



**Mazdock Modernisation Project**

**Shipyard Transporter Contract**

**Volume III**

**Employers Requirements**

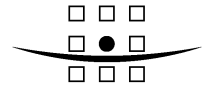
Mazagon Dock Ltd.  
Mumbai

Feb 2010

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A COMPANY OF



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# **Mazdock Modernisation Project Shipyard Transporter Contract**

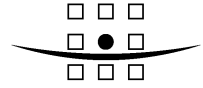
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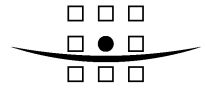
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## **PART A: PARTICULAR SITE CONDITIONS AND REQUIREMENTS**

### **1 SITE LOCATION AND LAYOUT**

- 1.1 The Shipyard Transporter shall be designed to carry fabricated sections of submarine or other vessels up to 150 tonnes in weight in MDL Yard.

### **2 ACCESS TO THE SITE**

- 2.1 The Contractor shall at all times make use only of the Contractors site entrance as instructed by the Engineer for access to the site. Vehicles and persons will be restricted to the Contractor's working area only. Except for making deliveries, Contractor's vehicles shall be parked outside the yard.
- 2.2 The Contractor shall make arrangements to obtain from the Employer all necessary passes for vehicles and persons entering the shipyard site for the purposes of carrying out the Works.
- 2.3 The Contractor shall gain access to the various site areas through shipyard operational areas. The Employer shall in general provide clear access for the Contractor to the site area; however the Contractor shall expect at times to have restrictions in access due to shipyard operations.

### **3 INSTRUCTIONS FOR CONTRACTORS WORKING IN MAZAGON DOCK LTD.**

- 3.1 All Contractors working within Mazagon Dock Ltd. shall comply with the following rules and instructions:
- (i) While employing workers in Mazagon Dock Ltd., the Contractor shall bear in mind that it is a vital Defence Installation.
  - (ii) The Contractor shall be responsible to produce a Police Report regarding checking of antecedents and verification of character of his employees, if so required by the Security Department.
  - (iii) The Contractor shall declare in the Security Office all tools, equipment or any other items brought by him for work in Mazagon Dock. In case of electric cables, its measurement is to be written properly. The paper containing list of items declared in the Security Office shall be retained by the contractor properly. For items of stores / material resembling that of Mazagon Dock Ltd., precaution will be taken to mark their clear identification of colour code and/or clear marking on each item of stores / material including tools.
  - (iv) All the items / material required to be taken out of Mazagon Dock Ltd. after completion of work is to be removed only during working hours. This shall be supported by the original paper / document completed at the time bringing the material / items inside Mazagon Dock Ltd.

(v) At the time of entry / exit, the Contractor's employees shall display their entry passes issued to them. As far as possible, temporary workers passes shall be collected and kept by the Supervisor of the Contractor at the time of his workers going out after completion of work in the Yard. On the next day, these passes shall be reissued to the workmen who are required for work inside Mazagon Dock Ltd. In respect of those workmen who are not required to report on the following day or who are discharged, their passes shall be deposited in the Security Department's Pass Issue Cell.

(vi) If the Contractor's employee is required to work in Mazagon Dock Ltd. for a period of 89 days or more, he shall produce 3 copies of photographs of each of his employees and other detailed information as may be required, which will be informed to him by the Staff of Pass issue Cell of Security Department.

(vii) If the period of work in Mazagon Dock Ltd. is less than 89 days, then the Contractor has to furnish the following information in a register as per the labour challan issued by the Personnel Department:

Sl.No. ....

Address .....

.....

.....

Name .....

Age .....

Designation .....

Local Address:.....

Permanent Address .....

(viii) The Contractor shall take adequate care while completing the labour challan (ESIS formalities from Personnel Department). The names of his employees who are required to work in the Yard are to be written in the labour challan. The Labour Challan must be signed by the Proprietor / Manager / Site Engineer of his concern. ESIS formalities in respect of his / his sub-contractor's workers have to be completed every month without fail.

(ix) Cost of Security Passes / Identity Cards will be recovered from the Contractor at the existing rate per Security Pass / Identity Card. For re-issue of Security Pass / Identity Card, in case of loss of the same, the Contractor will be charged extra as per prevailing rates. The amount

shall be deposited to the Cash Department of Mazagon Dock Ltd. A/c Code No. 440-00.

