



**MAZAGON DOCK SHIPBUILDERS LIMITED**

(Formerly known as Mazagon Dock Ltd.)

CIN : U35100MH1934GOI002079

(A Government of India Undertaking)

Dockyard Road, Mazagon,

Mumbai 400 010.

INDIA

**Design, Manufacturing, Class Approval,  
Supply, Installation, Testing and  
Commissioning of New Caisson Gate for  
Dry Dock in East Yard, MDL.**

**SCOPE OF WORK AND TECHNICAL  
SPECIFICATIONS**

**TENDER NO: 1900000089**

**I N D E X**

<b>Sr.No.</b>	<b>Description</b>	<b>Page</b>
	<b>PART A: PARTICULAR SITE CONDITION AND REQUIREMENTS</b>	
1	SITE LOCATION	3
2	ACCESS TO THE SITE	3
3	INSTRUCTIONS FOR SUPPLIERS WORKING IN MAZAGON DOCK SHIPBUILDERS LTD.	3
4	SUPPLIER'S PLANT, EQUIPMENT, LABOUR, PERSONNEL, FUEL AND CONSUMABLES.	4
5	SANITARY PROVISIONS	4
6	SAFETY, HEALTH & WELFARE PROTECTION, LIFE-SAVING	5
7	FIRE-FIGHTING EQUIPMENT AND STORAGE OF DANGEROUS MATERIALS	5
8	ADVANCE NOTIFICATION OF ALL OPERATIONS	6
9	REGULATIONS OF STATUTORY AUTHORITIES AND CUSTOMS	6
10	WORKS NOT TO INTERFERE WITH BUYER'S NORMAL BUSINESS	6
11	SITE CLEARANCE; MAKE GOOD ETC. ON COMPLETION	6
	<b>PART B : TECHNICAL REQUIREMENTS</b>	
12	SCOPE OF SUPPLY AND TECHNICAL SPECIFICATION	7
13	CAISSON GATE LOCATION, SITE CONDITIONS AND LIMITATIONS	26
14	APPOINTMENT OF THIRD PARTY EXPERT AGENCY (TPEA).	27
15	DRAWING APPROVAL PROCEDURE	27
16	MINIMUM DRAWINGS AND DOCUMENTS REQUIREMENT	28
17	HEALTH AND SAFETY	28
18	OPERATIONAL AND MAINTENANCE MANUALS	28
19	MATERIALS AND WORKMANSHIP	29
20	SUBMISSION OF MILESTONE/ACTIVITY-TIME CHART	29
21	WARRANTY PERIOD	29
22	REMOVAL OF EXISTING CAISSON GATE AT MDL AND INSTALLATION & COMMISSIONING OF NEW CAISSON GATE	29
23	SCHEDULE	30
24	LIST OF DRAWINGS OF EXISTING CAISSON GATE AT MDL (For Reference)	30

**PART A: PARTICULAR SITE CONDITIONS AND REQUIREMENTS****1. SITE LOCATION**

The site location is East Yard Dry Dock in MDL, Mumbai. The supplier has to visit the site and to take their own measurements as stated in succeeding paragraphs.

**2. ACCESS TO THE SITE**

2.1 The Supplier shall at all times make use of the site entrance as instructed by the MDL executive for access to the site. Vehicles and persons will be restricted to the Supplier's working area only. Except for making deliveries, Supplier's Vehicles shall be parked outside the yard.

2.2 The Supplier shall make arrangements to obtain from the MDL all necessary passes for vehicles and persons entering the shipyard site for the purpose of carrying out the Works.

2.3 The extent of the site will vary as the work progresses to suit the construction of the Works. In general, the site comprises a number of discrete areas within and outside Mazagon Dock Shipbuilders Ltd. The Supplier shall gain access to the various site areas through shipyard operational areas. The MDL shall in general provide clear access for the Supplier to the site areas; however, the Supplier shall expect at times to have restrictions in access due to shipyard operations.

**3. INSTRUCTIONS FOR SUPPLIERS WORKING IN MDL:**

All Suppliers working within Mazagon Dock Shipbuilders Ltd shall comply with the following rules and instructions:

- |       |  |
|-------|--|
| (i)   | While employing workers in Mazagon Dock Shipbuilders Ltd., the Supplier shall bear in mind that it is a vital Defence Installation.  |
| (ii)  | The Supplier shall be responsible to produce a Police Verification Report regarding checking of antecedents and verification of character of his employees, if so required by the security Department.   |
| (iii) | The Supplier shall declare in the Security Office all tools, equipment or any other items brought by him for work in Mazagon Dock Shipbuilder Ltd. In case of electric cables, its measurement (size & length) is to be written properly. The paper containing the list of items declared in the Security Office shall be retained by the Supplier properly. For items of stores / material resembling that of Mazagon Dock Shipbuilders Ltd;, precaution shall be taken to mark their clear identification of colour code and / or serial number and / or clear marking on each items of stores / material including tools. |
| (iv)  | All the items / material required to be taken out of Mazagon Dock Shipbuilders Ltd. After completion of work is to be removed only during working hours. This shall be supported by the original paper / document at the time bringing the material / items inside Mazagon Dock Shipbuilders Ltd.  |
| (v)   | At the time of entry / exit, the Supplier'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 supplier 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 Shipbuilders 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 Supplier's employee is required to work in Mazagon Dock Shipbuilders 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 the Security   |

	Department.
(vii)	If the period of work in Mazagon Dock Shipbuilders Ltd. is less than 89 days, then the Supplier has to furnish the following information in a register as per the labour challan issued by the personnel Department:
	Sl. ....
	Address .....
	No. ....
	Name .....
	Age .....
	Distinguishing mark on the body, if any .....
	Designation .....
	Local Address .....
	Permanent Address .....
(viii)	The Supplier 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 / Manger / site executive of his concern. ESIS formalities in respect of his / sub-Suppliers workers have to be completed every month without fail.
(ix)	Cost of Security passes / Identity Cards will be recovered from the Supplier 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 Supplier will be charged extra as per prevailing rates. The amount shall be deposited to the Cash Department of Mazagon Dock Shipbuilders Ltd.
(x)	The Supplier must ensure that all the security Rules of Mazagon Dock Shipbuilders Ltd. are observed by his employees.
(xi)	The Supplier shall give strict instructions to his or his Sub-Supplier's employees not to step on board ships under construction / repairs.

#### **4. SUPPLIER'S PLANT, EQUIPMENT, LABOUR, PERSONNEL, FUEL AND CONSUMABLES:**

4.1	The Supplier shall provide and mobilize all necessary plant, equipment and labour for the Construction of the Works. He shall provide all necessary maintenance facilities for the plant and equipment, which shall not be de-mobilized and removed from site before the completion of the Works without the written permission of the MDL executive.
4.2	The Supplier 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 supplier shall arrange for required supervisory staff on Site as and when required. He shall submit on award of the Contract for the approval of the MDL executive in the form of a bar chart showing numbers of supervisory staff needed at various stages of construction.
4.4	The Supplier 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. SANITARY PROVISIONS:**

5.1	The Supplier shall provide onsite and remove when directed by the MDL executive, adequate sanitary accommodation, including, if necessary, septic tanks(s) to the approval of the Statutory authorities for the use of persons employed on the Works and provide proper attendance to the satisfaction of the MDL executive.
5.2	The Supplier 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-Suppliers' employees and labour to use the facilities provided which shall be carefully maintained by the Supplier throughout the currency of the Contract to the satisfaction of the MDL executive.

