# Information and Regulations for FPSO Bravo Terminal

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| | Tubarão Martelo | NAV | Manual | MAN | 0001 | PRIO03-NAV-MAN-0001 |

# EXECUTIVE SUMMARY

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# 1. INTRODUCTION

## 1.1. GENERAL CONDITION

This Tanker Handbook contents are based upon the OCIMF, ISGOTT, ISPS, SOLAS and terminal information sheet but it is not intended to take the place of any official publications with respect to the waters and areas to which it pertains. It is also not intended to vary or override in any way the normal duties and responsibilities of Master(s) of Offtake Tanker(s) in regard to the safety and handling of their vessels, or to conflict with established standards of good marine practice. Therefore, the ultimate decision to undertake the offloading operations herein described rests with the Master of the Offtake Tanker and the FPSO BRAVO OIM in accordance with PETRORIO Representative, when applicable.

The instructions and guidance notes contained in this Tanker Handbook are based on the assumption of mutual co-operation between the FPSO BRAVO TERMINAL, the Mooring Master and the Master of the Offtake Tanker. Close consultation between these parties prior to undertaking mooring and any Offtake operations is essential in every case.

This Tanker Handbook shall be revised and updated whenever necessary. While every effort has been made to ensure accuracy of the contents, PETRORIO does not accept any responsibility for any omissions or errors or any consequences arising out of or connected with the use of this Tanker Handbook. Specifically, the plans and diagrams given are not to be used for the navigation of vessels approaching, leaving or navigating within the FPSO FPSO BRAVO area.

Notwithstanding the foregoing or any provision of this Tanker Handbook, PETRORIO may take whatever measures may be necessary to prevent hazards to human safety and health, property and to the environment that may arise from any activity concerning the FPSO.

The Mooring Master is the person appointed by PETRORIO to advise the Offtake Tanker Master in mooring and loading operations and custody transfer of documentation, in line with operating procedures from FPSO BRAVO TERMINAL and the Offtake Tanker. Where the Mooring Master observes anything of concern or deviation to procedures then this shall be brought to the attention of the Master of the Offtake Tanker, the Offshore Installation Manager of the FPSO BRAVO TERMINAL (who has overall responsibility for the operation of the FPSO) and the mooring or Offtake operation stopped in a safe manner until a resolution is reached.

The Mooring Master shall complete the appropriate pre-berthing procedure.

An International Safety Guide for Oil Tankers and Terminals (ISGOTT) checklist shall be completed to PETRORIO's satisfaction before commencing offloading operations.

The mooring operations and positioning procedures mentioned in this Tanker Handbook are intended to apply to all Offtake Tankers.

## 1.2. OBJECTIVE

The main objective of this document is to outline the information and procedures that are necessary for safe and efficient offloading operations. As a result, some relevant details of the special equipment involved have been included. However, each Offtake Tanker shall make

reference, where applicable, to their own vessel owners/managers operating instructions in respect of their installed equipment and procedures.

## 1.3. SCOPE OF REPORT

This Terminal Regulations and Tanker Handbook for FPSO BRAVO Terminal (Information for Offtake Tanker, Masters and Crew, Conditions of Use and Regulations) (herein after referred to as “Tanker Handbook”) has been prepared for the benefit of Offtake Tanker(s) loading at the FPSO BRAVO TERMINAL

This Tanker Handbook shall be made available to ships agents in Rio de Janeiro and may also be delivered by the Mooring Master when he boards the Offtake Tanker.

Additional copies shall be held by the Marine Superintendent on the FPSO, by the Master of AHTS, by the Marine Team Leader of PETRO RIO O&G Exploração e Produção Ltda (herein after referred to as “PETRORIO”).

## 1.4. LEGISLATION

FPSO FPSO BRAVO is a floating installation and subject to Brazilian Legal Water Regulations issued by the Brazilian Maritime Authority (Diretoria de Portos e Costas – DPC). Offtake Tankers must conform to all applicable Brazilian federal, state, and municipal laws and regulations, including but not limited to those related to safety, navigation, operating standards and protection of the environment.

The Offtake Tanker and it crew are subject to inspection and clearance by Customs, Immigration and Health authorities before proceeding to FPSO BRAVO.

The local Port Authorities may request to carry out an inspection on the Offtake Tanker.

## 1.5. COMPLIANCE WITH INTERNATIONAL SHIP AND PORT SECURITY CODE (ISPS)

It is PETRORIO policy to request the Offtake Tanker entering into a Declaration of Security with FPSO BRAVO at least twenty-four (24) hours before the scheduled mooring. This procedure will apply to all Offtake Tankers, either in international or Brazilian coastal trade. At the time of first contact with the responsible party of the Offtake Tanker, FPSO FPSO BRAVO will require a copy of the Offtake Tanker’s ISSC and a list of its last ten ports of call. Any Offtake Tanker that has not satisfied the Company Security Officer with regard to its ISPS status and that has not completed the Declaration of Security will not be permitted to moor to FPSO BRAVO.

## 2. REFERENCE DOCUMENTS

The following documents were used for the elaboration of this Tanker Handbook:

1. International Safety Guide for Oil Tankers & Terminal – ISGOTT
2. Offshore Loading Safety Guidelines – OCIMF
3. International Convention for Safety of Life at Sea (SOLAS, 1974)
4. Operation Manual Offloading – FPSO BRAVO
5. API - Manual of Petroleum Measurement Standards

**Figure 1 - FPSO BRAVO turret system**

## 3. TERMS AND DEFINITIONS

| TERM | MEANING WHEN USED HEREIN |
|---|---|
| AHTS | Anchor Handling Towing Supply - Tug designed to assist the Offtake Tanker during mooring and oil transfer operations |
| BCO | Barge Control Operator |
| CCR | Central Control Room |
| CRO | Central Control Room Operator |
| CPT | Master of a Vessel |
| ESD | Emergency Shut Down |
| ETA | Estimated Time of Arrival |
| FPSO | Floating Production Storage and Offloading Facility named FPSO BRAVO TERMINAL |
| ISGOTT | International Safety Guide for Oil Tankers and Terminals |
| ISPS | International Ship and Port Security Code |
| LAT | Low Astronomical Tide |
| MFSV | Multi-Functional Support Vessel |
| LHV | Line Handling Vessel – Responsible for picking up the mooring ropes into the water |
| MODU | Mobile Offshore Drilling Unit |
| OCIMF | Oil Companies International Marine Forum |
| LOA | Length Overall |
| MANIFOLD | A set of valves and intake/offtake connections terminating the tanker's piping system, generally located on deck amidships, that allows connection to the floating hose lines. |
| OI | Offshore Installation |
| OIM | Offshore Installation Manager |
| OTT | Offtake Tanker |
| MM | Mooring Master |
| PSV | Platform Supply Vessel |
| ROB | Remains on Board |
| PETRORIO | PETRORIO O&G Exploração e Produção de Petróleo Ltda |
| SB | Support Boat, used to transport the MM and his support team, and to engage in the line handling of messenger lines, among other things. |
| SOPEP | Ships Oil Pollution Emergency Plan |
| SUPEM | FPSO Superintendent – Deck Officer responsible for the oil transfer operations on the FPSO |
| SWL | Safe Working Load |
| BS&W | Bulk Sediments and Water - Amount of sludge and water in the oil. Generally given in percentile terms |
| ECR | Engine Control Room |
| CBM | Cubic Meter |
| EXCLUSION ZONE | This zone may extend from a distance between 750m to 1250 m around the FPSO BRAVO and are measured from their turrets. This zone takes into consideration the following: FPSO length, 110 m hawser system and Offtake Tanker length overall and towing wire hope and AHTS length |

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| DWT | Deadweight Tonnage |
| GRT | Gross Registered Tonnage |
| IMCA | International Marine Contractor Association |
| IMO | International Maritime Organization |
| IMPA | International Maritime Pilots Association |
| UHF | Ultra-High Frequency (radio) |
| VHF | Very High Frequency (radio) |
| WAVE HEIGHT | (Hmax) - The probable highest wave related to the height (Hs) by means of the expression Hmax = 1.86 * Hs. |
| NOR | Notice of Readiness |
| NRT | Net Register Tonnage |
| Independent Inspectors | The Independent Inspector(s) appointed by PETRORIO and responsible for determining the quantity and quality of the cargo transferred. |
| Customs Surveyor | The Customs Surveyor is an agent acting on behalf of the Brazilian Customs Authority to verify the quantity and quality of the cargo transferred |
| Operational Sector | Area predefined by operational limits in which offloading operations can be accomplished |
| QRH | Quick Release Hook, a hydraulic hook device on the stern of the FPSO to which the mooring hawser connecting with the Offtake Tanker is attached. |
| TURRET | Structure composed by roll bearing that maintain the FPSO anchored and aligned the environment conditions |
| PPE | Personal Protective Equipment |
| MBC | Marine Breakaway Coupling – Breakaway valve installed on the export hose to be used in case of emergency disconnection |
| ERC | Emergency Release Coupling |

# 4. CONDITIONS OF USE

This Tanker Handbook shall apply to all Offtake Tankers visiting the FPSO. The use of the FPSO or any of its facilities by an Offtake Tanker constitutes agreement to this Terminal Handbook and these conditions of use.

The Offtake Tanker shall comply with this Tanker Handbook and its conditions of use. In the event of non-compliance with this Tanker Handbook and its conditions of use, the Indemnified Parties (as defined below) shall be entitled to recover from the Offtake Tanker owners any loss or damage (including claims for loss of life and injury) incurred by the Indemnified Parties arising out of such non-compliance, (whether such loss or damage can be foreseen or not) provided always that, save for the indemnities provided for in this Tanker Handbook, nothing in these Conditions of Use should impose any liability on the Offtake Tanker in excess of the limits of liability available to it under any applicable laws or regulations.

## 4.1. ASSISTANCE, ADVICE AND INSTRUCTIONS

In all circumstances the Offtake Tanker Master shall remain solely responsible on behalf of the Offtake Tanker owners, charterers, contractors and personnel (including Master and crew) for the safety and proper navigation of the Offtake Tanker and protection of the environment. The Mooring Master and his assistant are supplied solely to provide assistance, in an advisory capacity, to the Offtake Tanker and in no way are responsible or liable for any action whatsoever of the Offtake Tanker. For the purposes of the Conditions of Use, the Mooring Master shall be deemed to be the servant of the Offtake Tanker and her owners.

The Mooring Master may refuse to accept an Offtake Tanker for Loading, or may Suspend or delay the loading of, or may unberth an Offtake Tanker if he/she considers the Offtake Tanker's conditions to be unsatisfactory. In the event the Master of the Offtake Tanker and the Mooring Master cannot agree to a procedure by which the Offtake Tanker can meet satisfactory conditions, both the FPSO BRAVO Terminal and the Owner/Charterer of the Offtake Tanker shall be immediately contacted so that acceptable corrections can be made. Time required to bring the Offtake Tanker in to a satisfactory condition shall not count as used Lay time or if any demurrage.

## 4.2. GENERAL INDEMNITIES

The Master of the Offtake Tanker shall always be solely responsible for the proper navigation and safety of the Offtake Tanker and her crew. OIM shall endeavor to ensure that the Terminal is safe and suitable, however, no guarantee of such safety or suitability is given, and PETRORIO presents no warranty of safe berth or any other warranty. The term "Indemnified Parties" shall include PETRORIO, its successors and assigns, parent companies, subsidiaries and affiliates and partners and joint ventures, and its directors, officers, employees, servants, contractors and agents of every tier.

The Indemnified Parties shall not be liable for or suffer loss arising out of, and the Offtake Tanker owners shall defend, indemnify and hold the Indemnified Parties harmless from any suit, claim, liability, loss, damage (including but not limited to punitive or exemplary damages), penalty, fine, cost or expense (including, but not limited to attorney's fees and court costs) arising out of, any injury to, disease or death of persons, any loss of or damage to property and any delay or liability (including those arising out of or connected with any pollution that occurs) suffered by the Indemnified Parties, any Offtake Tanker owner and/or any third party, arising out of or connected in any way with the Offtake Tanker's use of the Terminal, including but not limited to any advice, instructions, assistance or services, Pilotage, mooring or loading, or navigational facilities (including buoy or channel markers) offered or provided. This shall apply whether or not such injury, disease, death, loss, damage, delay or liability is caused by the active or passive negligence, omission or default of the Indemnified Parties (including any breach of any warranty of workmanlike performance which may be applicable) or by any fault or defect in the Terminal, unless such injury, disease, death, loss, damage, delay, liability, fault or defect is caused by the sole negligence of the Indemnified Parties.

Notwithstanding the above, the Offtake Tanker owners shall be solely responsible with respect to the escape of hydrocarbons or any other fluid from the Offtake Tanker. The Indemnified Parties shall not be liable for or suffer loss arising out of, and the Offtake Tanker owners shall defend, indemnify and hold the Indemnified Parties harmless from any suit, claim, liability, loss, damage (including but not limited to punitive or exemplary damages), penalty, fine, cost or expense (including, but not limited to attorney's fees and court costs) arising out of, any injury to, disease or death of persons, any loss of or damage to property and any delay or liability (including those arising out of or connected with any pollution that occurs) suffered by the Indemnified Parties, any Offtake Tanker owner and any third party, arising out of or connected in any way with the escape of hydrocarbons or any other fluid from the Offtake Tanker. This shall apply whether or not such escape of hydrocarbons or other fluid or such injury, disease, death, loss, damage, delay or liability is caused by the sole or concurrent, active or passive negligence, omission or default of the Indemnified Parties (including any breach of any warranty of workmanlike performance which may be applicable) or by any fault or defect in the FPSO.

Additionally, the Indemnified Parties are not responsible for any loss, damage or delay, directly or indirectly arising out of or connected with strikes or labor disputes, or disturbances whether or not the Indemnified Parties are parties thereto.

The above indemnities apply to all such suits, claims, liabilities, losses, damages, penalties, fines, costs and expenses described above based on any theory of liability, including negligence, negligence per se, gross negligence or strict liability. In addition, in the event any applicable law, regulation or order prohibits or restricts (by amount or otherwise) enforcement of the above indemnities to their fullest extent, the relevant indemnity shall be deemed amended, but only to the limited extent necessary to make it enforceable. Notwithstanding the above, if enforcement of these indemnities would not subject the Indemnified Parties or the Offtake Tanker owners to criminal or civil sanctions under the applicable law, regulation or order which prohibits or restricts such enforcement, then these indemnities shall not be deemed amended as described above but shall nonetheless be applied in accordance with their terms.

### 4.3. ENVIRONMENT

If in connection with, or by reason of, the use or intended use of the FPSO and its facilities, any Offtake Tanker becomes involved in any form of marine casualty, or otherwise becomes, in the opinion of PETRORIO, an obstruction or danger to any part of the FPSO and its facilities or the approaches thereto, and/or causes pollution of the sea, and the Offtake Tanker fails to remove the obstruction or danger, or respond to the pollution within a period of time reasonably stipulated by PETRORIO, and/or to the satisfaction of PETRORIO then PETRORIO shall be empowered to take any steps deemed necessary to remove the obstruction or danger, or respond to the pollution. Any costs, including legal costs, and or disbursements and/or expenses incurred by PETRORIO relating to such responses shall be recoverable from the Offtake Tanker owners.

### 4.4. GOVERNING LAW AND ARBITRATION

This Tanker Handbook shall be governed and construed in accordance with the laws of England. Any dispute, controversy or claim arising out of this Tanker Handbook shall be referred to and finally resolved by arbitration under the rules, then in force, of the London Court of International Arbitration, which rules are deemed to be incorporated by reference into this clause, the tribunal shall consist of 3 arbitrators, of which one (1) shall be appointed by the claimant(s), and one (1) by the respondent(s). The chairman of the arbitral tribunal shall be appointed, in agreement, by the two (2) co-arbitrators, in consultations with the parties to the arbitration, within fifteen (15) Days after the confirmation of the last co-arbitrator or, if that is not possible by any reason, by the Chamber, in accordance with the Rules. The place of arbitration shall be London, England. The language of the arbitration shall be English. The arbitration tribunal shall have the power to order specific performance and grant interim relief. The award of the arbitration tribunal shall be final and binding on the parties and may be enforced against them in any court or other authority of competent jurisdiction, and each party hereby waives any right of appeal.

## 4.5. ACKNOWLEDGEMENT OF CONDITIONS OF USE

The signature of a letter headed “Receipt and Acceptance of Terminal Information and Regulations” in the form which appears in Attachment to this Tanker Handbook shall constitute acknowledgment, receipt and agreement to this Tanker Handbook and these conditions of use by the Master of the Offtake Tanker, on his own behalf and on behalf of the Offtake Tanker owners.