- (x) The Contractor must ensure that all the Security Rules of Mazagon Dock Ltd. are observed by his employees.
- (xi) The Contractor shall give strict instructions to his or his Sub-Contractor's employees not to step on board ships under construction / repairs.
- (xii) The Contractor shall ensure that his / Sub-Contractor's employees remain at the place of work assigned to them and do not loiter around any other ship or working area. If any such infringement is observed, the employee is liable to be barred from further entry to Mazagon Dock Ltd.
- (xiii) In case the Contractor finds any difficulty in compliance of above Security instructions, he may call on the Chief Security Officer for the necessary guidance.

#### **4 CONTRACTOR'S PLANT, EQUIPMENT, LABOUR, PERSONNEL, FUEL AND CONSUMABLES**

- 4.1 The Contractor shall provide and mobilise all necessary plant, equipment and labour for the Works. The Contractor shall arrange all plant (including cranes) as necessary for the delivery, assembly, testing and commissioning of the Shipyard Transporter. The Contractor shall be responsible for the maintenance of his plant and equipment, which shall not be demobilised and removed from site before the completion of the Works without the written permission of the Engineer.
- 4.2 The Contractor shall ensure that all work is undertaken by trained and competent personnel under the supervision of responsible persons, experienced in the particular aspect of the works being undertaken.
- 4.3 The Contractor shall arrange for required supervisory staff on Site as and when required for assembly, testing and commissioning of the Shipyard Transporter.
- 4.4 The Contractor shall provide and pay for all fuel, lubricants, gas and other consumable stores required for his plant, equipment and transport and for the execution of the Works.

#### **5 POLLUTION PREVENTION**

- 5.1 The Contractor shall, at all times, during the continuance of the Contract adopt such precautions as may be necessary to prevent soil or water pollution on the Site (including any area occupied by temporary accommodation) and shall compel his and his Sub-Contractors' employees and labour to use the facilities provided which shall be carefully maintained by the Contractor throughout the currency of the Contract to the satisfaction of the Engineer.

## **6 SAFETY, HEALTH AND WELFARE; PROTECTION, LIFE-SAVING ETC.**

- 6.1 The Contractor shall comply with the regulations of the Statutory Authorities in respect of safety, health and welfare requirements. All facilities provided shall be subject also to the approval of the Engineer in respect of siting, type, quality, maintenance and cleanliness.
- 6.2 Contractor shall adhere to safe construction practices and guard against hazardous and unsafe working conditions and shall comply with Employer's Safety Rules.
- 6.3 The Contractor shall give prompt and due consideration to any matters to which the Engineer may find it necessary to call attention, for the purpose of ensuring compliance with the foregoing requirements.
- 6.4 The Contractor shall provide safety precautions as are consistent with normal good safety practice.
- 6.5 Site operatives shall be fully conversant with the use of safety equipment.
- 6.6 The Contractor shall provide all necessary personal protective equipment (PPE) to his workforce and that of his sub-contractors. This shall include, but shall not be limited to; safety boots, hard hats, gloves, eye protection, ear defenders, high visibility vests, harnesses etc.
- 6.7 All safety rules to be observed while working on live electrical system or installation as stipulated in the Indian Electricity Rules.
- 6.8 The Contractor shall in all dealings with labour in his employment have due regard to all recognised festivals, days of rest and religious or other customs and observe days of rest as applicable to the outdoor staff of the Employer.
- 6.9 The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his personnel or Sub-Contractors.
- 6.10 The Contractor shall recognise the freedom of his work people to be members of trade unions.
- 6.11 All personnel employed by the Contractor and any of his sub-contractors' shall carry an identity card which shall be clearly visible at all times on the Site.

## **7 FIRE-FIGHTING EQUIPMENT AND STORAGE OF DANGEROUS MATERIALS**

- 7.1 Suitable fire-fighting equipment shall be provided and maintained on the Site to deal with any outbreaks of fire on the site of the Works.

- 7.2 All possible precautions shall be taken to provide for the safe storage of petroleum, gas bottles, or other dangerous materials. Permits shall be obtained for the storage of such materials wherever this is required by the regulations of the relevant authorities, and the Contractor will be deemed to have included for all costs arising from such regulations within his tender prices and for providing the level of security required for storage and for arranging for the safe delivery to site of such materials.
- 7.3 The Contractor shall observe and abide by all fire and safety regulations of the Employer before starting and during execution of construction work. The Contractor shall consult with Employer's Safety Engineers or Engineer and must make good to the satisfaction of the Employer any loss or damage due to fire to any portion of the work done or to be done under this Contract or to any of the Employer's existing property.

