OROT RABIN & ESHKOL POWER STATIONS
TANKERS MULTI BUOY MOORING SYSTEMS

SPECIFICATION EMDM-100

TECHNICAL SPECIFICATION FOR:
SERVICES FOR REPLACEMENT OF OFFSHORE MULTI BUOY
MOORING SYSTEMS

ANNEXURE "B"
Rev.13, dated 17.07.2017
OROT RABIN & ESHKOL POWER STATIONS

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List of abbreviations:

IEC: Israel Electric Corporation.
MBM: Multi Buoy Mooring
CBM: Conventional Buoy mooring system
GPS: Global Positioning System
SOW: Scope of Work
IACS: International Association of Classification Societies
API: American petroleum institute
ABS: American Bureau of Shipping
DNVGL: Det norske Veritas & Germanisher Loyds (Norway)
LR: Lloyds Register
BV: Bureau Veritas (france)
AHV: Anchor Handling Vessel
AHTS: Anchor Handling Tug Vessel
I&TP: Inspection and Testing plan
PLEM: Pipe line end manifold
HSSEQ: Health Safety Security Environment and Quality
MOD: Ministry of defense
SBM: Single Buoy Mooring
TBD: To be determined
BOM: Bill of Materials
1. **PURCHASER:** The Israel Electric Corporation Limited (IEC).

2. **NAME OF PROJECT:** Multi Buoy Mooring Systems.

3. **LOCATION OF PROJECT:** Near Ashdod and Hadera Sea Shore, On the Mediterranean.

4. **SCOPE**

IEC is seeking to hire a contractor to execute all the works required in the current specification. The scope of work under the current specification includes services for replacements of major components in the existing three (3) Multi Buoy Mooring Systems (MBM) located in IEC’s offshore fuel terminals. Each MBM system includes 4 mooring legs. For each MBM, the scope of work includes the following (as minimum):

- Engineering, design and analysis of the multi buoy mooring systems according to design criteria and applicable standards.
- Offshore surveys as may be required in order to execute the SOW.
- Preparation of procedures for the execution of all the required activities under the current specification.
- Procurement, shipment, transportation and supply of all **new** required MBMs materials and components. All new components shall be supplied and mobilized to the installation locations.
- Installation of temporary buoy markers in specific locations, if necessary.
- Dismantling all existing (old) mooring anchors, chains and components. In addition, marking and shipment all dismantled MBM’s components from offshore to IEC’s onshore warehouse located at “Rogozin” area (or other location as may be specified by IEC).
- Preparation and fabrication onshore or on barge of all new materials/components to pre-fabricate new mooring legs according to design.
- Installation of all new mooring legs and existing buoys in the offshore fuel terminals under the current specification and supply all required staff, divers, equipment, vessels, lifting equipment, anchor handling tug supply (AHTS/AHV), testing equipment and any further required equipment, all in order to successfully execute the SOW under the current specification.
- Employment of single independent international classification society for new equipment inspection, validation and approval of overall project’s documentations at each phase (not entire MBM system classification). The classification society activities may include but not limited to: Approval of design documentations/reports, approval of installation procedures, approval of materials manufacturers, approval of all supplied materials, witness and approval of specific inspections according to the current specification and according to pre-prepared project’s I&TP and witness specific/critical offshore works on-site.
- Commissioning tests for each new installed mooring leg according to the current specification.
- As built surveys, furnish and transmit all related project’s drawings and documentations.

4.1 Project description

4.1.1 Following is a short description of the existing MBM systems and IEC’s fuel terminals (all with similar design with relatively small deviations, refer to supplements):

4.1.1.1 IEC is the owner of a three (3) offshore Conventional buoy mooring (CBM) fuel terminals serving Oil tankers of approximately 45,000 DWT as following:

- **Eshkol – 16**: Oil tankers terminal located offshore nearby Eshkol Power station (close to "ASHDOD" city), having a 16” offshore fuel oil pipeline to the power station.
- **Eshkol – 24**: Oil tankers terminal located offshore nearby Eshkol Power station (close to "ASHDOD" city), having a 24” offshore fuel oil pipeline to the power station.
Orot-Rabin – 32: Oil tankers terminal located offshore nearby Orot-Rabin Power station (close to "HADERA" city), having a 32" offshore fuel oil pipeline to the power station.

4.1.1.2 At mooring condition, the tankers are moored on four (4) permanent mooring legs existed on the terminal and two tanker’s anchors dropped during tanker approach. The contractor services under the current specification are related to replacements of all anchors and chains in the four (4) permanent mooring legs in each fuel terminal.

4.1.1.3 Each permanent mooring leg consist the following components:

- **Drum type mooring Buoy**: The buoy with dimensions of: Diameter =4000 mm and height of 1886 mm. On the its top, the buoy has a quick release hook and mooring steel cable of 40-44 mm diameter with length of approximately 200-220 m to the tanker, the cable is connected to the tanker winch (Refer to supplemented drawings - Supplement-16). The drum buoys shall not be replaced and shall be returned and connected to the new replaced mooring legs.

- **Anchor & Chains**: The anchors are spread in water depth ranging from approximately 16.5 m to 22 m. Each buoy has a single chain with length of approximately 107 m, and a three (3) way plate that spreads to two separate chains with length of 27.5 m each. At the end the 27.5 m chains, two admiral embedment anchors of 7-7.5 ton weight each are placed (refer to supplemented drawings and material list table - Supplement-01).

- **Shackles and swivels** for the connection of the chain to the anchors and to the Buoy.

4.1.1.4 As mentioned, the contractor services under the current specification are related to the permanent mooring legs in each fuel terminal (excluding buoys replacements. Based on IEC’s decision and notification to the contractor prior to works beginning, the Contractor shall perform all required works for the specified fuel terminal, the installation itself shall be in a limited time window. Following is the project activities sequence (subjected to changes):

- **Basic scope**: Replacement of 4 (four) Mooring legs in Eshkol – 16.
- **Basic scope**: Replacement of 4 (four) mooring legs in Orot-Rabin – 32.

4.2 Scope of Work

4.2.1 General Requirements:

- The Contractor shall provide the services listed in the following sub-articles as part of the Basic Scope of Work or as purchaser option, at a lump sum rates as specified in prices submission supplement (Annexure-C). All fees such as: travels, import, transportation, accommodation and expenses, or any other fees or taxes for any activity required to the contractor shall be on the contractor account.

- During pricing in submission for works required in the current spec, the contractor shall take into account all expenses or fees for meetings as may be required by the purchaser, in the purchaser offices, as will be required by the purchaser.

- As per the documents attached to this specification and site visit followed by kick-off meeting in IEC’s offices (Israel) with the project personnel, the Contractor shall immediately commence the basic scope of works.

- The pricing submission shall be according to Annexure-C.

4.2.2 Required scope of services:

Within the scope of work, the Contractor shall, as applicable, survey, design, analyze, develop installation procedures, specify materials for procurement, procure, ship, mobilize, supply, Inspect materials, report, prefabricate, erect, install, test and commission as mentioned below:

4.2.2.1 Basic Scope: Replacement of major components of two (2) MBM Systems in fuel terminals: Eshkol – 16 and Orot-Rabin – 32. For more details, refer to paragraph 4.2.3.