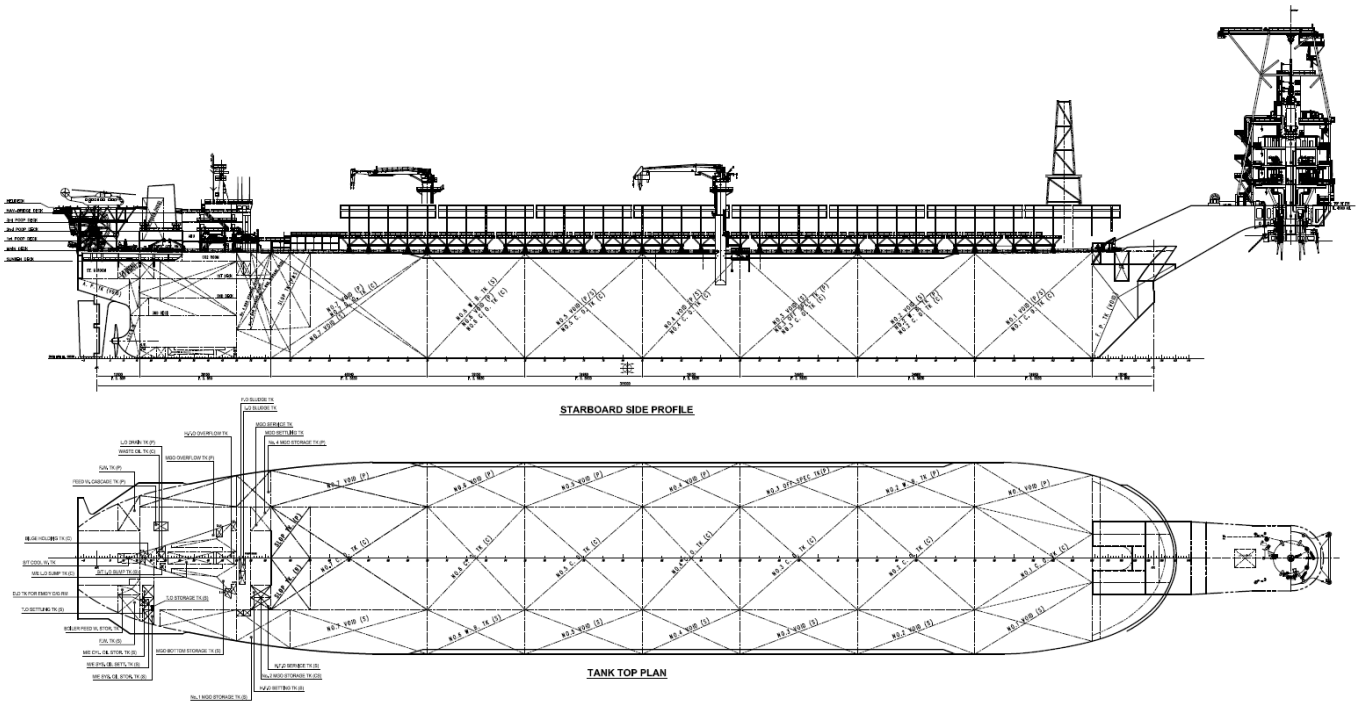



**Figure 2 – FPSO BRAVO Tank Arrangement**

# 5. DESCRIPTION OF FPSO BRAVO TERMINAL

## 5.1. LOCATION

The FPSO BRAVO is positioned in the field of production called TUBARÃO MARTELO, located south of the Campos Basin, approximately 92 km off the coast of Armação de Búzios, in the State of Rio de Janeiro or 50 nautical miles from the nearest point on the coast, South East Brazil.

**Latitude 23° 8’ 7.15" South and Longitude 41° 4' 23" West**

Note: Drilling and marine subsea operations may take place within the field boundaries at any time. Detailed updates shall be received by the Offtake Tanker from the FPSO and plotted before entry to the field. A description of other activities shall be transmitted from FPSO radio operator to the Offtake Tanker prior to approach.

There are also other explorations and production activities being potentially carried out by in the general area approximately 4.0 miles away from the FPSO.


**Figure 3 – FPSO BRAVO Location**

## 5.2. FPSO INFORMATION AND CRUDE OIL SPECIFICATION

The FPSO BRAVO is connected to an external turret system, which has the advantage of keeping the vessel with free rotation around its axis, providing to the FPSO a heading according to the result of environmental forces acting upon the hull and its structures above the main deck. The Turret chain table is provided with 12 chains into the sea (4 chains in 3 groups making a angle of 120° between then) responsible for the FPSO anchoring.

As the system formed by the FPSO and the OTT is subjected to the action of wind, current and waves, with different intensities and impacts, the stability of this system depends a lot on the differences of the two draft vessels. Special attention should be given to the dynamics of this system.

The OTT remains tied to the FPSO stern through a polyamide rope (nylon) 130 meters in length.

The oil transfer is performed through 33 floating sections (10,7 meters each) that compose a total of 352 meters of the export hose.

The assistance of the Mooring Master in mooring and unmooring maneuvers and in the hose connections and disconnections is mandatory for all tankers.

An SB (Support Boat) is provided to assist in mooring maneuvers/unmooring, as well as in the operation of connection /disconnection of the hose line.

An AHTS is provided to keep the OTT aligned and in a safe distance from the FPSO.

After connecting the tug wire at the stern of the ship and the mooring operation has finished, the OTT crew starts connecting the floating hose line, which is used to transfer oil to the OTT.

*Crude Oil Washing (COW) may take place on the FPSO during a discharge. On the occasions that this occurs the Offtake Tanker shall be advised prior to pumping commencing and during the COW periods.*

*There is no provision for transfer of Volatile Organic Compounds (VOCs).*

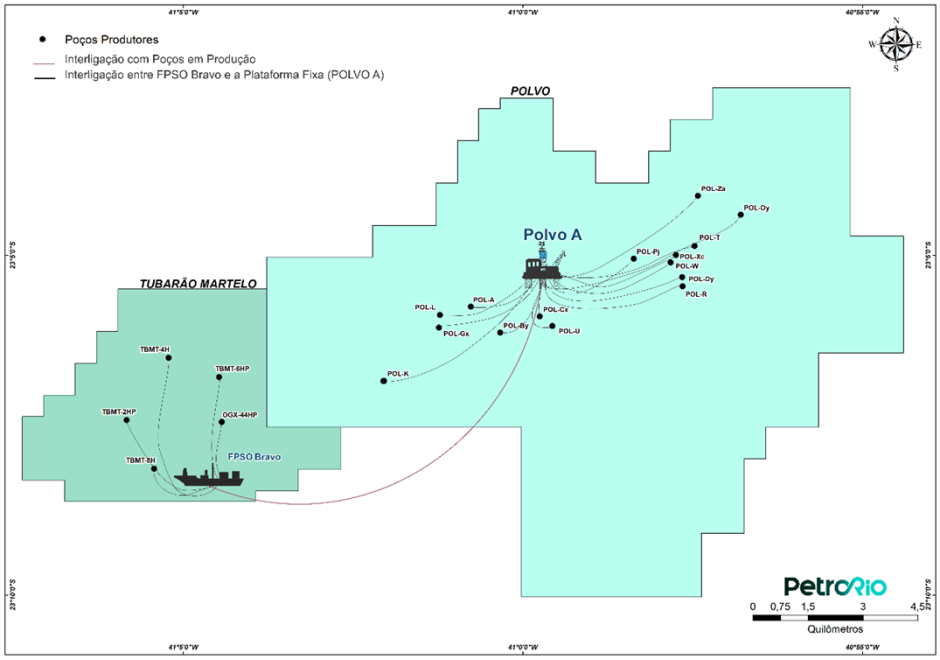



**Figure 4 – Tubarão Martelo and Polvo fields**

## Table 1: FPSO BRAVO Details

| | |
|---|---|
| Type | FPSO – Floating Production Storage and Offloading |
| Build Yard | Daewoo Shipbuilding & Heavy Machinery Ltd., Korea |
| Build/ Conversion Date | 1989/2013 |
| Hull | Double hull |
| Call Sign | C6EW2 |
| Length Overall | 370.50 meters |
| Length between perpendiculars | 315 meters |
| Beam (molded) | 57.20 meters |
| Maximum operating draft | 20.80 meters |
| Depth | 31.20 meters |
| Total Tank Capacity | 278,922.6 $m^3$ |
| Light Weight | 47763,03 mt |
| Oil Storage Capacity (100%) | 244,933.3 $m^3$ or 1541430.2 BBLS |
| Slops Clean/ Dirty | 8,231.6 $m^3$ or 51803.6 BBLS |
| Means of Export | Floating export hose |
| IMO Number | 8715027 |
| Class | ABS |
| Port of Register | Bahamas, Nassau |
| Location | Campos Basin |
| Legal Time | GMT -3h |
| Official Number | 8526 |
| Operating Water depth | 105 meters |

**Observation:**
The Campos Basin area is in the GMT -3h Time Zone.

### 5.3. CRUDE OIL SPECIFICATION

Crude oil loaded at FPSO BRAVO Terminal is a blend of crudes produced from Tubarão Martelo and Polvo fields and will have an average API of 18.2 ~ 20.5 and Pour Point of – 25 to -28°C. and may contain low quantities of H2S in crude.

The Mooring Master will provide a copy of the MSDS, Material Safety Data Sheet of the crude oil. Loading temperature and API will be communicated to the Offtake Tanker prior to the commence of the cargo transfer.

### 5.4. WATER DEPTH

The water depth at the FPSO is also approximately 105 meters.

### 5.5. LIMITATIONS

Maximum Offtake Tanker size at the FPSO BRAVO TERMINAL is up to 170,000 tones deadweight. According to the P&ID we can operate with Panamax (60.000 to 80.000 DWT), Aframax (80.000 to 120.000 DWT) and Suezmax (120.000 to 200.000 DWT). Maximum distance from bow to manifold is 150 meters with maximum beam of 60 meters.

DP Tankers calling at FPSO BRAVO TERMINAL will be moored and loaded in the conventional manner as descript in the sections of this guideline.

All hose handling equipment and fittings used on the Offtake Tanker shall be certified at a minimum 15 tons SWL.

The tongue type chain stoppers forward and the ship's manifolds shall be as per OCIMF recommendations

Partial Loadings at FPSO BRAVO Terminal may be allowed, however it shall be authorized by PETRORIO OIM, FPSO BRAVO Cargo Superintendent and MM during the vetting process, due to the close proximity of the Wellhead Platform. Shall be mandatory follow these items described below:

- An ON Watch office on the bridge during the time OTT is moored at the terminal
- Range/Distance detector used by Forecastle based mooring master.
- Maximum final approach speed as per study in annex (0.5 knots when inside 500 meters zone). Main engines and auxiliaries shall remain at constant readiness whilst the Offtake Tanker is connected to the FPSO. No shut down of main engines for maintenance is permitted within the Field.
- TWO (2) MESSENGER ROPES FWD, 200 METRES LONG AND MINIMUM 32mm DIAMETER AND STOWED ON DRUMS IN LINE WITH THE CHAIN STOPPERS. THE SPOOL DRUM/S MUST BE CAPABLE TO ALSO STOWING 150 METRES X 80mm DIAMETER POLYBLEND ROPE. STERN, A STRONG MESSENGER READY

### 5.6. PARTICULARITIES TO MOOR IN THE FPSO

The mooring and unmooring operations of OTTs must be performed according to the following instructions:

- The Mooring Master shall be responsible for the operation with Conventional Vessels and also by the Dynamic Positioning Vessels.
- An AHTS and a SB will be provided for supporting the mooring and unmooring operations.

- The AHTS shall keep connect by the towing wire astern of the Conventional OTT during all the offloading operation and to the Dynamic Positioning OTT when requested.
- If necessary, the replacement of AHTS connected to OTT, the release of the AHTS may only be done after the assignment of the Mooring Master and/or OTT CPT, which shall be realized under environmental conditions and other variables in the operation moment.
- The AHTS conditions must be evaluated during all time when connected to the OTT, especially in adverse meteorological weather.
- In meteorological adverse conditions that may affect the integrity of the AHTS, the Mooring Master, OTT CPT and AHTS CPT must evaluate the possibility of reducing the engine power of the AHTS and other necessary actions required in order to mitigate the impacts on the vessel.

# 6. RESPONSABILITIES

## 6.1. OFFTAKE TANKER MASTER

Notwithstanding Offtake Tanker Master is fully responsible for the operation and conduct of his vessel; he shall follow the operational procedures herein established, and also the recommendations, rules and procedures established by international organizations and associations. Additional duties include:

- The Offtake Tanker Master shall guarantee that safety checklist is filled before started the operation.
- To make certain that the tanker's officers and crew who are directly involved with the operation are familiar with all the procedures, include emergency procedure, that are relevant for the approach, mooring, positioning and departure operations. Ensure they are appropriately outfitted with PPE and tools.
- To establish VHF/UHF communication with the FPSO at least two hours before arrival in the 10 NM zone, on the agreed working channel to be used during all the operation.
- To ensure the Offtake Tanker should be ballasted with the bulbous bow and propeller submerged and the anchors shall be secured in their position.
- To report to the FPSO and its representative ETA notices each of 72, 48 and 24 hours prior to its arrival
- To notify the FPSO that the Offtake Tanker is ready to approach (issue the NOR), in addition to the notification of when 5 NM zone is passed.
- To check the mooring equipment for any defects or faults and report condition of the mooring equipment shall be reported to the FPSO. The FPSO shall keep a log of these reports. Faults or damages in the mooring equipment, which may be of significance to safety during loading operations, shall be reported.
- To establish continuous communications with the FPSO, which monitors the loading operation when the tanker has been moored, positioned, and the hose has been connected.
- To ensure that the cargo system on board has been checked and the right valves are open before the FPSO is notified that the Offtake Tanker is ready to start loading.
- To notify the FPSO every hour about the progress of the loading operation (total cargo on board, last rate and available space) and the estimated time of completion.
- To monitor the hose and hawser tension especially when the weather conditions cause significant motions.
- To notify the FPSO when the Offtake Tanker is ready to disconnect loading hose. To report to the FPSO when the Offtake Tanker is out of 500 meters zone.
- To maintain the main engines and auxiliaries at constant readiness whilst the Offtake Tanker is connected to the FPSO.
- Ensure no main engines repair or maintenance will be carrying out when Tanker is moored at the Terminal.
- To ensure the Air Conditioner system on the Offtake Tanker should maintain positive pressure inside the accommodation all time during the loading operation.

- To ensure the cargo venting system on the Offtake Tanker shall be closed during the chopper operations at the FPSO.

### 6.1.1. Before Loading Operation

- On arrival at 25 NM zone, establishing radio contact on VHF channel 16 to agree the communication channel between Mooring Master, Offtake Tanker Master and FPSO FPSO BRAVO; confirming Offtake Tanker's position and Estimated Time of Arrival (ETA) 10 NM zone;
- Establishing radio contact and maintaining communication with FPSO CCR on arrival at 10 NM zone, through the VHF channel to be used during the entire operation;
- Ballast condition upon arrival to be in compliance with ISGOTT/MARPOL and each specific ship to be fit for safe maneuverability;
- The maneuverability of the main engine, available starting air, rudder and thrusters (if installed) shall be thoroughly tested prior to entering the Field;
- Tendering Notice of Readiness (NOR) to FPSO CCR and all concerned parties when Offtake Tanker is ready in all aspects to make final approach towards the installation;
- Ensuring that Offtake Tanker officers and crew involved in tandem operation are familiar with all procedures relevant to visual inspection, approach, mooring, loading and departure operations;
- Ensuring that Offtake Tanker officers and crew involved in tandem operation are familiar with emergency procedures and wear appropriate and approved personal protection and safety equipment;
- Ensuring there is complete understanding with FPSO CCR and the AHTS regarding Terminal loading procedures;
- Advising FPSO CCR of any defects in the maneuvering systems, navigation devices, communication system and equipment necessary for the offloading operation;
- Inspecting mooring equipment, loading manifolds (16") and associated equipment for faults and defects. Faults and defects shall be immediately reported to FPSO CCR and, upon departure, reported to the charterer and PETRORIO;
- Ensuring that ordinary safety and pollution measures are taken, including air-conditioning plant for recirculation, scuppers plugs on main deck, etc.;
- Ensuring that FPSO, Offtake Tanker and ISGOTT check lists (Appendixes 15, 19, 20, 21, 22 and 23) are complied with;
- Ensuring cargo systems have been inspected and correct valves are open before FPSO CCR is advised that the Offtake Tanker is ready to start loading.

### 6.1.2. During Loading Operation

Throughout the entire loading operation, the following shall apply:

- Offtake Tanker shall maintain position inside the operational sector according to "Operational Sectors";

- AHTS shall assist Offtake Tanker keeping position relative to the FPSO within the acceptable operational sectors;
- Mooring hawser shall be maintained tight (as required by Mooring Master);
- During loading, Offtake Tanker's main propulsion shall be stopped, but shall remain at constant readiness;
- Pump must be ready for immediate "pump back" of water received from FPSO BRAVO in case of need (FPSO BRAVO power loss) as requested by FPSO CCR;
- Communication with FPSO CCR and AHTS is continuously maintained;
- Logbooks and journals are kept as required;
- Mooring hawser tension is maintained within the acceptable;
- Area in immediate vicinity of Offtake Tanker and FPSO BRAVO is monitored for any signs of oil spill or leakage;
- Mooring equipment, loading manifold and export hose line shall be continuously monitored. Any irregularity shall be immediately reported to FPSO CCR. Irregularities and actions taken shall be logged on both FPSO BRAVO and the Offtake Tanker. If a leak occurs in the export hose line manifold, the Offtake Tanker must stop loading immediately;
- During topping up of cargo tanks FPSO CCR shall be instructed to reduce offloading rate as required, and such instruction shall be confirmed by FPSO CCR;
- All undesirable events and emergencies arising while the Offtake Tanker is within the Field safety zone shall be reported to the Marine Supervisor, Mooring Master and PETRORIO;
- The Offtake Tanker shall fly the flag of its Flag State and the flag of Brazil during daylight hours whilst moored at FPSO BRAVO;
- Offtake Tanker shall display the international code flag "Bravo" during daylights hours. During darkness, a red light shall be displayed. Such light should be of a character such as to be visible at a distance of at least one mile, and show an unbroken light all around the horizon;
- Offtake Tanker shall hourly report cargo figures and average loading rate to FPSO CCR;
- Request hourly FPSO CCR to inform hawser line tension.

*For operations using the manifold amidships, the connection of the floating line of hoses should be performed by the crew of the OTT, assisted by the MM and his assistant.*

### 6.1.3. After Loading Operation

- Advising the FPSO CCR when Offtake Tanker is ready for flushing and disconnection of the export hose line;
- Pumping back all water that was received from FPSO BRAVO;
- Disconnecting export hose line according to Mooring Master's instructions;
- Disconnecting mooring hawser according to Mooring Master's instructions;

- Informing FPSO CCR when end of messenger rope is in the water;
- Vacate the Berth as soon as loading hoses have been disconnected
- Reporting to FPSO CCR when the Offtake Tanker leaves the 10 NM zone.