#### **6. SAFETY, HEALTH & WELFARE PROTECTION, LIFE-SAVING.**

6.1	The Supplier shall comply with the regulations of the Statutory Authorities in respect of safety, health and welfare requirements. All facilities provided shall also be subjected to the approval of the MDL executive in respect of sitting, type quality, maintenance and cleanliness.
6.2	The Supplier shall adhere to safe construction practices and guard against hazardous and unsafe working conditions and shall comply with MDL's Safety Rules.
6.3	The Supplier shall give prompt and due consideration to any matters to which the MDL executive may find it necessary to call attention, for the purpose of ensuring compliance with the foregoing requirements.
6.4	The Supplier shall provide handrails, scaffolding, and take such other safety precautions as are consistent with normal good safety practice.
6.5	Site operatives shall be fully conversant with the use of safety equipment and drills shall be carried out frequently to ensure that all necessary procedures can be correctly observed.
6.6	The Supplier shall provide all necessary personal protective equipment (PPE) to his workforce and that of his sub-suppliers. This shall include, but shall not be limited to; safety boots, hard hats, gloves, lifejackets, eye protection, ear defenders, high visibility vests, harnesses.
6.7	All safety rules to be observed while working on live electrical system or installation as stipulated in The Indian Electricity Rules and other relevant rules.
6.8	The supplier shall in all dealings with about in his employment have due regard to all recognized festivals, days of rest and religious or other customs and observe days of rest as applicable to the outdoor staff of the MDL.
6.9	The Supplier 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-Suppliers.
6.10	The Supplier shall recognize the freedom of his work people to be members of trade unions.
6.11	All personnel employed by the Supplier and any of his sub-Supplier's 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 Supplier 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 Supplier shall observe and abide by all fire and safety regulations of the MDL before starting and during execution of construction work. The Supplier shall consult with MDL's Safety executives and must make good to the satisfaction of the MDL any

loss or damage to any portion of the work done or to be done under this Contract or to any of the MDL'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 Supplier of all operations to be carried out on the site. Such notice shall be provided in sufficient time for the MDL executive to make all necessary arrangements for inspection and checking. Such inspection and checking shall not relieve in any way the obligations of the Supplier under the Contract.

8.2 Where the MDL executive 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 the Contract, the Supplier shall be responsible for meeting obligations of all statutory authorities, including but not limited to local representatives, The Indian Electricity Rules and Act, Fire Insurance Regulations, Brihan Mumbai Electricity Supply and Transport Undertaking (B.E.S.T.) and the Central Electricity Authority (CEA) and Mumbai Port Trust (herein referred as MbPT).

9.2 Should any of the statutory authorities request an inspection of the installation, equipment or the final works, the Supplier shall co-ordinate with the MDL executive in carrying out such inspection. Any modification suggested by the authorities shall be carried out by the Supplier, on the advice of the MDL executive at no additional cost.

9.3 The Supplier shall comply with all regulations imposed by the Customs authorities in respect of the passage of all imported Supplier's equipment, plant, materials and vehicles and personnel through Customs barriers inclusive of relevant fees.

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

10.1 The Supplier shall not interfere in any respect with the normal business of the MDL 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 Supplier, shall co-operate, by temporarily removing any of his Equipment, floating craft, obstructions, etc. which may cause hindrance to the launching of a newly built ship/submarine till the process of launching has been completed, as per direction of the MDL executive at no additional cost.

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

11.1 The MDL will provide space to the supplier during fabrication, assembly of Caisson Gate and subsequent project work.

11.2 The Supplier 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 MDL executive.

## **PART B: TECHNICAL REQUIREMENTS**

### PREAMBLE

The Floating Caisson Gate of East Yard Dry Dock was designed, fabricated and installed during the year 2010. The existing Caisson gate is working satisfactorily since last many years with minor refit/repairs/maintenance.

### PREBID SURVEY

The scope of work for individual activities is broadly specified. Bidders shall visit MDL site for the assessment of total quantum of work involved in fabrication, supply and delivery to MDL site, Commissioning, testing, trials of new caisson gate at 'C' workshop dry dock in East Yard, MDL.

The new Caisson Gate shall be fabricated at the suitable existing space in the SSA Workshop (a covered Workshop) in MDL as per mutually agreement and assembly of the gate to be carried out in Workshop 'C' at MDL.

The actual dimensions for the gate to be constructed shall be taken from the Dry Dock by the contractor. The Caisson structure shall be capable of being accommodated conveniently in the existing caisson groove in Dry dock wall as well as floor and shall act as water tight when sealed in the grooves, with minimum leakage.

The bidders shall submit the vendor declaration form (As per attached format)

## **12. SCOPE OF WORK AND TECHNICAL SPECIFICATION**

### 12.1 GENERAL

- A) The general arrangement of Existing Floating Caisson Dry Dock Gate in MDL is illustrated in attached Drg. No. 35.DG.01. The size of the Caisson Gate is 18 meter x 3.5 meter x 10 meter (LxWxH). The Contractor shall carry out Design, manufacturing, class approval, supply, installation, Testing and Commissioning on Turnkey Basis of Caisson Gate for Dry Dock in East Yard at MDL including Third Party inspection at Contractors cost for Complete Work. The total scope is to be executed under inspection of Third Party Expert Agency (TPEA(THIRD PARTY EXPERT AGENCY)).
- B) Contractor shall appoint a Third Party Expert Agency (TPEA(THIRD PARTY EXPERT AGENCY)) for Class Approval of Design, Drawings, Quality Assurance Plan (QAP), Welding procedures, Welding Plan and NDT Plan, Fabrication Methodology, Testing Methodology and also for inspection to be carried out by them during Fabrication, installation, testing and commissioning of Caisson Gate.

### 12.2 CAISSON GATE SPECIFICATION:

- a. The weight of Caisson Gate is 300 tons (approx).
- b. Size of the Gate (LxWxH) = 18 meters x 3.5 meters x 10 Meters
- c. Draft = 6 meters
- d. Tank – 6 Tanks (2 Ballast Tanks, 1 Scuttle Tank & 3 Tidal Tanks)
- e. De Ballasting in 20 Min. By Using Suitable Electric Self Priming Pump.
- f. The contractor shall prepare detailed design and drawing for Fabrication of Caisson Gate based on the basic drawings, Hull and Engineering items Parlist of Existing Gate. Basic drawings of Existing Caisson Gate i.e. drawing No: 35.DG.01 (general arrangement), 35.DG.02 (Framing arrangement), 35.DG.03 (Floating Caisson – Dry Dock Gate Erection Sequence), 35.DG.04 (Details of Piping Valves and Pumps), 35.DG.05 (Draught Marks), P75/0811-17-00-00 (Disposition of Aluminium Anodes), P75/0811-18-00-00 (Disposition of Aluminium Anodes in Tanks), P75/0811-16-00-00 (Caisson Gate Support Cradles), P75/0811-05-63-00

(Disposition & details of Drain Plug), P75/0811-05-29-00 (Rubber seal for Caisson Gate) shall be provided by MDL for reference purpose only. Also, Part list of Hull items and Part list of Engineering items of the Existing Caisson Gate shall be provided by MDL for reference purpose only.

### 12.3 SALIENT FEATURES OF THE EXISTING CAISSON GATE ARE AS UNDER:

The Caisson Gate is of welded construction. Steel protection is provided by painting and anodes.

The actual dimensions may vary to some extent from drawing. The caisson structure is capable of being accommodated conveniently in the existing caisson groove in dry dock wall as well as floor.

The caisson gate can be operated easily without depending on any of the shore services except filling up top tank from shore water Supply and draining the same in end water chamber during floating operation through deck drain valve and electric Supply for operating the submersible pumps for transfer of water from scuttle tank to top tank or back to the basin will be required only in case of leakage of some drain valves.

The caisson structure accommodates conveniently in the existing grooves in the 'C' workshop Dry Dock East Yard MDL wall and dock floor.

The gate is reversible and can be used with either side facing the sea.

The actual times taken for raising/sinking the caisson is as under

- |      |                                    |   |                     |
|------|------------------------------------|---|---------------------|
| i)   | Raising the caisson                | : | Maximum 20 minutes. |
| ii)  | Sinking the caisson in groove      | : | Maximum 30 minutes. |
| iii) | Time required to fill the Dry dock | : | 2 hours             |

The normal sinking operation is carried out using valve arrangement without requiring any external assistance. However, for any emergency an alternative arrangement is generally provided for pumping the water from scuttle tank to the top tank by means of electric submersible pumps.

The caisson groove contour dimensions and overall dimensions are to be obtained by actual measurements at site to ensure water tightness when the caisson is seated in the grooves. The existing sill at the bottom abutment faces has to be utilized.

The caisson is freely maneuverable at a mean draft available at MDL Site.

The contractor shall ensure that the sealing surfaces are properly matched to ensure that the leakage is minimum.

