clear covered space for storage of material/equipment required for working during installation of the traverser etc.
- v. The consignee shall arrange the test load for prove out of traverser at their end within 7 days of the installation & power connection of traverser.
- vi. Supply and erection of cables from mains to DSL.
- vii. Provision of runway rails as per Schedule-I & Earthing of runway rails.

12.2.2 The bidder shall be responsible for-

- i. Checking of alignment of runway rails at site. Any rectification required, however, will be done by the consignee.
- ii. Advise consignee in time regarding schedule for requirement of infrastructure, resources & facilities required.
- iii. Unloading of the machine on receipt and its movement to the site of installation including provision of road mobile crane.
- iv. Provision of all tools and equipment, technical and unskilled manpower, material handling accessories/ equipment and material for installation and commissioning.
- v. The bidder should ensure the proper earthing for the traverser and its peripherals/accessories.
- (vi) Complete fitting & wiring of all electrical items.
- (vii) Fixing of down shop leads and support masts and earthing of DSL & support masts/DSL, wherever requirement of DSL/support masts are specified in schedule-1.
- (viii) Installation and commissioning of the traverser structure and associated machinery in position and demonstration of the traverser performance after successful commissioning.

12.3 In the interest of early commissioning, the supplier shall ensure that minimum amount of assembly is necessary at site. Site welding and rivetting shall be avoided as far as possible. The supplier, before proceeding with detailed design, shall satisfy himself about the conditions so as to avoid any difficulty at the time of erection.

12.4 Consignee will provide only 415 V+/-10%, 3 phase 50 Hz+3% AC supply to DSL. Electrical work like laying of power/electrical cables, earthing wires & circuit breakers etc from DSL to cabin of traverser as well as within the traverser, with supply of all materials shall also be carried out by the supplier. Requirement of grounding/earthing of traverser and its equipment shall also be incorporated by the supplier during commissioning of traverser.

Electrical work like laying of power/electrical cables & earthing wires from mains to machine control panel (upto 20 meters) as well as within the machine, with supply of all materials shall also be carried out by the supplier.

12.5 The supplier shall demonstrate traverser performance and prove out the claimed capability for successful commissioning at the consignee's works as per clause 3 of Section-IV. The M&P shall be deemed to be "commissioned" at consignee premises on the date when it is tested and meets with the specified capabilities/functions according to the technical specifications. Any delay in providing the "raw material or any other input" for proving out shall not be logged on supplier's account.

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A Joint Commissioning Note (JCN) to this effect shall be made as per the format at Annexure-D of Section-VI. After issue of JCN the performance shall be watched for a period of one month, after which the commissioning certificate shall be issued. The issue of commissioning certificate can not 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 and suitable extension of the warranty period, under intimation to purchaser.

12.6 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.

12.7 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 for establishment of communication with the Pollution Control Board.

13.0 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. 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 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.

13.3 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.

14.0 BOUGHT OUT ITEMS

14.1 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.

14.2 The bidder should clearly indicate that in case of components/sub assemblies taken from foreign manufacturers, the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.

S.No.	Sub-assembly	Make
1.	Motors	NGEF/BBL/ ABB/KEC / CROMPTON / SIEMENS/ ALLEN BRADLEY / HINDUSTAN MOTOR/