## 6.2. MOORING MASTER

- The assistance of Mooring Masters is mandatory for approaching, mooring, unmooring, departure and during all offloading operation of an Offtake Tanker. The Mooring Masters assistance does not exempt the Offtake Tanker Master from his responsibilities;
- The Mooring Master shall be in direct charge of all communications between the Offtake Tanker, AHTS, FPSO and the Line handling vessel;
- The Mooring Master shall commence his mooring duties at approximately 5 miles from the FPSO;
- To inform the Master on board the Offtake Tanker with regards to supply boat movements in the area, MODU and or DSV locations and give the geographical locations of any portable obstructions, such as marker buoys, that may be in the vicinity;
- The Mooring Master shall fill in the necessary reports, sign the NOR, Ullage Report, Time Sheet, Safety Check List, and Offtake Tanker and Letter of Protest;
- The mooring Master shall receive the cargo documents issued by the FPSO BRAVO, review main information prior to deliver master copies as well as obtain his signature and stamp in all required documents that shall be delivered to PetroRio onshore.
- 
    - **Attachment 20 - Statement of Compliance for Operation in Brazilian Waters**

- The Mooring Master shall complete a pre-berthing inspection as soon as practicable on arrival on board the Offtake Tanker and complete the following documents:
    - **Attachment 03 - OTT/FPSO - Safety Check List**
    - **Attachment 04 - Check List #1: Before Operation Commence**
    - **Attachment 05 - Check List #2: Before Run-in and Mooring**
    - **Attachment 06 - Check List #3: Before Loading Operations**
    - **Attachment 07 - Check List #4: Before Unmooring**
    - **Attachment 08 - OTT/TERMINAL Safety Check List**
    - **Attachment 09 – Revalidation (Sign by Mooring Master)**

- The Mooring Master shall complete the appropriate pre-berthing procedure;
- The Mooring Master shall send the required reports to the FPSO and to the attention of the Commercial Operations Focal Point in the PETRORIO Office;
- The Mooring Master shall supervise the Mooring Master Assistant during the hose connection;
- A Mooring Master shall be in direct charge of all activities from the Mooring-maintenance team onboard the AHTS;

- A Mooring Master shall supervise the Mooring-Maintenance team during the pre-inspection-maintenance of hose and hawser before the offload;
- A Mooring Master shall be in direct charge for the hose flushing activities onboard the AHTS after offtake operation.

During the entire offloading operation, the Mooring Master will carry out the duties as PETRORIO Terminal Representative on board the Offtake Tanker. He/she has an Assistant in connection with these duties.

The Mooring Master and the Mooring Assistant will board and disembark the Offtake Tanker at a Brazilian bonded and suitable port, typically Rio de Janeiro, as far as safely practicable, during daylight only and weather permitting. Disembark are only permitted at daylight hours – maximum 17:00. If ETA is later than that, disembark shall be carried out next morning.

The Mooring Master has the responsibility to alert the Offtake Tanker Master during the mooring and loading operations. He/she needs to provide (filled in and signed) the documentation regarding custody transfer in line with operational procedures from FPSO

The Master of the Offtake Tanker, field vessels and FRADE FPSO OIM will exercise exclusive command of their respective vessels and will be the sole parties responsible.

FPSO BRAVO Marine Superintendent and Mooring Master shall observe any deviation of procedures, which he/she must inform immediately to the Master of the Offtake Tanker so the mooring or the offloading operation can be aborted in a safe manner until the problem is solved.

The Mooring Master has the right to refuse, suspend or delay an Offtake Tanker for loading. The Mooring Master shall unmoor an Offtake Tanker if he/she considers the Offtake Tanker's conditions to be unsatisfactory. In the event the Master of the Offtake Tanker and the Mooring Master cannot agree on a procedure by which the Offtake Tanker can meet satisfactory conditions, both the FPSO OIM and the Owner/Charterer of the Offtake Tanker shall be immediately contacted.

In all circumstances the Offtake Tanker Master will remain solely responsible on behalf of the Offtake Tanker Owners, Charterers, Contractors and Personnel (including Master and crew) for the safety and proper navigation of the Offtake Tanker and protection of the environment. The Mooring Master and his/her Mooring Assistant are supplied solely to provide assistance to the Offtake Tanker and in no way are responsible or liable for any action of the Offtake Tanker.

The Mooring Master and/or the Mooring Assistant are responsible for reporting any HSE incidents onboard the Offtake Tanker during offloading operations.

### 6.3. ANCHOR HANDLING TUG SUPPLY VESSEL (AHTS) CAPTAIN

The AHTS Captain is fully responsible for the operation and conduct of his vessel. Additional duties stated in this Tanker Handbook do not relieve the AHTS Captain from conforming to the rules and regulations given by national and/or other legal authorities. These additional duties include, but are not limited to:

- To make certain that the officers and crew who are directly involved with the operation are familiar with all the procedures, include emergency procedure, that are relevant for the approach, wire connection, station keeping and departure operations. Ensure they are appropriately outfitted with PPE;

- To make all the necessary preparations before the Offtake Tanker arrives as instructed by the FPSO;
- Ensure that Mooring-Maintenance team onboard are appropriately with PPE and follow all safety procedures established by PETRORIO and/or AHTS Company;
- Monitor the radio on the agreed working channel for communication between the Offtake Tanker and the FPSO;
- Reporting any faults in the mooring, offloading or tug systems to the FPSO;
- Assisting the Offtake Tanker as instructed by the Mooring Master on board the Offtake Tanker. Assisting the Offtake Tanker with keeping clear of and aligned with the FPSO;
- Maintain the required distance between the Offtake tanker and the FPSO;
- AHTS shall provide assistance in following situations: Power failure on Offtake Tanker during any phase of operation; Collision; Fire or explosion; Oil spill; Man overboard; etc.

### 6.4. LINE HANDLER

Duties of the Line Handler include, but are not limited to:

- Establishing radio contact on VHF channel 16 to agree the communication channel with Mooring Master, Offtake Tanker Master and FPSO BRAVO;
- Handling Mooring Master's toolbox from FPSO BRAVO to the Offtake Tanker and back;
- Handling messenger line/mooring hawser from FPSO BRAVO to the Offtake Tanker and back;
- Handling export hose line from FPSO BRAVO to the Offtake Tanker and back;
- Delivering cargo sample(s) and documents to Offtake Tanker and FPSO;
- Keeping full time contact on VHF channel 16 and watching operation channel chosen during all operations;
- Providing assistance in following situations: Collision, Fire or explosion, Oil spill, Man overboard, etc.

### 6.5. FPSO MARINE SUPERINTENDENT

All the operations and routines in the FPSO are controlled and monitored in the Central Control Room. The OIM, usually represented by Marine Superintendent during the offloading procedures, is responsible for all the operations on board the FPSO and around it. The OIM shall use diligence to:

- To make certain that safety check list has been completed.
- To make certain that the officers and crew who are directly involved with the operation are familiar with all the procedures, include emergency procedure, that

are relevant for the offloading operations in general. Ensure they are appropriately outfitted with PPE.

- To make all the necessary preparations to the FPSO before the Offtake Tanker arrives.
- To inform the Master on board the Offtake Tanker if any problems or irregularities with the mooring and/or offloading system.
- To inform the Master on board the Offtake Tanker with regards to supply boat movements in the area, MODU and or DSV locations and give the geographical locations of any portable obstructions, such as marker buoys, that may be in the vicinity;
- To establish communication with the Offtake Tanker Master before entering 5 NM zone.
- To issue information report to the Offtake Tanker Master and the Mooring Master in case of any changes on the mooring equipment and other information that may be significance for navigation within 5 NM zone.
- Provide the weather forecast from the field to Master of the Offtake Tanker;
- After mooring and ready to load, give the loading information and local weather report to the Offtake Tanker Master.
- To check and receive Offtake Tanker MM and AHTS inspection report about mooring and offloading systems.
- Inform PETRORIO of the condition of such equipment.
- Shut down oil transfer in an emergency situation.

## 6.6. OFFTAKE TANKER OPERATIONAL REQUIREMENTS

The Offtake Tanker must comply with:

- MARPOL 73/78 (International Convention for Prevention of Pollution from Ships);
- SOLAS (International Convention for the Safety of Life at Sea 1974/88);
- International Safety Management (ISM) code;
- International Ship and Port Security Code (ISPS).

Any Offtake Tanker found to be seriously deficient or substandard in any safety requirements would be: (a) refused permission to moor; or (b) removed from berth if such safety deficiency becomes evident to the FPSO during loading.

The operations, including mooring, unmooring, de-ballasting, loading and emergency operations, as well as the equipment employed in these operations, shall be conducted in and to be in accordance with the latest editions of the following:

- FPSO BRAVO Offloading Safety Manual;
- Oil Companies International Marine Forum/International Chamber of Shipping (OCIMF/ICS);
- International Safety Guide for Oil Tankers and Terminals (ISGOTT);
- OCIMF/ICS – Ship to Ship Transfer Guide;

- OCIMF – Recommendations for Equipment Employed in the Bow Mooring of Conventional Tankers at Single Point Mooring;
- OCIMF – Mooring Equipment Guidelines.
- OCIMF - Tandem Mooring and Offloading Guidelines for Conventional Tankers at F(P)SO Facilities

Important Comment:

If the Offtake Tanker will be found deficient during initial inspection performed by the Mooring Masters, FPSO OIM, Marine Superintendent and commercial operations focal point onshore will be promptly informed and necessary steps will be taken to avoid any disruption to FPSO production.

PetroRio shall not be liable for the consequences of rejection or delay (including but not limited to demurrage) of the Offtake tanker or other restriction suffered in respect of the OTT by virtue of the application of any regulations or other requirements of this Section 6.6 and the charterer/owners shall be liable for any costs or damages incurred by Petrorio arising out of any such rejection of, delay to or restriction of the OTT

## 6.7. OTHERS

The responsibility for the safety and security of the facilities is also given to representatives of Asset managers of the PetroRio oil fields. PetroRio assumes no responsibility for collision or damage on any platform or offshore facilities due to:

- Negligence in navigation;
- Problems with equipment of government;
- Problems of propulsion;
- Any other problems that may occur in tankers

# 7. PREVAILING WEATHER CONDITIONS

The Campos Basin area in which the Field is situated is a dynamic region in terms of oceanographic and meteorological conditions. The area is under the effect of the Brazilian current flowing southwards and different water masses are present in subsurface layers.

As part of the initial arrival communications, the FPSO BRAVO TERMINAL shall confirm prevailing / forecast weather conditions and advise the Offtake Tanker of the FPSO BRAVO TERMINAL motions, i.e. pitch, roll, heave and heading.

## 7.1. ENVIRONMENTAL CONDITIONS

The environmental conditions in Campos Basin can be considered fairly good, tending along the year to have the behavior as shown on Table 1 below.

**Table 1 - Environmental Conditions**

| *Period of year* | *Weather Conditions* |
|---|---|
| November to March | Fairly good |
| April to June | Variable |
| July to October | Severe weather conditions |

### 7.1.1. Winds and Waves

Northeast winds prevail in Campos Basin with intensity between 15 to 20 knots, northeast winds may occur with 40 knots of intensity but is not common, even in this condition the waves are not bigger than 2.5 m.

The bad weather conditions usually happen with S or SW wind direction and the wind speed may be between 30 to 40 knots, in this condition the waves are bigger than 2.5 m

Special care must be taken during offloading operations with cold masses coming from SW, which can bring sudden wind changes in direction (from NE to SW in less than one hour) and intensity (gusts up to 40 knots). This phenomenon is more likely to happen in the two periods of the year from March to May and September to November.

**REMARK -** *Special attention shall be given to a critical condition for the FPSO operation: when heavy winds and local waves come from a specific direction, and the swell is deflected 90º, large roll motions shall occur on the FPSO. This situation tends to happen with weather inversions (SW to NE wind directions).*

### 7.1.2. Current

The “Brazil Stream” moves south along the Brazilian coast. It exerts a lot of influence in Campos Basin area especially in water depths of 200 m or less. Campos Basin generally has currents moving south with speed of 1.5 knots. However, current speeds up to 3.0 knots moving south have also been frequently recorded, especially in the northern area.

Mooring Master experience and local knowledge should assist the Offtake Tanker Master during berthing operations.

## 7.2. ADVERSE WEATHER GUIDANCE

### 7.2.1. Mooring Approach

The Offtake Tanker approach to the mooring position is a maneuver that requires skill and seasoned judgment to be completed without incident. The table below gives limiting wave height conditions applicable for commencing the approach by Offtake Tankers of different sizes. The table is useful only as a guide to the professional judgment of the Mooring Master, Offtake Tanker Master and the OIM. Numerous other factors may combine to make otherwise acceptable sea conditions unsafe.

**Table 2 - Mooring Approach**

| DESCRIPTION | WORST ACCEPT. OPERAT. CONDIT. | ACTIVITY | ACTION TO BE TAKEN |
|---|---|---|---|
| Wind | 25 knots | Mooring approach | OIM, MM and OTT Master to review mooring approach. |
| Wind | 35 - 45 knots | Mooring approach | OTT Master to hold at the holding point until favorable wind conditions. |
| Sea state | 2,0 – 3,0 meters | Mooring approach | OIM, MM and OTT Master to review mooring approach, and to agree with LHV Master to operate alongside the Offtake Vessel. |
| Sea state | Above 3,0 meters | Mooring approach | OTT Master to hold at the holding point until favorable sea state conditions. |
| Surface Current | Above 3 knots | Mooring approach | OTT Master to hold at the holding point until favorable current conditions. |
| Visibility | Less than 1,5 miles | Mooring approach | Mooring with caution after agreement between OTT Master, MM and OIM;<br>The radar shall be operating properly;<br>The visibility shall be more than 1000 meters ahead the OTT bow. |
| Visibility | Less than 0,5 mile | Mooring approach | OTT Master to hold at the holding point until visibility conditions are favorable. |

***Important Comment:***

1. Mooring shall only be attempted in daylight hours. FOR THE PURPOSES OF CALCULATING LAYTIME, NOR SHALL BE CONSIDERED RECEIVED BY THE MM AND TERMINAL ONLY BETWEEN 0600 (INCLUDING) AND 15:00 (INCLUDING) LOCAL TIMETIME
2. Unmooring can be attempted at any time, weather permitting.

3. Special attention is necessary when the vector of the combined forces (wind, sea state and current) acting upon the OTT within the final approach, drags the OTT towards the TERMINAL.
4. During reduced visibility situations, the OTT shall make the final approach with extreme caution and the OTT shall be aligned with the resultant of the environmental forces and FPSO BRAVO.

### 7.2.2. Oil Transfer

Pumping cargo oil to the Offtake Tanker (as well as the mooring operation) is weather dependent. Once the mooring is secure and the export hose is connected, the offloading operation can continue in higher sea states if all other factors are acceptable, but it is mandatory to keep the Mooring Master or his assistant on standby on the bridge. The table below gives limiting wave heights, during which pumping could be sustained subject to the other factors. The table is useful only as a guide to the professional judgment of the Mooring Master, Offtake Tanker Master and the OIM. Numerous other factors may combine to make otherwise acceptable sea conditions unsafe.

**Table 3 - Oil Transfer**

| DESCRIPTION | WORST ACCEPT. OPERAT. CONDIT. | ACTIVITY | ACTION TO BE TAKEN |
|---|---|---|---|
| Wind | 40 – 43 knots | Oil Transfer | OIM, MM and OTT Master to review wind conditions and decide to continue or to suspend the oil transfer. |
| Wind | 43 – 48 knots | Oil Transfer | The oil transfer shall be stopped, and the OTT crew should disconnect the hose line, leaving it ready to be abandoned. |
| Wind | Above 48 knots | Oil Transfer | The OTT shall let go of the messenger for the hose line and the mooring system. |
| Sea State | Above 3,0 meters | Oil Transfer | OIM, MM and OTT Master review sea state conditions and ship motions, and decide whether to continue or suspend the offloading operations. |
| Hawser tension | Above 100 tons | Oil Transfer | OIM, MM and OTT Master should review loading operations and shall suspend loading operations and release OTT if Hawser pull tension exceeds 100 tons more than 5 times in one hour or exceeds a maximum pull of 120 tons. |
| Differences between attitude of OTT and FPSO | AHTS use engine power less than 50% | Oil Transfer | Due to the large number of concurrent vectors (wind, wave and current) and the dynamics of displacements of either vessel during the offloading operations, it is anticipated to be differences between the attitudes of the Offtake Tanker and the FPSO. The equilibrium of hawser tension between |

| | | | |
|---|---|---|---|
| | | | the OTT, FPSO and AHTS should be monitored at all times. |
| Differences between attitude of OTT and FPSO | AHTS use engine power less than 50% | Oil Transfer | **Suspend loading operations** when the AHTS cannot maintain station at 50% power or a 40° offset is approached, between hawser and centerline of FPSO. MM onboard off the AHTS shall be responsible for passing this information to MM onboard of the OTT and OIM. |
| Fishtailing | More than 20° | Oil Transfer | OIM, MM and OTT Master to review loading operations if fishtailing **the Offtake Tanker exceeds 20° each direction** |
| Fishtailing | More than 40° and AHTS use engine power more than 50% | Oil Transfer | **Suspend loading operations** if the assistance of the AHTS is not adequate at 50% power to control fishtailing, **or if fishtailing exceeds 40° each direction** and/or a 40° offset is approached, between hawser and centerline of FPSO. MM onboard off the AHTS shall be responsible for passing this information to MM onboard of the OTT and OIM. |

***Complementary Remarks:***

The OTT Master has the authority to halt or abort mooring operation at any time, but he shall inform MM and OIM prior to taking this decision; and also give the MM and OIM an estimate of when the operations shall be restarted. The decision to halt or abort the operation shall be the result of one or more situations below:

1. Weather conditions exceeding the operating limits.
2. Fishtailing that might cause any damage to the OTT, Offloading equipment or FPSO
3. Damage to mooring or oil transfer equipment.
4. Visibility.
5. Or any other hazardous activities nearby

### 7.2.3. Holding Positions

If the Offtake Tanker is unable to immediately moor or if the FPSO is not ready for offloading at time of arrival, the Offtake Tanker, can hold in deep water position away from other installations.

Suggested holding positions in an area South of the FPSO away from any other installations in deep water

Offtake Tankers shall not leave the waiting area proceeding to the FPSO unless instructed so by the Mooring Master.

***Important Comment:***

Minimum 5 miles to south of FPSO, and away from any other installation

# 8. OFFTAKE TANKER OPERATIONAL REQUIREMENTS

Offtake Tanker shall have been surveyed and approved. In this item are the basic requirements for mooring equipment, the offloading hose line handling systems and the working area illumination on board the Offtake Tanker.