### 12.4 RESPONSIBILITY MATRIX:



<b>RESPONSIBILITY MATRIX FOR CONSTRUCTION OF CAISSON GATE</b>				
Sl. No.	Activity	Contractor	Third Party Expert Agency (TPEA)	MDL
1	Providing Basic Drawing of Existing Caisson Gate along with Tender			√
2	Appointment of TPEA(THIRD PARTY EXPERT AGENCY) for inspection, Class approval and Coordination at Site.	Proposed √		Approved √
3	Preparation of Detailed Design, Quality Assurance Plan (QAP), Welding procedures, Welding Plan and NDT Plan, Fabrication Methodology, Testing Methodology, drawings and Class Approval of the same.	Proposed √	Approved √	Accept √
4	Procurement of all Materials and Consumables as per approved detailed design.	Proposed √	Approved √	Accept √
5	Fabrication and Testing of the Caisson Gate progressively.	√	Inspection & Approval √	Accept √
6	Compliance of the Requirements of QAP	√		
7	Removal of existing Caisson Gate in MDL and handing over the same to MDL. Transportation, Launching, Installation and Commissioning of New Caisson gate at site.	√		
8	Rectification & Repair on site, if need arise.	√		
9	Operation and Maintenance training	√	Approved √	Witness & Taking Over √
10	Documentation	√	Approved √	Accept √

## 12.5 APPLICABLE CODE AND SPECIFICATIONS:

The following specifications, standards and codes are made a part of this specification. All standards, specifications, codes of practice referred to herein shall be latest editions including all applicable official amendments and revisions.

### 12.5.1 MATERIAL

- a. IS:3039-Ship building quality structural steel
- b. IS:2985-Ship building quality structural steel
- c. IS:2061-Structural steel/(Standard quality)
- d. IS:1363-Black hexagonal bolts, nuts (diameter 6 to 39 mm) and black hexagonal screw (diameter 6 to 24 mm)
- e. IS:1364-Precision and semi precision hexagonal bolts, screws, nuts and lock nuts (diameter 5 to 24 mm)
- f. IS:1367 Technical supply conditions for treated fasteners.
- g. IS:1357-High tensile friction grip fasteners for structural engineering purpose.
- h. BS:1083-Precision hexagonal bolts, screws, and nuts (BSW & BSF threads)
- i. BS:3139-High strength friction grip bolts for structural engineering.
- j. ASTM A 325-High strength steel bolts for structural joints.
- k. IS:2016-Plain washers
- l. IS:814-Specification for covered electrodes for metal arc welding for mild steel.
- m. IS:3613-Acceptance test for wire flux combination for submerged arc welding (SAW)
- n. IS:7280-Bare wire electrodes for submerged arc welding (SAW) of structural steel.
- o. BS:639-Converted electrode for manual metal arc welding (MMAW) of mild steel medium tensile steel.
- p. AWS-A5-1-specification for mild steel covered arc welding electrodes.
- q. AWS.A5-17-Specification for fare mild steel electrodes and fluxes for submerged arc welding.
- r. BS:970-Carbon construction steel.

### 12.5.2 CODES OF PRACTICE

- a. IS:4622-Recommendations for structural design of fixed wheel gates.
- b. IS:4651-code of practices for planning and design of ports and harbours.
- c. IS:800-code of practice for general construction in steel.
- d. IS:875-code of practice for structural safety of building's loading standards
- f. BS:6349-British standard code of practice for maritime structures (part-3) Design of dry docks, locks, slipways and ship building berths, ship lifts and dock and lock gates
- g. IS:4000-Code of practice for assembly of structural joints using high tensile friction grip fasteners.
- h. IS:3294-The use of high strength friction grip bolts in structural steel work
- I. IS:816- Code of practice for use of metal arc welding for general construction
- j. IS:9595-Recommendations for metal arc welding of carbon and carbon manganese sleet

- k. IS:4353-Recommendation for submerged arc welding of mild steel and low alloy steels.
- l. IS:817-Code of practice for training and testing of metal arc welders
- m. IS:1181-Qualifying test.
- n. IS:1182-Recommended practice for Radiographic examination of fusion welded Butt joints in steel plates for metal arc welders
- o. IS:2595-Code of graphic for radiographic testing.
- p. IS:3658-Code of practice for liquid penetrant flaw detection
- q. IS:5334-Code of practice for magnetic particle flaw detection of welds.
- r. ASTM E 94 – Recommended practice for Radiographic Testing.
- s. ASTM E 109 – Dry powder magnetic particle Inspection.
- t. ASTM E 138 – Wet magnetic particle Inspection.
- u. ASTM E 165 – Liquid penetrant Inspection.
- V IS: 1477 (Part 1 & 2) Code of practice for painting of ferrous metals in buildings.
- w. IS: 1852 Specification for rolling and cutting tolerances for Hot rolled steel products.
- x. DIN: 17005 – Specification for low carbon. High tensile steels.
- y. DIN: 2931/C – Specification for Hydraulic tubings.

## 12.6 FABRICATION

1. The contractor shall carryout the site inspection and takes measurements etc. to know the site conditions before quoting.
2. The contractor shall be responsible for getting approval by the TPEA(THIRD PARTY EXPERT AGENCY) by providing all the details / clarifications.

The additional cost towards any increase in quantity / quality of work on account of certifying agency shall be to the contractors account and MDL shall not bear any additional cost over the contracted value of work.

If any modification is made in the design or drawing during the course of execution of work, revised design drawing shall be prepared by the contractor at no extra cost and shall be duly approved by the certification agency as the above clause.

If any modification is made in the design or drawing during the course of execution of work, revised design drawing shall be prepared by the contractor at no extra cost and shall be duly approved by the certification agency as the above clause.

All workmanship and finish shall be of required quality and shall conform to the approved method of fabrication. All hoes and edges shall be free of burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished. Unless otherwise directed/approved, reference may be made to IS:7215 (Tolerances for fabrication of steel structures). Materials at the shops shall be kept clean and protected from weather.

3. In addition to the above mentioned aspects, the contractor is required to strictly adhere to the following:

- a) Fabrication shall be done as per approved manufacturing drawings. Well-designed fixtures and clamps shall be employed/used during setup and assembly of joints for welding and bolting. As far as possible direct tack welding of joint setups shall not be resorted to.
- b) Any defective materials used shall be replaced by the Contractor at his own expense, care being taken to prevent any damage to the structure during removal and reinstatement.
- c) All the fabricated and delivered items shall be protected from any damage during transportation and handling. Any damage caused at any time shall be made good by the Contractor at this own cost.
- d) Any faulty fabrication pointed out at any stage of work shall be made good by the contractor at his own cost.

#### 12.7 WELDING PROCEDURES:

- 1.1 All welding shall be done either manually by the shielded metallic arc (SMAW) process for short runs and automatically/semi-automatically by the Metal Inert Gas (MIG) or Submerged Arc Welding (SAW) method for continuous runs.
- 1.2 The Contractor shall develop a welding procedure for the approval of the TPEA (THIRD PARTY EXPERT AGENCY). After the welding procedure has been approved, the Contractor shall record it and follow the same.
- 1.3 All welds shall be usually made continuous and watertight the minimum throat dimensions of all fillet welds shall be 6mm. or the corresponding plate thickness at min.
- 1.4 All defects in welds shall be chipped/gauged/ground/machined out to sound metal and such areas shall be magnet fluxed or ultrasonically tested to ensure that the defect has been completely removed before repair welding. The dimensions and shape of the edges to be jointed shall be such as to allow thorough fusion and completed penetration and edges of plates shall be properly formed to accommodate the various welding conditions. The surface of the plates for distance of 20 mm from the edge to be welded shall be thoroughly cleaned. Of oil rust grease and scale to bright metal by wire wheel brushing and pre-heated to the required temperature prior to the commencement of welding.
- 1.5 The technique of welding employed, the appearance and quality of the welds made and the methods used in correcting defective work, shall conform to the IS:9595.
- 1.6 Welding shall be carried out only by fully trained, experienced and MDL /TPEA (THIRD PARTY EXPERT AGENCY) approved welders. All welders and welding machine operators to be assigned to the work shall be tested by the qualification tests as per Code IS:817 within three (3) months and all test results shall be submitted to the TPEA for approval. If in the opinion of the TPEA/MDL, the work of any welder at any time appears questionable, he shall be required to pass the appropriate prequalification test. All costs of these qualification tests shall be borne by the Contractor. All as per approved QA Plans.
- 1.7 Welding electrodes shall conform to IS:815, Bare wire electrodes of Submerged Arc Welding process shall conform to IS:7280 all as per AWS standards.