## **8 ADVANCE NOTIFICATION OF ALL OPERATIONS**

- 8.1 In addition to his general obligations under the Contract, full and complete notice shall be given by the Contractor of all operations to be carried out on the site. Such notice shall be provided in sufficient time for the Engineer to make all necessary arrangements for inspection and checking. Such inspection and checking shall not relieve in any way the obligations to the Contractor under the Contract.
- 8.2 Where the Engineer is required by the specification to give approval to the supply of materials, plant or methods to be used in any part of the Works, this notice shall be sufficient to allow time to carry out inspections, checks or tests prior to giving such approval.

## **9 REGULATIONS OF STATUTORY AUTHORITIES AND CUSTOMS**

- 9.1 Without limiting his obligations under the General Conditions of Contract the Contractor shall observe all regulations laid down by all Statutory Authorities, including, but not limited to Mumbai Port Trust, (hereinafter referred to as MbPT) and Central Electricity Regulatory Authority.
- 9.2 The Contractor shall comply with all regulations imposed by the Customs authorities in respect of the passage of all imported Contractor's Equipment, Plant, Materials and vehicles and personnel through Customs barriers.

## **10 WORKS NOT TO INTERFERE WITH EMPLOYER'S NORMAL BUSINESS**

- 10.1 The Contractor shall not interfere in any respect with the normal business of the Employer and shall co-operate with him/them if and when special measures become necessary as a direct consequence on the progress of the Works.
- 10.2 The Contractor, shall co-operate, by temporarily removing any of his Equipment, obstructions, etc. which may cause hindrance to the launching of a newly built ship until the process of launching has been completed, as per direction of the Engineer / Employer.

10.3 No claim for interference or impedance arising from the Employer's normal operations will be considered.

## **11 SITE CLEARANCE, MAKE GOOD ETC. ON COMPLETION**

11.1 The Employer will clear away all plant and materials, scrap steel and rubbish from areas to be used by the Contractor, prior to commencement of the Contract.

11.2 The Contractor shall on completion of the Works at his own expense restore, reinstate or make good the surfaces of all ground disturbed by his operations; remove any rubbish, surplus materials etc, and leave the Site clean and tidy to the satisfaction of the Engineer.

## PART B: TECHNICAL REQUIREMENTS

### B1 - GENERAL

The technical requirements of the Shipyard Transporter required by the Employer are broadly given below. The Contractor is requested to submit detail specifications of the Shipyard Transporter offered, which should include the type, make, capacity, rating, material specifications etc. of major components.

#### 12 SCOPE OF SUPPLY

12.1 The scope of supply shall include:

- (a) The design, manufacture, delivery to site, on-site assembly, installation, testing and commissioning of one number of rubber tyred 150T Shipyard Transporter and all necessary peripherals inclusive of all necessary temporary works required.
- (b) The supply of an initial stock of operating spare parts.
- (c) Recommendations for additional spare parts necessary to maintain the Transporter in service over the initial 5 years of operation.
- (d) The provision of comprehensive operating, maintenance and spare parts manuals for the Shipyard Transporter. All such manuals to be in English.
- (e) The provision of all necessary operating and maintenance training at site for Employer's nominated personnel.
- (f) A Guarantee against damage or failure due to defects in design, material and workmanship for a period of 36 months from the date of final acceptance of the Shipyard Transporter.

#### 13 LOCATION, SITE CONDITIONS AND LIMITATIONS

13.1 The Shipyard Transporter is to be delivered for operation within the Employers shipyard in Mumbai, India. Companies wishing to tender for the supply of the Shipyard Transporter shall visit the shipyard to fully familiarise themselves with the intended location, the prevailing site conditions and any possible constraints in advance of submitting their offer.

13.2 It should be noted that access to the Site will be subject to limitations and restrictions. In addition, the availability of working areas will be reduced due to other contractors working in the vicinity of the dockyard area generally. Companies wishing to tender are to ensure that they are fully conversant with any limitations and restrictions on access and the work being undertaken by other contractors.

13,3 Work being undertaken by other contractors identified above includes but is not limited to:

- (a) Construction of new Wet Basin
- (b) Construction of new crane rail beams, Module Shop, Cradle Assembly Shop and Stores Building, and electric overhead cranes.
- (c) Construction of new ancillary buildings, roads, drainage and paving
- (d) Re-profiling of existing quay walls
- (e) Erection of a new Goliath Crane

#### **14 DRAWING APPROVAL PROCEDURE**

14.1 Three (3) copies of all design drawings, specifications, literature, assembly, testing, commissioning and setting to work programmes are to be supplied to the Engineer for approval purposes. The Engineer will respond within three (3) weeks of receipt of such information advising of each item approved or those being returned for amendment. The approval procedure for amended items will be the same as for the original submission. However, comments / approval of the drawings by the Employer or Engineer or their representatives will not relieve the Contractor of his responsibility for the correctness, adequacy of design and completeness of his work as per the Contract.