## 8.1. WINCHES

### 8.1.1. Bow Winch

The following minimum requirements are required for the traction winch:

- Collection speed: 20 m/min
- Pull capacity: 15 m/min - 20 tf pull SWL

### 8.1.2. Auxiliary Winch

The operation of handling the floating hose line (alternate line) should be done with the aid of a crane or winch with the following characteristics:

- Speed to pick up the hose line: 15 m/min
- Traction capacity 15 m/min - 20 tf pull SWL

## 8.2. CHAIN STOPPER

It is required to use one chain stopper to the chain. This equipment may be hydraulic or mechanical, with appropriate capacity according to the size ship (OCIMF's recommendations).

The chain stopper must be designed to accommodate the passage of a chain stretch made of common stud links, 76 mm in diameter. The OTT must have at least one Panama Lead aligned with the chain stopper, able to receive 76 mm chain stretch and its accessories.

## 8.3. HANDLING SYSTEM TO MIDSHIP HOSE CONNECTION

The OTT shall be equipped with a hose handling system (crane) under minimum capacity of load equal to 15 tf.

The OTT must have leads on the port and starboard side, for the passage of the hose line messenger and a supporting chain of 1.1/16'' with 4 meters of length.

The tools and equipment needed for the line connection hoses are stored on the FPSO.

The FPSO Marine Superintendent under supervision of the Mooring Master must arrange the transfer of the Toolbox from the FPSO to the OTT through the support boat.

At the manifold, the OTT must have manometers in scale from 0 to 40 kg/cm² with core, which may be sealed before the operation beginning.

The other characteristics should follow the recommendations established by OCIMF.

## 8.4. TUG MOORING DEVICE

### 8.4.1. Quick Release Device

As a safety measure in case of bad weather, emergency or urgent need to disconnect the tugboat, the OTT should be provided with quick-release device for AHTS moorings, installed on the centerline at the stern of the OTT and with the following characteristics:

- Load capacity of 100 SWL tf;
- Uncoupling of stressed towline, adopting the amount 200 KN (20 tf) as reference.

The nonexistence of a Quick Release System (Pelican Hook) will not be regarded as an impediment to the operation in the Campos Basin.

### 8.4.2. Winch Aft

The towline handling operation shall be supported by a winch or reel, located in the middle line on the OTT stern and according to the following characteristics:

- Collection speed of the tow line: 15m/min
- Pull capacity: 15 m/min – 20 tf pull SWL

## 8.5. WORKING AREAS ILLUMINATION

Working areas such as the manifold area, the forecastle deck and the area around the chain stopper and the manifold shall be adequately illuminated. The Offtake Tanker shall be fitted with searchlights on the forecastle deck and on the bridge with minimum reach of 250 m. The ship should also have emergency lighting system for the following areas: Deck Aft, Bridge, Bow Deck, Centre for Machine Control and Cargo Control Centre.

## 8.6. MESSENGER LINES

The FPSO shall be fitted with two (02) polypropylene messenger lines of 10 inch circumference, 220 m length and 72 tf MBL; and another two (02) polypropylene messenger lines of 06 inch circumference, 220 m length and 27 tf MBL. These lines are used for both mooring hawser and offloading hose line handling.

## 8.7. ACCOMODATIONS

The OTT shall have sufficient accommodations for the Mooring Master, Mooring Master Assistant, (2) two Independent Inspector and Customs Surveyor for the duration the offloading. In case of partial load operation the vessel shall have another accommodation for an extra Mooring Master team, if required.

Vessel must provide WIFI/Internet connection (such as SAT SIM CARDS with 100 MB or more) for boarding team in order to ensure smooth communication o shore.

### 8.8. SLOP TANKS

THE EXPORT TANKER MUST ARRIVE, AT LEAST, WITH ONE SLOP TANK EMPTY FOR FLUSHING (300 M3 OF WATER), LINE DISPLACEMENT (150 M3 OF OIL) AND BACKFLUSHING OPERATIONS (450 M3 OF OIL AND WATER)

### 8.9. BOARDING AND DISEMBARKATION AT BASIN CAMPOS

No basket transfers or any other type of transfer shall be allowed for boarding or disembarkation of Mooring Team at the Field. Personnel Transfer Operations are only authorized in case of emergency situations.

Exceptional/emergency cases shall be analyzed and agreed, only after Risk Assessment has been completed and Mooring Master, PETRORIO OIM, OTT Master, MRSV Captains are in agreement.

All operations must be conducted safely by following the appropriate procedures and using equipment recommended.

### 8.10. BOARDING AND DISEMBARKATION BY PILOT LADDER IN A SHELTERED WATERS

Pilot ladder or pilot ladder/accommodation ladder combinations shall be used to transfer personnel between the pilot boat and Offtake Tankers. A pilot launch shall be used for personnel transfers.

The pilot ladder shall meet the requirements of the International Maritime Pilots Associations (IMPA) ‘Required Boarding Arrangements for Pilot’.

Accommodation ladders on their own shall never be used for transfers. Boarding and disembarkation shall only be done during daylight.

| |
|---|
| **Boarding by pilot ladder shall not take place in non-sheltered waters** |

# 9. MOORING AND OFFLOADING ARRANGEMENTS

## 9.1. MOORING HAWSER

### 9.1.1. Mooring Hawser

The FPSO is equipped with single mooring hook, chafe chain and messenger line. The Offtake Tanker is moored using a 130 meter x 21 inch Nylon hawser with a breaking load of 630 tones attached to the FPSO's stern mooring hook with a chafe chain. At the Offtake Tanker end a 'chafe' chain is provided for connection to the OCIMF approved chain stopper. The chafing chain consists of 9.5 meters of 76 mm of stud-link chain connected to the hawser followed with a 10.0 meters x 76 mm stud link chain as rated at 470 tones breaking strain. At the Offtake end of the chafe chain a buoy is attached (Attachment 22).

| COMPONENT | DESCRIPTION | SPECIFICATION |
|---|---|---|
| Mooring rope | Length | 130 m |
| | Material | NYLON |
| | Circumference | 21" |
| | Construction Type | DOUBLE BRAIDED |
| | Nominal Breaking Load | 630T |
| Mooring chain | Specification | 16m x 3" and float 5 ton. |

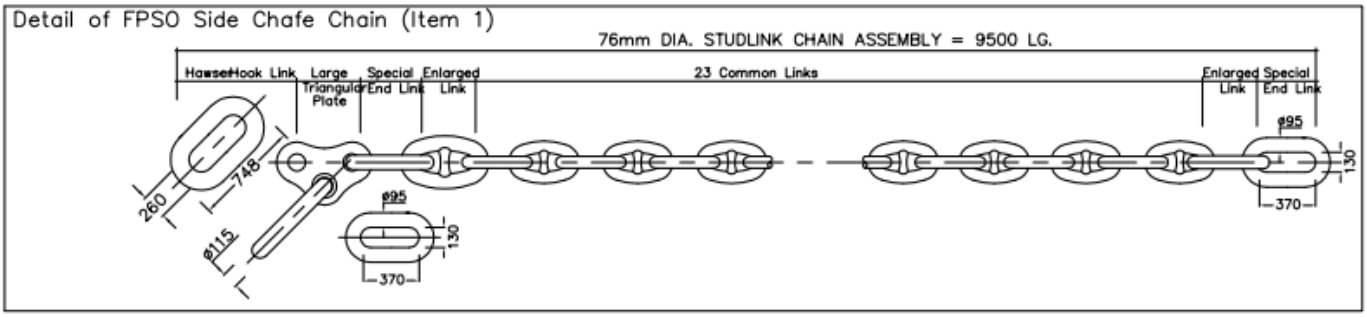



Figure 5 - Detail of FPSO Side Chafe Chain

### 9.1.2. Hawser Floating Messenger

The floating pick-up rope is attached to the outer end of the chafing chain by an endless wire sling. It consists of 110 m x 10 inch polypropylene rope with one steel thimble, known as the main messenger.

Offtake Tankers shall have an empty spooling drum to accommodate the ship's messenger and Terminal's pick-up rope.

The floating messenger shall be passed from the FPSO by means of the Line-handling vessel to the Offtake Tanker in the pick-up point area using a heaving line or similar rope connection.

The pick-up line shall be led through the bow chock fairlead, through the stopper and onto the mooring winch. The winch shall pull the chafe chain of the hawser through the stopper until the stopper pawl can be set and locked. The above operation requires the Offtake Tanker to maintain position until the pawl is set and locked in place.

When the Offtake Tanker is securely moored, the offloading hose shall be transferred from its stowage position off the starboard side of the FPSO to the Offtake Tanker. During the offloading operations, the hose condition, positions of both vessels and the environmental conditions shall be continually monitored. The Central Control Room of the FPSO BRAVO TERMINAL is manned on a 24-hour basis, CCTV and a standby man shall visually monitor the relative positions of the FPSO BRAVO TERMINAL stern and Offtake Tanker bow. The hawser tension is also monitored and alarmed in the FPSO BRAVO TERMINAL Central Control Room. If during the loading the Hawser tension maintain 81 tons continuously the loading operations shall be aborted and commence hose and hawser disconnection, prior to take this decision the PETRORIO shall be informed.

The FPSO BRAVO TERMINAL is fitted with an impressed current cathodes protection system. Both the Offtake Tanker and FPSO BRAVO TERMINAL shall switch off their systems before the mooring operation commences. This shall overcome the danger associated with a difference of potential between the two vessels in the event that an electrical path between the two vessels is established.

### 9.1.3. Offtake Tanker Chain Stopper

All Offtake Tankers shall be provided with two OCIMF approved bow stoppers that should freely pass a standard for 76-mm stud link chain and associated fittings with a minimum Safe Working Load of 350 MT and Nominal Breaking Load 438 tones. All Offtake Tankers shall have at least one panama lead aligned with the bow stopper able to freely pass a chafing chain of 76 mm and its fittings.

### 9.1.4. Emergency Disconnection of Hawser

The emergency disconnection of the hawser can be carried out by a locally positioned hydraulic release or alternatively the Central Control Room on the FPSO. The hydraulic ESD release for the hawser shall take approximately one minute from being initiated from the FPSO.

Cargo pumping can be stopped within 10 seconds by activating the ESD system in the Central Control Room of the FPSO. This shall NOT activate the ESD system release of the hawser as described above.

The hose shall be manually released at the Camlock connector at the Offtake Tanker manifold.

If time does not allow this disconnection, the hose shall part at the dry marine breakaway coupling on the First Off FPSO Hose – known as ERC (Emergency Release Coupling).

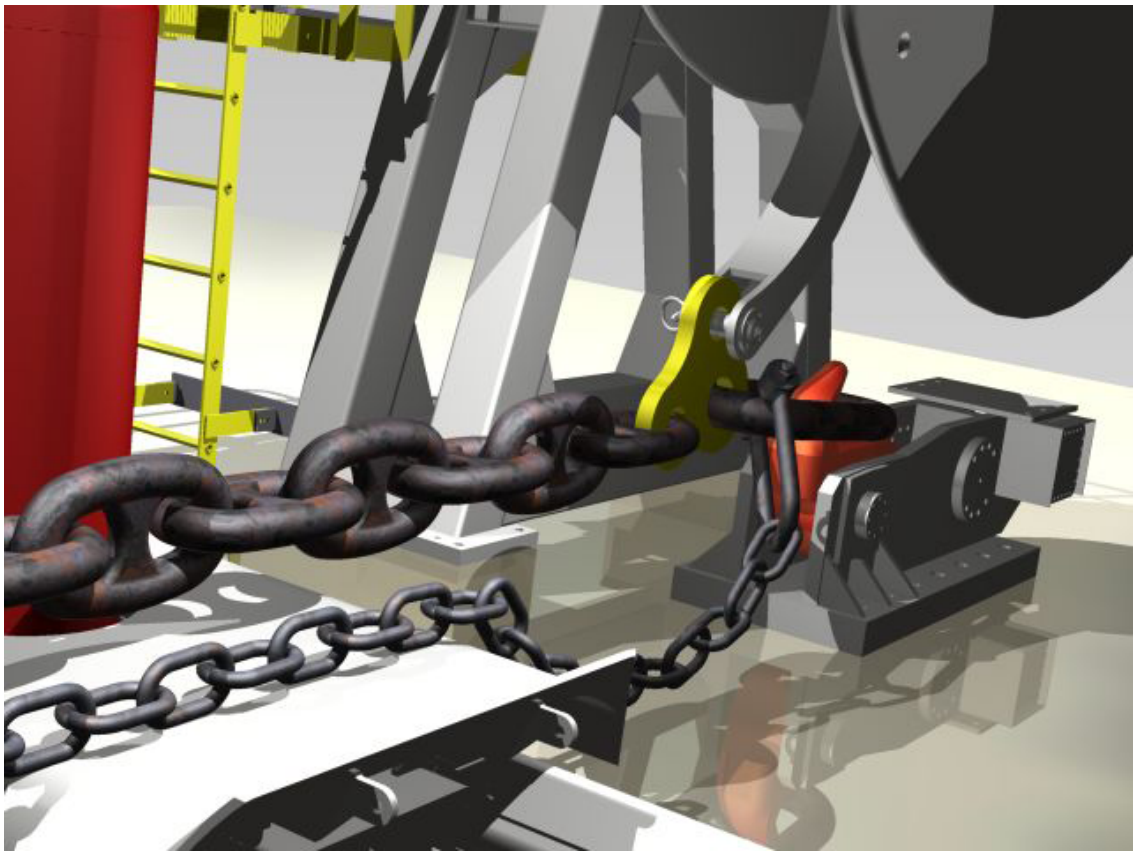


**Figure 6 - Detail of FPSO QRH (Quick Release Hook)**

## 9.2. HOSES

The FPSO offtake system consists of a pneumatically operated shut off valve and a bolted line connection at the loading hose manifold. A double carcass 20" loading hose string approximately 340 m in length is secured to the offloading manifold starboard side aft. The hose-string is fitted with a 20" x 16" reducing hose followed by 5 sections of 16" in diameter. The hose is of black color, but no illumination shall be provided by navigation lights. A searchlight is deployed at night to observe the hose from the FPSO.

The Offtake Tanker shall be fitted with one starboard chock as close as possible to the manifold and able to freely pass the hose line messenger and its fittings.

The Offtake Tanker shall be fitted with at least two cruciform bollards, one forward and one aft of the manifold area.

The hose terminates in a 1 x 30 ft 16" tail with Offtake Tanker rail hose for connection to the Offtake Tanker starboard amidships manifold. A 16-inch Camlock coupler is provided for the Offtake Tanker manifold connection. A lifting chain, lifting shackle and pick-up line are provided at the end of the hose for handling from the Line Handling Vessel to the Offtake Tanker (Appendix 19).

The hose shall be positioned adjacent to the starboard amidships manifold using the Line Handling Vessel. A suitable lifting equipment with 15t SWL shall be provided to lift the hose and Camlock spool piece fitting. A lifting shackle is provided at the end of the hose.

The manifolds shall be fitted with pressure gauges (readings between 0 and 30 kg/cm²) that can be sealed before commencing operation.

The offloading hose has a capacity of about 70 m3 and at the time of connection shall be full of sea water. The FPSO export header and hose has a capacity of about 90 m3 and remains full (to be flushed with water on completion of a discharge).

The offloading hose shall be flushed to OTT on completion of each discharge. In normal circumstances the total volume to flushing the hose shall be 450 m³, this include the initial line displacement. After flushing of hose with water the OTT shall close hose butterfly valve. Once confirmed close the FPSO shall pressure manifold to 2 Bar of $N_2$. FPSO shall inform OTT to open Butterfly valve. This shall allow some buoyancy before OTT drops the Hose into the Sea as water is displaced in the hose.

### 9.3. Pressure Test

The pressure test is performed immediately after the connection of the offloading hose to the OTT Cargo Manifold:

Pressure Test:

1. Start one cargo pump PBB-7005-01/02/03;
2. Pressurize the offloading hose line at 7 kgf/cm²;
3. Open SDV from offloading hose line;
4. Stop cargo pump PBB-7005-01/02/03
5. Monitor offloading hose line pressure;
    a. Pressure sustained at 7 kgf/cm² for 30 minutes:
        i. Request opening of valves PL-V100CC and PL-V100CD to Operator E2 in order to depressurize offloading hose line;
        ii. Open valves PL-V100CC AND PL-V100CD to depressurize offloading hose line aligned to dirty slop and inform Operator E1;
        iii. Inform depressurization of offloading hose line to OTT;
    b. Loss of pressure:
        i. Inform issue to FPSO Ballast and Cargo Supervisor and Marine Superintendent;
        ii. Investigate loss of pressure and interrupt any cargo transfer operation until origin of problem is identified and properly solved;

# 10. CARGO HANDLING

Crude oil can be discharged from the FPSO through a fiscal metering skid on the main deck aft to the discharge manifold located on the stern of the FPSO and to the Offtake Tanker via the floating offloading hose. Offloading operations shall be restricted to maximum of 8 bars FPSO manifold pressure at an average flow rate of 5000 m3/hr.

The FPSO is fitted with 3 x 5500m³/hr vertical, induced barrel, single suction, double volute pumps.

The maximum allowable laytime for discharge parcels in the order of 500,000 barrels before demurrage is charged shall be 36 hours. Such maximum allowable laytime shall be increased by 1 hour per each 25,000 barrels in excess of 500,000 barrels up to a limit of extra 12 hours even if the discharge parcel is in the order of 1,000,000 barrels.

Due to the nature of the FPSO, as a production and storage facility, crude oil is being pumped from FPSO cargo tanks as oil production continues to other available tanks.

Due to the high rates of discharge, specific controls are required to mitigate surge in the hose. The Offtake Tanker shall ensure that:

Three tanks are available at all times during offloading;

No valve operation to shut off flow in less than 30 seconds is initiated;

No throttling of flow during loading operations.

The loading plan shall indicate the requirement for lower loading rates, i.e., when changing tanks. If changes of loading rates are required contact should be made immediately to the FPSO Central Control Room.

## 10.1. OFFLOADING PROCEDURE

The transfer line must be pressurized before the transfer operation. The transfer valve must remain open and TANKEREND valve closed, so that pressure is maintained on the transfer line. The test is performed by the FPSO to a pressure of 7 (seven) bar for 30 minutes. The FPSO will monitor the pressure test. The test results are recorded in appropriate books. Observing the FPSO any loss of pressure, the transfer will not be initiated until maintenance staff gives the solution of the problem. The problem being solved, it will retest.