- 1.8 When welding is carried out in an open area, steps shall be taken to protect the place of welding against wind or rain. The electrodes, wire flux and parts being welded shall be dry and baked/preheated to the required temperature
- 1.9 For single V butt welds and double V butt welds the re-welding of the root is mandatory but only after the metal deposit on the root has been cleaned by back gauging and chipping and after thorough checking for the removal any root defects by Dye Penetrant Tests/and all NDT Test as per QA Plan.
- 1.10 For multilayer welding, before welding the following layer, the formerly welded layer shall be cleaned metal bright by light chipping and wire wheel brushing.
- 1.11 The defects in welds shall be rectified according to IS-9595 and as per instruction of the TPEA)/MDL, if rectification is allowed by TPEA/ MDL.

## 12.8 DECKS

- a. All the decks, skin plates, etc. shall be fabricated from Ship Building Quality steel plates confirming to IS3039, 2985. All decks shall be continuous throughout from stem to stem and from side to side and shall be watertight through-out
- b. The complete portion of deck which is outside end water chambers and central water chamber shall be provided with a slope of at least 75mm to ensure that there is no stagnation of water, Also one extra coat of top coat paint shall be applied in this area.

## 12.9 SLUICE VALVES

- a. Sluice valves shall be Ni-Resist cast iron, double flanged, fitted with non-raising spindle having flanged internal collar and tapered wedge and shall be suitable for handling sea water having turbidity of 500 PPM. Valves shall be provided with flange type of dome and with square end for-operating with valve opening portable lever closing by clockwise rotation of the spindle. They shall conform to IS:2906-1984 Class II series, for general construction and having material of construction as under all as per new design & sizes.
- b. The valves shall be fitted with arrangement to operate them by operating lever from deck A and also fitted with a hand wheel for local operation. The operation from the deck A shall be very smooth and easy for one person to handle. If required, suitable reduction gear arrangement with lubrication shall be provided.
- c. Test pressure for all valves, shall be as per TPEA(THIRD PARTY EXPERT AGENCY) Specifications or relevant I.S. Specification.
- d. The control spindles (shafts) shall be SS316 with tubular sleeves 10mm thick and approved universal joints, with adequate rust prevention, as required. Where it is unavoidable to have the shafts pass through watertight decks, without sleeves watertight glands shall be fitted.
- e. Sluice valves should be of reputed make like Kirloskar, BDK, Vaas Industries, Orbinox etc.
- f. The main flooding valves will be motorized and under normal condition they will be operated using motor. These valves are to be also provided with arrangement for manual operation during breakdown of motor. The manual system of operation should be very smooth and easy for one person to handle.

- g. Other valves to be manually operated

#### 12.10 FLOODING DISCHARGING AND VENTING OF CAISSON

- 1.1 Ni-resist Cast Iron sluice valves/screw Down Deck Drain valves 300 mm/460 mm diameter shall be fitted for flooding and draining the scuttle tank/end chambers. Suitable flanged steel pipe in straights and bends shall be provided to connect these valves to bell-mouth discharge pieces suitably places on the top of the scuttle tank and to shaped intakes having square openings of suitable size in the side of the caisson.
- 1.2 All tanks shall be provided with suitable air vent and sounding pipes at both ends. All Pipes on water tanks and void spaces shall be galvanized.
- 1.3 An 80 mm diameter pipe shall be laid from the bottom of the scuttle tank through 80 mm diameter isolating valves to the ballast chamber below deck 'E'. These connections are required for complete draining of the scuttle tank for maintenance purposes.

#### 12.11 WALKWAY

- a) The top surface level of steel deck A shall have at least 75mm chamber. The walkway level shall correspond to the cope deck level. The teak wood shall be coated with double boiled linseed oil and then painted with polyurethane paint.
- b) Mild steel landing plates with suitable hinges shall be provided for each end of the caisson gate chequered. These chequered plates shall be provided with lifting arrangement and locking arrangement with chains.
- c) A Kerb shall formed as shown in the drawings no35.DG.01, 02, 03, 04. Weep holes with carry away pipes shall be provided for draining the surface water through each weep hole, from deck A. Any other arrangement to prevent water stagnation on deck A will also be acceptable.

#### 12.12 BEARING TIMBER ON KEEL AND STEMS

- a. The bearing surface of the keel and stems shall be formed with best quality seasoned Sal/Teak wood. The timber shall be worked in as long lengths as practicable. The seal timber shall be secured to the steel plating by 30 mm or suitable diameter S.S. AISI 316 bolts, nuts and washers duly as shown in the drawings.
- b. All bots, nuts made of S.S. AISI 316L S. S. washers shall be fixed in keel timber which shall be well recessed (Counterbored). The counterbored holes shall be plugged with best quality Sal Teak Wood plugs soaked in marine glue.

#### 12.13 MISCELLANEOUS ITEMS/FITTINGS

- a. The fixed ballast shall be of steel and concrete slurry. The requirements of the ballast for operation of the caisson gate shall be decided by the Contractor and will be as per existing design and drawings.
- b. The loose ballast shall be in the form of cast iron blocks (rectangular or square cubes each weighing about 20 kg.) and placed in suitably constructed boxes provided at each corner in the Air chamber of the caisson against the inner side of the end bulkheads and the skin plating. The size of these boxes shall be large

enough to hold up to 8 tonnes of cast iron blocks. This loose ballast is only intended for affecting subsequent alteration in the trim and stability of the caisson gate at later stage if required and shall not be used for making any initial major adjustment, during designing to the trim of the caisson gate. The requirement of loose ballast shall be as per existing drawings and later during commissioning the caisson.

#### 12.14 BOLLARDS

- a) Four good quality double bollards shall be fitted at the four corners of deck A, immediately beyond the ends of the operating platforms as shown in the Drawings No. **35.DG.01, 02, 03, 04**. These shall be fabricated and capable of withstanding at least 7 M.T. bollard pull/safe working load and conform to relevant I.S. These bollards shall be hot dip galvanized and painted using suitable primer and epoxy paints. The top of those bollards shall be convex shaped.
- b) Four Nos. fair leads/mooring bitts shall also be provided near the ends of the deck A. They shall be properly painted/ C.I. or M.S. Duly hot dip galvanized.
- c) Fixed hand rails of galvanized steel tubes, medium grade, conforming to IS: 1239-1966, in three tiers, shall be fitted at each side of deck A over the full length supported by galvanized steel stanchions welded to the doubler plate and gusset plate all as shown in drawing. The top level of handrail shall be about 900 mm above the walkway and the stanchions shall be at a spacing not exceeding 2000 mm. In way of the bollards and the ends of the caisson, the stanchions shall be provided with removable fittings into socket welded to the deck plating and the rails being replaced by hot dip galvanized chains. The removable stanchions shall be fitted into sockets in the cope decks on either side. Eyes shall be provided at the end of the handrails, etc. shall be approved pattern. Suitable hand rails shall be provided on both sides of deck D for additional safety of staff working of deck D.
- d) All vertical ladders shall be 450 mm wide and fabricated of steel flats 100 x 12 mm with rungs of 25 mm dia round bar, 250 mm apart. All sloping ladders shall be similar to vertical ladders galvanized and welded to brackets.
- e) Suitable brackets shall be provided on both sides of the caisson for easy positioning of wooden shores in the dry dock, during maintenance, etc.
- f) Ring plates of 7 Ton capacity each shall be provided for handling the caisson when afloat as per the drawings. The assembly shall be welded on to doubler plates and adequate strengthening shall be provided inside the caisson, behind the ring plate mounting area.

#### 12.15 SACRIFICIAL ANODE CATHODIC PROTECTION

- i) Cathodic Protection System: External underwater hull below working water line shall be protected by providing sacrificial anodes sufficing for minimum of 5 years. Ballast tanks shall be fitted with sacrificial anodes for 3 years' protection.
- ii) The anodes shall be welded on to the doubler plates. The anodes shall be bright and unpainted and the steel under these shall be painted adequately.

- iii) Draught marks shall be of 150 mm height welded mild steel Roman Numerals on each side of the caisson, near each stem and painted in white denoting the draught in metres. In addition to the numerals welded, M.S. strips painted white shall also be provided every 10 cm. throughout the depth.
- iv) Two Nos. Cast steel side stops (as shown in Drawing No. 35.DG.01 shall be provided on the caisson so the caisson can position and fit in property in the corresponding guide (steel casting) fitted in the grooves of the Dry Dock at 'C' workshop East Yard, MDL.