		BONFIGLIOLI / ROSSI
2.	Contactors	SIEMENS/L&T/BCH/ABB/SCHNEIDER/C&S
3.	Time Relays	ABB/SIEMENS/BCH/L&T/SCHNEIDER/C&S
4.	Limit Switches	BCH/SIEMENS/L&T/TEKNIC/EUCHENER/HONEYWELL /BALLUFF/PEPPERL & FUCHS/ OMRON / C&S/ SPEED-O-CONTROL /CCE /ELECTROMAG/ANAND SYSTEM
5.	Master Controllers	SPEED-O-CONTROL/CCE/ELECTROMAG /C&S / ANAND SYSTEM
6.	Overload Relays	SIEMENS/ BCH / L&T / SCHNEIDER/C&S
7.	Molded core Circuit Breaker	L&T/ SCHNEIDER/ C&S /SIEMENS/ HAVELLS /BCH/ ABB
8.	Control/Lighting Transformer	CROMPTON/RAINBOW/BAJAJ
9.	Bearings	FAG/SKF/TIMKEN/NTN/KOYO/NACHI/NBC/NORMA/ NRB
10.	Toggle Switches for Lighting Distribution	Kaycee
11.	VVVF Drive	FANUC/ SIEMENS/ ABB/ALLEN BRADLEY/ SCHNEIDER/ MITSUBISHI /L&T/ INDRAMART
12.	Resistors	SPEED-O-CONTROL/ ELECTROMAG /CCE/ C&S /ANAND SYSTEM
13.	Safety Switches	L&T/SIEMENS
14.	Cables	SIEMENS/INDRAMART/HUBERSHNUER/FINOLEX/HA VELLS/POLYCAB/LAPP/ROLIFLEX/RR CABLE/ R K CABLE/ KEI/ C&S/ UNIVERSAL/ CCI/ ICC/ NATIONAL / IGUS/ RALLISON/ PARAGON/ KABEL SCHLEPP
15.	Isolators/load break switch	SIEMENS/L&T/BCH
16.	Push button switch	SIEMENS/L&T/BCH/TEKNIC/C&S
17.	Fuses	ENGLISH ELECTRIC/SIEMENS
18.	Sockets for hand lamps etc.	CROMPTON/BCH/REYROLL
19.	Indicating lamps	SIEMENS/L&T/BCH
20.	Electro Hydraulic Thruster Brake	ELECTROMAG/GALVI/SPEED-O-CONTROL / CCE/ KATEEL/ANAND SYSTEM
21.	DSL and current collector	INSUL-8 / SAFLINE /SAFE TRACK / SAFELINK /SILVER LINE
22.	Wire rope	USHA MATIN/ BOMBAY WIRE ROPE/ MAHADEV

15.0 COLOUR:

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

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

15.3 All parts except motors, resistors, gears, thrustors etc. should be painted with:

- (i) One coat of red oxide lead primer to IS:2074 before dispatch from the contractor's premises, one additional coat of the same primer should be given after erection and testing.
- (ii) Over the second primer coat, two coats of finishing paints (ready mixed oil based paints) as per the relevant IS code should be given as per the colour scheme to be approved by the consignee.

15.4 The interior of all gear box housings should be painted with two coats of oil resisting enamel paint.

15.5 All machined pads, bearing surface on structures or housings should be painted with white lead.

16. Payment Terms:

16.1 80% payment will be made on receipt of the material duly pre inspected by inspecting agency, Delivery challan and receipt at site by the consignee in good condition. JRI should be attached for receipt document.

16.2 Balance 20% payment will be made after commissioning certificate along with submission of warranty Bank Guarantee (WBG)/FD for an amount equal to 10% of the contract value. Validity of BG should be minimum 2 years 6 months from the date of commissioning for extension purpose, if any.

17.0 Warranty/Guarantee The warranty/Guarantee shall be as specified in the IRS condition of the contract i.e. 30 months from the date of supply or 24 months from the date of commissioning whichever is earlier. The offer of firm quoting warranty/Guarantee in deviation of tender schedule will be summarily rejected.

SCHEDULE-1
Technical Specification No. KGPW/Carr/22-23/Traverser/02
LEADING PARAMETERS

Consignee :- 091250-SSE-26/Carr/KGPW - SER

1	Place at which to be installed (site particulars)				Between Air Brake shop and Paint Shop of Carriage Workshop, Kharagpur			
2	Number of traversers indented with Leading Parameters as given below.				01 No			
3	Leading Parameters							
3.1	Carrying capacity (T)				80 Ton			
3.2	Class of Duty				IV			
3.3	Details of Locomotives and/or rolling stock to be handled.							
	S.No.	Type of Locomotive/ Rolling Stock to be handled	Gauge (mm)	Buffer to buffer distance (mm)	Wheel base (mm)	Width of rolling stock (mm)	Height of rolling stock (mm)	Tare weight (T)
	1	LHB coaches	1676	24100	2560	3250	4085	60
	2	ICF/ RCF Conventional coaches	1676	22297	2896	3245	4026	80
3.4	Type of traverser required							
(a)	Surface Type or Pit Type				Pit Type			
(b)	Two Track or Multitrack				Multitrack			
(c)	VVVF drive (step less speed for all motions) ('✓' one option) Advantages of VVVF drive v/s Non VVVF drive (i) Energy efficient (ii) Improved load control i.e. no shock loading and load swing, no jerking load (iii) Multiple speed adjustments for all movements i.e. stepless speeds (iv) Smooth start and stop (v) Enhanced motor life (vi) Less electrical maintenance				Yes ✓		No	
					Please give detailed justification for Non-VVVF drive despite clear cut advantages of VVVF drive especially being energy efficient. ➤ Not applicable			
3.5	Effective length of traverser i.e. length of traverser rail (excluding the length of Tongue rails)				21.350m			
3.6	For pit type:							
(a)	Clear width of pit				21.450m			
(b)	Construction depth of pit				0.200 m			
3.7	Details of runway track if new traverser requires new runway rails (brief reasons also to be indicated if consignee has any views/preferences regarding items listed below)				Not applicable			
(i)	Any limitations regarding number of runway rails				Not applicable			
(ii)	Desired centre to centre distance between runway rails				Not applicable			
(iii)	Specification of runway rails to be used a) Weight b) Section				Not applicable			
3.8	Details of runway rails if new traverser is to be utilized on existing rails of old traverser							
(i)	No. of runway rails available				09 Nos			
(ii)	Center to center distance of runway rails (mm)				1740mm, 2870mm, 2870mm, 2870mm, 2870mm, 2870mm, 2870mm, 1740mm			