The Mooring Master or OTT CPT during all loading operation must keep constant vigil on the distance between the operational units and position inside operational sector.

The Mooring Master and OTT CPT should not allow the OTT approaches less than 60 meters during the mooring in the FPSO, oil transfer operation or unmooring.

The Mooring Master will remain aboard the ST throughout the loading operation likely observing anomalies in the systems and with special attention to possible causes of oil spills.

The Mooring Master and / or OTT CPT shall observe the angle of the mooring with the center line of the FPSO, noting the operational limits, not allowing the Hawser is immersed.

Observing systems anomalies likely or possible causes of oil spills, the ST CPT should request that the transfer is stopped.

The FPSO will be informed about the sequence of loading, exchange tanks, ullages, flow, pressure, and quantity due to end.

The OTT CPT and Mooring Master shall maintain a constant ship position control and tension force used by the AHTS.

The tug will keep the OTT aligned to the FPSO, and in case of any difficulties, it should be immediately notified to the Mooring Master and OTT CPT.

## 10.2. BALLAST, SLOP HANDLING BILGE, AND DRAINS HANDLING AND SCUPPERS

Owners and the Master of the OTT are responsible for complying with all International Conventions as well as the laws of Brazil concerning pollution of the sea, having particular regard for the offshore environment. Pollution of the sea by dirty ballast water, bilge discharge or any other means may result in heavy fines being imposed, and in severe cases may result in imprisonment of the Master or the arrest of the OTT. A discharge of oil, oily slops or bilge water into the sea is strictly prohibited. All overboard discharge valves not meeting MARPOL 73/78 shall be isolated, closed and sealed.

The OTT shall arrive with clean ballast only. The FPSO BRAVO TERMINAL has no facilities for the disposal of dirty ballast. It is the Master's responsibility to see that no oil of any kind is pumped, spilled or leaked overboard from the OTT. This includes oily water from bilges, decks, crude residues from previous voyages or any other matter that may result in pollution of the sea. Any fines imposed on or by third party claims against the Indemnified Parties arising from these matters shall be for the OTT's account.

If evidence of oil appears during deballasting, the OTT shall be rejected forthwith and shall not be accepted until satisfactory evidence is produced that such ballast was disposed of in a proper manner. Any OTT rejected because of dirty ballast or pollution of the sea shall automatically nullify accepted "Notice of Readiness".

# 11. APPROACH / DEPARTURE

## 11.1. APPROACHING AND MOORING PROCEDURES

It is a requirement that all Offtake Tankers entering the Field are in standby condition, i.e., auxiliary propulsion and steering machinery are online for immediate availability, and there is sufficient manning available on the bridge, in the engine room and on deck, as appropriate. Verbal contact between the bridge and the engine room should also have been established.

Masters of Offtake Tankers shall plan their courses in conjunction with the Mooring Master and the OIM to and from the FPSO BRAVO TERMINAL such that the Offtake Tanker remains clear of other installations in the area.

The following infield information is available, from the Central Control Room, to assist Offtake Tanker Master and the Mooring Master in their navigation within the FPSO BRAVO TERMINAL location.

- FPSO BRAVO TERMINAL heading.
- FPSO BRAVO TERMINAL motions - pitch, roll and heave.
- Prevailing weather conditions.
- Any temporary obstruction within the 5 NM zone of the FPSO.

For safety reasons, the approaching and mooring in the field area that depends on the Support Boat and the Mooring Master Assistance must be started not less than 03 hours before the sunset. The Mooring Master, OTT CPT and OIM must analyze special situations.

NOR may be tendered to the terminal at any time for purposes of establishing the OTT's arrival within the agreed commercial laycan. However, for purposes of calculating Laytime, NOR shall be considered received by the mooring master on be behalf of the terminal only between 0600 (including) and 1500 (including) local time.

The Laytime shall include Sundays, or local equivalent, holidays, unless loading during holidays is prohibited by the FPSO Terminal Regulations, or by applicable laws and/or regulations.

When the OTT arrives prior to the commercial laycan, the Terminal at its sole discretion and after having received formal agreement from the PetroRio Commercial Operations focal point may allow the OTT to begin loading early, provided the Agreed Lifting Quantity is available in inventory in the Crude Oil storage facilities. In such case, Laytime shall commence pursuant to (2) below:

(1) NOR tendered within COMMERCIAL LAYCAN

(A) If the NOR is tendered between 0001 (including) on the 1st day of COMMERCIAL LAYCAN and 1500 (including) on the 2nd Day of COMMERCIAL LAYCAN, Laytime shall commence six (6) hours after the NOR is received or all fast, whichever is earlier.

(B) If the NOR is tendered after 1501 (including) on the 2nd day of COMMERCIAL LAYCAN, the Terminal shall allow the OTT to become

all fast at the FPSO when convenient to the Terminal, and Laytime shall begin when the OTT is all fast.

(2) NOR tendered before COMMERCIAL LAYCAN

If NOR is tendered any day before COMMERCIAL LAYCAN, then NOR is considered received at 0600 on the 1st day of COMMERCIAL LAYCAN and Laytime shall commence at 1200 on the 1st day of COMMERCIAL LAYCAN or all fast, whichever is earlier.

(3) NOR tendered after COMMERCIAL LAYCAN

If NOR is tendered after COMMERCIAL LAYCAN, then Laytime shall begin on the commencement of loading.

Laytime shall run continuously from commencement until cessation, unless prohibited by FPSO Terminal Regulations and/or applicable law and regulations, and shall cease on the disconnection of the cargo loading hose(s) after completion of loading.

**Offtake Tanker Arrival Condition**

The Offtake Tanker should be ballasted with the Bulbous Bow and propeller submerged. The anchors shall be secured in her stowed position.

**Maneuvering restrictions**

No approach shall be made by the Offtake Tanker to the FPSO unless the berthing operation can be completed in daylight.

- When navigating and maneuvering in the Field, the following shall be taken into account: the presence of underwater oil and gas pipelines in the vicinity, and the dangers of indiscriminate anchoring (water depth - 105m);
- Drilling and other marine and subsea activities that may impact on the Offtake Tanker approach.

The FPSO BRAVO TERMINAL is free to weathervane around the external turret. Marked changes of wind, waves and/or current shall, therefore, affect the heading of the FPSO BRAVO TERMINAL and the approach course of the Offtake Tanker.

The offloading hose shall be stored from the hose reel on the starboard side of the FPSO. The Line Handling Vessel or the AHTS shall tow the hose to a clear position until hose handling is safe to commence.

## 11.2. CONTINGENCY PLAN DURING OPERATION

### 11.2.1. Contingency On Board

The OTT must have contingency plans prepared to emergency situations that may occur when operating with an OI. These procedures must be available in the Operation Manual of OTT and in the Shipbuilder Rules and Regulations.

### 11.2.2. Stand by Conditions

It is mandatory to all OTTs entering the Campos Basin have their propulsion system, boilers, steering gear and auxiliary systems ready and working in a satisfactory manner to the maneuver, operating by bridge and CCM as applicable.

Communication means between bridge and CCM must be guaranteed.

Bridge and CCM must be prepared to operate while works are being carried out in the unit.

### 11.2.3. Approaching and Departure Plans

The OTT CPT must be careful, plan the tracks in advance and keep away from the units in safe operation conditions, during lay time in the FPSO area.

### 11.2.4. Approaching Direction and Speed

When the OTT is at 650 meters away from the FPSO, its heading must be different in 10 degrees from the FPSO's in order to guarantee a safe emergency escape route.

When the approaching maneuver has started, the OTT approaches the FPSO in the assigned sector, observing the maximum speed according to the table below:

| Position | Maximum speed permitted |
|---|---|
| Within the limits of 10 NM from FPSO | Maximum speed permitted by COLREG |
| Within the limits of 3 NM from FPSO | 5 knots |
| Within the limits of 3000 meters from FPSO | 3 knots |
| Within the limits of 1500 meters from FPSO | 2 knots |
| Within the limits of 500 meters from FPSO | 0.6 knots |
| Within the limits of 300 meters from FPSO | 0.4 knots |
| Within the limits of 200 meters from FPSO | 0.2 knots |

### 11.2.5. Low Visibility

In visibility conditions less than 1000 meters in the FPSO approaching area, the Mooring Master, OTT CPT, AHTS CPT, OIM and SUPEM must jointly assess the situation and decide the safe conditions in order to perform the operation.

### 11.2.6. Emergency Procedures

In case of engine or steering system failure, running into a total or partial loss of maneuvering, the OTT CPT must start ship's emergency procedures, requesting the AHTS submission in order to control the vessel drift. The Mooring Master, Marine Superintendent and OIM must be immediately informed.

### 11.2.7. Pre-Operational Stage

In the arrival of the OTT, the Mooring Master, Marine Superintendent and OIM are responsible for ensuring that the CPT of OTT has the all required and relevant information in relation to the environmental conditions and the operational installation situation, as follows:

- Load quantity, temperature and specific density or API.
- Maximum flow rate and the duration estimated.
- Information about the approaching sector including the obstructions and restrictions.
- Handling range of FPSO such as pitch, roll and heave.
- FPSO Heading.
- AHTS Operational Situation.
- Method to be used for mooring and offloading handling system.
- Activities of other vessels in the vicinity of FPSO.

The OTT CPT and the Mooring Master shall assess the conditions above and shall decide about the approaching direction and mooring starting.

The OTT CPT may delay or interrupt the operation when any anomaly in the systems is identified, informing all people involved and estimating the restarting time. Other factors that may interrupt the offloading operation are:

- Environmental conditions exceeding the operating limit;
- Large handling in the ST that may cause damages to the equipment;
- Low visibility;
- Other possible risk activities in the surroundings;
- Electromagnetic Storm.

## 11.3. NORMAL DISCONNECTING & DEPARTURE PROCEDURE

Upon completion of the cargo loading, the Offtake Tanker Master and the Mooring Master together shall estimate the time needed to prepare the Offtake Tanker for departure and report this to the FPSO by radio.

When the Offtake Tanker is ready to unmoor with offloading hose disconnected, lowered and towed away, the deck officer and ship´s crew shall clear forward, following unmooring orders under Mooring Master´s advice. Once the mooring hawser is lowered in the water, messenger all clear from bow fitting and OTT in a safe distance from Terminal, the Mooring Master shall advise the Offtake Tanker Master to release the aft AHTS. Cargo documents, once ready, shall be dispatched by means of AHTS or Line Handling Vessel.

After the Offtake Tanker is unmoored, she maneuvers to go clear of the FPSO and to take a safe course down wind and down current from the FPSO.

## 11.4. SUMMARY DESCRIPTION OF OPERATING PROCEDURES

**Table 4- Arrival – Approach - Mooring**

| ARRIVAL – APPROACH - MOORING | | | |
|---|---|---|---|
| **DISTANCE TO FPSO** | **STAGE** | **RESPONSIBLE** | **ACTIONS** |
| **30 NM** | 1 | OTT CPT | Test propulsion, steering, communication, mooring and cargo systems |
| | | AHTS CPT | Test propulsion, steering, communication, mooring and towing systems |
| **20 NM** | 2 | OTT CPT | Contact FPSO and inform:<br>• ETA in the FPSO vicinity.<br>• Last Port of Call and ship's position;<br>• Space available for cargo, water and waste tank cleaning;<br>• Operational restrictions, if any.<br>• Check if propeller is submerged and Bulb (when applicable) is submerged to its centerline. |
| | | MARINE SUPT | Contact OTT in VHF CH16 or CH09 and establish a working channel.<br>Inform OTT CPT:<br>• Ship's routing to approach;<br>• Weather conditions;<br>• Estimated time for maneuver;<br>• Any obstacles that may be dangerous to Navigation;<br>• Name of the AHTS and SB;<br>• Other relevant information identified;<br>• Check the operational status of the AHTS and SB.<br>Report to OTT CPT:<br>• The hose line that will be used (length, gauge...)<br>• Quantity, temperature and API or density (20°C) of the oil to be transferred.<br>• Flow scheduled for transfer (in $m^3/h$);<br>• Operational restrictions, if any.<br>• Begin preparations for the operation |
| **10 NM** | 3 | OTT CPT | Contact FPSO to inform the NOR.<br>• Send NOR.<br>• Check if the crew, systems and other facilities necessary to perform a secure operation are ready. |
| **3 NM** | 4 | OTT CPT | Keep maximum approaching speed of 5 Knots. |
| **1.5 NM** | 5 | OTT CPT | Keep maximum approaching speed of 2 Knots.<br>• Embark the Mooring Master in the designated area (if applicable), in a good position to the SB.<br>• Inform Ship's Particulars to the Mooring Master |
| | | MOORING MASTER | Embark in the OTT<br>Request the FPSO the following information:<br>• FPSO Heading; |

| | | | |
|---|---|---|---|
| | | | • Total cargo on board;<br>• Wind (direction and intensity);<br>• Current (direction and intensity)<br>• Confronting the data (direction and wind speed) reported by FPSO and OTT |
| | | MOORING MASTER / CPT | In this stage the ship should be stopped.<br>• Observe OTT's drift for 10 minutes to determine if the conditions are normal for continue operation.<br>• If, in ten (10) minutes of waiting is not observed a great drift, continue the operation usually;<br>• If you get a special situation characterized, inform all involved (Marine SUPT / AHTS CPT / SB CPT) |
| | | AHTS CPT | Prepare for connecting towing wire. |
| | | OTT CPT | Prepare to receive and connect the AHTS towing wire. |
| | | AHTS CPT | Approach his vessel to the OTT stern to connect towing wire. |
| **1 NM** | 6 | FPSO | Release the mooring system with the help of SB and make visual inspection.<br>Inform the Mooring Master or OTT that the mooring system is released and secured.<br>Ready for operation. |
| **0.5 NM** | 7 | OTT CPT | Keep maximum speed of 1.5 Knots.<br>Must have a 10" x 220m polypropylene messenger line and keep ready to pass to the SB |
| **350 m** | 8 | SB CPT | Get in position to receive the Messenger line from the OTT |
| | | OTT CPT | Lower the Messenger line to the SB. The mooring maneuvering must comply<br>the PetroRio procedures. |
| | | SB CPT | Connect FPSO pick-up rope to OTT Messenger line and release the system to the water;<br>Keep clear of the maneuvering area in a safe place waiting for instructions. |
| | | OTT CPT | Start heaving the mooring system while moving to the mooring position. |
| **90 m** | 9 | OTT CPT | Stop in the mooring position;<br>Put the chain stretch of the system in the chain stopper and secure |
| | | MOORING MASTER / CPT | Inform all persons involved that ship is securely moored. |

**Table 5- Hose Connection Procedures**

| HOSE CONNECTION PROCEDURES | | |
|---|---|---|
| **STAGE** | **RESPONSIBLE** | **ACTIONS** |
| 1 | MARINE SUPT | Pay out hose string from the hose reel with assistance of the LHB. |
| 2 | MARINE SUPT | Guides the LHB, such as the speed, towing and best position to keep the hose string safe. |
| 3 | SB CPT | Tows the line hose until the OTT STBD manifold and passes the messenger line |
| 4 | OTT CPT | Lowers a messenger line one meter from the water through the lead aligned to the cargo line to be used. |
| | SB CPT | Connects the ship´s messenger to the line hose pick-up rope and throw all in the water. |
| 5 | OTT CPT | Starts heaving up messenger line; |
| | MOORING MASTER / CPT | Monitor operational areas within the permitted limits |
| | MARINE SUPT | Guides OTT regarding to heaving up messenger line safely. |
| 6 | MOORING MASTER / OTT | Be responsible for the correct connection of the hose |
| 7 | OTT CPT | Connects the hose line with his crew.<br>Follows Mooring Master and assistant instructions for the correct procedure to connect the Tanker end |
| | MOORING MASTER / OTT | Inform the FPSO, AHTS and SB that the hose line is connected, Butterfly valve closed and the ship is ready for pressure test. |

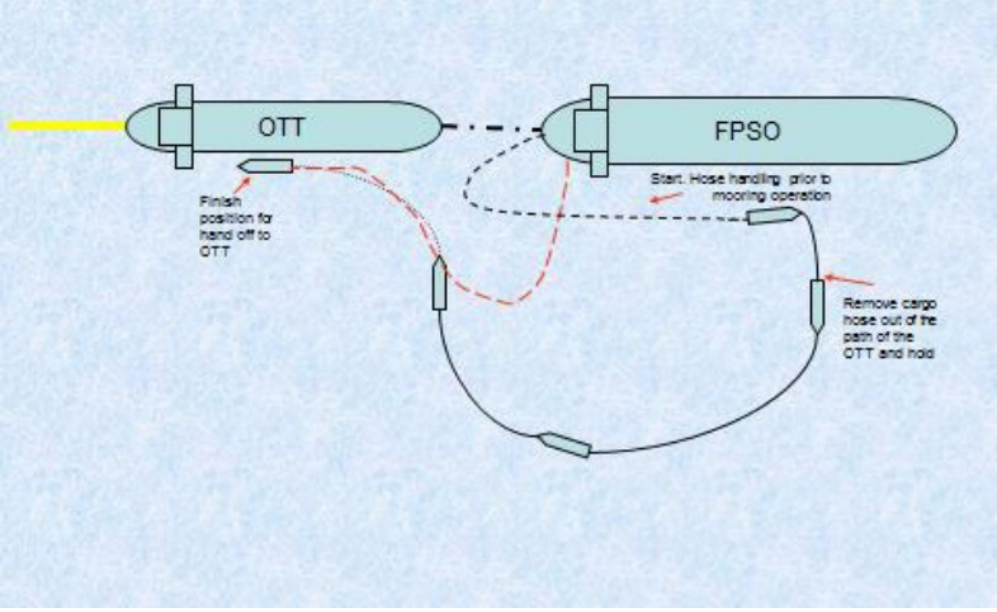



**Figure 6 - Hose Handling Tug Approach Route with Hose Attached**

**Table 6- Hose Line Disconnection Amidshps**

| HOSE LINE DISCONNECTION AMIDSHPS | | | |
|---|---|---|---|
| **STAGE** | | **RESPONSIBLE** | **ACTIONS** |
| 1 | **2 hours before maneuvering** | OTT CPT | Performs tests on equipment and propulsion systems, communications, government, mooring, cargo and safety systems due to disconnection and unmooring. |
| 2 | **Maneuvering** | MARINE SUPT | Authorizes OTT disconnection. |
| | | OTT CPT | Disconnects the hose line in accordance with PetroRio procedures or approved by it, which should be described in all phases of this operation. |
| | | MOORING MASTER | Instructs the OTT, how to lower down and release hose by crane and right way to handle pick-up rope.<br>The operational areas should be permanently monitored within the permitted limits.<br>Tells the FPSO, AHTS and SB, the hose line is disconnected. |
| 3 | | OTT CPT | Delivers the hose messenger line to the SB. |
| 4 | | SB CPT | Tow the hose string clear of the vessel and hold it until vessel casted off from the Terminal. |
| 5 | | SUPEM | Recovers the hose string on hose reel with assistance of the LHB. |