#### 12.16 CONTROLS

- i) Each valve or cock shall have a separate control. All controls shall lead to deck A. In addition, provision shall also be made so that the valves for draining compartment below deck D can be operated locally i.e. on deck D or top of scuttle tank. A descriptive chrome plated gunmetal/brass name plate shall be fixed on the control platforms at each operating portion.
- ii) All valve controls shall be operated by hand wheel and are to turn anticlockwise for opening and clockwise for closing. All controls shall have suitable indicators showing the position of level for the valve or cock.

#### 12.17 SUBMERSIBLE PUMPS

1. There are two ballast tank and one scuttle tank of suitable capacity, hence six number of submersible pumps of suitable rating, discharge and head along with NRV at discharge side and discharge pipe to suite sea water application. Two pumps in each tank and one shall be standby always. Total time taken for emptying all the tanks of the caisson gate should be maximum 20 minutes.
2. The pump, shaft and the impeller shall be suitable material, as per manufactures standard. They shall be fully sea water corrosion resistant.
3. The pumps shall be fixed permanently in suitable sump on bracket, clamps, etc. these chambers and the lead cables shall be brought out on to deck A. through water tight glands/GI pipes and terminated in suitable switch, plug, socket, etc. The pumps, all cables, fittings, etc. shall be of the best quality and the control shall have single phase preventer. The controls shall be housed in water tight 2 mm thick stainless steel or reinforced fiber glass plastic enclosure of suitable thickness and of approved type, fitted on deck A, upon suitable brackets.
4. All pumps, cables, fittings, connections, etc. shall be of best quality make and shall conform to the statutory requirements as per marine standards.
5. Special precautions shall be taken to provide suitable additional earthing etc. to prevent any mishap in dry or flooded conditions. Also, proper fuses and other protective systems are to be provided.
6. The pumps should have but not restricted to protection like dry run protection, overload, etc. The submersible pump should of reputed make like Modi, Sehra, Kirloaskar, Cropton Greaves, Auro pump, Sonwell.
7. All submersible pumps supplied should have OEM FAT certificate along with relevant markings/labels as per IS standards. Shall have Guarantee / warrantee of maintains free service life of 3 years.



#### 12.18 FLOATION DRAUGHT

- 1) The caisson when ready for services in all respect with the fittings and under conditions mentioned herein below is expected to float upright on an even keel at a draught corresponding to approximately 7.50 m measured from the level of the baseline:
  - a) Fixed and Loose ballast in place;
  - b) The scuttle tank drained empty; and
  - c) End chambers and upper tank empty.
- 2) The quantity of fixed/loose ballast is to be adjusted by the contractor to obtain the aforesaid result. The contractor shall also submit all relevant calculations duly approved by TPEA(THIRD PARTY EXPERT AGENCY).

#### 12.19 TEST FOR AIR / WATER TIGHTNESS

12.19.1.The entire caisson gate shall be tested for water or air tightness as the case may be, separately for individual compartment and jointly as a complete gate.

12.19.2.The scuttle tank shall be tested to withstand the internal water pressure of not less than 1 kg per sq.cm.

12.19.3.All water pipes and valve bodies shall be tested in the presence of TPEA(THIRD PARTY EXPERT AGENCY) at the manufacturer's workshop to withstand the water pressure of 7 kgs. Per sq cm. The original test certificate issued by the manufacturer (with identification mark, TPEA(THIRD PARTY EXPERT AGENCY) stamp etc.) shall be submitted by contractor.

12.19.4.The scuffle tank valves shall be tested to withstand a water pressure of at least 5 kgs. Per sq. cm or as specified by TPEA(THIRD PARTY EXPERT AGENCY), when dosed, the pressure being applied separately on each side of the valves.

12.19.5.The air/water tightness of the compartments shall be ensured by physical test as directed by the TPEA(THIRD PARTY EXPERT AGENCY) in accordance with TPEA(THIRD PARTY EXPERT AGENCY) Rules and acceptance to TPEA(THIRD PARTY EXPERT AGENCY) Surveyors.

12.19.6.The entire water piping system shall be tested for a pressure of not less than 4.05 kgs. Per sq. cm

12.19.7.The contractor shall ensure that all faulty materials, imperfect or unskillful workmanship which do not withstand the tests and which may not ensure satisfactory performance of the caisson gate shall be removed and replace/reconstructed to meet the requirements in full.

12.19.8.The test certificates in support of having earned out the various tests in presence of and as directed by TPEA(THIRD PARTY EXPERT AGENCY) to ensure the absolute water/air tightness of the compartments/parts shall be submitted to the MDL by the contractor. The price quoted shall be deemed to include the costs towards various tests as specified.

#### 12.20 TESTS AFTER ERECTION

12.20.1. Any replacement due to defective material and workmanship consequent on tests at site, shall be carried out and contractor shall ensure perfect operation and efficient performance of the Caisson gate.

12.20.2. In addition to the tests mentioned herein above, floating and sinking trials shall be carried out on the caisson gate, as reasonably as practicable, between extreme limits of draught and tank level conditions. During these tests, the time for flooding and draining the scuttle tank level conditions. During these tests, the time for flooding and draining the scuttle tank and for floating and sinking the caisson gate shall be observed and recorded.

12.20.3. The contractor shall provide all necessary skilled labour, supervisors, apparatus and instruments necessary to carry out the test at site at no extra cost to the MDL and the price quoted shall be deemed to cover all these. However flooding and dewatering of the dry dock for testing purposes shall be arranged by MDL without any charges.

#### 12.21 STABILITY

- 1) The contractor shall ensure that the caisson gate provides maximum stability, thereby ensuring safety to personnel and installations.
- 2) Proper data should be taken from existing gate parameters like solid/water ballast arrangements shall be incorporated so that the caisson gate is fully stable from the moment it raises from the groove, till it reaches its normal floatation level. The operational arrangements shall also be fool proof.
- 3) The stability of the caisson shall be ensured such that the caisson is fully stable, while the caisson is being towed and also during operations (raising/sinking). The metacentric height of the Caisson in operating condition shall be sufficiently large, to ensure the stability of the Caisson and in accordance with rules of TPEA (THIRD PARTY EXPERT AGENCY) and the same as offered shall be clearly indicated in the Technical offer.
- 4) The limit of inclination of the caisson up to which it remains stable shall be tested and recorded, in the presence of the Engineer and the surveyor of TPEA (THIRD PARTY EXPERT AGENCY) by the contractor by means of experiments conducted at site. Exact value of GM fixed as per the design approved by the TPEA (THIRD PARTY EXPERT AGENCY) shall be verified by actual inclining experiment carried out before final commissioning and handing over of the caisson gate to the MDL.
- 5) Drawing(s) and Chart(s) showing the weight, buoyancy calculations of GM and weights of steel structure, permanent ballast both concrete slurry and Cast Iron Ballast/Steel Ballast/Pig Iron Ballast, water ballast, if any, etc. shall be submitted with the design drawings after final testing and trials for commissioning, a revised set of copy of drawings and charts shall be submitted by the contractor along with the as made drawings,
- 6) All safety precautions required during this experiment shall be taken by the contractor to avoid any mishap to men and material
- 7) All apparatus, men and material including the ballast, and the equipment for the above tests shall be provided by the contractor within the tender cost.

## 12.22 INSPECTION

(All stage and final inspection to be carried out by TPEA(THIRD PARTY EXPERT AGENCY). Copies of test certificates shall be provided to the MDL within 7 days of testing.)

### 12.22.1. WELD INSPECTION

Weld seams shall satisfy the following:

- a) This shall correspond to design shapes and dimensions
- b) They shall not have any defects such as cracks, incomplete penetration and fusion, undercuts, rough surfaces, high spots, burns, blowholes and porosity etc. beyond permissible limits.
- c) Besides the routine radiographic test, the contractor shall perform magnetic particle/liquid penetration test on all weld joints to the satisfaction of the TPEA(THIRD PARTY EXPERT AGENCY) as and when necessary.
- d) MDL shall have free access to the contractor place of fabrication and shall be afforded all reasonable facilities for satisfying himself that the production is being undertaken in accordance with the drawing and specification.
- e) The contractor shall maintain a well-planned quality controlled program to monitor the quality of the manufacturing works in properly documented format for every stage of manufacturing and in line with the approved QAP.
- f) The contractor shall furnish all necessary tools, gauges, instruments etc. and technical and non-technical personnel for shop tests by TPEA(THIRD PARTY EXPERT AGENCY).
- g) Any action or omission on part of the inspecting and certifying agency however shall not relieve the contractor of his responsibility and obligation to construct, deliver, testing, trials and commissioning of new caisson gate strictly in accordance with the specifications.