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(iii)	Specification of existing runway rails a) Weight b) Section	75 lbs (60mm rail head width)
3.9	Difference in height between approach rails either existing or proposed, in case of new track (mm)	200mm
3.10	Minimum clearance from top of traverser rails to the lowest rolling stock component above track (mm)	215mm
3.11	Travel speed (meters/minute)	100m/min
3.12	Maximum rope speed (meters/minute)	45m/min
3.13	Length of wire rope (meters)	125m
3.14	Traction force required on the winch	4T
4	Details of Down Shop Lead:	
(i)	Length (in meters) and type of existing DSL if any, with cross-sectional particulars	Length of DSL - 332 Mtr; Existing DSL- Hard drawn Bare copper wire DSL (3 phase) of cross section diameter 8.6mm supported with 25 Nos of masts for DSL.
(ii)	Whether it is proposed to use existing DSL for new traverser. If yes, reasons may be given	Yes, DSL is already present and could be used for new traverser on the bay which is cost effective.
(iii)	Length (in meters) & type of new DSL required with new traverser	Not applicable
(iv)	Whether Mast along with foundation and masonry work required for fixing new DSL If yes, number of masts along with details	Not applicable
5.0	Other special requirements/limitations affecting manufacture and design of traverser:	
5.1	Adequate unobstructed space must be available both sides for men to walk on loading platform after placement of coach for handling hook etc.	
5.2	Lever of Master Controller should return to neutral position, whenever released from any position	

SCHEDULE-II
INFORMATION TO BE SUPPLIED BY TENDERER

-Tonnes Capacity Traverser for..... Workshop
1. Is the traverser offered as per technical specification including technical parameter indicated in Schedule-I (Furnish General Arrangement drawing indicating various components provided & dimensions).
 2. If answer to Clause-I above is in negative, furnish a list of technical deviations with reasons thereof.
 3. Break up weight of the traverser mentioned below should be furnished.
 - 3.1 total weight of traverser including all mechanical and electrical equipment.
 - 3.2 Total weight of bridge girders with all structural equipment excluding cabin.
 - 3.3 Total weight of cabin with all mech. electrical equipment.
 4. Class of duty.
 5. Safe working load in tonnes.
 6. Maximum traverse speed.
 7. Maximum rope speed.
 8. No. of speed steps.
 9. Constructional Details.
 - 9.1 Size of traverser rail.
 - 9.2 Gauge of traverser track.
 - 9.3 No. of total wheels sets.
 - 9.4 No. of driving wheel sets.
 - 9.5 Diameter of wheels.
 - 9.6 Material & hardness of wheels.
 - 9.7 Camber provided at the centre.
 - 9.8 Rope-size, constructional details & safety factor.
 - 9.9 Rope drum diameter.
 - 9.10 Material of rope drum.
 - 9.11 Material & hardness of gears.
 - 9.12 Material of gear box & method of manufacture.
 - 9.13 Type of brake & size.
 - 9.14 Type of bearings.
 - 9.15 Bridge wheel base.
 - 9.16 Maximum wheel load.
 10. Structural Details
Furnish drawings showing various dimensions including those specified in Schedule-I. The bridge structure should also be clearly described.
 11. Other information to be furnished alongwith tender.
 - 11.1 Details of devices incorporated to reduce vibrations.
 - 11.2 Type of coupling & detailed specifications & sizes.
 - 11.3 Arrangement for manual operation of traverser.
 - 11.4 Arrangement to prevent accidental over-travel of the traverser at the extremities of runway track.
 - 11.5 Details of drive system & couplings etc.
 12. Any other details.
 13. Details of bearings offered with sizes and nos. for each location:

S.No.	Location	Make-I (Specify) Type Size No.	Make-II (Specify) Type Size No.	Make-III (Specify) Type Size No.