**Table 7- Offtake Tanker Unmooring Procedure**

| OFFTAKE TANKER UNMOORING PROCEDURE | | | |
|---|---|---|---|
| **STAGE** | | **RESPONSIBLE** | **ACTIONS** |
| 1 | **2 hours before the maneuver** | OTT CPT | Performs tests on equipment and propulsion systems, communications, government, mooring, cargo and safety systems to be used in the hose disconnection and unmooring from the FPSO. |
| 2 | **1 hour before the maneuver** | MOORING MASTER / OTT CPT | Inform FPSO, AHTS and SB the estimated time of maneuvering, directing them to prepare themselves to OTT unmooring.<br>Request the AHTS to reduce power to minimum.<br>Observe ship's movement, and its tendency to drift, setting the condition for unmooring: normal or special |
| 3 | **1 hour before the maneuver** | MOORING MASTER / OTT CPT | Should observe the relative position of the OTT and tension in mooring line, in order to determine whether it's necessary the approaching to the FPSO for the unmooring.<br>The unmooring may only be commenced with no tension in the hawser. (For safety). |
| 4 | **1 hour before the maneuver** | OTT CPT | Reconnects the messenger line of the mooring system.<br>Starts the process of unmooring, opening the chain stopper and releasing the mooring system to the water. |
| | | MOORING MASTER / CPT | Start coming aft carefully, with no tension in the messenger line.<br>Informs the FPSO, AHTS and SB commenced unmooring. |
| 5 | **1 hour before the maneuver** | OTT CPT | Throws the end of the messenger line in the water. |
| | | MOORING MASTER / CPT | Inform the FPSO, AHTS and SB the end of unmooring |
| 6 | **-** | SB CPT | Picks up the messenger line and delivers it to FPSO. |
| | | SUPEM | In systems that are not fitted with the support buoy, the FPSO will gather all messenger line by own ways. |
| 7 | **-** | MOORING MASTER / CPT | Get the OTT away in a minimum distance of 1,000 meters from FPSO, placing it in a safe position in relation to FPSO. |
| 8 | **1000 m** | OTT CPT | Releases the towing line from the Stern of the OTT. |
| | | MOORING MASTER | Keep the OTT away from the FPSO.<br>Evaluates the meteorological conditions, examining the possibility of disembark to the SB (if applicable) |
| 9 | **1 NM** | OTT CPT | Position the OTT safely, stopping the ship and making a lee to the Mooring Master, his assistant and the toolbox disembark. |
| | | SB CPT | Comes alongside the OTT for disembarking the Mooring Master, positioning in line with ship's crane and hold position. |
| 10 | **10 nm** | OTT CPT | Informs FPSO /Mooring Master the Official Time of Departure |

# 12. FOG SIGNALS

## 12.1. ON THE FPSO CHARACTERISTICS AND POSITION

A white flashing light with a range of 10 miles is exhibited at each end of the FPSO. The white flashing lights are located in forward end of turret at turret head level and on port and starboard side at Navigation Deck level. Subsidiary 5-mile red lights or obstruction lights for aircraft warning are mounted at top forward end of turret, top of radar mast and top of funnel. All lights operate simultaneously giving a flashing Morse "U" signal (..-) once every 10 seconds.

The flare tower is floodlight illuminated.

On the FPSO, a fog signal, with a range of five miles, is sounded from one omni-directional foghorn. The signal has been coded to sound "U" (..-) every 30 seconds. This foghorn has been positioned to obtain an audible coverage of 360°.

## 12.2. ON THE OFFTAKE TANKER

When the Offtake Tanker is connected to the FPSO, navigation lights are not required, but the appropriate lights and shapes as per the International Regulations for Prevention of Collision at Sea shall be shown.

# 13. AHTS

An Anchor Handling Tug Supply Vessel (AHTS) shall be made available for the offloading operations. Berthing operations cannot proceed if the AHTS is unavailable. The towline shall be secured to the Offtake Tanker at approximately 1.5 miles from the FPSO.

The AHTS should be capable of producing minimum static traction (bollard pull) of up to 120 tones and minimum lateral force of up 10 tones, and shall be on station in the BM-C-39 Field in the vicinity of the FPSO. The AHTS maintains a watch on Marine VHF channel 16, channel 09 and UFH where provided.

The AHTS shall offer a 76-mm work wire with a pee wee socket for connection to a suitable pennant wire (minimum SWL 110 tones) on the stern of the Offtake Tanker utilizing a suitable enclosed fairlead. Offtake Tanker crew shall be provided for the securing of the AHTS. During the time that the AHTS is secured regular inspections and reports on the fairlead and towing line condition shall be carried out and reported to the Mooring Master.

The master of the AHTS shall be advised of the SWL of the tow connection point on the Offtake Tanker.

The AHTS has onboard 3 different pendant lines for OTT types SUEZMAX, AFRAMAX and PANAMAX, respectively. MM onboard the OTT shall inform the AHTS master which shall be connected to the towing hope.

The Offtake Tanker is to confirm the SWL of the bollards utilized for the tow connection point. The AHTS shall monitor the load and advise the Mooring Master when load excursions

reach pre agreed levels. The Mooring Master shall coordinate the AHTS and shall communicate by VHF radio.

## 14. INERT GAS SYSTEM

Occasionally, there may be conditions of little or no wind at the FPSO. In such cases, cargo operations may be stopped to prevent a build up of hydrocarbon gases in the area. FPSO gas detectors shall shut down the installation automatically if gas is detected.

Offloading operations shall be suspended when electrical storms are in the immediate vicinity of the FPSO. Offtake Tankers should ensure that all cargo tank vents are closed at this time.

If, for any reason, the FPSO inert gas plant fails to deliver the required quality (not to exceed 5% O2) and quantity (to maintain positive pressure >100mm WG) of inert gas, cargo discharge shall be stopped and the inert gas deck-isolating valve closed.

The Offtake Tanker is required to have an inert gas system operational and capable of maintaining an inert atmosphere in the cargo tanks at a positive gas pressure >100mm WG with oxygen percentage less than 8%. A lower pressure and / or higher oxygen percentage shall suspend operations.

## 15. COMMUNICATION

During all steps of operation, it is essential to ensure a perfect communication between the FPSO and the OTT, using at least two media, which shall be tested before each transfer operation to ensure the ongoing maintenance and effective communication between these units.

Table 8- Communication FPSO BRAVO

| | | | |
|---|---|---|---|
| **Call Sign FPSO BRAVO:** | C6EW2 | **Direct Dial Facilities:** | +55(22)2106-1756 |
| **MMSI Number:** | 311 001 017 | **FBB** | 00870773236131 |
| **Phone – Radio Room:** | +55(21)3721-2545 | **E-mail – OIM:** | tbmtoim@petroriosa.com.br |
| **Phone – CCR:** | +55(21)3721-2543 | **E-mail – SUPEM:** | tbmtcargosupt@petroriosa.com.br |
| **Phone – Ballast Control Room:** | +55(21)3721-2507 | **E-mail – Radio Room:** | tbmtradio@petroriosa.com.br |
| **VHF channel:** | 16 / 09 (SSB 4125 MHz) | - | - |

Table 9- Contacts in Rio de Janeiro

| **Contacts in Rio de Janeiro** | | |
|---|---|---|
| **RIO Office PETRORIO** | **FPSO BRAVO Asset Manager** | + 55 21 3721-3866<br>gabriel.romeiro@petroriosa.com.br |

| | | |
|---|---|---|
| **RIO Office PETRORIO** | **Engineering Manager** | + 55 21 3721-3820<br>lfurtado@petroriosa.com.br |
| **RIO Office PETRORIO** | **Trading Crude Operations** | + 55 21 3721-3800<br>crudeops@petroriosa.com.br |

## 15.1. COMMUNICATION EQUIPMENT

The FPSO and OTT must be fitted with GMDSS equipment.

The OTT must be fitted with VHF equipment in CCR and Bridge, and portable devices for the crew involved in the operation. Two portable VHF radios must be provided, one to the Mooring Master and one to his assistant.

## 15.2. COMMUNICATION PROTOCOL

At least two communication methods shall be established and fully tested prior to every offloading operation, to ensure that continuous and effective communications can be maintained between the Offtake Tanker and the FPSO BRAVO TERMINAL in the event of any equipment failure.

The primary means of communication between the Offtake Tanker and FPSO CCR shall be marine VHF on Channel 09, which is composed of a fixed and portable equipment.

Other communication means are:

- Satellite voice and data telecommunications MF SSB voice transceivers (4125 MHz)
- E-mail (listed above)
- Marine VHF (Channel 16 156.8 MHz, Channel 10 156.95 MHz)

On arrival of the Offtake Tanker, the Mooring Master shall test the communication networks. During all offloading operations, a strict communications procedure shall be followed. This requires that the FPSO BRAVO TERMINAL repeats verbally all requests from the Offtake Tanker immediately on receipt, and follows up by advising the Offtake Tanker immediately the requested action has been carried out. The same procedure shall apply to the officer of the watch on the Offtake Tanker when information or action is requested by the FPSO BRAVO TERMINAL.

## 15.3. VHF WORKING CHANNELS

VHF Marine Offloading Control Channel 16 shall be the primary means of communication throughout the loading operations. Channel 09 is secondary.

| | |
|---|---|
| 10 – Marine Control | 12 - Supply/Standby Vessel operations |
| 16 - Listening | 09 - Offtake Tanker/ FPSO BRAVO TERMINAL communications as required. |

To ensure standardization of radio call signs, the following names are in use for the relevant positions on the FPSO BRAVO TERMINAL. The main contact for the Offtake Tanker crew shall be the 'FPSO BRAVO Control'

| | |
|---|---|
| FPSO BRAVO Control | = FPSO BRAVO Central Control Room |
| FPSO BRAVO OIM | = FPSO BRAVO OIM |
| FPSO BRAVO MARINE | = FPSO BRAVO Marine Superintendent |
| FPSO BRAVO DECK | = FPSO BRAVO Marine Supervisor |

## 15.4. UHF SYSTEM

The FPSO BRAVO TERMINAL has an onboard UHF system of handheld radios for internal communications.

## 15.5. ESTABLISHING COMMUNICATION

When appointed, and two hours before entering the zone of 10 nautical miles, the OTT must make contact with the FPSO CCR informing their estimated time of arrival. This contact can be made via VHF – channel 16, (SSB frequency 4125 MHz), telephone or email.

## 15.6. NOTICE OF READINESS (NOR)

The OTT reaching the zone of 10 nautical miles from the OT, and being ready to operate, informs the NOR to the FPSO.

## 15.7. INFORMATION EXCHANGE

After NOR issue, there must be assigned a working channel to transfer the following information:

- Conditions of mooring and offloading systems.
- Mooring, connection, loading, and disconnection trip operations.
- Stop time of cargo pumps.
- Time to get ready to departure.

The OTT shall inform the FPSO its Official Time of Departure, when it reaches the zone of 10 nautical miles from the FPSO.

During operation, the communication between the units is of vital importance to ensuring a safe operation. A high-quality job must be achieved to ensure the technicians involved in the

operation on board the FPSO and OTT, have an understanding of the complexity and limitations of the ship and operation, so that decisions are taken together.

The information to be exchanged during operation by the ST and the FPSO each hour, are described below:

**Table 10 - Hourly Information Exchange**

| Information | Unit |
|---|---|
| Swell height and period | FPSO |
| Wind Speed and Direction | FPSO |
| Loaded quantity, flow rate and quantity to be loaded | OTT<br>FPSO |
| Medium tension in the mooring system of the last hour | OTT |
| Maximum tension in the hawser in the last hour | OTT |

## 15.8. COMMUNICATION SEQUENCE FOR OFFTAKE TANKER

The procedure for arrival at FPSO BRAVO TERMINAL is as follows:

1. ITS provide nominated vessel Via IMAS
2. PETRORIO Marine Superintendent shall advise FPSO BRAVO TERMINAL of the arrival window of the Offtake Tanker.
3. Offtake Tanker shall contact FPSO BRAVO TERMINAL with ETA 72 hours before arrival and updates every 24 hours and any other time if the ETA is to be revised by more than 12 hours. THE FOLLOWING INFORMATION IS REQUIRED:
    a. Tankers name, call sign and ETA;
    b. Arrival and Departure draft fore and aft and free board;
    c. Amount of cargo, basic loading rate and loading plan and deballasting time;
    d. Mooring equipment, bow and aft deck;
    e. Hose and hawser handling equipment.
4. Marine Superintendent on FPSO BRAVO TERMINAL to advise PETRORIO on receipt of ETA and updates.
5. E-mail traffic shall be used by all parties as back-up to ensure consistent information.
6. The Offtake Tanker is to call FPSO BRAVO TERMINAL Control on VHF Channel 16 when within range (approx. 20 miles) of the BM-C-39 Field.
7. Thereafter the Offtake Tanker shall regularly inform FPSO BRAVO TERMINAL Central Control Room of position.
8. At this stage the Emergency Shut Down procedures on board the Offtake Tanker and the FPSO BRAVO TERMINAL are to be tested in accordance with the check lists.

## 15.9. RADIO COMMUNICATION FAILURE

Should loading operations be in progress on receipt of a radio communication failure signal from the Offtake Tanker, or if the FPSO is unable to communicate with the Offtake Tanker, the FPSO BRAVO TERMINAL shall immediately stop all pumps and close the export valve. The emergency signal from the FPSO and Offtake Tanker shall be a continuous blast on the vessel's whistle or SSB, frequency 4125 MHz.

# 16. EMERGENCY PROCEDURES

## 16.1. EMERGENCY GUIDELINES

This section contains emergency guidelines for disconnection of the Offtake Tanker in the event of an emergency arising. The emergency guidelines listed below shall be used if an emergency occur, such as:

- Mooring hawser failure or defect;
- Loading hose failure or defect;
- AHTS engine break down;
- Collision between the OTT and FPSO
- If any potential hazardous occur, the FPSO OIM and OTT Master, should consider the actions below:
- Stop offloading but remain moored with the hose connected;
- Stop offloading but remain moored with the hose disconnected;
- Stop offloading and disconnected hose and hawser, and move away from the FPSO.

## 16.2. OIL TRANSFER ESD PROCEDURES

The manual communication which initiates an ESD of the oil transfer from the FPSO Central Control Room shall be tested prior to commencement of the offloading operations. If initiated from the FPSO the Central Control Room shall inform the Mooring Master of the emergency.

a) The FPSO systems shall automatically shut down the pumps with the designated rate control.

b) The Offtake Tanker manifold valves and hose end butterfly valve are closed as soon as FPSO`s pumps are shut off.

c) Central Control Room operator shuts off FPSO valves.

Depending on the scale of the emergency, the Offtake Tanker shall be instructed to disconnect the hose and then the mooring hawser.

## 16.3. SHIPBOARD CONTINGENCIES

Masters of Offtake Tankers shall have contingency plans prepared for emergency situations that may occur in the vicinity of the Tubarão Martelo and Polvo Field. These shall be fully documented and provided to the Mooring Master. This Tanker Handbook shall not cover the Offtake Tanker's internal organization or procedures to deal with contingencies/emergencies as these form part of the Offtake Tanker's operations manual and owners' regulations.

In all cases of shipboard emergency, Offtake Tanker Masters are required to notify the FPSO BRAVO TERMINAL immediately in addition to satisfying the requirements of the Offtake Tanker's Owner.

Masters are free to request any assistance that can be offered by the FPSO BRAVO TERMINAL. Should the Offtake Tanker be drifting without power, or should the steering gear have failed, and there is the slightest chance of the Offtake Tanker drifting near to an oil field structure with no AHTS connected, the AHTS should be called in immediately and made fast for towing. The AHTS shall have a bollard pull in excess of 110 tones and every effort should be made to avert a collision between the Offtake Tanker and any oil field structure. The above should not be interpreted as over-ruling the Offtake Tanker owner's instructions to Masters for seeking assistance in emergencies. PETRORIO shall provide towing assistance as required to 'Not under Command' vessels within the locality of FPSO BRAVO Field to protect the field assets and this offer of assistance shall not be unnecessarily refused.

## 16.4. FIRE ON THE OFFTAKE TANKER OF FPSO BRAVO TERMINAL

In the event of fire on either the FPSO BRAVO TERMINAL or the Offtake Tanker, the manual ESD should be activated IMMEDIATELY and confirmation obtained by the parties that all offloading operations have been stopped and the cargo system has been shut down. This action should be followed by releasing the hose string and unmooring.

## 16.5. FPSO, OFFTAKE TANKER OR AHTS BLACKOUT

A total blackout of the FPSO shall cause the offloading operations to be halted. Instructions shall be given from the FPSO on the status and whether it is necessary to disconnect the hose and hawser.

A total blackout on the Offtake Tanker with a complete loss of main engine and auxiliary power should not result in the Offtake Tanker closing and colliding with the FPSO BRAVO TERMINAL. The AHTS shall maintain the Offtake Tanker position and heading.

If the time required to rectify a total blackout is relatively short, i.e. less than 3 hours, the hose need not be disconnected. Nevertheless, as in all emergency situations, the cargo transfer shall be stopped, and the FPSO BRAVO TERMINAL alerted.

In those cases, where the blackout rectification is likely to take longer than 3 hours and, it is possible to disconnect and lower the hose, then the hose should be released by the Offtake Tanker from the manifold. The Offtake Tanker Master may then elect to unmoor from the FPSO BRAVO TERMINAL and depart. The Offtake Tanker can then be towed clear by the AHTS. Before deciding on this course of action, the Offtake Tanker Captain, Mooring Master and OIM shall give the adequate consideration to the risk of collision with nearby oil field structures.