### 12.22.2. MAGNETIC PARTICLE INSPECTION

Where the root and intermediate passes of weld are examined by the magnetic particle testing, such testing shall be carried out throughout its entire length in accordance with ASTM specification E-109. In cases of completed welds, such tests shall be carried out in accordance with ASTM specifications E-109 or E-138 as decided by the inspecting agency. If heat treatment is performed, the completed weld shall be examined after the heat treatment. All defects shall be repaired and re-tested. Magnetic particle test shall be carried out using Alternating Current. Direct Current may be used with the permission of the Engineer.

### 12.22.3. LIQUID PENETRANT INSPECTION

In the case of welds examined by Liquid Penetrant Inspection, such tests shall be carried out in accordance with ASTM E-165 or IS:3658. All defects shown shall be repaired and rechecked.

### 12.22.4. RADIOGRAPHIC INSPECTION

Five (5) percent of the length of all full length welds shall be radiographed in accordance with the recommended practice of radiographic testing as per IS:2595/ASTM E-94 and part U.W. 51 of ASME Code section VII. Excluding this five percent random positions to be indicated by the Engineer/TPEA (THIRD PARTY EXPERT AGENCY), all end joints and all T-joints of all butt weld joints shall be subjected to Radiographic Examination.

#### 12.23 CONTRACTOR'S SCOPE OF WORK

- 1) The fabrication shall be executed at the suitable existing space in SSA Workshop (a covered workshop) in MDL as per mutually agreement. Crane (upto 30T capacity) with crane operator during the fabrication of the units of Gate inside the SSA workshop shall be provided by MDL free of cost. SPMT (Self Propelled Modular transporter) shall be provided by MDL free of Cost for transporting/shifting the Fabricated Gate units to Workshop C of East Yard of MDL for assembly (Manpower required for loading and unloading shall be provided by Contractor). Compressed Air, Electricity and drinking water will be provided to Contractor free of Cost.
- 2) All the equipments, necessary support machines and manpower viz. Slingman, Rigger, Loader/Unloader, Hydra, Forklift, etc. except as stated aboves shall be arranged by the Contractor at their own expense.
- 3) All the steel required for fabrication has to be procured by contractor confirming it to IS:2062/IS:3039 or equivalent standard.
- 4) All consumables like welding electrodes, gases, grinding machine, welding machines, Gas cutting set.
- 5) Bending and rolling if required.
- 6) All sub-assemblies/assembly pre-fit up inspection and fit up inspection like setting, positioning, alignment, tacking, etc.
- 7) The contractor has to follow the bar chart submitted by them with confirmation with MDL.
- 8) The contractor to submit QA Plan to TPEA(THIRD PARTY EXPERT AGENCY) for approval and approved QA plan to be submitted to MDL for acceptance immediately after award of the order. The outlined QAP is attached at **Annexure-II. for reference purpose.**
- 9) Welders qualification to be carried out in presence of TPEA(THIRD PARTY EXPERT AGENCY) and to prepare the test coupons as per welding specifications.
- 10) The standard fabrication and welding procedures as indicated by TPEA(THIRD PARTY EXPERT AGENCY) are to be strictly followed by the contractor.
- 11) The contractor to depute qualified supervisors at site to control the labour and be responsible for execution of the job/work with all safety measures for men, materials and machines and to co-ordinate and follow up. In order to expedite the work time.
  - i) To be present at all times as long as contractor's workmen are at site.
  - ii) The contractor to forward weekly progress of the job in progress to MDL on every Monday morning.

- 12) After completion of the job the same is to be verified by TPEA (THIRD PARTY EXPERT AGENCY) / MDL.
- 13) Any rework modification arising out of faulty workmanship, incorrect welding and erection sequence will be total responsibility of the contractors.
- 14) All the scaffolding required for the erection work will be in contractor's scope of work.
- 15) All the material required should be approved by TPEA (THIRD PARTY EXPERT AGENCY) before bulk supply.
- 16) All the material required for the work has to be arranged by contractors.
- 17) TPEA (THIRD PARTY EXPERT AGENCY) qualified welding procedure and welders are to be used.
- 18) Towing of new caisson gate after completion of assembly is to be towed to MDL site.
- 19) Installation, commissioning, testing, trials, acceptance by TPEA (THIRD PARTY EXPERT AGENCY) and MDL.
- 20) The contractor shall be responsible for getting approval by TPEA (THIRD PARTY EXPERT AGENCY) by providing all the details / clarifications before starting the work.

The additional cost towards any increase in quantity / quality of work on account of certifying agency shall be to the contractors account and MDL shall not bear any additional cost over the contracted value of work.

#### 21) CORROSION PROTECTION, PAINTING & PAINT SCHEME

- a) **GENERAL:** The paint work of the steel shall be of high international standard. All steel surfaces shall be coated with paints of approved make. All steel material shall be grit blasted to Sa 2.5, and provided with a shop primer before starting construction. This shop primer is only for protection during the building period and does not form part of the paint systems. A Representative of the paint Supplier shall inspect the paint work on regular basis and submit reports to the Owners. Prior to the application of the first coat of the main paint system, all weld spatter, rust, grease and other contaminants shall be removed from weld areas and plate surfaces to the satisfaction of Supplier's Representatives, if necessary by blast sweeping. No paint shall be applied before welding, cutting and fairing is completely finished. Damages to the paintwork shall be cleaned and repaired according the required system. Subsequent coats shall not be applied until all such repairs have been carried out. Before and after application of each coat, the surfaces shall be inspected by the Manufacturer's Representative. Especially epoxy paints shall be applied strictly within the terms required by the paint Manufacturer with regard to temperature, humidity, draught, drying time etc. Spaces and parts which shall become inaccessible after closing or mounting of equipment shall be painted with the required number of Coats before mounting of pipes, cables, ducts and other equipment. Backsides of equipment, cableways, ducts etc. are to be painted before mounting. Compatible schemes from internationally reputed marine paint suppliers shall be used.

- b) Coated surfaces will only be inspected when the paint is fully dry. Inspection criteria will include achieved DFT, consistency of application and the physical appearance of the paint coat. The MDL executive may reject unsatisfactory paint work, which shall then be rectified to the MDL executive's satisfaction. The paint coat shall be inspected and certified by TPEA(THIRD PARTY EXPERT AGENCY).
- c) Any repairs necessary to the coating system should be undertaken at the earliest possible opportunity to reinstate the relevant stage and DFT. The coating system in way of the bare steel construction joints shall be stepped back, coat by coat, to allow the overall coating system integrity to be achieved on site. The same acceptance criteria as used for the workshops will apply.
- d) **PAINT SCHEME:**The paint scheme of the existing gate in MDL is given below **for reference purpose only**. Based on the same contractor shall prepare/use Compatible schemes as per internationally reputed marine paint suppliers and get it approved by TPEA(THIRD PARTY EXPERT AGENCY) and acceptance by MDL.

MAZAGONDOCK SHIPBUILDERS LTD.	CLIENT :	YARD NO.
DOCKYARD ROAD MUMBAI – 400 010	PAINT SCHEME	

**PAINT SCHEME**  
**FOR**  
**CAISSON GATE**

Rev. No.	Rev. Date	Details of Revision	Authority	Prepared By	Checked by	Approved By

<b>PREPARED BY :</b>	<b>CHECKED BY :</b>	<b>APPROVED / VERIFIED BY :</b>
<b>MAZAGONDOCK SHIPBUILDERS LTD</b>		
<b>DOCKYARD ROAD MUMBAI – 400 010</b>		

**1. PREPARATION OF SURFACE BEFORE PAINTING**

**1.1 Surface Preparation**

The Surfaces of all the steel plates and sections are to be cleaned off the rust, scale, dirt, oil, and any other foreign matters sticking to it, by means of wire brushing and subsequently by abrasive blasting to SA 2.5 of Swedish Specifications, before application of paints.

**1.2 Inspection of Surface Preparation**

Application of paints/primer shall not be proceeded with unless all the applicable surfaces are made ready for painting with proper surface preparation and cleared by the QC department.

**1.3 Application of primer**

Within an hour of abrasive blasting, the surface of the steel plates and sections are to be applied with the primer specified.