14.2 The Contractor shall submit to the Employer/Engineer, any calculations required to substantiate aspects of the design. With respect to items of proprietary supply the manufacturers own selection chart or certificate of approval may be submitted as appropriate.

14.3 The Contractor shall maintain a complete record of all and any changes made to the Transporter design.

#### **15 DRAWING REQUIREMENTS**

15.1 The drawings and documentation supplied shall include the following:

- (a) General arrangement drawings
- (b) Machinery assembly drawings with itemised parts lists, component ratings and manufacturer's part numbers as appropriate.
- (c) Structural arrangement drawings with materials and quantities.
- (d) Control cabin layout and arrangement showing operators seat, windows, limiting sight lines, location of operating controls and all other significant features.
- (e) Electrical and hydraulic control systems
- (f) Machinery/mechanical drawings

15.2 In addition the Contractor will supply full documentation for the installed electrical and control systems as below:

- (a) List of all equipment and devices complete with ratings as appropriate.
- (b) Line diagrams of power distribution system.
- (c) Simple schematic diagrams depicting each control circuit.

- (d) PLC logic diagrams.
- (e) Details of electrical components with manufacturer's part numbers.
- (f) Connection diagrams for all electrical equipment showing all terminal strips in their correct orientation with each wire and conduit identified.

## **16 HEALTH AND SAFETY**

- 16.1 The Transporter shall be prominently marked with its safe working load.
- 16.2 The Contractor must fully comply with all relevant Indian health and safety legislation in force at the date of tender submission.

## **17 DESIGN, CONSTRUCTION AND TESTING STANDARDS**

- 17.1 The International System of measurement units (SI) shall apply throughout.
- 17.2 The design, manufacture and testing of all elements of the Transporter shall comply with the appropriate recommendations or requirements of recognised international standards and codes such as:
  - (a) Federation European de la Manutention (FEM)
  - (b) British Standards Institute (BSI)
  - (c) International Electrotechnical Commission (IEC)
  - (d) Deutsches Institut für Normung e.V. (DIN)
  - (e) Indian Standards Institution (IS)
- 17.3 The Contractor will be responsible for ensuring compliance with any other relevant standard or code as appropriate and may propose other or alternative equivalent internationally recognised standards provided they are published in English and prove acceptable to the Employer. All Standards shall be the latest version of the relevant Standard.

## **18 OPERATOR TRAINING**

- 18.1 Full training at site in the safe operation and maintenance of the Transporter and all equipment shall be provided to the Employer's nominated personnel by a suitably qualified person, or persons, employed by the Contractor and approved by the Employer. If interpreters are required to assist the exchange of information and instructions from the trainer to the operators, these are to be provided by the Contractor at their own cost.
- 18.2 The necessary training programmes will be developed jointly with the Employer to ensure that the specific operational requirements of the yard and workforce are adequately addressed.
- 18.3 Maintenance training shall include, inter alia:
  - a) routine examination and maintenance
  - b) fault diagnosis

- c) removal, dismantling and replacement of parts and components.
- d) basic electrical checks, safety routines and component replacement.
- e) approach to hydraulic systems overhaul
- f) maintenance planning records and procedures.
- g) Instruction and familiarisation regarding the overall operation and maintenance of the Transporter including Health and safety provisions incorporated (including the operation etc. of items such as load weighing and limit switches etc.).

18.5 Operational training shall include, inter alia:

- a) safety procedures
- b) practice at the control and synchronisation of the Transporter motions
- c) start up and shut down procedures including use of the storm anchors and any supplementary securing equipment.
- d) application of the daily check list
- e) Instruction and familiarisation regarding the overall operation and maintenance of the Transporter including Health and Safety provisions incorporated (including the operation etc. of items such as load weighing and limit switches etc.).

## **19 OPERATIONAL AND MAINTENANCE MANUALS**

- 19.1 Separate illustrated manuals shall be provided by the Contractor covering the operation, maintenance and parts identification for the Transporter and associated equipment and components. Proprietary equipment manufacturer's manuals may be provided where they comply with the requirements of this specification. Where possible the manuals shall be presented in A4 format and be protected from damage by employing durable covers.
- 19.2 The operator's manuals shall contain advice and instructions on all aspects of the safe operation and use of the Transporter including actions to be taken in the event of emergency or breakdown. A start up and hand over check list for the drivers shall also be included.
- 19.3 The maintenance manual set shall include illustrated instructions on what tasks need to be undertaken on a regular basis and how to perform all routine and scheduled tasks.
- 19.4 In total four sets of all manuals shall be provided.