SCHEDULE-III
ELECTRICAL DETAILS

The undermentioned electrical details should be furnished for each motor or specified item of equipment separately along with the offer.

- CONSIGNEE..... CAPACITY.....
1. Motor
 - 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 A.C. Voltage across phase & frequency
 - 1.7 Speed in rpm
 - 1.8 Class of insulation of stator
 - 1.9 Class of insulation of rotor
 - 1.10 Frame size (see clause)
 - 1.11 Normal full load current
 - 1.12 Starting current
 - 1.13 Is motor of slipring type?
 - 1.13.1 Make, grade & running life of carbon brushes
 - 1.14 Temperature rise of winding and other parts
Allowed above ambient temperature for 50°C
 - 1.15 Cyclic duration factor
 - 1.16 Maximum starts per hour for which motor is Suitable.
 - 1.17 Class of duty (S1,S2,S3,S4 etc.)
 - 1.18 Maximum temperature 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) $\frac{3}{4}$ load
 - c) $\frac{1}{2}$ load
 - 1.22 Power factor at
 - a) Full load
 - b) $\frac{3}{4}$ load
 - c) $\frac{1}{2}$ load
 - 1.23 Type of drive (Direct/gear etc.)
 - 1.24 Manufacturers catalogue of motors (3 nos.)
 - 1.25 Type and routine test charts for motors control
 2. Controls
 - 2.1 Are the following provided for each motor.
 - 2.1.1 Short circuit protection by hydro magnetic MCB.
 - 2.1.2 No volt trip
 - 2.1.3 Overload trip
 - 2.1.4 Instantaneous trip current sensitive single Phasing preventor.
 3. Make and type of the following components (While Indicating makes para 5 may please be referred to)
 - 3.1 Motors
 - 3.2 Cables
 - 3.3 Contactors
 - 3.4 Time relays
 - 3.5 Limit switches
 - 3.6 Master controllers
 - 3.7 Overload relays

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- 3.8 Moulded case circuit breakers & MCB's
- 3.9 Resistors
- 3.10 VVVF Drive
- 3.11 Control panels
- 3.12 Transformers (capacity also)
- 3.13 R.C. Unit
- 3.14 Light fittings
- 4. Standard specification to which the motor control gear and its ancillaries as offered conform.

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SECTION VI
ANNEXURE-A
FORMAT FOR SUBMISSION OF TECHNICAL BID

1. (a) We, M/s. _____ offer our _____ machine model no. _____ 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-V.

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

(c) We also confirm all the schedules given in the Delivery Schedule at para 7 of Section-IV. :

Note-1: The bidder shall mention all technical deviations only in the format enclosed above and / or in proforma for statement of deviation from technical specification..

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-VI.

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.

(B) We have made the following past supplies of similar machines as per clause 1.2 of special conditions during last 5 years:-

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 /entities as detailed in clause 5 of qualifying Requirements)

(C) We are submitting following performance certificate from past users:-

S. No.	Name of purchaser with address	Purchase / Supply Order number (along with a date copy of PO) (It should be the one(s) which are enlisted at clause 2B above)	Quantity Supplied	Date of Supply	Date installation and / or Commissioning	Date of issue of Performance Certificate	Performance as per Annexure-A-1
1.	2.	3.	4.	5.	8.	7.	8.

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 the following optional accessories as indicated under clause 4.3 of section IV

Sr No.	Description of the optional accessory	Quantity (in Nos.)	Rate (in Rest.)	Indigenous	Shelf Life (in Months)

5. We have quoted for following recommended perishable and non-perishable spares required for normal maintenance to cover complete range of mechanical, hydraulic and electrical equipment including controls on double shift working basis:

Perishable Spares

Sr No.	Description of the spares	Part number	Quantity (In Nos.)	Rate (In Rest.)	Shelf Life (in Months)

Non perishable spares

Sr No.	Description of the spares	Part number	Quantity (In Nos.)	Rate (In Rest.)

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

OR

*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 28 years including the maintenance spares required for the bought out sub-assemblies and parts.

(*Strike out which ever is not applicable)

7. We have quoted consumables required as per clause 6.1 of Section V of Bid document Pt-II, in the format give below

Sr No.	Description of the consumable spares	Qty	Unit	Rate

- 8 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.