**2. PAINTING SCHEME (EXTERNAL)**

**2.1 Paint Scheme for Side Skin Plates & Bottom Skin Plates**

**SUMMARY**

<b>COAT</b>	<b>SIGMA</b>	<b>AKZO NOBLE</b>	<b>JOTUN</b>	<b>DFT (MICRONS)</b>
PRIMER	Universal Primer	Integrated 269	Epoxy Holding Primer	50**
ANTI CORROSIVE	Sigma Multimastic (Aluminium)	Intershield 300 (Aluminium)	Jotacote Universal (Aluminium)	150
ANTI CORROSIVE	Sigma Multimastic (Grey)	Intershield 300 (Bronze)	Jotacote Universal (Grey)	150
TIE COAT	Sigma Hullrite	Integrated 263	Safe Guard ES	125
ANTI FOULING	Sigma Alphagen 50 (Brown/Light Red)	Intersmooth 360 (Brown)	Seaquantum Ultra (Brown/Light Red)	150
ANTI FOULING	Sigma Alphagen 50 (Red Brown/Dark Red)	Intersmooth 360 (Dark Red)	Seaquantum Ultra (Red Brown/Dark Red)	150
ANTI FOULING	Sigma Alphagen 50 (Brown/Light Red)	Intersmooth 360 (Brown)	Seaquantum Ultra (Brown/Light Red)	150

<b>MAZAGONDOCK SHIPBUILDERS LTD</b>				
<b>DOCKYARD ROAD MUMBAI – 400 010</b>				
<b>2.2 <u>Paint Scheme for Weather Deck</u></b>				
2.2.1 The interval application of each coat of Primer and Epoxy Heavy Duty Non-Skid Paint is not to be less than 16 hours and not to exceed 72 hours.				
<b>SUMMARY</b>				
<b>COAT</b>	<b>SIGMA</b>	<b>AKZO NOBLE</b>	<b>JOTUN</b>	<b>DFT (MICRONS)</b>
PRIMER	Sigma Universal Primer (7417)	Intergard 269	Muki Eps Red	1 x 50**
HEAVY DUTY NON-SKID PAINT	Sigmarite Flight Deck Coating	Intergard 300	Jotamastic 85 Al	1 x 200
HEAVY DUTY NON-SKID PAINT	Sigmarite Flight Deck Coating	InterShield 852	Jota Armouras	1 x 800
<b>2.3 <u>Deck Accessories</u></b>				
<b>(a) <u>Bollards and Railings</u></b>				
<b>COAT</b>	<b>SIGM</b>	<b>AKZO NOBLE</b>	<b>JOTUN</b>	<b>DFT(MICRONS)</b>
PRIMER	Universal Primer	Intergard 269	Epoxy Holding Primer	1 x 50**
ANTI CORROSIVE	Sigma Multimastic (Aluminium)	Intershield 300 (Aluminium)	Jotacote Universal (Aluminium)	1 x 150
ANTI CORROSIVE	Sigma Multimastic (Grey)	Intershield 300 (Bronze)	Jotacote Universal (Grey)	1 x 150
<b>(b) Wooden Fenders</b>				
The Wood work final surfaces to be treated with oil or varnish				



MAZAGONDOCK SHIPBUILDERS LTD		
DOCKYARD ROAD MUMBAI – 400 010		

### 3. Paint Scheme for Internal Areas (Ballast Tanks)

COAT	SIGM	AKZO NOBLE	JOTUN	DFT(MICRONS)
PRIMER	Universal Primer	Intergard 269	Epoxy Holding Primer	50**
ANTI CORROSIVE	Sigmaguard BT	Intershield 300	Balloxy HB Light	2 x 150

Note : \*\* - DFT for M/s. Jotun Epoxy Holding Primer-30 microns

### 4. NOTES

- (I) Anodes are to be fitted after painting is completed. Welding areas are to be scraped thoroughly to remove slag, scale etc. then painted as per painting scheme.
- (II) Anode surfaces are not to be painted.
- (III) Inside of fenders to be filled with bituminous solution and drained subsequently before putting closing plates at the end.

### 5. SURFACE AREAS FOR PAINTING:

- (I) External Area (Bottom shell & Side shell) : 540 sqm
- (II) Weather Deck Area : 140 sqm
- (III) Deck Accessories (Bollard & Railings) : 33 sqm
- (IV) Wooden Fender Area : 270 sqm
- (V) Internal Area (Ballast Tank) : 1807 sqm

22) Rubber seal to be provided (Existing Rubber seals are as per drawing no. P75/0811-05-29-00).

23) Rung ladder to be provided for accessibility to all tanks.

24) For securing the Gate, proper key locking system shall be provided at both the ends of the Caisson Gate as per existing provision.

25) Permissible leakages to be maximum up to 100 m<sup>3</sup> /hr.

26) The scope of work and existing drawings (for reference only) are to be read for understanding the caisson gate operation and Final Drawings are to be submitted after class approval by the firm.

27) Owners' representatives/Engineer shall be stationed at the MDL during the construction activity.

28) Providing training to MDL personnel for operation and Maintenance.

29) The design calculations and detailed manufacturing drawings shall pertain to but not limited to and include the following details.

- (a) Design of the Caisson Gate
- (b) Buoyancy calculations
- (c) Casting/forged/machined member sizes and details (with bill of Materials/ Qty. indicating make, critical dimensions, material grade, Manufacturing process/procedure and Qty.)
- (d) Quantity and Quality of structural steel, bolts, nuts and washers, etc. to be used.
- (e) Structural strength calculations and floatation design, calculations, inclusive of solid ballast details, water ballast chambers and filling details and drawings regarding the chambers, etc.
- (g) Overall critical dimensional details after conducting actual measurements and levels at site of installation taking into account sealing surfaces and as approved by TPEA (THIRD PARTY EXPERT AGENCY).
- (h) Operating system and machinery
- (i) Walkway on top of gate
- (j) All fabricated member sizes and details
- (k) Shapes and sizes of edge preparation for welding
- (l) Details of shop and field joints included in assemblies
- (m) All parts to be colour coded in three distinct colours in a general isometric drawing
- (n) Docking plan of the Caisson – Both in horizontal & vertical positions.

**13. CAISSON GATE LOCATION, SITE CONDITIONS AND LIMITATIONS**

- a. The Caisson Gate is to be fabricated, assembled, installed, tested and commissioned within the Mazagon Dock Shipbuilders Ltd. Shipyard, Mumbai, India. Companies/Firms wishing to tender for the supply of the Caisson Gate shall visit the shipyard to fully familiarize themselves with the intended location, the prevailing site conditions and any possible constraints in advance of submitting their offer.
- b. It should be noted that access to the Site would be subject to limitations and restrictions. In addition, the availability of working areas will be reduced due to other Suppliers/MDL working in the vicinity of the dockyard area. 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 Suppliers.

**14. APPOINTMENT OF THIRD PARTY EXPERT AGENCY(TPEA).**

- i. The Caisson Gate supplier shall appoint a Third Party Expert Agency to carry out following activities:
  - a. To familiarize themselves with the site condition and users need.
  - b. To review & approve the GA drawings and its suitability for the Caisson Gate site.
  - c. To review & approve the design calculation & Caisson Gate specifications and to suggest improvement, amendment/alteration, if so required. They should also verify the adequacy of the Caisson Gate design submitted by the supplier.
  - d. To verify and to approve various drawings submitted by the Caisson Gate suppliers within a period not exceeding 02 weeks time during the currency of the project.
  - e. To carry out stage inspection on site/supplier works either accompanied with MDL or solo as per MDL directions as and when felt appropriate.
  - f. To act as an expert technical guide for the project concerned and to provide required information / solution to the technical issues if so arises during the currency of the project.
  - g. To devise a checking / inspection mechanism to ensure that Caisson Gate is manufactured following sound engineering practices and the Caisson Gate fitted / provided with standard instruments / machines / components etc.
  - h. To prepare an independent monthly progress report with input from Caisson Gate supplier and MDL.
  - i. To safeguard the users need / purpose of investment in the larger interest of MDL.
  - j. Inspection / test during fabrication, assembly, testing, launching, installation and commissioning of Caisson Gate at MDL site.
- ii. The Caisson Gate supplier shall appoint any of these expert agencies such as : ABS / IRS / DNV / BV / Premier technical institution such as IIT Bombay, IIT Chennai or any other equivalent agency in this field of national / international repute. The Caisson Gate supplier shall furnish documents pertaining to credentials & past experience of the agency in this field & seek approval from MDL prior to the appointment of a particular TPEA(THIRD PARTY EXPERT AGENCY).
- iii. The TPEA(THIRD PARTY EXPERT AGENCY) once appointed shall not be changed till the completion of the project.