## **20 PACKING MATERIALS**

- 20.1 All the packing material (which shall include hay, straw, wood shavings, wood chips, sawdust, wood waste, wooden pallets, dunnage mats, wooden packages, coir pith, peat or sphagnum moss etc.) made of plant origin used for packing shall require treatment including Heat-kiln treatment at 56 degree centigrade for a minimum of 30 hours or Methyl Bromide fumigation at 48 g/cum for 32 hours or chemical impregnation of wood with wood preservatives such as copper arsenic or any other approved treatment as per international standards.

20.2 All the shipments coming into India shall be packed in packaging material confirming to the above standard and shall carry a Phytosanitary certificate issued by an authorised officer at the Country of Origin of the consignment in the format prescribed under International Plant Protection Convention of the Food & Agriculture Organisation.

## 21 ENVIRONMENTAL AND CLIMATIC CONSIDERATIONS

21.1 All elements and components of supply for the Shipyard Transporter shall be suited to performing to reliably and to specification within the environmental and climatic conditions that prevail in the yard as summarised below:

- a) Climate – marine / tropical
- b) Annual temperature range – typically 15°C to 45°C. Temperatures in direct sunlight may be considerably higher and consideration shall be given to this possibility in the location and specification of any potentially affected elements or components.
- c) Relative humidity - Ranging between 50% and 95%.

## 22 MATERIALS AND WORKMANSHIP

22.1 All major items of equipment and major materials used in the manufacture of the Transporter shall have been specified and procured specifically for this contract. No pre used or sub standard materials or equipment shall be employed.

22.2 The contractor shall provide Quality Assurance plan.

## 23 SHIPYARD TRANSPORTER DETAILS

23.1 The Shipyard Transporter is to be a dedicated shipbuilding type, capable of lifting sections of submarines and ships;

Item	Summary of Requirements
Transporter capacity	150 tonnes total load as a Uniformly Distributed Load. 3.2 tonnes as point load
Maximum dimensions of component to be transported	Width: 5 metres Length: 9 metres Height: 5 metres Or 6.3m diameter x 9.0 metres in length
Minimum platform height above ground	To be stated in Tender submission
Lifting Stroke	700mm
Wheel type	Rubber Tyred
Platform type	Flat bed
Drivers cab	Minimum 1 at front
Maximum width of Transporter (to fit through Cradle Assembly Shop Doors & interyard movement between Alcock Yard and North Yard)	5.0 metres (+/-) 150 mm

Speed of travel	Max: 4 to 5 metres/second (Unloaded) Min: 1.4 to 1.6 metres/second (Loaded)
Turning radius	Max: 8 + 1 metres Min: 0 metres
Brakes	Service & Parking
Engine	Diesel, Water Cooled, Turbo Charged
Systems	Centre of gravity system Steering
Alarms	Overload Reversing
Cradles for ship transport	To be fabricated by Employer

## 23.2 Operating speeds

All motions shall offer variable speed with steps control from zero through to the load limited maximum.

If the Contractors standard operating speeds are different from but generally comparable to the above-specified values the standard speeds should be offered for consideration by the Employer with such departures highlighted in the tender documents.

## 24 SHIPYARD TRANSPORTER DESIGN CLASSIFICATION

- 24.1 The Shipyard Transporter and machinery is to be designed in accordance with appropriate Design Codes and Standards.
- 24.2 The Standards and Codes adopted by the Tenderer may be listed as part of the Tender submission.

## 25 STRUCTURE

- 25.1 The main structural elements of the Transporter are considered to comprise, inter alia, the main platform, drivers cab, chassis and axles.
- 25.2 All enclosed volumes within the structure that are not 100% sealed shall be fitted with weatherproof covers or similar to facilitate inspection.
- 25.3 Where electric cables, hydraulic lines or similar vulnerable items are run through the Transporter structure access panels shall be provided for inspection and maintenance purposes. All exterior surface runs shall be adequately protected from accidental damage.

## 26 COATING SYSTEM

The paint coating system is to be anticorrosive as per general standard followed.

## **27 OTHER PROTECTIVE REQUIREMENTS**

27.1 The hydraulic lifting system is to be protected against damage in case of overload.

## **28 GENERAL TRANSPORTER MOTIONS**

28.1 The Transporter shall be provided with independent machinery units for:

- (a) Forward and reverse travel
- (b) Steering within the turning radius specified
- (c) Raising and lowering of the platform
- (d) Raising and lowering of individual bogies to allow wheel changes and axle load compensation
- (e) Manual mechanism to be provided to tow/pull the Transporter in case of breakdown of Transporter machinery.