A total blackout on the AHTS with a complete loss of main engine power should not result in the AHTS or the Offtake Tanker closing and colliding with the FPSO BRAVO TERMINAL or with each other, however, the cargo transfer shall be stopped and the FPSO BRAVO TERMINAL alerted.

The Offtake Tanker Captain may, in consultation with the AHTS, Mooring Master and FPSO BRAVO TERMINAL OIM run his main engine astern to prevent the Offtake Tanker closing on the FPSO BRAVO TERMINAL.

The AHTS shall decide whether to let go or not from the Offtake Tanker, however, the FPSO BRAVO TERMINAL OIM shall summon assistance as soon as possible to assist the AHTS, only to minimize the risks we can connect the LHV on the AHTS bow, to towing it away from the OTT.

In those cases, when the wind speed is below 25 knots, or the AHTS blackout rectification is likely to take longer than 30 minutes or there is no immediate assistance available or there is a tendency for the Offtake Tanker to move towards the FPSO BRAVO TERMINAL, then the OTT shall release the hose. The Offtake Tanker Master may unmoor from the FPSO BRAVO TERMINAL and depart if the FPSO BRAVO TERMINAL or his vessel is endangered in any way.

## 16.6. MOORING HAWSER AND HOSE FAILURE

Sudden, height tension can be expected to rupture the mooring hawser. In the event of this occurring or the hawser tension exceeding 100 tons, an alarm is activated in the Central Control Room. The failure of the mooring hawser does not permit a choice of action, and the Offtake Tanker shall disconnect the hose and make a prompt departure from the FPSO BRAVO TERMINAL. The elapsed time between a hawser failure and a strain coming on the oil transfer hose is likely to be short and may amount to only a few minutes.

Should the hose not be released in time then the MBC (Marine Breakaway Coupling) in the hose tail should part allowing a break point in the hose. This coupling is designed to break at 35 tones pull.

The Offtake Tanker and the AHTS should take up a standby position outside the 5 mile exclusion zone.

The Line Handling Vessel should be used to control the hose and messenger lines as appropriate, having due regard to the existing weather and environmental conditions.

The failure or burst of the hose may constitute a pollution event. The Offtake Tanker shall disconnect the hose and prepare for the hawser to be disconnected. Notice shall be given from the OIM to the Offtake Tanker on what actions to take.

Figure 9 - FPSO BRAVO Marine Breakaway Coupling knowning as ERC (Emergency Release Coupling)

## 16.7. POLLUTION

In the case of an Offtake Tanker onboard oil spill, immediate response shall be given in accordance with the Offtake Tanker SOPEP. All cargo transfer shall cease regardless of the cause of the leak and the FPSO BRAVO TERMINAL OIM shall be immediately informed. Every effort should be made to prevent spillage from going overboard.

In the event of an overboard oil spill from or caused by the Offtake Tanker, the FPSO BRAVO TERMINAL OIM shall take command of any oil-spill abatement and cleanup activities. **Incident Command from PETRORIO-IMT shall be informed immediately**. Notwithstanding the foregoing, the Offtake Tanker owners shall take full responsibility, including financially, for any such oil-spill.

Under no circumstances shall dispersant be used without the authorization of PETRORIO Incident Command. The AHTS has oil spill response capability and can assist in the event of oil spilling overboard, as instructed by the FPSO BRAVO TERMINAL OIM. Any first response provided by the FPSO BRAVO TERMINAL, the AHTS and other associated resources, whether conducted independently or directed by the Offtake Tanker Master, shall not relieve the Offtake Tanker owners of their responsibility.

## 16.8. COMMUNICATIONS FAILURE

In the event of the total failure of radio communications, all berthing/unberthing and cargo operations should be suspended until normal communications are restored.

Communications failure is to be signaled by continuous sounding of the ship's whistle (either FPSO or OTT). This signal stops all loading. Emergency communications are to be maintained using written messages and boat transfer, until normal communications.

On failure of VHF only the, communication shall be attempted on SSB, frequency 4125 MHz and loading shall be stopped until VHF communications are re-established.

Upon an emergency occurring, the ESD system shall be activated to stop the cargo transfer. FPSO BRAVO TERMINAL is alerted via the VHF radio and advised of the situation and intended action (if any). If an emergency occurs on the FPSO BRAVO TERMINAL, the staff shall activate the ESD system to stop the cargo and inform the Offtake Tanker of the situation and the action required.

On receipt of confirmation from the FPSO BRAVO TERMINAL that the cargo transfer has been stopped, the hose string can be released. Unmooring should then proceed. If time allows, the hose and mooring disconnection and release should follow the normal procedure.

If time does not permit a normal departure, then the FPSO BRAVO TERMINAL manual emergency hawser release system should be operated through the QRH (Quick Release Hook). The hose shall be manually released from OTT manifold. Alternatively, the marine breakaway coupling ERC (Emergency Release Coupling) shall part. The hawser shall be released from the FPSO and the Offtake Tanker shall take care not to overrun the hose or hawser and make her way assisted by the AHTS to a safe position.

# 17. DOCUMENTATION

The following documents, checklists and sailing advice telexes shall be completed and distributed as appropriate, with respect to every Offtake Tanker loading at the FPSO. In all cases the Mooring Master shall remain on board of the Offtake Tanker until the signature of the cargo documentation and the departure clearance of the Offtake Tanker.

## 17.1. PRE-MOORING / PRE-LOADING CHECKLIST

A pre-mooring and a pre-loading checklist have been provided by the FPSO BRAVO TERMINAL to visiting Offtake Tankers. Copies of checklists are included in the appendices of this Tanker Handbook. Those shall be completed, signed by the Master of the Offtake Tanker and returned to the OIM. Offtake Tankers, which have loaded at the FPSO previously, are exempt from this requirement unless there has been a change.

- **Attachment 1 – Conditions of Use of FPSO Terminal Facilities**
- **Attachment 3 – OTT/FPSO - Safety Check List**
- **Attachment 4 - Check List #1: Before Operation Commence**
- **Attachment 5 - Check List #2: Before Run-in and Mooring**
- **Attachment 6 - Check List #3: Before Loading Operations**
- **Attachment 7 - Check List #4: Before Unmooring**
- **Attachment 8 - OTT/TERMINAL SAFETY CHECK LIST**
- **Attachment 9 – Revalidation (Sign by Mooring Master)**
- **Attachment 10 - Declaration of Security Between FPSO and Vessel**

## 17.2. BILL OF LANDING

The Bill of Lading figure stated by the FPSO BRAVO TERMINAL in the Quality and Quantity Certificate should be checked against the quantity determined from the Offtake Tanker's measurements. If there is a difference between these two quantities, notification by the Master of the Offtake Tanker to the OIM shall be given. This shall draw attention to the discrepancy and stating that the Bill of Lading is signed under protest. Under no circumstances should the Bill of Lading be endorsed to this effect or altered in any way. A non-negotiable copy can be sent by fax, if requested.

The ship/cargo agent shall issue the Bill of Lading onshore after the Offtake Tanker's departure.

### 17.3. NOTICE OF READINESS

Subject to the Offtake Tanker being ready in all respects (including all licenses and permits required by the Brazilian authorities regarding clearance of the Offtake Tanker and cargo and/or bunker aboard) to moor to the FPSO BRAVO TERMINAL and load cargo, the Notice of Readiness should be presented verbally, via the VHF radio, to the FPSO BRAVO TERMINAL Central Control Room. Notice of Readiness should be given when the Offtake Tanker is approximately 5 miles from FPSO. If on arrival at location the Offtake Tanker is not ready to load because of some shipboard deficiency, the Notice of Readiness should not be presented until the Offtake Tanker is ready in all respects to proceed with mooring and loading operations. Mooring Master shall sign the Notice of Readiness.

### 17.4. TIMESHEETS

This is completed by the Mooring Master on board of the Offtake Tanker.

### 17.5. CERTIFICATE OF QUALITY AND QUANTITY

This is a form produced by Independent Inspector representatives on board the FPSO BRAVO TERMINAL and by the FPSO BRAVO TERMINAL operations staff and is used to produce the Bills of Lading.

### 17.6. CERTIFICATE OF ORIGIN AND AUTHENTICITY

This is produced by FPSO BRAVO TERMINAL operations staff to indicate origin of the cargo for future discharge ports. This document is signed by FIRJAN and shall be sent by FedEx, as all other documents.

### 17.7. CARGO MANIFEST

This shall be prepared by operations staff on the FPSO BRAVO TERMINAL.

### 17.8. ULLAGE REPORT

This is required to be completed by the Offtake Tanker Master and contains a section for declaration of slop residue before loading. This is also used for comparison between Offtake Tanker and FPSO figures.

## 17.9. DISTRIBUTION OF DOCUMENTS

This shall be prepared by the FPSO BRAVO TERMINAL operations staff and presented to the Offtake Tanker Master along with all the required documentation.

## 17.10. RECEIPT FOR SAMPLES

This shall be prepared by the FPSO BRAVO TERMINAL operations staff and sent to the Master of the Offtake Tanker for signature when samples are transferred. Only the Mooring Master onboard the Offtake Tanker can authorize the sample transfer which shall be supervised by third part Surveyor.

## 17.11. SAILING ADVICE

This shall be completed by FPSO BRAVO TERMINAL staff and sent to the shipping agent and Marine Supervisor of PETRORIO.

## 17.12. RECEIPT AND ACKNOWLEDGEMENT OF TANKER HANDBOOK – CONDITIONS OF USE AND REGULATIONS

The Offtake Tanker Master shall sign this document.

# 18. COMPLIANCE WITH REGULATIONS / SAFETY GUIDELINES

Offtake Tankers shall conform to all applicable Brazilian federal, state and local laws and regulations, including but not limited to those related to safety, navigation, operation standards and protection of the environment. The Offtake Tanker and crew are subject to inspection and clearance by Customs, immigration, Navy, and health authorities. The local port authority may also request to carry out an inspection on the Offtake Tanker.

The Offtake Tanker shall comply with:

- MARPOL 73/78 (International Convention for Prevention of Pollution from Ships)
- SOLAS (International Convention for the Safety of Life at Sea 1974/88)
- International Safety Management ISM code
- Oil Company International Marine Forum (OCIMF) standards and procedures, including International Safety Guide for Oil Tankers and Terminals (ISGOTT), Marine Terminal Survey Guides and International Chamber of Shipping/OCIMF Ship to Ship Transfer Guide (Petroleum).
- STCW (Standards of Training, Certification and Watchkeeping for Seafares) – Including 2010 Manila Amendments. STCW Convention and STC Code (2017 Edition).

Any Offtake Tanker found to be deficient or substandard in any safety requirements shall be refused permission to moor or load or removed from berth if such safety deficiency becomes evident to the FPSO during loading.

During loading operations, the Offtake Tanker's HF/MF radio antenna shall be grounded in accordance with the requirements of ISGOTT. If the Master of the Offtake Tanker has reason to contact the shore, he should call via the Offtake Tanker's marine satellite link or pass his message through the PETRORIO communications network as appropriate.

# 19. TERMINAL USAGE

## 19.1. TERMINAL FACILITIES

Provisions, Fuel and Water: The FPSO BRAVO TERMINAL cannot provide any facility for provisions, water, or fuel at the FPSO.

## 19.2. TERMINAL SERVICES

There are no terminal services available except in the event of a medical emergency aboard the Offtake Tanker. The FPSO normally has on board a specialist in medical first aid. If notified of a medical emergency on the Offtake Tanker, the OIM shall arrange for his transport to the Offtake Tanker to render first aid. If necessary and the victim can be transported by boat to the

FPSO, the OIM can arrange for the patient's transportation by helicopter to a medical facility in the city of Rio de Janeiro, on a reimbursable basis. In a situation for MEDVAC the Incident Command from PETRORIO shall be notified.

## 20. COMPLIANCE WITH INTERNATIONAL SHIP AND PORT SECURITY (ISPS)

It is the FPSO's policy to request the Offtake Tanker to enter a Declaration of Security with the FPSO at least 24 hours before the scheduled mooring. Appendix 07 provides an example of the Declaration of Security form that the FPSO currently uses. These procedures shall apply to all Offtake Tankers, including those operating solely in Brazilian waters. At the time of first contact with the responsible party of the Offtake Tanker, the Terminal shall request a copy of the Offtake Tanker's ISSC and a list of its ten ports of call. Any Offtake Tanker that has not satisfied the Ship Security Officer and Company Security Officer of PetroRio S.A. regarding its ISPS status and that has not completed the Declaration of Security shall not be permitted to moor with the FPSO.

## 21. SECURITY OPERATIONS

### 21.1. APPROACH AND MOORING

In order to circumvent the problem of determining with some precision, environmental variables such as wind, wave and current, it is mandatory to use an AHTS connected to the OTT during the approach maneuver and mooring, ready to act.

As the OTT is tied to the FPSO, all equipment essential for maneuvering should be kept in standby, in a condition that allows the OTT to escape using its own resources in emergency situations.

### 21.2. OPERATIONAL ZONES

**GREEN ZONE:** area in which the OTT can freely move safely while in transfer operation with the FPSO. The limits for normal operations are +/– 45 degrees of heading to the Oceanic Terminal central line.

**YELLOW ZONE:** area in which the OTT can stay long enough for the master to try to bring it back to THE GREEN ZONE using all available means at the moment, beyond the help of the AHTS. When the ST reaches the mark of 60 degrees, the CPT informs the OIM or the FPSO Superintendent so there is an immediate discontinuation of the transfer. The OTT should be ready to perform emergency disconnection of the hose line and disconnection of the mooring system.

**RED ZONE:** area in which the OTT cannot remain. When the OTT reaches the mark of 70 degrees, the OTT captain should immediately execute the emergency disconnection of the hose

line and disconnection of the mooring system, and move the ship away from the FPSO, heading to a safe area.

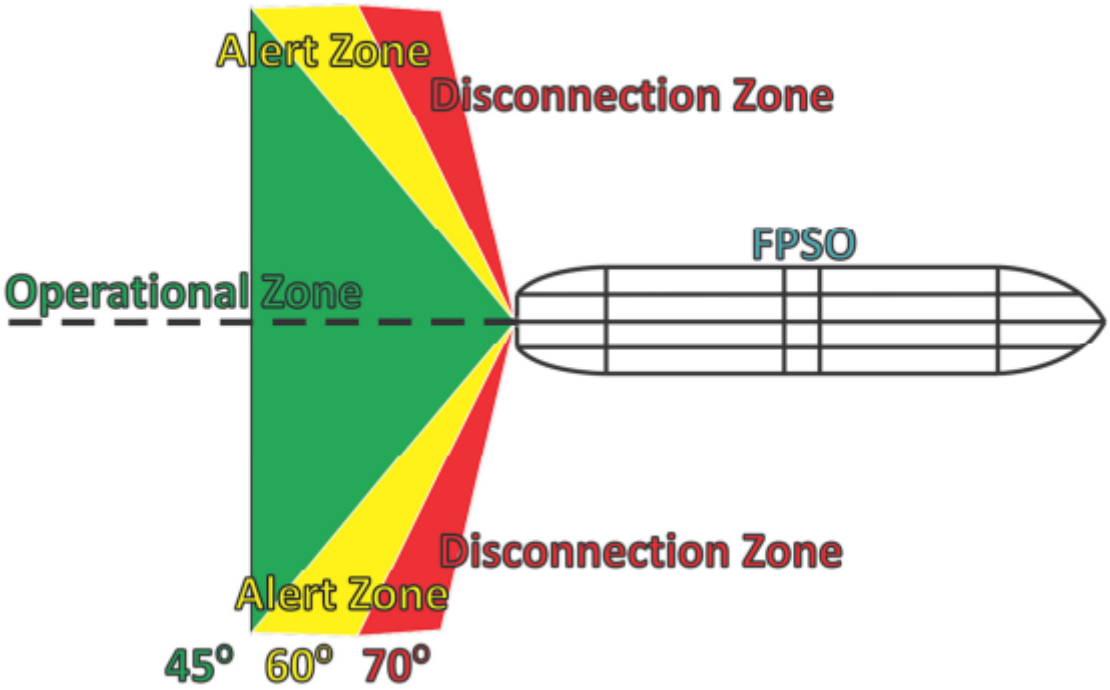



**Figure 10 - Operational Zones**

## 21.3. EXCLUSION AREA FOR NAVIGATION AND MANOUEVERING

| | |
|---|---|
| NAME OF THE OCEAN TERMINAL | **OSX 3** |
| LENGTH OF OCEAN TERMINAL | **370,50 m** |
| LENGTH OF MOORING SYSTEM | **150 m** |
| LENGTH OF THE SHUTTLE TANKER | **275 m** |
| TOW WIRE + LENGTH OF THE AHTS | **570 m** |
| AHTS | **70 m** |
| EXCLUDE ZONE | **1.480,5m** |

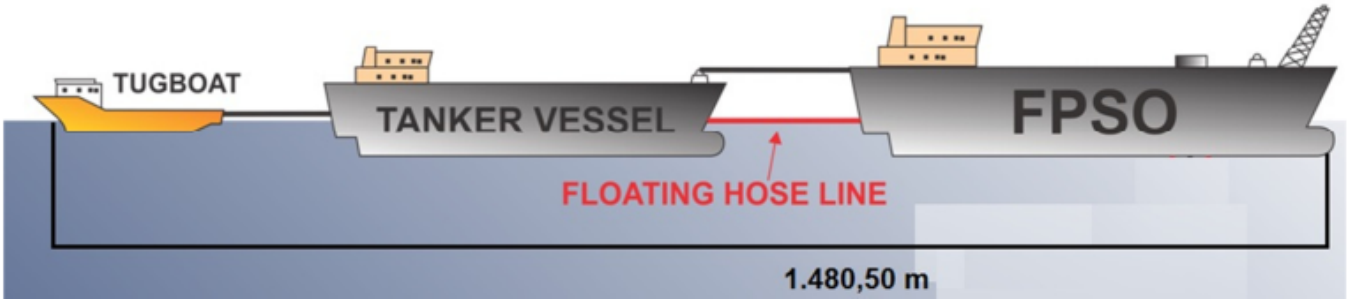



**Figure 11 - Offloading Operation**

## 21.4. STATE OF ALERT

State of Alert is a condition characterized by an adverse environmental condition that may threaten the safety of the FPSO and OTT during oil transfer operations. The main objective of the stages is to raise the alert level of security by avoiding the occurrence of faults in the premises of PETRORIO and contractors. The alert has three stages:

**ALERT 1:** It begins when the sea reaches force 8 on the Beaufort scale. The FPSO Superintendent, the OTT and AHTS Captains must maintain constant alert on VHF channel 16 and channel agreed to the operation. The facilities of the units should be ready to stop loading.