9. **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
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	

10. We further submit the following information about the offered machine as per the technical specification Section V and Important Features of the tender section IV. 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-IV & V) 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.N.	Information required	As per Clause No.	Value /Write up/ Brochure
1.	Information on leading parameters specified in schedule-I (separately for each traverser)	Schedule-I specified in Section-V	values
2.	Information on schedule-II (separately for each traverser)	Schedule-II specified in section-V	Values/write up
3.	Information on schedule-III (separately for each traverser)	Schedule-III specified in section-V	Values/write up
4.	Information on delivery schedule chart	Clause 7 of Section-IV	Values
5.	Details of all weather protection for electrical and mechanical equipment	Clause 1.1.9 of section-V	Write up
6.	List of maintenance offered in tool box	Clause 1.4.7 of section-V	List
7.	The details on arrangement to prevent wagons and coaches from rolling on their own from traverser.	Clause 1.5.2.2 of section-V	Write up
8.	Details of camber provided in the traverser	Clause 1.5.2.6 of section-V	Value
9.	Size and material of bridge platform of traverser.	Clause 1.5.2.12 of section-V	Write up/value
10.	Details on locking arrangement of pit and surface traverser and interlocking with long travel.	Clause 1.5.2.12.1 of section-V	Write up/Drawing
11.	Details of reflector mirrors provided to assist the operator in viewing the opposite side when rolling stock is standing on the bridge platform.	Clause 1.5.2.14 of section-V	Write up
12.	The arrangement of long travel drive system.	Clause 1.5.3.1	Write up along with drawing
13.	The details on type of couplings provided with their special features,	Clause 1.5.3.2	Write up along with drawing
14.	Details of automatic coiling device for wire rope	Clause 1.5.7.3 of section-V	Write up along with drawing
15.	Drawing of lever operated brake for rope drum,	Clause 1.5.7.8 of section-V	Drawing
16.	The drawing of additional hydraulic or pedal operated mechanical brake for instantaneous braking force provided in the cabin	Clause 1.5.8.1 of section-V	Write up and drawing

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

Signature Not
Verified

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BOREN HEMBRAM
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Location: New Delhi

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 FA & CAO, South Eastern Railway, Kolkata, India, 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 inter alia in the Tender Document.

And whereas, clause of the above mentioned tender document described that the machine shall be designed for a life of 15 years with regular maintenance and all the structural members of the machine should be guaranteed for 5 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)

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ANNEXURE-C of Section VI

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: Contract 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.	Status of readiness of foundation:	
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)

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ANNEXURE –D of Section VI

JOINT COMMISSIONING NOTE

Date:.....

Sub: Commissioning of (name of machine).....**Ref:** Contract 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 commissioning certificate for the machine:
- -
 -

Representative of firm
Designation

Representative of consignee
Designation
(Minimum Gazetted level)

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ANNEXURE –E of Section VI

PERFORMANCE APPRAISAL FORMAPPRAISAL ON COMPLETION OF WARRANTY PERIOD

Dated:.....

To, M/s.

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

11. In case, Reliability clause No.16 of the machine during warranty period is also given in Bid Document Pt.II, then following details of breakdown hours for preceding eight quarters may also be furnished.

Quarter	Period From - ____ To-____	Breakdown hours
1		
to		
8		

Signature-----

Name-----

ANNEXURE-F

LIST OF COMPONENTS TO BE LOADED ON THE MACHINE

S.No.	Component	Drawing No.	Part/PL. No.	Machining Operations to be carried out
		NOT APPLICABLE		

ANNEXURE- H

Report on Capability Assessment of New Vendors

M/s(Name of Vendor).....

Machine/Product Class

Contents:

Para - 1	:	General Information
Para - 2	:	General Information (Technical)
Para - 3	:	Design Capability
Para - 4	:	Manufacturing Process
Para - 5	:	Quality Assurance
Para - 6	:	After-Sales Service
Para - 7	:	Past Performance
Para - 8	:	Commercial Information
Para - 9	:	Conclusions
Para - 10	:	Recommendations

List of Annexures :

A	:	List of Managerial Staff
B	:	Plan of Works to be assessed
C	:	List of Machinery & Plant
D	:	List of Raw Materials in Stock
E	:	Q.A.P. of the Firm.
F	:	List of QC equipments, Measuring equipments and Gauges
G	:	List of Important Customers & Orders
H	:	List of pending orders
I	:	Performance of Machines supplied
J	:	Proof of Ownership
K	:	Factory License, NSIC/ SSI
L	:	Copy of Latest Electricity Bill
M	:	Certified copies of Balance Sheet and Profit & Loss accounts
N	:	Income Tax Clearance Certificate