4.2.2.2 Optional Scope: Replacement of major components of MBM Systems in fuel terminal: Eshkol – 24. For more details, refer to paragraph 4.2.3.

4.2.3 Replacement of major components of the MBM Systems in IEC’s fuel terminals: The following activities are required (as minimum):
4.2.3.1 **Design:**

4.2.3.1.1 Each MBM system shall be designed and analyzed using proven industry software, according to the design criteria, technical requirements and applicable standards. The analysis shall take into account all environmental loads, tankers size and orientation.

4.2.3.1.2 A design report including all calculations and analysis deliverables, material selection criteria, operational envelope, details and drawings for each terminal shall be issued for purchaser review.

4.2.3.1.3 Detailed drawings with sufficient details shall be issued for MBM system, showing all system components and coordinates.

4.2.3.1.4 Upon completion of the detailed design, a bill of materials BOM for each MBM system shall be issued for purchaser review.

4.2.3.2 **Offshore surveys:**

4.2.3.2.1 As part of the job, and as may be required in order to execute the SOW, the contractor shall conduct any survey needed. Such activities may include but not limited to

- Geophysical bathymetry survey in order to determine seabed topography for each MBM installation area.
- Geotechnical survey at the anchors area to determine soil properties for anchors design. It shall be noted that soil surveys are exist for the area of Eshkol-16 & 24 terminals. In addition, old soil surveys data are exist for Hadera coal jetty (close to the MBM). Refer to Supplements 17, 18 and 19. However, if any additional soil investigation/survey is needed, then it shall be on contractor's responsibility.
- ROV Locating and identifying of existing chains/anchors on seabed surrounding infrastructures.
- As-Built surveys as may needed.

4.2.3.3 **Procedures preparations:**

4.2.3.3.1 The contractor shall prepare a specific procedure for locating and marking the existing infrastructures end points of the mooring legs, such as: location existing PLEM, steel pipeline, existing buoys and locations of buried anchors. The procedure shall be verified and approved by the selected independent international classification society. The procedure shall include at least:
a. Marine equipment to be used for locating the existing offshore features or facilities.
b. Surveying/locating method in order to precisely locate the existing end points of the mooring legs and the depths of their components into seabed.
c. Considerations for detection accuracy.
d. Specifications for temporary buoy markers to be installed at locations that are to be marked during installation (PLEMs, pipelines).
e. Time table for the activity.
f. Deliverables to purchaser including drawings and coordinates of markers.

4.2.3.3.2 The contractor shall prepare a specific procedure for dismantling the existing mooring legs components. The contractor shall be aware that major parts of the chains/anchors are buried in the seabed, the 2 anchors of each leg might also be buried and even “frozen” into position, for which the Contractor might have to utilize divers as well as mechanical equipment to dismantle (extricate) them. The procedure shall be verified and approved by the selected independent international classification society. The procedure shall include at least:
a. Specification/datasheet of all required equipment to be used during the activity.
b. Marine equipment environmental working conditions.
c. Detailed step-by-step dismantling activities.
d. Buoy handling considerations.
e. Anchor pull out method.
f. Chain pull out and dismantling method.
g. Dismantled chain marking method.
h. Time table for the activity.

4.2.3.3.3 The contractor shall prepare a specific procedure for installation of new mooring legs. The installation procedure will be updated and detailed after final planning of works. The procedure shall be verified and approved by the selected independent international classification society. The procedure shall include at least the following items:
a. List of equipment to be used during the activity.
b. Specification/datasheet of all required installation equipment: vessels, tugboat, barge, lifting equipment, anchor handler, AHTS, survey and diving support, etc.

c. The installation procedure and the work itself shall be planned taking into consideration to minimize as much as possible the non-working duration of the mooring system. (Refer also to 10.10.2).

d. The installation procedure shall include detailed drawings of the system including marine charts, cross-sections and detailed step-by-step installation manual.

e. The installation procedure will be planned considering the nearby operational infrastructures. It shall be noted that all operations will be planned without interference to the daily operation of the operational infrastructures, such as:
   - IEC's Eshkol power station cooling basin.
   - Operational coal jetty in Hadera (Orot - Rabin).
   - Ashdod port.
   - Nearby construction works for Ashdod port extension.
   - Nearby operational MBM in Ashdod (During works in one of the terminals in Ashdod, the second will still remain operational and a tankers may moor there).
   - Operational natural gas pipelines at the north of the Eshkol – 24 terminal.

f. Chain preparation onboard, laying and installation method.

g. Specific instructions for operations above and near sub-sea infrastructures to avoid and damage or risk to the existing pipeline and cradle.

h. Mooring wires and messenger ropes shall be installed after buoy, chains and anchors installation are completed.

i. Anchors required "soaking" period before applying tension forces.

j. Anchors precise positioning, installation/burying method in order to achieve the test load.

k. Burial of anchors and chains methods.

l. Buoy installation considerations.

m. Time table for the activity.
4.2.3.3.4 The contractor shall prepare a specific procedure for testing of new installed mooring legs. The procedure shall include intermediate testing by tension for specific holding power of installed segments of anchor chains and final testing before commissioning. The procedure shall be verified and approved by the selected independent international classification society (refer also paragraph 10.11). The procedure shall include at least:

a. All Required equipment to be used during the activities.

b. Visual inspection/ROV after placing anchors on the seabed, and before starting of chain spread, to ensure the anchor is laying properly on the seabed and with the correct orientation.

c. Calculation of the estimated drag on the anchor during pre-tensioning.

d. Proof tension tests (field test) after anchors installation and after complete individual mooring leg installation. The contractor shall provide sufficient details and description of the required tension’s testing methods, testing devices, testing force, tension testing time duration, method for detecting anchor movement during testing, etc.

e. Each chain is visually inspected on the seabed after spreading to make sure there are no twists or entanglements before connecting the buoy.

f. Specific instructions for operations above and near sub-sea infrastructures to avoid any damage or risk to the existing pipeline and cradle.

g. Time table

4.2.3.3.5 The contractor shall prepare a specific procedure for as-built survey of new mooring legs. The procedure shall be verified and approved by the selected independent international classification society. The procedure shall include at least:


b. List of all required equipment to be used during the activity

c. Method of determining anchor orientation and position.

4.2.3.3.6 The contractor shall prepare a specific procedure for Materials inspection and testing plan (I&TP). The I&TP shall coordinated, verified and approved by the selected independent international classification society, and, shall be approved prior to manufacturing by IEC. The I&TP shall include at least:
a. Approval procedure for manufacturers.
b. Testing plan and inspections millstone in the manufacturer's works.
c. Description of inspection and requirements.
d. Acceptance criteria, acceptance documents/rules.
e. Specification of tests/inspections to be witnessed in the manufacturer
    site/work by the Classification society representative.
f. Manufacturing hold points.
g. Specification of tests/inspections to be witnessed by the IEC, (to be specified
    by IEC after receiving the I&TP).
h. Specification of final tests before shipment for all procured materials.
i. Specification of critical tests/inspections to be witnessed during installation in
    IEC's site by the Classification society representative.

4.2.3.4 **Procurement, Shipment, Transportation and Supply to site:**
As part of works under the current specification, the contractor shall procure,
transport and supply all new materials such as chains, anchors and related
accessories according to the designed system. The following activities are
applicable:

4.2.3.4.1 The contractor is responsible to all costs and activities related procurement of
new materials, shipment, transportation and supply of all new required MBMs
materials and components. All new components shall be supplied and mobilized
to the installation sites.