## B2 - ELECTRICAL EQUIPMENT

### 29 GENERAL

- 29.1 All electrical installation work shall comply with the current edition of the IEE (Institution of Electrical Engineers, UK) Regulations for Electrical Installations or other comparable Indian or international standard.

### 30 WIRING

- 30.1 Where the control system wiring or similar vulnerable means of transmitting electrical or electronic signals are run through the Transporter structure, access panels shall be provided for the inspection and maintenance purposes. All surface runs, whether exterior or interior, shall be adequately protected from accidental damage.

### 31 INSTRUMENTATION

- 31.1 As a minimum the following instruments shall be provided in the drivers cab:
- a) A non-re-settable "hours run" meter
  - b) Fuel tank gauge
  - c) Load indicator with alarm

### 32 COMMUNICATIONS

- 32.1 The Transporter shall be fitted with a two-way radio.

### 33 LIGHTING

- 33.1 The Shipyard Transporter shall be equipped with the following lighting:
- (a) 2 main headlights to be provided in the rear of the vehicle in addition to the front headlights
  - (b) 1 small light in the drivers cab
  - (c) 4 direction indicators, one at each corner of the platform
  - (d) flashing hazard warning lights
  - (e) 4 flashing warning beacons, mounted
  - (f) 4 movable working lights to be exterior floodlights capable of illuminating the platform and working area to an average illumination level of 50 lux, enclosed in weatherproof bulkheads
  - (g) Lights in bonnet.
- 33.2 All lights and lamps shall be readily accessible for replacement of the bulbs.
- 33.3 All lights shall be controlled from the driver's cab

### **B3 - HYDRAULIC EQUIPMENT AND LUBRICATION REQUIREMENTS**

#### **34 HYDRAULIC EQUIPMENT**

- 34.1 Any hydraulic lifting system shall be controlled from the driver's cab.
- 34.2 Where fitted, hydraulic systems shall be designed and installed in accordance with DIN 19705 or equivalent to provide smooth, controlled operation. Pipe diameters shall be generous and pressure relief valves are to be fitted at all necessary locations to avoid over pressure situations. Pressure gauges shall be installed on all systems as required. Piping shall be amply supported to prevent vibration and radiuses and bends proportioned to minimise the likelihood of cavitation. Bleeding points shall be provided at high points in each system and the necessary bleeding sequence instructions provided in the maintenance manual.
- 34.3 Oil reservoirs shall be of generous capacity, baffled internally to minimise surge and fitted with magnetic drain plugs. They shall be vented to atmosphere through filtered breathers with desiccants and water drains shall also be provided.
- 34.4 The maximum permitted oil hot spot temperature within any reservoir is 60<sup>0</sup> C.
- 34.5 Pump flow and return lines are to be fitted with full flow filters of 10 microns filter capability or better to suit the components employed. Filters shall be fitted with pressure drop blockage indicators and integral bypass as elements of the control/alarm system.
- 34.6 The Contractor shall provide catch trays or similar such that wherever hydraulic fluids are to be bled or drained from the system, the resultant releases of hydraulic fluid can be captured and removed from the Transporter without spillage occurring such that they can be disposed of in a controlled manner.
- 34.7 Where possible hydraulic cylinders shall be parked in the retracted position and fitted with both pressure and wiper seals for the exclusion of dirt. If possible short stroke cylinders shall be fitted with gaiters.
- 34.8 All design use of hydraulic components must comply with manufacturer's recommendations.

#### **35 LUBRICATION**

- 35.1 Wherever possible all regular, routine lubrication requirements shall be mechanised, employing small bore piping to pressure distribute lubrication from central reservoirs to all necessary locations. Individual grease lines shall be labelled indicating the item being lubricated. Grease reservoirs shall be suitable for accepting a standard grease pail (25 litre minimum capacity, 300mm outer rim diameter).

- 35.2 Ideally the lubrication sequence should be initiated either at Transporter start up or immediately following shut down.
- 35.3 Where manual lubrication is retained all grease nipples etc. shall be brought to convenient and accessible central locations. All nipples shall conform to BS 1486: Part 4 or equivalent.
- 35.4 Lubrication and oil fill points shall be clearly and permanently labelled with the type of lubricant to be used. A list of all recommended lubricants and oils required for the Transporter shall be submitted to the Employer's approval that these lubricants and oils are all readily available from stock within India. The Contractor shall be responsible for the first fill of all lubricants and for ensuring that the Transporter is correctly lubricated in all areas before commencement of testing and commissioning activities.
- 35.5 All pressure lubricated machinery shall be provided with renewable oil filters equipped with pressure drop blockage indicators.
- 35.6 To the extent practicable, the Contractor shall provide catch trays or similar such that wherever Lubricants including greases and oils are ejected or otherwise removed from the system concerned, the resultant releases of the greases and oils can be captured and removed from the Transporter without spillage occurring such that they can be disposed of in a controlled manner.