**15. DRAWING APPROVAL PROCEDURE**

15.1 The Caisson Gate supplier shall submit all design drawings, specifications, literature, transportation, launching, installation, testing, commissioning and setting to work programme to the TPEA(THIRD PARTY EXPERT AGENCY) (third party expert agency) for approval purposes with a copy to MDL for reference. The TPEA(THIRD PARTY EXPERT AGENCY) shall respond within one week of receipt of such information

advising each items 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 TPEA(THIRD PARTY EXPERT AGENCY) will not relieve the supplier of his responsibilities for the correctness, adequacy of design and completeness of his work as per the contract.

15.2 The Supplier shall submit 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.

15.3 The Supplier shall maintain a complete record of all the changes made to the Caisson Gate design or construction and supply to the MDL in three A1 sets of "as built" prints together with two sets drawings, each on a CD-R disc in a PC compatible AutoCAD/MS Windows format at the time of delivery.

## **16. MINIMUM DRAWINGS AND DOCUMENTS REQUIREMENT**

16.1 The drawings and documentation supplied for Caisson Gateshall, as a minimum, include the following:

- a) General arrangement drawings
- b) Framing arrangement drawings
- c) Caisson Gate Erection Sequence drawings
- d) Details of Piping valves and Pumps drawings
- e) Disposition of Aluminum Anodes drawings
- f) Disposition and details of drain plug drawings
- g) Rubber Seal for Caisson Gate drawing
- h) Supplier shall submit in 3 sets of Quality Assurance Plan and Inspection and Test Plan for works at worksite to TPEA(THIRD PARTY EXPERT AGENCY) and a copy to MDL.
- i) Supplier shall submit in 3 sets of Method statements fabrication, transportation, launching, testing, installation and commissioning with risk assessment details for installation of Caisson Gate to TPEA(THIRD PARTY EXPERT AGENCY) for approval and a copy to MDL.

## **17. HEALTH AND SAFETY**

17.1 Permanent safe access must be provided for all operating and routine maintenance functions on the Caisson Gate. Safe access means stairways, ladders, platforms, guard rails and all doors, hatches and other openings having safe means of securing in both the open and shut positions all to a standard appropriate to best Indian / European practice.

17.2 The Supplier must fully comply with all relevant Indian Health & Safety legislation in force at the date of tender submission.

## **18. OPERATIONAL AND MAINTENANCE MANUALS**

18.1 Separate illustrated manuals shall be provided by the Supplier covering the operation, maintenance and parts identification for the Caisson Gate and associated equipment and components for Gates. 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 and plastic encapsulated pages.

- 18.2 The operator's manuals shall contain advice and instructions on all aspects of the safe operation and use of the Caisson Gate including actions to be taken in the event of emergency or breakdown.
- 18.3 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. Additionally, a separate document, or set of documents, with exploded isometrics where possible identifying all components and their associated spare part numbers for all items and components of the Caisson Gate, both for the Suppliers own manufacture and of all sub Suppliers shall be provided.
- 18.4 Copies of all manuals and illustrations shall also be provided on CD-R discs compatible with a PC system running Microsoft Windows.
- 18.5 In total 4 (four) sets of paper based and 2 (two) sets CD-R disc/USB based copies of all manuals shall be provided. The covers of each paper copy of the operating manuals and the boxes for the CD-R discs of the operating manual shall carry the following clear title as the case may be:

**“OPERATING INSTRUCTIONS FOR CAISSON GATE”**

The comparable sets of manuals and CD-R discs/USB for the maintenance instructions shall be marked using the same format.

**19. MATERIALS AND WORKMANSHIP**

- 19.1 All major items of equipment and major materials used in the manufacture of the Caisson Gate shall have been specified and procured specifically for this contract. No pre used or sub standard materials or equipment shall be employed.
- 19.2 The country of origin and manufacture for all major materials, equipment and systems shall be identified by the Supplier for approval by the MDL.
- 19.3 In the event, fabrication of the Caisson Gate structure is being outsourced by the Gate supplier, the same should be undertaken under guidance and supervision of the Supplier. However, the Supplier shall be fully responsible for the work done by the fabricator. The Supplier shall provide all required details of the intended fabricator meeting the qualification requirements to the MDL.
- 19.4 The Supplier shall provide details of the Quality Assurance system operated that must cover all aspects of in house design and manufacture as well as covering the monitoring of quality from external suppliers of sub-assemblies and components. The QA plan shall be approved by the TPEA(THIRD PARTY EXPERT AGENCY) and a copy to be provided to MDL.

**20. SUBMISSION OF MILESTONE/ACTIVITY-TIME CHART**

- 20.1 The supplier shall submit a milestone/Activity-time chart to indicate the various project activities and their time line within the stipulated completion period of twelve Months.
- 20.2 The milestone chart shall establish the indicated delivery/commissioning date for the Caisson Gate.

**21. WARRANTY PERIOD**

- 21.1 The paint manufacturer shall provide a warranty of 5 years from the date of handing over of Caisson Gate by contractor..
- 21.2 The defect liability period for the Caisson Gate shall be 1 Year from the date of handing over by contractor.

## **22. REMOVAL OF EXISTING CAISSON GATE AT MDL AND INSTALLATION & COMMISSIONING OF NEW CAISSON GATE**

- 22.1 Prior to installation the contractor shall prepare installation and commissioning procedure and get it approved by TPEA(THIRD PARTY EXPERT AGENCY) and acceptance by MDL. The Caisson Gate is to be fabricated, installed & Commissioned at MDL designated Dry Dock. The cost of Transportation to the designated location is to be borne by the Subcontractor. Only Capstan and Bollard Facility for installation at MDL shall be provided by MDL free of cost. Installation & Commissioning of the Caisson Gate is to be carried out by the Subcontractor.
- 22.2 Any rectifications, modifications and repairs during fabrication, testing, installation and commissioning of Caisson Gate shall be carried out by contractor without any additional cost to MDL.
- 22.3 The Contractor shall carry out removal of Existing Caisson Gate at MDL and handing over the same to MDL.

## **23. SCHEDULE**

<b>Sr. No</b>	<b>Activity</b>	<b>Period</b>
1	Appointment of TPEA(THIRD PARTY EXPERT AGENCY) (Third Party Expert Agency) for inspection, Class approval and Coordination at Site.	Within 01 Month after issuing of PO.
2	Preparation of Detailed Design, Quality Assurance Plan (QAP), Welding procedures, Welding Plan and NDT Plan, Fabrication Methodology, testing methodology, drawings and Class Approval of the same.	Within 03 Month after issuing of PO.
3	Procurement of all Materials and Consumables as per approved detailed design.	Within 04 Month after issuing of PO .
4	Fabrication, Shifting of units & assembly of the Caisson Gate.	Within 08 Month after issuing of PO.
5	a) Removal of existing Caisson Gate in MDL and handing over the same to MDL. b) Launching, Installation, Testing and Commissioning of New Caisson gate at site.	Within 10 Month after issuing of PO.
6	Operation, Maintenance training to MDL Employees, Submission of AS Built drawings, Handing over of Caisson Gate to MDL	Within 12 Month after issuing of PO.

## **24. LIST OF DRAWINGS AND PART LIST OF EXISTING CAISSON GATE AT MDL** **(Attached in Separate folder – Annexure )- For Reference Purpose only:**

<b>SR.NO</b>	<b>DESCRIPTION</b>	<b>DRAWING NUMBER</b>
1	General arrangement	35.DG.01
2	Framing arrangement	35.DG.02
3	Floating Caisson – Dry Dock Gate Erection Sequence	35.DG.03
4	Details of Piping Valves and Pumps	35.DG.04
5	Draught Marks	35.DG.05
6	Disposition of Aluminium Anodes	P75/0811-17-00-00
7	Disposition of Aluminium Anodes in Tanks	P75/0811-18-00-00
8	Caisson Gate Support Cradles	P75/0811-16-00-00
9	Disposition & details of Drain Plug	P75/0811-05-63-00

10	Rubber seal for Caisson Gate	P75/0811-05-29-00
11	Part list of Hull items	-
12	Part list of Engineering items	-