4.2.3.4.2 Any miscellaneous or temporary materials such as temporary buoys, markers,
etc. shall be on the contractor's responsibility and on its own cost.

4.2.3.4.3 All specifications, documents and drawings of procured materials shall be sent to
IEC for approval prior to procurement.

4.2.3.5 **Temporary markers installation:**
4.2.3.5.1 Before any offshore operation in each fuel terminal area, the contractor shall
familiarize himself with the subsea structures, PLEMs, Hose string, steel fuel
pipelines, nearby distillation subsea pipelines, nearby gas pipelines, nearby
Ashdod port breakwater construction, passing vessels to port, passing tankers to
other terminal, etc. In case that buoy markers are required, then they shall be
supplied and installed by the contractor.
4.2.3.6 **Mooring legs dismantling and new mooring legs installation:**

4.2.3.6.1 All operations shall be executed only according to specific procedures prepared by the contractor and approved by the classification society and IEC.

4.2.3.6.2 All arrangements and expenditures connected to the execution of the Works according to this specification shall be borne by the Contractor. The Contractor must acquaint himself with each site condition, terrestrial as well as marine, take into account sea and weather conditions and be aware that his operations shall take place in an environment with fishing, shipping, operational infrastructures, ports and nearby construction activities of Ashdod port extension.

4.2.3.6.3 The contractor shall supply all required staff, divers, equipment, vessels, lifting equipment, anchor handling tug supply (AHTS), testing equipment and any further required equipment, all in order to successfully execute the SOW under the current specification.

4.2.3.6.4 The contractor shall dismantle, mark and transport all removed existing (old) mooring chains and anchors to IEC’s warehouses (onshore) in “Rogozin” area (or other location as may be specified by IEC).

4.2.3.6.5 It is the contractor duty to prepare and fabricate all new materials/components to create new individual mooring legs each with the required length according to the design.

4.2.3.6.6 The contractor shall install all new mooring legs and existing buoys in the offshore fuel terminals under the current specification according to a procedure prepared by him and approved by the classification society and IEC.

4.2.3.6.7 After completely of chains installation, the contractor shall return and install the existing buoys.

4.2.3.7 **Mooring leg commissioning tests:**

4.2.3.7.1 The contractor shall test each installed mooring leg on-site. The test shall include visual testing and proof tension test. The tests shall be carried according to a procedure prepared by the contractor and approved by the classification society and IEC.

4.2.3.7.2 The mooring leg shall be delivered to IEC responsibility only after passing all commissioning tests with classification society signature on testing documents.

4.2.3.7.3 Proof tension test shall be witnessed by the classification society.
4.2.3.7.4 Upon completion of commissioning tests, the contractor shall remove all temporary markers.

4.2.3.8 **Requirements for classification society:**
According to the current specification, the contractor shall employ a single independent international classification society for at least the following activities:

4.2.3.8.1 Approval of overall project’s documentations and installation procedures.
4.2.3.8.2 Approval of materials manufacturers.
4.2.3.8.3 Inspection and approval of all supplied materials according to EN-10204-3.2 (This clause govern to state elsewhere in Supplement-12).
4.2.3.8.4 Witness specific inspections according to prepared I&TP.
4.2.3.8.5 Witness and approve specific/critical offshore works on-site, the proof tension test for installed mooring leg shall be witnessed as minimum.

4.2.3.9 **As-built documentation:**
4.2.3.9.1 Upon installation completion, the contractor shall perform as built survey.
4.2.3.9.2 The contractor shall furnish and transmit to IEC all as-built project’s drawings and documentations.

5. **TERMINAL POINTS AND TERMINAL CONNECTIONS**
Each mooring leg to be replaced shall be entirely replaced by new components according to the current specification from its Buoy shackle up to (include) its two embedment anchors.

6. **CYBER & INFORMATION SECURITY**
NA

7. **QUALITY ASSURANCE AND QUALITY CONTROL**
7.1 The main Contractor and the subcontractors shall be valid certified to ISO-9001 or equivalent for the herein scope of services.
7.2 The Contractor shall submit upon request a copy of its Quality Assurance Manual including Quality Procedures.
7.3 Individual certificates are to be issued for each type of accessory/component. The accessory identification numbers are to be included on the certificate. The Certificate number may be exchanged against an abbreviation or equivalent. If so, this shall be stated in the certificate.

7.4 The contractor shall employ an Independent International Classification Society to perform all the duties described elsewhere in the current specification. The following essential conditions shall apply:

a. The contractor shall provide a Letter of intent from one a classification society to the contractor, at which the classification society expresses readiness to support the contractor in the project. The letter shall include the activities to be performed by the classification society.

b. The classification society shall be member of IACS.

c. The classification society shall have sufficient experience in marine and offshore mooring installations and other scope of services required in the current specification.

d. The classification society shall be approved by the purchaser after first stage of the bid. In order to demonstrate the classification competency, and to obtain the purchaser's approval, the contractor shall provide to the purchaser a list of at least 5 projects (during the last 10 years) of installations of mooring chains that already delivered by the classification society. The list shall include the following:
   - Project description, year of installation and location.
   - The classification society role in each the project.
   - Description of the chains and anchors installed.
   - Description of activities performed by the classification society that are similar to the required in the current spec.

7.5 In general, all procured and supplied materials under the current specification. Any supplied component (such as chains, anchors, accessories) shall have an EN 10204-3.2 certificate approved and stamped by the project's classification society (Instead of as stated in Supplement-12).

7.6 IEC reserve the right to witness during any test of any component in a manufacturer work and/or manufacturer site.

8. **STANDARDS AND SUPPLEMENTS**
8.1 Standards and Codes referenced in this Specification and in the Supplements to this Specification form an integral part of this Specification - to the extent their requirements are consistent and conform to the requirements specifically set forth herein. All such Standards and Codes are to the issue, including all amendments, supplements, etc., current as of the date of the Contract, unless indicated otherwise. In the event of a variance between the requirements of the Standards and Codes and the particular requirements set forth in the Specification, the requirements specifically set forth in the Specification shall take precedence.

8.2 The Contractor may propose Standards and Codes as alternates for, or additions to those specified herein. A copy of each proposed Standard and code, if any, shall be submitted (in English) for Purchaser's approval. In case Purchaser's approval is granted, the Contractor shall remain responsible for the compatibility of the design and the physical interfaces between the supplied Equipment and the equipment supplied by others.

8.3 The Purchaser shall assist Contractor in identification of Israeli codes and standards applicable to the Work. In all cases Contractor shall adhere to and comply with the requirements of Israeli official standards found to be more restrictive than those specified herein.

8.4 Subject to the provisions stated above, the MBMs shall be designed, manufactured, erected, tested operated and maintained in accordance with the standards, regulations, directives and publications of the following agencies and organizations:

- **ANSI:** American National Standards Institute, Inc.
- **ASME:** American Society of Mechanical Engineers.
- **ASTM:** American Society for Testing and Materials.
- **AWS:** American Welding Society.
- **API:** American Petroleum Institute.
- **DNV:** Det Norske Veritas.
- **ABS:** American Bureau of Shipping
8.4.1 For Analysis of MBM system, the following standard shall be followed (latest valid edition):
   a. DNV OS-E301, Position Mooring, (Precedence standard).