### **36 PIPING OF HYDRAULIC AND LUBRICATION SYSTEMS**

- 36.1 Where pipe systems carrying hydraulic fluid or lubricants are run through the Transporter structure, access panels shall be provided for the inspection and maintenance purposes. All surface runs, whether exterior or interior, shall be adequately protected from accidental damage.

## B4 - MISCELLANEOUS REQUIREMENTS

### 37 DRIVERS CABIN

- 37.1 A single Driver's Cabin shall be mounted securely on the Transporter and shall generally consist of:
- (a) Full weatherproof enclosure
  - (b) One lockable side door with sliding window
  - (c) One spring-mounted driver's seat, ergonomically designed, upholstered and adjustable in height, length (forward and backward) with adjustable back
  - (d) Large front pane with two side windows, made from safety glass
  - (e) Two large rear view mirrors
  - (f) Air conditioning system capable of maintaining 20 degrees Centigrade
  - (g) Air vents capable of demisting the windshield
  - (h) Insulated against heat and noise
  - (i) Non slip finish to the floor of the cab
  - (j) Variable speed windshield wiper with washer system
  - (k) Fold up sun visor
  - (l) Controls shall be mounted adjacent to the driver
  - (m) A small carbon dioxide fire extinguisher shall be mounted in the cab
  - (n) A fixed CB radio transmitter/receiver
  - (o) Instrumentation
- 37.2 The main Transporter functions shall be operated by means of joystick controllers, switches, buttons etc. as appropriate situated on or in close proximity of the chair arms. A lift up seat, for a driving instructor or second person, shall be provided and fixed to the rear or side walls of the cabin.

### 38 SAFE LOAD INDICATOR

- 38.1 A safe load indicators for the Transporter shall be fitted in the driver's cab providing dial scale information of the load on the platform.

### 39 EMERGENCY STOPS

- 39.1 Emergency stops shall be preferably considered at the following locations on the Transporter:
- a) At both sides, at ground level on the Transporter body
  - b) In the driver's cab
  - c) Within the engine enclosure
- 39.2 Any one of the emergency stops shall be capable of tripping all control circuits safely and shutting down the engine.
- 39.3 The Emergency Stops shall be of robust construction and have preferably yellow bodies and red mushroom heads. When depressed the red mushroom head will

not be released except from the Drivers Operating Panel. Depression of the red mushroom head will immediately activate an Emergency Stop in all motions. A red light indicating which Emergency Stop was depressed on the Drivers Operating Panel. When the cause of the Emergency Stop being depressed has been investigated and corrected, the driver may restart his Transporter using the appropriate security system and start up procedure and release the depressed Red Mushroom Head Emergency Stop.

#### **40 NOTICES AND LABELS**

- 40.1 Safe working load notices shall be prominently displayed on the structure of the Transporter in both English and Hindi.
- 40.2 All notices and labels within the driver's cab shall be indicated.
- 40.3 Filling points for water, lubricating oils and greases, tank capacities and other similar maintenance instructions shall be indicated.
- 40.4 All equipment with manufacturers rating and identification plates shall be indicated.
- 40.5 The Contractor must submit the locations, styles and sizes proposed for all significant notices for approval by the Employer. Notices and labels shall be manufactured from steel, brass or durable plastic. External notices shall be painted and manufacturer's rating plates stamped. General labels shall be engraved from white/black/white sandwich plastic or similar to provide black lettering on a white background. Emergency labels etc. shall be engraved to provide red lettering on a white background. All labels shall be mechanically secured by screws, rivets or similar. Adhesive labels are not permitted.
- 40.6 Both sides of the Transporter body shall be painted with the MDL logo shown below, and the following legend in large blue lettering.



**MAZAGON DOCK LTD.**

- 40.7 The precise colour blue to be applied will be selected from a selection of colour swatches provided by the supplier.
- 40.8 Before dispatch to site for assembly all connecting items, whether mechanical, electrical or structural shall be suitably identified and, where appropriate, also carry orientation marks to prevent mis-assembly. Identification marks shall be positioned such that they will remain visible throughout the assembly process. Small loose items shall either be securely wired to associated parts or bagged. All such items shall be clearly identified. Nuts, bolts and washers shall be bagged and identified by size and material specification.