Other Annexure (if any)

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Report on Capability Assessment of New Vendors

- i) **Name of Vendor**
- ii) **Purpose:** (Assessing officers should detail the purpose of assessment, manufacturer, name of the machine and the tender number which necessitated assessment or otherwise.)
- iii) **Scope:**.....(The scope should define scope of capability assessment carried out detailing the machine/system or range of machines/systems.)
- iv) **Details of Stores/Items/Parts/components** for which assessment is carried out.
(Indicate complete description. Vendor should submit a request to include more similar items in the assessment if required)
- v) **Assessment done on**

1.0 General Information

1.1. Background of vendor in Brief

1.1.2 Location

1.2 Postal Address

i. Head Office :

ii. Works/Factory (as per Factory License) :

1.3. Telephone No. (with STD code and Mobile)

i. Head Office :

ii. Works/Factory :

iii. Authorized Person who can be contacted telephonically:

1.4. E-mail IDs

i. Head Office :

ii. Works/Factory :

iii. Authorized Person :

1.5 Description of Factory/Works.

i. Total land area :
(in Sq. metres)

ii. Total covered area :
(in sq. metres)

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

iv. Special features, if any :

1.6. No. of personnel employed (category-wise).

i. Managerial :

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(List to be attached as **Annexure-A**)

- ii. Supervisory : Permanent_____ Temporary _____
- iii. Skilled artisans : Permanent_____ Temporary _____
- iv. Unskilled : Permanent_____ Temporary _____

1.7 Hours of working :

- 1.8 Is this first inspection for assessment?
If it is a re-inspection, details of earlier capability assessment(s) to be recorded and attached.

2.0 General Information--Technical

2.1 Description of different departments in the Factory/Works and function of each department.

2.1.1 The break-up of different work areas given below

Unit - I

Administrative Block :
Fabrication and assembly :
Machine Shop :
Store :
Laboratory :

Unit – II, Unit – III

Administrative Block :
Fabrication and assembly. :
Machine Shop :
Store :
Laboratory :

2.1.2 A plan of the works, as described above, to be attached (**Annexure-B**).

2.2 Detailed description of Machinery and Plant in each department Unit wise (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).
The list of machinery & plant available to be attached (**Annexure-C**).

2.2.1 It was observed that (Comments of Assessing Officer(s), on machines and infrastructure)

2.3 Plans for future expansion, if any.....

2.4 Details of raw-materials held in stock (state whether imported/indigenous).
(list enclosed as **Annexure-D**)

2.5 Production Capacity.

- i. Per month :
- ii. Per year :

2.5.1 Whether Production capacity has been certified by external agencies? If yes, then details/certificates to be attached.
(Comments of Assessing Officer(s))

2.6 Enumerate Type of Stores/Items, which the firm is capable of manufacturing.

(Comments of Assessing Officer(s))

3.0 Design Capability

3.1 Availability of Qualified Personnel.

(Comments of Assessing Officer(s))

3.2 Assessment of Expertise and Facilities.

(Comments of Assessing Officer(s))

4.0 Manufacturing Process

4.1 In-house Manufacturing Facilities for the item(s) being assessed.

(Comments of Assessing Officer(s))

4.2 Details of manufacturing process relevant to the items for which assessment is carried out.

(Comments of Assessing Officer(s))

4.3 Important Items/processes Outsourced by the Vendors

(Comments of Assessing Officer(s))

4.4 What is the system of traceability of the components/sub-assemblies manufactured in-house and outsourced.

(Assessment team to comment on the traceability records maintained by the vendor for the range of machines manufactured, from the stage of drawings to dispatch of material/machine.)

5.0 Quality Assurance

5.1 Does the factory have an established Quality Assurance Programme. If yes, please enclose a copy of the write-up? If not, what plans are there if any for setting it up? (QAP attached as **Annexure-E**)

(Comments of Assessing Officer(s))

5.2 Details of Quality Assurance Organisation.

Names of key personnel, their qualifications, designations and position in overall management structure (Data in tabular form, explain with organisation chart, if necessary).