8.4.2 For Analysis of MBM system, the following standard may be consulted (latest valid editions):
   b. BS-6349 Part 6: Maritime structures, Design of inshore moorings and floating.
   c. API 2SK, Design and Analysis of Station keeping Systems for Floating Structures.

8.4.3 For purchasing of mooring chains, anchors and accessories, one of the following standards shall be followed (all latest valid editions):
   a. DNVGL-OS-E302, Offshore mooring chain.
   c. BV, NR 216 DT R08 E: Rules on materials and welding for the classification of marine units.

8.5 **Supplement**
The following supplements are attached hereto and their requirements form an integral part of this specification - to the extent they are consistent and conform to the requirements specifically set forth herein. In the event of a variance between the requirements of the Supplements and the particular requirements set forth in the Specification, the requirements specifically set forth in the Specification shall take precedence.

8.5.1 **General information:**
8.5.1.1  **Supplement-01**: Terminals existing basic materials list *(for information only)*.

8.5.1.2  **Supplement-02**: Dwg no. SK-744, Eshkol-24 mooring leg materials, *(For information only)*.

8.5.1.3  **Supplement-03**: Dwg no. 128480, Orot Rabin-32-Mooring Leg No-1 and 4.

8.5.1.4  **Supplement-04**: Dwg no. 128481, Orot Rabin-32-Mooring Leg No-2 and 3.

8.5.1.5  **Supplement-05**: Dwg no. SK-743, Eshkol-24, 7/7.5 ton anchor.

8.5.1.6  **Supplement-06**: Dwg no. 121094, Orot Rabin-32-Buoy 5” pin Shackle.

8.5.1.7  **Supplement-07**: Dwg no. 121094, Orot Rabin-32-Buoy 5” pin Shackle.

8.5.1.8  **Supplement-08**: Dwg no. SK-320, Eshkol -16-Terminal general arrangement.

8.5.1.9  **Supplement-09**: Dwg no. SK-760, Eshkol -24-Terminal general arrangement.

8.5.1.10 **Supplement-10**: Dwg no. SK-804, Eshkol-24&16-Typical 3 way element.

8.5.1.11 **Supplement-11**: Standard 01-1E, Standard specification for contractor’s drawing and data transmittal.

8.5.1.12 **Supplement-12**: Q-APP-02-PR: Quality requirements from suppliers.

8.5.1.13 **Supplement-13**: "Processing of hydrographic data for Ashdod Region. *(Reserved – Will be provided during to bid winner)*.

8.5.1.14 **Supplement-14**: MBM minimum wind speeds requirements.

8.5.1.15 **Supplement-15**: General Plan for Relocation of Eshkol Berths.

8.5.1.16 **Supplement-16**: General Buoy Drawing (Old drawing in Hebrew, however general dimensions are highlighted).

8.5.1.17 **Supplement-17**: Hadera Coal Jetty 1978 Soil Survey.

8.5.1.18 **Supplement-18**: Eshkol Borehole logs Locations Drawing.

8.5.1.19 **Supplement-19**: Eshkol Seabed geotechnical lab investigation.

8.5.1.20 **Supplement-20**: Eshkol-24, mooring leg of No.2, Drawing of chain shortening.

8.5.1.21 **Supplement-21**: Orot Rabin-32, PLEM.

9.  **TECHNICAL DOCUMENTATION**

The Contractor shall submit technical documentation in accordance with the provisions of Annexure "J" – Documentation Submission Schedule.

9.1  **Documentation Submission Schedule-General**

9.1.1 Without derogating from Contractor's obligation to provide any other document called for by the Contract, the Contractor shall provide the following
documentation in accordance with the general requirements set forth above and the schedule as listed in annexure JA & JB (attached herein).

Annexure JA: A table that summarizes all required technical documentation that will accompany the proposal.

Annexure JB: A table that summarizes all required technical documentation that shall be submitted after notification of award.

9.1.2 The table of annexure JB shall form the basis for a monthly report to be submitted following Contract award showing the actual submission dates and the respective Approval Status, and upon Purchaser's and Contractor's mutual written consent shall be updated to account for any additional documents called for by the Contract in the course of detail design or additional documents called for by Change Orders.

10. TECHNICAL REQUIREMENTS

10.1 Design and analysis requirements:
Each MBM system shall be designed and analyzed to allow safe mooring of tankers according to the following data:

10.1.1 Each MBM system shall include 4 mooring legs.

10.1.2 Tankers design data for design:
- Tanker maximum tonnage: DWT = 50,000 MT. (Typically 45,000).
- Tankers Minimum length overall (MIN. LOA) is 164 meter.
- Tankers Maximum length overall (MAX. LOA) is 200 meter. (Typical tanker LOA is 183 m).
- The designer shall be aware that mooring leg no-2 of Eshkol-24 MBM system was shortened during 2012 to allow free pass of destination pipelines (Refer to supplement-20). The leg is anchored to sea bottom using Pile anchor. In case that the pile location is not suitable for the new configuration, then an anchor may be considered.
10.1.3 Analysis of MBM components:

10.1.3.1 As minimum, each MBM system shall be capable to withstand the standard load combinations of the following: Minimum Wind velocity according "Supplement 14", current velocities as specified in paragraph 10.4.2.3 and a wave significant height of at least 2m.

10.1.3.2 The design life of each system shall be at least 30 years.

10.1.3.3 The criteria and safety factors to be adopted for selecting the capacity of mooring components shall be not less than those specified in "Table 4 — Suggested criteria for selecting the capacity of mooring components" of BS-6349 part 6 standard.

10.1.3.4 Considering that the connections of mooring legs to tanker are by steel cables connected to tanker's winches. A wind limitations envelope (operational envelope) shall be developed after analysis for each MBM considering winch braking loads (30 Ton) combined with maximum wave height and maximum current speed.

10.1.3.5 The MBM analysis shall take into account both ballast draft and fully laden conditions.

10.1.3.6 The MBM shall be designed to allow survival condition for berth occupied and unoccupied.

10.1.3.7 Wear and corrosion rates in allowances [mm] per year of service life for chain sections, shall not be less than:

- For splash zone, 0.4 mm/year.
- For Intermediary zone (catenary), 0.2 mm/year
- For touch down zone and bottom, 0.4 mm/year.

10.1.3.8 After analysis and material selection, the contractor shall specify the minimum free maintenance/inspection period in years for the each chain section (Splash zone, Intermediary (catenary) zone, touch down and bottom zones). The period in any case shall not be less than 5 years, as following sections:

10.1.3.9 A quasi-static and dynamic analysis for each MBM system shall be performed considering all design and environmental loads according to DNVGL-OS-E301 (Position mooring), latest edition.

10.1.3.10 The analysis of MBM system shall be performed by competent and experienced engineer, and shall be executed using proven industry analysis software dedicated for mooring analysis.
10.1.3.11 The tankers in all berths are mooring in a direction of 270°±5° degree.

10.1.3.12 IEC is considering to relocate the Eshkol-16 and Eshkol-24 mooring berths within few years to a water depths of approximately 18.5 [m] and 25.5 [m] respectively. Hence, the proposed design elements shall allow relocating the MBM's with minimum modifications (For information, refer to Supplement-15).