## **B5 - TESTING**

### **41 TESTS AT WORKS**

- 41.1 Inspection / test during assembly and final test shall be done by the Engineer.
- 41.2 Functional tests to demonstrate the correct operation of all control and alarm equipment shall be conducted.

All machinery elements shall be assembled sufficiently to be capable of being tested under no load for proper operation and control of all speeds and directions and that feedback information and interlock functions are also correct.

- 41.3 The Employer and/or his representative may wish to witness certain of the works tests. The Contractor shall provide ample advance notification of all impending tests to the Employer.

### **42 COMMISSIONING**

- 42.1 The commissioning tests shall be conducted by the Contractor's personnel and demonstrate the overall suitability of the Transporter for the shipbuilding function intended together with proof of specified performance as required amply demonstrating operational reliability.
- 42.2 The Contractor is responsible for arranging certified test weight(s), slings, lifting beams and load frames such that a variety of test loads up to the overload test weight can be securely assembled and safely used in all Tests undertaken at the Shipyard and during the Setting to Work period outlined below
- 42.3 Any breakages or component or equipment failures that arise during commissioning shall be rectified or replaced at the Contractors cost and without penalty to the overall Transporter guarantee. All tests associated with the breakage or failure shall be repeated.

### **43 PERFORMANCE TESTS**

- 43.1 The Contractor shall perform fitness tests of the Transporter to include functional, load tests, endurance and trial operations type work. After the Transporter has successfully completed all such tests to the Contractor's satisfaction a certificate of competence will be issued to the Employer.
- 43.2 Upon receipt of the certificate the Employer's Representatives and personnel will conduct the performance tests together with, and under supervision from, the Contractor's own engineers and operators. The performance tests to include, inter alia:
  - a) insulation resistance tests on cables, transformers and motors.
  - b) operation of emergency stops, interlocks and safety equipment.
  - c) rated load tests.
  - d) over load test in accordance with design standard requirements.

- e) noise level checks.
- f) Any other requirement as required by Engineer / Employer.

43.3 The Contractor shall provide details of all proposed procedures and methods for each test for approval by the Engineer / Employer. Testing will be undertaken in accordance with the agreed finalised procedures and methods and to the satisfaction of the Employer that the results are in accord with the Contract Specification.

#### **44 DURABILITY**

44.1 The Transporter will be subjected to a durability test after successfully completing all performance tests. Durability shall be proven by subjecting the Transporter to a period of continuous simulated operation at its maximum designed load. The test shall include raising and lowering of the platform and the Transporters forward and backward travel.

#### **45 SETTING TO WORK**

- 45.1 Once the Transporter has successfully completed all formal testing it will be handed over to the Employer so that shipbuilding operations can begin.
- 45.2 It must be recognised that the Employer's workforce have no prior experience of using a Shipyard Transporter.
- 45.3 The Contractor is therefore required to provide on site support and on the job training for the drivers during which time the Transporter is set to work and the driver's acquire adequate levels of competence.

#### **46 CERTIFICATION**

46.1 The Contractor shall supply to the Employer test certificates in accordance with the relevant statutory requirements following completion of all necessary tests.

## **B6 - MAINTENANCE**

### **47 GENERAL**

- 47.1 The Contractor should demonstrate their capability to rapidly attend to Transporter breakdowns and repairs during and after the defect liability period. Details are to be indicated in the tender document.
- 47.2 At the tender submission stage an itemised price listing of the manufacturer's recommended additional spare parts considered necessary to support the Shipyard Transporter during the initial 5 years or 5,000 hours of operation. This listing shall not include consumables except where the Contractor has been unable to identify a source in India. Where this is the case he shall provide full details of such items giving the justification for the Specification used which necessitates the import of the consumable involved.
- 47.3 To simplify the spares holding and procurement aspects, materials, equipment and components shall be standardised as far as is reasonable within the design of the Transporter. All spare parts are to be fully interchangeable with the original parts and be manufactured to the same quality and standards.
- 47.4 All spare parts and any associated special tools shall be suitably boxed and/or preserved to prevent deterioration whilst in storage. All such packaged items shall be clearly labelled in English for ease of identification.
- 47.5 All spare parts shall be available after 20 years against obsolescence.

### **48 SPECIALIST TOOLING**

- 48.1 The Contractor shall supply to the Employer one complete set of special tools and fixtures necessary for the erection, removal, maintenance and subsequent replacement of all assemblies, components, spare parts and consumables, required to ensure that no item exceeding 25 kg need be manually handled.
- 48.2 All special tools and fixtures shall be permanently marked as to their function and specific use. Size permitting, they shall all be stowed in secure portable metal tool chests or, if large, wall mounted on shadow boards within a suitably located compartment within the Transporter structure.