5.2.1 The QC organisation is headed by Shri, who is designated as....., with responsibility for..... (Comments of Assessing Officer(s))

5.3 Enlist Quality Control Testing Facilities and Laboratory equipment available.

5.3.1 In-house facilities available for inspection and QC include the following:

i

ii

iii

(list enclosed as **Annexure-F**)

5.4 Availability of gauges

- 5.4.1 The following important items of gauging and other related equipment are available: **(Annexure F)**
- 5.5** Calibration of Laboratory/test equipment/gauges, indicated in para 5.3 and above: 5.4
- How is the calibration done? :
 - Frequency of calibration. :
 - System to ensure that calibration of above equipments does not fall overdue. :
 - Action taken if such calibration has fallen overdue :
- (Comments of Assessing Officer(s))
- 5.6** Source of procurement of raw-materials, important bought-outs, and steps taken to ensure their quality. to
- (Comments of Assessing Officer(s))
- 5.7** Details of inspection/checks done on material during various stages of the above manufacturing process.
- (Comments of Assessing Officer(s))
- 5.8** Have acceptable values for the parameters inspected during above stage checks been laid down? If yes, the action taken if value of the parameter inspected does not meet the desired laid-down value.
- (Comments of Assessing Officer(s))
- 5.9** System for documentation of the results of the above stage checks.
- (Comments of Assessing Officer(s))
- 6.0 After-Sales Service**
- 6.1** After-Sales Service Facilities Available at Works and Branch Offices.
- 6.2** What is the system of recording customer complaints and action taken their upon.
(Comments of Assessing Officer(s))
- 6.3** Assessment of Quality of Service Including Response times.
- (Comments of Assessing Officer(s))
- 7.0 Past Performance**
- 7.1** List of important customers of the firm (as relevant to the works for which assessment being done)
- This is attached at **Annexure-G**.
- 7.2** Details of important orders executed/supplies in the past.
- Also included in **Annexure-G**.
- 7.3** Details of Pending orders in hand **(Annexure-H)**
- 7.4** Whether another unit/factory of the firm is already approved by COFMOW/IR for supply of stores/components. supply
- (Comments of Assessing Officer(s))

- 7.5** Performance of machines manufactured and supplied in the past to different consignees.
(Comments of Assessing Officer(s))
- 7.5.1** Machines at M/s (Name of consignee)
- 7.5.2** Conclusions on performance (Attach performance certificates from at least 5 consignees where machines are working for more than one year since commissioning as **Annexure-I**).
(Comments of Assessing Officer(s))
- 8.0 Commercial Information**
- 8.1** Copies of following documents obtained and attached as Annexures.
i. Proof of Ownership. : **Annexure-J**.
ii. Factory License, NSIC/ SSI : **Annexure-K**.
iii. Latest Electricity Bill. : **Annexure-L**.
iv. CA/CS certified copies of Balance sheets and Profit & Loss accounts : **Annexure-M**
- 8.2** Whether the firm is registered under Indian Factories Act.
(Comments of Assessing Officer(s))
- 8.3** Whether the firm comes under the scope of Industries (Development & Regulations) Act, 1951.
(Comments of Assessing Officer(s))
- 8.4** Income Tax Clearance Certificate Copy attached at **Annexure-N**.
- 9.0 Conclusions**
(Comments of Assessing Officer(s))
- 10 Recommendations**
(Should detail the findings in line with the scope of the assessment)

(Signatures of the Assessing Officer(s)
Name & Designation

Place:

Date:

**ANNEXURE - A
LIST OF MANAGERIAL STAFF
AS ON-----**

S.No.	Name	Designation	Qualification	Working since
-------	------	-------------	---------------	---------------

**ANNEXURE -C
LIST OF MACHINERY AND PLANT**

S.No.	Description of Items	Make	Qty.	Year of procurement
-------	----------------------	------	------	---------------------

**ANNEXURE - F
LIST OF QC EQUIPMENT, MEASURING EQUIPMENT AND GAUGES**

S.No.	Description	Range Least count where applicable	Qty.	Year of procurement
-------	-------------	------------------------------------	------	---------------------

**ANNEXURE - G
LIST OF IMPORATANT CUSTOMER & ORDERS EXECUTED W.E.F.(DATE)**

S.No.	Purchaser Order No.	Description/ value	Delivery dt.	Date recd.	Date Comm.	REMARKS
-------	---------------------	--------------------	--------------	------------	------------	---------

**ANNEXURE - H
LIST OF PENDING ORDERS AS ON -----(DATE)**

S.No.	Purchaser	Order No. and date	Value
-------	-----------	--------------------	-------