10.1.3.13 The water depths at berths are as following (PLEM location): Hadera-32 is ~ 20.0 [m] (to be verified on site), Eshkol-16 is 16.5 [m], Eshkol-24 is 18.5 [m]. All depths shall be verified during surveying stage.

10.1.4 Selection of MBM components:

10.1.5 The proposed MBM's design shall assure that the buoys will remain at their positions without excessive movements during storms according to the supplemented environmental conditions. To avoid excessive buoy movements, or in order to shorten chains of mooring legs, the designer may offer adding sinkers blocks, However, this will not gain an advantage for bidder's proposal evaluation.

10.1.6 The use of intermediate shackles for chains joining shall be avoided, i.e. the mooring leg shall be made of one piece of chains without intermediate shackles or connecting elements.

10.1.7 Anchors shall be selected to hold at least the most severe calculated combination of analyzed load.

10.2 General requirements:

The following requirements and activities are part of the contractor's scope if required:

10.2.1 Diving and divers as may be required.

10.2.2 Hand Held Metal detector.

10.2.3 Broadcasting quality underwater Video and still camera.

10.2.4 Bathymetric survey spread consists of shallow water multi beam and precise positioning system.

10.2.5 A vessel with bollard pull that capable to apply/generate at least 120 ton tension force.

10.2.6 The anchor chain handling vessel shall be equipped with a suitable winch and lifting equipment for the installed mooring chain type, chain length and thickness.
10.2.7 All materials loading and unloading operations to AHV shall be done by the contractor using Israeli ports (Ashdod or Haifa).

10.3 **Project Team.**

10.3.1 Shall consist of certified operators, divers, surveyors and supervisors in accordance with the Israeli law and regulation and the contractor Insurance policy.

10.3.2 All installation activities shall be carried out by competent personnel. Competence includes having the necessary theoretical and practical knowledge and experience of the activity being conducted. An adequate installation of some activities may require access to specialized technical knowledge.

10.4 **Environmental considerations, Site Conditions and Hydrographic Conditions:**

10.4.1 **Environmental requirement**

Should the equipment to be designed by the Contractor have discharge points to the environment and/or generate waste materials that must be discharged to the environment, the Contractor shall provide a plan for the treatment of the discharge/waste to meet current regulations of the U.S. Environmental Protection Agency (EPA).

10.4.2 **Environmental information in Ashdod area**

The environmental conditions data (wind, current, waves and sea temperature), provided herein are for information only and are based on a study done by "Cameri - Coastal and Marine Engineering Research Institute". For Ashdod region, the full Hydrographic report for design purposes, is provided in Supplement-13. It will be handed to the winner of the bid after contract sign. It shall be noted that there are no specific data available in IEC for "Hadera" area.

10.4.2.1 **Waves:**

The statistical analysis of waves at Ashdod during the considered 19 hydrographic years (01.04.1992 – 31.03.2011) shows that:
• The dominant direction is WNW. Approximately 51% of the annual waves come from this direction.

• At the recording buoy location the extreme wave height with 50 years return period is about 7.2 m, with 100 years return period is about 7.6 m, with 200 years return period is about 8.0 m.

• In deep water, the extreme wave height with 50 years return period is about 8.1 m, with 100 years return period is about 8.7 m, with 200 years return period is about 9.2 m.

• The total number of storms was 91.

• The average number of storms per year is ~5, the minimum is 2 storms per year and the maximum is 9 storms per year.

• Three major storms with $H_{m0}>6.5$ m occurred on December 2002, January 2008, and December 2010. The highest significant wave in deep water was $H_{m0} = 6.93$ m (20.12.2002). The highest waves propagate from the dominant direction WNW.

• The average storm duration is about 47 hr.

• The longest storm duration was approximately 100 hr and the shortest storm duration was 18 hr.

• Refer to the following figures:
Fig.2.1.2. – Annual rose of wave height ($H_{\text{mo}}$) at the buoy location, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.25%.

Fig.2.1.3. – Annual rose of wave period ($T_p$) at the buoy location, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.25%.
Fig. 2.1.4. – Winter rose of wave height ($H_{mo}$) at the buoy location, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.04%.

Fig. 2.1.5. – Winter rose of wave period ($T_p$) at the buoy location, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.04%.
Fig. 2.1.6. – Summer rose of wave height ($H_m$) at the buoy location, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.41%.

Fig. 2.1.7. – Summer rose of wave period ($T_p$) at the buoy location, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.41%.
Fig. 2.1.8. – Annual rose of wave height ($H_{\text{m}0}$) in deep water, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.25%.

Fig. 2.1.9. – Annual rose of wave period ($T_p$) in deep water, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.25%. 
Fig. 2.1.10. – Winter rose of wave height ($H_{\text{m0}}$) in deep water, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.04%.

Fig. 2.1.11. – Winter rose of wave period ($T_p$) in deep water, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.04%.
Fig.2.1.12. - Summer rose of wave height ($H_{m0}$) in deep water, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.41%.

Fig.2.1.13. - Summer rose of wave period ($T_p$) in deep water, Ashdod (01.04.1992-31.03.2011). Data coverage is 99.41%.
10.4.2.2 Winds data to be considered for the design:

It should be noted that the statistical analysis is based on 10min wind time series, thus, could not be applied for analysis of wind gusts. The statistical analysis of winds in Ashdod area shows that:

- Approximately 90% of annual winds, 86% of winter winds and 93% of summer winds are light (Wind speed less than 6 m/s). About 9% of annual winds, 12% of winter winds and 7% of summer winds are fresh (Wind speed between 6 m/s and 10 m/s). In general, only 1.2% of annual winds, 2.7% of winter winds and 0.26% of summer winds are strong and exceed 10 m/s.

- The direction of significant winds (wind speed larger than 6 m/s) is NNW with 1.64% occurrence. The dominant direction of strong winds (wind speed larger than 10 m/s) able to generate wave storms and strong currents is SW with 0.30% occurrence.

- The strongest winds are in reasonable agreement with wave storm events in deep water. The maximum wind speed 21.8 m/s was recorded during the winter storm event on 12.12.2010. In that storm the wave significant height at the Ashdod buoy location larger than 6m. The corresponding wind direction was SSW.

- Refer to the following figures:
10.4.2.3 **Currents:**

The statistical analysis of currents in the, according to measurement stations Asd1-Asd3 (most relevant stations) and CM1-CM3, in Ashdod area shows that:

- Most of the time (90%), the speed of near-surface current does not exceed 35 cm/s at Asd1, Asd2 and Asd3 stations, 25 cm/s at CM1 station and 15 cm/s at CM3 station; and the speed of the near-bottom current does not exceed 25 cm/s at Asd1, Asd2 and Asd3 stations, 20 cm/s at CM1 station and 10 cm/s at CM3 station.

- The larger velocities were recorded close to the water surface. The largest near-surface and near-bottom speeds recorded were: at Asd1, Asd2 and Asd3 stations (10 years of measurements) ~ 120 cm/s and 85.0 cm/s respectively; (b) at CM1 station for every short time of records (1 year of measurements only) ~ 61 cm/s and 60 cm/s, respectively; (c) at CM3 station for every short time of records (1 year of measurements only) ~ 41 cm/s and 32 cm/s, respectively.

- The predominant direction of currents is from south to north along shore.

- Refer to the following figures:

<table>
<thead>
<tr>
<th>Percentage of measurements</th>
<th>Location</th>
<th>Year</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% or more</td>
<td>upper cell (3.5-4.0 m below the surface)</td>
<td>less than 30-35 cm/s</td>
<td>less than 30-35 cm/s</td>
<td>less than 30-35 cm/s</td>
</tr>
<tr>
<td></td>
<td>lower cell (2.0-2.5 m above the seabed)</td>
<td>less than 20-25 cm/s</td>
<td>less than 20-25 cm/s</td>
<td>less than 15-20 cm/s</td>
</tr>
<tr>
<td>1% or less</td>
<td>upper cell (3.5-4.0 m below the surface)</td>
<td>larger than 55-60 cm/s</td>
<td>larger than 70-75 cm/s</td>
<td>larger than 40-45 cm/s</td>
</tr>
<tr>
<td></td>
<td>lower cell (2.0-2.5 m above the seabed)</td>
<td>larger than 45-50 cm/s</td>
<td>larger than 55-60 cm/s</td>
<td>larger than 30-35 cm/s</td>
</tr>
</tbody>
</table>
10.4.2.4 **Seawater Temperature:**

The statistical analysis of seawater temperature in the Ashdod area shows that:

- **Seawater temperature** range from 12.5 °C in winter to 32.8 °C in summer. The average temperatures in winter are 19.6 °C, 26.2 °C in summer and 23.4 °C on a yearly basis.
- Seawater temperatures are larger than 19.0 °C for 50% of winter records, 27.5 °C for 50% of summer records and 23.0 °C for 50% of annual records.
- Only 10% of winter records show temperature lower than 17.0 °C, only 10% of summer records show temperatures lower than 20.0 °C and only 10% of annual records show temperature lower than 17.5 °C.
- Only 10% of winter records show temperature larger than 24.0 °C, only 10% of summer records show temperatures larger than 30.5 °C and only 10% of annual records show temperature larger than 30.0 °C.

10.4.2.5 **Air Temperature:**

Records at the "Negba" meteorological station (Nearest one to Ashdod) during 1981-2000 show that:
• The daily mean maximum and minimum air temperature measured by Israeli meteorological services "IMS" are +31.1 ºC in August and +8 ºC in February.
• The highest daily maximum and the lowest daily minimum air temperature are +42.4 ºC in September and -0.7 ºC in February.

10.5 Pre project safety boundaries and critical infrastructures marking
10.5.1 The contractor shall be aware of the various sub marine infrastructure located in vicinity of the work area (both Ashdod and Hadera).
10.5.2 The contractor shall avoid and be aware of the adjacent offshore natural Gas pipelines. A safety distance shall be maintained from the natural gas pipelines corridor.
10.5.3 The contractor shall avoid and be aware of the fuel terminals subsea pipelines, hoses strings and their offshore PLEMs.
10.5.4 The contractor shall use temporary marking buoys to mark these safety zones and all subsea infrastructures to be temporary visible by marking buoys during all work activities.

10.6 Coordination
10.6.1 The "time-window" for operation at each MBM system (including all associated works from dismantling first mooring leg up to commissioning the whore MBM system and deliver it to IEC), is limited to Maximum 10 days. The commencement day of the “time window” for the installation beginning at each terminal, shall be selected, coordinated and approved by IEC’s terminal manager. The commencement day of the “Time-window” in each terminal shall be selected, based on all available restrictions and/or limitations. Such limitation may be but not limited to weather, passing ships/tankers, MOD restrictions and IEC’s tankers mooring activities and/or tankers loading commitments to third parties (Oil refinery).
10.6.2 The contractor shall conduct a specific coordination with third parties for successfully execution the works within the area. IEC’s terminal manager shall assist the contractor for such coordination if required. Such third parties may be:
10.6.2.1 Port of Ashdod or Port of Hadera.
10.6.2.2 IEC fuel terminal manager.
10.6.2.3 Unit of protecting the marine environment of the Ministry of Protecting the environment, if necessary.

10.7 **The contractor shall prepare a complete HSSEQ plan for the project, the HSSEQ plan shall include, but not limited to:**

10.7.1 Safety Zone marking.
10.7.2 Subsea infrastructures marking and avoidance of any damage to any infrastructure facilities at site.
10.7.3 Diving procedures safety and evacuation plan in case of emergency or if so required by third party.
10.7.4 Dredging activities safety.
10.7.5 Evacuation Process.
10.7.6 Diving Safety Procedure as well as other project’s activities.
10.7.7 Marine safety operations.
10.7.8 Personnel familiarity with safety procedures.
10.7.9 Communication.
10.7.10 Operational risk management during leg installation.

10.8 **Project execution:**
Following the coordination with all required parties, the contractor shall mobilize its project spread to the site.

10.8.1 **Design:**
Before installation commencement, the contractor shall finalize all activities the associated with the design phase. The contractor shall present the design to the purchaser and implement all purchaser comments, an organized design report including all relevant drawings and details shall be provided to the purchaser.

10.8.2 **Pre-project documents preparation:**
The work commencement shall be only after obtaining IEC’s approval for the planned procedures, specifications and drawings.
10.8.2.1 The contractor’s HSSEQ plan shall be approved by the purchaser prior to execution any field work.
10.8.2.2 For each terminal, the contractor shall perform a survey and locate each anchor and buoy. After performing the survey, a layout drawing of each MBM system shall be prepared. The layout drawing shall include locations (coordinates) for at least the following components:
   a. Existing Buoys and associated cables.
   b. Existing Anchors on seabed (eight anchors in each MBM system).
   c. Steel pipeline offshore end.

10.8.2.3 The Contractor shall prepare a detailed commitment project schedule that shall be sent with the proposal.

10.8.3 Infrastructures Marking and safety:

10.8.3.1 The contractor shall mark by a temporary buoy any subsea infrastructure. The contractor shall avoid any damage to any existing infrastructure or facilities at the site. refer also to para. 4.2.3.5.

10.8.4 New Components complete drawings:

10.8.4.1 The contractor shall submit manufacturer’s complete drawings for all procured components. Each drawing shall contain cross sections and details as much as necessary. Each drawing shall be approved by IEC prior to procurement.

10.8.4.2 The contractor shall prepare composite layout and drawings for each MBM system for IEC’s approval, the drawings shall include at least (Buoys location, anchors locations,).

10.8.5 Testing & Inspection Plan:

10.8.5.1 The contractor shall prepare comprehensive I&TP coordinated with the classification society bureau. The I&TP shall include be approved by the purchaser.

10.8.6 Restoration:

10.8.6.1 After works completions, the contractor shall remove any temporary markers, removed chains or any other temporary structures. The contractor shall restore the site to its original condition.

10.8.7 As-Built Report and Inspection & maintenance Plan:
After completion of the works in each terminal, the contractor shall prepare As-built report and Inspection & Maintenance Plan. The as-built report deliverables shall be based on as built survey. The documents shall include at least the following:

10.8.7.1 As built general layout drawing that include the MBM system description, elements, components with specific relation to the bill of materials, coordinates of end points (Bouys, Anchors) and general dimensions.