Annexure-I

QUALITY ASSURANCE PLAN FOR TRAVERSER

S. No.	COMPONENT & OPERATION		TYPE OF CHECK	QUANTAM OF CHECK	ACCEPTANCE NORMS	FORMAT OF RECORD	SOURCE	REMARKS	OTHER REMARKS
Raw Material & Bought out Material Inspection									
1	Structural material for traverser frame		Physical & Chemical	1 Sample per size	IS:2062-2011 Grade- E-250, BR or BO	TC & Invoice	SAIL, TISCO, IISCO, ESSAR, JINDAL Steel,RIN vendor appd. lab	CHP	Identification and tests to be carried out in the absence of Mill TC and proper co-relation
2	Rope Drum	Plate	Chemical & Mechanical	1 Sample per size	-do-	-do-	-do-	-do-	-do-
		Seamless Steel Tube	Acid Etching of end	100%	ASTM A-106	IR	-do-	-do-	Check for seamless
3	Wire Rope		Examination of report for breaking load	100%	IS:2266	TC & Invoice	Manufacturer / Authorised Stockist	V	Wire rope of Usha Martin / Bombay Wire Rope / Mahadev to be used
4	Square bar/ Rectangular bar/ Rail		Visual	100%	Manufacturer's Standards	Invoice	-do-	V	
5	Brake Drums		Chemical	1 sample	IS:1875 Class 3A or above, IS:1030 Grade 280-520 W	TC	Manufacturer	V	Forged or Cast Steel
6	Pulleys		Chemical	1 / lot	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)	TC	Vendor / approved lab	V	Forging / Casting
7	Wheels		Chemical	1-Sample	IS:1570	TC	Vendor / Approved lab	V	C55Mn75
8	Gears / Pinions		Chemical	1-Sample	Manufacturer's Standards	TC	Vendor / Approved lab	V	MTC in case of compact geared motors
9	Hooks		U.T	100%	IS:3664, ASTM A388	TC & Invoice	Vendor / Approved agency	CHP	U.T on shank portion only
10	Bearings		Visual	100%	Manufacturer's Standards	Invoice	Manufacturer / Authorised Stockist	V	
11	Gear Boxes		Sound Level Temp. rise Leakage Backlash	100%	Max. 85 db at a distance of 1 meter from gear box, Maximum 20 deg rise above ambient temp. after 2 hrs continuous running	IR	Vendor	CHP CHP CHP V	No abnormal sound, No leakage,

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In Process Inspection								
11	Welding Procedure/Welder Qualification	WPS PQR WQTR	Type test	As per 7318 IS:817 AWS D:14.1 ASME Sec IX		Vendor	V	Proper welding, welders records maintained as per ASME ix AWS D:14.1 by Inspecting Engineer to carry out the type test if he is not satisfied
Final Inspection								
12	Motors	Review of routine test certificate	100%	Manufacturer's standards	TC & Invoice	Manufacturer / Authorised Stockist	V	Manufacturer's invoice should be available for verification by inspector
13	Cables	Review of type test/routine test	100%	Manufacturer's standards	TC & Invoice	Manufacturer / Authorised Stockist	V	Manufacturer's invoice should be available for verification by inspector
14	Control Panel, Marking, continuity Input/Output, sequence	Visual checking of fittings of components	100%	Electrical Diagram	I.R	Vendor	CHP	Component type/routine test certificate to be reviewed
15	EHT Brake	Review of routine test certificate	100%	Manufacturer's standards	TC & Invoice	Manufacturer / Authorised Stockist	V	Manufacturer's invoice should be available for verification by inspector
16	Complete assembled traverser, No load test	Visual inspection, checking overall dimensions, alignment and completeness, hauling speed and no load current check measurmnt	100%	Approved Drawing / Schedule-II IS:800 IS:807 IS:3938 IS:3177	I.R	Vendor	CHP	
17	Painting	Visual surface inspection	100%	Tender Spec	I.R	Vendor	V	
18	Lubrication	Visual	100%	-do-	I.R	Vendor	V	Ease of lubrication without dismantling any component
19	Current Collector & DSL System	Review of test certificate	100%	Manufacturer's standards	TC & Invoice	Manufacturer / Authorised Stockist	V	Manufacturer's invoice should be available for verification by inspector

WPS =: Welding Procedure Specification
 PQR = Procedure Qualification Record
 WQTR = Welder Qualification Test Record
 V = Verification
 CHP = Hold point to be got cleared before further processing
 I.R = Inspection Report
 T.C. = Test Certificate

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