10.8.7.2 Mooring leg after installation tension test results, including applied pulling load and test result (test duration, anchor movement).

10.8.7.3 As built approved materials drawings.

10.8.7.4 Set of materials certificates, and third party certificates.

10.8.7.5 For each MBM system, the contractor shall supply an "Inspection and maintenance plan" that shall be approved by the independent classification society. The plan shall be based on the governing standard and most applicable industry standards and practices.

10.9 Basic MBM data and additional requirements:
10.9.1 DELETED

10.10 Requirements for Materials, manufacturing and procurement:
10.10.1 The contractor shall prepare a specification for all procured materials. The specification shall be approved by the purchaser prior to any procurement.

10.10.2 Raw materials (bars) intended for chain and accessories are to be manufactured only by works approved by an international classification society that is member IACS. The approval is limited to a nominated supplier of bar material. If a chain manufacturer wishes to use material from a number of suppliers, separate approval tests must be carried out for each supplier.

10.10.3 Prior to manufacturing, the steeldmaker shall submit a specification of the chemical composition of the bar material, which must be approved by the chain manufacturer and the international classification society.

10.10.4 All procured/supplied materials to IEC under the current specification, shall be manufactured at works and manufacturers which have been approved and certified to manufacture mooring chains their accessories. The certification of
works or manufacturers shall be valid and already issued by an international classification society that is member of IACS. The manufacturer shall submit all certificates that indicate specifically its competency and approval for manufacturing the required component. All documentations and certificates of the works and/or manufacturers shall be verified by the project's classification society.

10.10.5 The contractor shall employ a classification society to test all procured and supplied materials under the current specification. Each supplied component (such as chains, anchors, accessories, etc.) shall have EN 10204-3.2 certificate stamped by the project's classification society (Instead of as stated in Supplement-12).

10.10.6 All installed components and materials shall be new with materials tests and valid certifications. The contractor shall provide each component with valid material certificate approved by the project's classification society.

10.10.7 IEC and/or its representative shall have the right to audit on-site any manufacturer, work and factory. IEC shall have the right to verify on-site manufacturing process, quality insurance process, quality documents, welding process and welders qualifications. IEC and/or its representative shall have the right to disqualify any material manufacturer or manufactured materials after auditing in case of non-conformances with the current specification or its supplemental standards and/or industry practices.

10.10.8 Prior to any procurement and/or contracting with material manufactures, the contractor shall obtain IEC’s approval for manufacturer and/or its work. In order to provide IEC’s a sufficient time to audit manufacturers/works, the contractor shall inform IEC two (2) months before manufacturing beginning. It prohibited procure/install any material from non-approved manufacturer.

10.10.9 The use of joining shackles to replace defective links is not permitted. The use of connecting common links (splice links) is restricted to three (3) links in each 100 m of chain.

10.10.10 The use of Kenter Link connections between chain shots shall be avoided, a joining shackle may be used instead.

10.10.11 A complete Inspection and Testing Report in booklet form shall be provided by the manufacturer for each order. This booklet shall include all dimensional checks, test and inspection reports, NDT reports, process records, and
photographs, as well as any nonconformity, corrective action, and repair work. Each type of accessory shall be covered by separate certificates. All accompanying documents, appendices, and reports shall carry reference to the original certificate number. The manufacturer will be responsible for storing, in a safe and retrievable manner, all documentation produced for a period of at least 10 years.

10.11 Requirements for Materials, manufacturing and procurement:
10.11.1 All chain materials shall be “Offshore mooring Chain” of Grade R3. The steel bars and manufactured chains/accessories shall be manufactured, tested and certified to meet at least all requirements specified in one of the following documents:
- BV, NR 216 DT R08 E: Rules on materials and welding for the classification of marine units.

10.11.2 The following properties as reference for R3 Mooring chain are required:
   a. Chains minimum yield strength is 410 N/mm².
   b. Chains minimum tensile strength is 690 N/mm², Refer to Table-1.
   c. All chains shall be Stud-less.

10.11.3 The chains diameters shall be selected according to the design of the system, considering all technical requirements in the current specification. The minimum chain diameter shall be provided during proposal, Refer to Annexure JA.

10.11.4 Anchors shall be selected according to analysis and govern standard to hold the maximum expected design load.

10.11.5 The proof strength of all accessories and hardware such as shackles, three way plate, pins, anchors and swivels shall not be less that the chain proof test.

10.12 Chain Installation, removal:
10.12.1 The chains shall be installed or dismantled using anchor handling vessel equipped with suitable AHTS (anchor handling and towing winch).
10.12.2 The time-window operation at each MBM including all associated works up to commissioning and deliver to IEC is limited to **10 days**. Refer also to para 10.6.1.

10.12.3 Since the time for installation is very limited, and in order to reduce logistic time in the ports during loading and unloading, the contractor fleet (AHV and others) shall has a capability to load at the same time **at least 2 complete MBM** (8 mooring legs), as following: one dismantled MBM system and the new MBM to be installed.

10.13 **Commissioning and field testing:**

10.13.1 After new installation of each individual mooring leg, the Contractor shall perform a field proof test (tension test) to the complete installed mooring leg includes its components (chains, embedment anchors, accessories). The test shall be part of the complete commissioning procedure approved by the classification society. **The testing proof load shall be based on the analysis of the MBM, with time duration of 15-30 minutes.** The contractor shall apply a load measurement device and test load data logger to record measured load. Alternative testing methods are subjected to the purchaser and the classification society approval.

10.13.2 During tension test, the contractor shall identify and report any anchor slippage.

10.13.3 The mooring leg shall be tested and delivered to IEC only after successfully passing the tension test.

10.14 **Installation Management:**

10.14.1 The Contractor and its sub-contractors shall be all certified ISO-9001:2008 or equivalent.

10.14.2 The Dismantling and Installation methods used shall be described to the purchaser in order to ensure satisfactory completion of the dismantling/installation activities.

10.14.3 All the activities required in the current specification shall be performed according Contractor's specific procedures that shall be based on to the requirements of **the relevant standards**, guidelines and their referenced standards (all latest editions).

10.14.4 The philosophy and the methods used shall ensure that the works:
• Has a consistent and constructive approach to the satisfactory completion and operation of the MBM system.

• Applies up-to-date methods, tools and procedures.

10.15 **Project’s Independent international classification society required activities:**

The contractor under the current specification shall employ an independent international classification society. The classification society shall be member of IACS and shall be approved by the purchaser *(for additional conditions, refer also to "clause 7")*. The following and activities shall be responsibility of the classification society:

10.15.1 Verification and approval of Contractor’s overall project documentations.

10.15.2 Verification and approval of Contractor’s installation procedures.

10.15.3 Approval of materials, manufacturers and/or works (factories).

10.15.4 Inspection (quality surveillance) during fabrication / manufacture of components and approval of all supplied materials and their documentation. Any supplied component (such as chains, anchors, accessories) shall have an EN 10204-3.2 certificate stamped by classification the society, *(Instead of as stated in Supplement-12)*.

10.15.5 On-site surveillance and/or attendance to supervise the installation works during critical and specific activities.

10.15.6 The attendance of the classification society representative in manufacturers works and on-site during installation activities shall be specified in the I&TP.

10.15.7 Witnessing of acceptance testing of key equipment items.

10.15.8 During the projects, the classification society shall report directly to IEC’s for any finding or reports or any test results or in any correspondence.

10.15.9 Approval of final as-built documentations.

10.16 **Project execution team:**

10.16.1 The Contractor shall provide and employ competent work superintendents, nominated by him in sufficient numbers to be able to perform the Works.

10.16.2 The Contractor shall also provide such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Works.
10.16.3 Any person employed by the Contractor who in the opinion of IEC misconducts himself or is incompetent or negligent in the proper performance of his duties shall be removed from the Works and replaced without delay by a competent substitute. The removal and replacement of any person under this section will not be compensated.

10.16.4 The contractor's staff on-site shall include at least Senior Project Manager whose duties shall be at least:
   a. Coordination of all works according to the project schedule.
   b. Ensure that all works performed according to approved plans and procedures.
   c. Ensure that procurement progress and material supply are according to project schedule.
   d. Participate in weekly meetings in IEC's offices or in site.

10.16.5 The contractor's staff on-site shall include at least Senior Project Engineer, having at least the following responsibilities:
   a. Ensuring that all work is safely planned, resourced and executed in line with contractual requirements.
   b. Ensuring that all personnel utilized within the project are fit for purpose (meeting the requirements detailed within the SOW) and suitably briefed on the work scope in line with documented processes and procedures.
   c. Maintaining conformance to HSE & Quality Management System. Ensuring that the Cardinal Safety Rules are followed at all times during the project and that quality deliverables are understood by all personnel.
   d. Maintaining a high profile for safety and quality on the project in general.
   e. Maintain communication with the IEC on technical and commercial matters.
   f. Review and approve project calculations, drawings, risk assessments and other relevant documentation.
   g. Carry out the relevant calculations and prepare the relevant procedures as prescribed by the scope of the project.
   h. Ensuring team members adhere to the project processes such as document control and ensuring that all deliverables are presented as detailed within the contract.

10.16.6 The contractor's staff on-site shall include at least HSSEQ officer, having the following responsibilities:
a. Collation, preparation and presentation of all project HSSEQ documentation to satisfy Contractor and IEC’s requirements.
b. Maintenance and reporting of project safety figures within Contractor safety database, including HSSEQ observations and near misses.
c. Involved in the approval and audit of key suppliers.
d. Attending and assisting the marine manager with project Task Risk Assessments.
e. Representing the project at client meetings, workshops and visits as required.
f. Being actively involved in implementation and close out of corrective actions following any Non Conformance Report (NCR) in relation to Quality.
g. Checking accuracy of dispatch documents.
h. Filing of documents and drawings.
i. Managing and maintaining the Document Control System. Provide advice on procedures of issue and methods in accessing the system.
j. Ensuring that all documents are up to date within electronic filing systems.

10.17 HEALTH, SAFETY, SECURITY AND ENVIRONMENT

10.17.1 All project team members shall ensure that the work is safely planned and conducted, at all times ensuring that the Health, Safety and Environment policy is implemented and followed within all project activities.

10.17.2 The HSSEQ Officer will provide direct support, advice and guidance to the Project Team to ensure that project activities are carried out in accordance with statutory HSE legislation and the requirements of the Contract.

10.17.3 The HSSEQ Officer shall ensure that all Health and Safety related activities are carried out in accordance with the stated project requirements and are addressed in the project meetings. Other typical work tasks for Health and Safety Advisor are:

10.17.4 Assisting in the preparation, planning, execution and recording of Risk Assessments.

10.17.5 Monthly Health and Safety reporting.

10.17.6 Accident/Incident report follow-up and analysis.

10.17.7 Acting on Non-conformance reports and corrective actions with respect to Health, Safety and Environment.

10.17.8 External Environment Analysis and environmental reporting.
10.17.9 Health, Safety and Environment familiarization and Inspection.

10.17.10 Participation in Safe Job Analyses as relevant.

10.17.11 Assistance in Health and Safety Audit and Verification activities.

10.17.12 The Health and Safety Management Plan for the Project provides the minimum standards of HSE requirements throughout the duration of this contract for contractor Employees and its Subcontractors. By implementing these requirements the intention is to reduce the risks involved in everyday operations to People, Environment and Assets to as low as reasonably practicable (ALARP).

11. **TEST AND INSPECTIONS**

All inspections shall be carried out according approved I&TP.

12. **PACKAGING & DELIVERY**

12.1 All components or accessories shipped detached for field mounting or field assembly shall be suitably tagged to allow easy identification. Tags shall be stamped with cross reference data such as Manufacturer's Name, Contract No., Power Station, Unit No., reference drawing and Equipment Designation, and shall be exceptionally durable and securely tied to items by wire or other methods approved by Purchaser.

12.2 Major pieces of Equipment shall be supplied with securely tied nameplates (Adhesive fastening is not acceptable) including manufacturer’s name, model number, serial number and additional information, such as voltage, frequency, etc.

12.3 Unless specially designated, all Equipment and other items shall be packaged for outdoor storage until erection. Where required by the nature of the Equipment, the Contractor shall furnish and install necessary covers to protect the Equipment from sand, rain, hail, wind, dust and salt spray. Equipment shall be adequately sealed and protected during shipment to prevent corrosion and entrance of foreign matter. All exposed machined surfaces shall be protected where required with a suitable antirust compound or covers before shipment, for shipment and storage until erection.
13. STORAGE & HANDLING
N.A.

14. NAMEPLATE / MARKING

14.1.1 New Installed Mooring legs materials: The new chain, anchors and accessories, all shall be clearly marked according to the selected classification society rules, the following shall be applicable:

14.1.1.1 The marking is to be permanent and legible throughout the expected lifetime of the accessory/component.

14.1.1.2 The number of the certificate (furnished by the Surveyor).

14.1.1.3 The mark signifying that the accessory has been satisfactorily tested to classification society requirements and the grade as applicable (i.e., R3).

14.1.1.4 Each accessory is to have a traceable identifying marking.

14.1.1.5 The manufacturer name or trademark and the nominal accessory diameter in millimeters or inches (when the accessory manufacturer embosses the information in a permanent manner by some suitable means such as forging or casting, marking may be omitted).

14.1.1.6 For stud link, marking to be on the stud.

14.1.1.7 For chain, marking to be at each end of the chain length.

14.1.1.8 Each connecting common link.

14.1.1.9 Each link next to shackles or connecting common links.

14.1.1.10 At first and last common link of each steel heat.

14.1.2 Dismantled Chains and Anchors

14.1.2.1 The contractor shall mark each dismantled chain segment and anchor using identification tags attached to the dismantled elements. The markers shall be painted and shall be durable to withstand the corrosive environment near shore (humidity and salty environment).

14.1.2.2 A specific report shall be delivered to IEC in order to identify marking method. The following data are required to be identified using the attached markers:

a. Identification of fuel terminal name.

b. Identification of mooring leg number.

c. Identification of chain segment location (trash zone or buried).

d. Identification of Anchor number.
15. **NOTES**
   Contractor Identification: Prior to the commencement of work, the Contractor shall submit legible, color photocopies of all the Contractors staff personnel who will be on the sites. Additionally, Contractor personnel shall, at all times, clearly display the IEC issued approved authorizations.

16. **SPECIAL REQUIREMENT**
   N.A.