**ALERT 2:** It begins when the sea reaches force 9 on the Beaufort scale. The transfer of oil should be stopped. The OTT should be ready to perform emergency disconnection of the hose line and disconnection of the mooring system.

**ALERT 3:** It begins when the sea reaches force 10 BEAUFORT scale. The OTT shall immediately execute the emergency disconnection of the hose line and disconnection of the mooring system and get away from the FPSO.

## 21.5. AIRCRAFT OPERATIONS

The OIM, the OTT Captain and AHTS Captain shall be previously informed about aircraft operations next to the FPSO during the transfer operations.

## 21.6. IDENTIFICATION LIGHTS

For Offshore Facilities and Shuttle Tankers, the proper lights and shapes shall be used in compliance with the International Regulations for Preventing Collisions at Sea (RIPEAM).

When connected to the FPSO, the OTT is moored and its navigations lights shall not be alighted.

## 21.7. FIRE FIGHTING EQUIPMENT

The firefighting equipment of the FPSO and OTT must be operational and ready for immediate use. The main pipeline for firefighting must be pressurized. The fire pump must be on stand-by condition and ready for immediate operation.

## 21.8. RESTRICTED AREAS TO NAVIGATION

Under no circumstances may the OTT be anchored in the Campos Basin area or areas marked by the Brazilian Navy, where navigation is prohibited. Better information sources in the following publications from Brazilian Hydrography and Navigation Directorate (DHN):

- Nautical Chart No. 23000 – Cape of São Tomé to Rio de Janeiro
- Nautical Chart No. 1550 – Campos Basin

# 22. ATTACHMENTS

**ATTACHMENT 1 – Conditions of Use of FPSO Terminal Facilities (Sign by FPSO)**

THE FACILITIES AND ASSISTANCE THAT MAY BE PROVIDED BY PETRORIO (ITS AFFILIATES AND PARENT COMPANIES – HEREIN AFTER REFERRED TO INDIVIDUALLY AND COLLECTIVELY AS "THE PARTIES") TO VESSELS VISITING THE FPSO TERMINAL FOR ANY PURPOSE WHATSOEVER ARE SUBJECT TO THE FOLLOWING CONDITIONS:

1. Neither the parties, the FPSO nor their employees, servants, agents, contractors, or representatives (in whatever capacity they may be acting), shall be responsible for any loss, damage, injury, or delay whatsoever arising from any cause whatsoever in consequence of any assistance, advice, or by way of navigational facilities including buoys, light, horns, or otherwise. In all circumstances, the master of any vessel visiting the terminal shall remain solely responsible for the safety and proper navigation of the vessel and the owner of said vessel shall indemnify the parties, the FPSO, their employees, servants, agents, contractors, representatives, or its agents against all loss or damage sustained by the parties, their employees, servants, agents, contractors, or representatives by reason of the use by any vessel or any facility belonging to or provided by the parties, their employees, servants agents, contractors, or representatives.

2. The parties do not represent or warrant that berth, loading lines, gear, equipment, or any other articles used in connection with the mooring of a visiting vessel are safe or suitable for any vessel, and any vessel using them shall do so at the sole risk of the vessel and the owners thereof. The parties do not warrant the seaworthiness of any craft hired or used by any vessel nor its fitness for any particular purpose.

3. The parties shall not be responsible for acts or defaults whether caused by negligence or not, of any of their employees, servants, contractors, agents, or representatives nor for any loss, damage, injury or delay arising from any cause whatsoever that may occur to the vessel or her cargo or equipment or to the master or any member of her crew, whether on board or otherwise, or which may occur in the course of mooring or unmooring of the vessel, or lowering or raising of the loading line, which may occur in the course of loading or discharging or otherwise, including any damage, loss, injury, or delay to any third party. The vessel and her owners shall hold the parties, the FPSO, their employees, servants, contractors, and agents harmless and indemnified against all claims, damages, cost and expenses arising therefrom.

4. The parties shall not be responsible for any loss, damage, injury, or delay directly or indirectly caused by or arising from strikes, lock-outs or labor disputes or disturbances whether the parties, their employees, servants or agents are parties thereto or not.

5. If during or by reason of the use of the vessel of the terminal or its agents or the gear or equipment used in connection therewith or any craft of the parties, any of them shall be damaged or become dangerous or unusable and irrespective of whether or not such damage has been caused or contributed to by the negligence of the parties or their servants or agents, the vessel and her owners shall hold the parties, the FPSO and their employees, contractors, servants, agents, or representatives harmless and indemnified against all loss arising therefrom.

These conditions shall be construed, according to the laws of England. Any dispute, controversy or claim arising out of these conditions shall be referred to and finally resolved by arbitration under the rules, then in force, of the London court of international arbitration, which rules are deemed to be incorporated by reference into this clause, the tribunal shall consist of a sole arbitrator. The place of arbitration shall be London, England. The language of the arbitration shall be English. The arbitration tribunal shall have the power to order specific performance and grant interim relief. The award of the arbitration tribunal shall be final and binding on the parties and may be enforced against them in any court or other authority of competent jurisdiction, and each party hereby waives any right of appeal.

Acknowledged and Agreed to:

SS/MV _____ Signed (Master) _____

Date _____ Time _____

## ATTACHMENT 2 – OTT/FPSO – Safety Check List (Sign by FPSO)

**Shipment:**

**Vessel:**

**Date:** **Time:**

| FPSO/ OFFTAKE TANKER | OTT | FPSO |
|---|---|---|
| 1. Are SMOKING regulations being observed? | | |
| 2. Are GALLEY requirements being observed? | | |
| 3. Are NAKED LIGHT requirements being observed? | | |
| 4. Are electrical cables to portable equipment disconnected from power | | |
| 5. Bow stoppers, leads, lines, inspected and satisfactory. | | |
| 6. Are both anchors secured? (Wires, pawls and stoppers in the place) | | |
| 7. Is vessel upright with suitable trim? | | |
| 8. Are the vessel's main transmitting aerials switched off? | | |
| 9. Are hand torches of an approved type? | | |
| 10. Are portable R/.T sets of approved type? | | |
| 11. Are all external doors and ports in the accommodation closed | | |
| 12. Are ventilators set in re-circulation mode conditions? | | |
| 13. Are unsafe air conditioning intakes closed? | | |
| 14. Are window-type air conditioning units disconnected? | | |
| 15. Has the P/V valves vents operation been verified, where are fitted | | |
| 16. Are unused cargo/bunker connections blanked? | | |
| 17. Manifold reducers in the place and fully bolted | | |
| 18. Is stern discharge line (if fitted) blanked? | | |
| 19. Are sea and overboard discharge valves (when not in use) closed and lashed? | | |
| 20. Are scuppers effectively plugged? | | |
| 21. Is the agreed ship/FPSO communication system working? | | |
| 22. Are all cargo/bunker tank lids closed? | | |
| 23. Are cargo tanks being loaded or discharged open to the atmosphere via the agreed venting system? | | |
| 24. Are fire hoses and equipment ready for use? | | |
| 25. AHTS confirmed power/ propulsion/ steering systems tested before approaching the OTT | | |
| 26. Are emergency towing wires correctly positioned? | | |
| 27. Is the vessel ready to move under her own power? | | |
| 28. Did was The OTT engine tested a stern? | | |
| 29. Is the inert gas system of the vessel working properly? | | |

| | | |
|---|---|---|
| 30. At least one cargo tank checked and acceptable to $O_2$ level | | |

*Remarks*

| | |
|---|---|
| Offtake Tanker: | For the part concerning the OTT |
| FPSO: | For the part concerning the FPSO |

**ATTACHMENT 3 – Check List #1: Before Operation Commence (Sign by FPSO)**

**Shipment:**

**Vessel:**

**Date:** **Time:**

| FPSO/ OFFTAKE TANKER | OTT | FPSO |
|---|---|---|
| 1. Radio communications established. VHF Channel 09 | | |
| 2. All walkie-talkie sets in order. | | |
| 3. Language of operation agreed. | | |
| 4. Checked for maneuvering/mooring/loading operation suitability. | | N/A |
| 5. Checked cathode protection. (Can remain “on” if not Insulating Flange is mounted at Manifold) | | |
| 6. Ship upright and in suitable trim. | | |
| 7. Engines, steering gear, controls and navigational equipment tested and found in good order. | | N/A |
| 8. Did was The OTT engine tested a stern? | | |
| 9. Chief Engineer briefed on engine requirements. | | N/A |
| 10. Weather forecasts for area obtained. | | |
| 11. Hose lifting equipment checked and found correct and ready for use. Boom to swing by power slew not by hand. | | N/A |
| 12. Manifold reducers in the place and fully bolted | | |
| 13. Manifold connections ready and marked. | | |
| 14. Signals ready. | | |
| 15. Mooring equipment in good order. | | N/A |
| 16. Mooring winches in good order. | | N/A |
| 17. Messengers, stoppers and heaving lines ready in place. | | N/A |
| 18. Toolbox with Cargo Hose equipment on board | | N/A |
| 19. Crew briefed on mooring methods. | | |
| 20. Emergency plan prepared. | | |
| 21. Offtake Tanker/FPSO informed Check List No. 1 completed in the affirmative. | | |

Offtake Tanker _____
MASTER’S SIGNATURE

FPSO _____
TERMINAL REPRESENTATIVE

**ATTACHMENT 4 – Check List #2: Before Run-in and Mooring (Sign by FPSO)**

**Shipment:**

**Vessel:**

**Date:** **Time:**

| FPSO/ OFFTAKE TANKER | OTT | FPSO |
|---|---|---|
| 1. Check List NO. 1 Completed. | | |
| 2. Towing lines checked and found correct. | | |
| 3. Proficient helmsman at the wheel. | | N/A |
| 4. Scuppers plugged and sealed. | | |
| 5. Signals displayed. | | |
| 6. Accommodation doors and ports closed. | | |
| 7. Firefighting and anti-pollution equipment checked and ready for use. | | |
| 8. Bridge/Navigational equipment and machinery operational | | |
| 9. Adequate lighting available. | | |
| 10. Walkie-talkie sets tested and intrinsically safe. | | |
| 11. Power on winches. | | |
| 12. Mooring gangs in position and briefed with reference to dangers of OFFTAKE tanker using gun. | | |
| 13. Communications established with mooring gangs. | | |
| 14. Offtake Tanker/FPSO informed Check List No. 2 completed in the affirmative | | |

Offtake Tanker _____
MASTER'S SIGNATURE

FPSO _____
TERMINAL REPRESENTATIVE

**ATTACHMENT 5 – Check List #3: Before Loading Operations (Sign by FPSO)**

**Shipment:**

**Vessel:**

**Date:** **Time:**

| FPSO/ OFFTAKE TANKER | OTT | FPSO |
|---|---|---|
| 1. Communication system established with FPSO/Offtake Tanker. | | |
| 2. Emergency signals and shutdown procedures agreed. | | |
| 3. Efficient Deck Watch established. | | |
| 4. Check Offtake Tanker loading plan for stress and stability | | |
| 5. Initial loading rate agreed with FPSO/ Offtake Tanker _____ $M^3PH/BPH$ | | |
| 6. Maximum loading rate agreed with FPSO/ Offtake Tanker _____ $M^3PH/BPH$ | | |
| 7. Topping-off rate agreed with FPSO/ Offtake Tanker _____ $M^3PH/BPH$ | | |
| 8. Line flush + Line displacement (Total volume 300 cubic meters) | | |
| 9. Drip trays under manifold connections. | | N/A |
| 10. Hose suspended efficiently. | | |
| 11. Sea and overboard discharge valves tightly closed and sealed. | | N/A |
| 12. Air-conditioning plant off or in re-circulation. | | |
| 13. All cargo tanks lids closed and secured | | |
| 14. All unused manifold connections closed and blanked. | | N/A |
| 15. Procedures for Cargo & Ballast handling agreed. | | |
| 16. Is the pump room bilge alarm system operational? | | |
| 17. Have measures been taken to ensure sufficient pump room ventilation. | | |
| 18. Is the cargo tanks level alarm system operational? | | |
| 19. Inert gas system operation (FPSO). | N/A | |
| 20. Manifold & Cargo line lined up | | |
| 21. Offtake Tanker/FPSO informed Check List NO. 3 completed in the affirmative | | |

Offtake Tanker _____
MASTER'S SIGNATURE

FPSO _____
TERMINAL REPRESENTATIVE

## ATTACHMENT 6 – Check List #4: Before Unmooring (Sign by FPSO)

**Shipment:**

**Vessel:**

**Date:** **Time:**

| FPSO/ OFFTAKE TANKER | OTT | FPSO |
|---|---|---|
| 1. Cargo hose or manifold blanked. | | |
| 2. Method of disengagement and of letting go moorings agreed with Offtake Tanker /FPSO. | | |
| 3. Power on winches and windlass. | | N/A |
| 4. Messengers, rope stoppers etc. at all mooring stations. | | |
| 5. Engines, steering gear, controls and navigational equipment tested and found in good order. | | N/A |
| 6. Crew at stations standing by. | | |
| 7. Communications confirmed with Offtake Tanker/FPSO | | |
| 8. Proficient helmsman at the wheel. | | N/A |
| 9. Communications established with mooring gangs. | | |
| 10. Mooring gangs instructed to cast off only in the manner and when requested by Offtake Tanker. | | |
| 11. Offtake Tanker /FPSO informed Check list NO. 4 completed in the affirmative | | |

Offtake Tanker _____
MASTER'S SIGNATURE

FPSO _____
TERMINAL REPRESENTATIVE

## ATTACHMENT 7 – OTT/TERMINAL Safety Check List (Sign by FPSO)

**Ship's Name:**

**Berth:** **FPSO BRAVO** **Port:** **FPSO BRAVO**

**Date of Arrival:** **Time:**

**Instruction for completion:**

The safety of operations requires that all questions should be answered affirmatively by clearly ticking the appropriate box. If an affirmative answer is not possible, the reason should be given and agreement reached and upon appropriate precautions to be taken between the OTT and TERMINAL. Where any question is considered to be applicable, them a note to that effect should be inserted in the remarks column.

**Code:**

- **A** - any procedures and agreements should be in writing in the remarks column of this Check List or other mutually acceptable form. In either case, the signature of both parties should be required.
- **P** - in the case of a negative answer, the operation should not be carried out without the permission of the Port Authority.
- **R** - indicates items to be re-checked at intervals not exceeding that agreed in the declaration.

### Part 'A' – BULK LIQUID GENERAL

| General | OTT | Terminal | Code | Remarks |
|---|---|---|---|---|
| 1. Is the ship securely moored? | | | R | Stop cargo at: ____kts (wind vel)<br>Disconnect at: ____kts (wind vel)<br>Unberth at: ____kts (wind vel) |
| 2. Are emergency towing wires correctly positioned? | | | R | |
| 3. Is there safe access between ship and shore? | | | R | |
| 4. Is the ship ready to move under its own power? | | | PR | |
| 5. Is there an effective deck watch in attendance on board and adequate supervision on the terminal and on the ship? | | | R | |
| 6. Is the agreed OTT/terminal communication system operative? | | | AR | |
| 7. Has the emergency signal to be used by OTT and TERMINAL been explained and understood? | | | A | |

| | | | | |
|---|---|---|---|---|
| 8. Have the procedures for cargo, bunker and ballast handling been agreed? | | | AR | |
| 9. Have the hazards associated with toxic substances in the cargo being handled been identified and understood? | | | | |
| 10. Has the emergency shutdown procedure been agreed? | | | A | |
| 11. Are fire hoses and fire-fighting equipment on board and ashore positioned and ready for immediate use? | | | R | |
| 12. Are cargo and bunker hoses/arms in good condition, properly rigged and appropriate for the service intended? | | | | |
| 13. Are scuppers effectively plugged and drip trays in position, both on board and ashore? | | | R | |
| 14. Are unused cargo and bunker connections properly secured with blank flanges fully bolted? | | | | |
| 15. Are sea and overboard discharge valves, when not in use, closed and visibly secured? | | | | |
| 16. Are all cargo and bunker tank lids closed? | | | | |
| 17. Is the agreed tank venting system being used? | | | AR | |
| 18. Has the operational of the P/V valves and/or velocity vents been verified using the checklist facility, where fitted? | | | | |
| 19. Are hand torches of an approved type? | | | | |
| 20. Are portable VHF/UHF transceivers of an approved type? | | | | |
| 21. Are the OTT's main radio transmitter aerials earthed and radars switched off? | | | | |
| 22. Are electric cables to portable electrical equipment disconnected from power? | | | | |
| 23. Are all external doors and ports in accommodation closed? | | | R | |
| 24. Are window-type air conditioning units disconnected? | | | | |
| 25. Are air conditioning intakes which may permit the entry of cargo vapours closed? | | | | |
| 26. Are the requirements for use of galley equipment and other cooking appliances being observed? | | | R | |
| 27. Are smoking regulations being observed? R | | | R | |
| 28. Are naked light regulations being observed? R | | | R | |
| 29. Is there provision for an emergency escape? | | | | |

| | | | | |
|---|---|---|---|---|
| 30. Are sufficient personal on board to deal with an emergency? | | | R | |
| 31. Are adequate insulating means in place in the OTT/TERMINAL connection? | | | | |
| 32. Have measures been taken to ensure sufficient pump room ventilation? | | | R | |
| 33. If the ship is capable of closed loading, have the requirements for closed operations been agreed? | | | | |
| 34. Has a vapour return line been connected? | | | | |
| 35. If a vapour return line is connected, have operating parameters been agreed? | | | | |
| 36. Are OTT emergency fire control plans located externally? | | | | |

If the OTT is fitted. Or required to be fitted with an inert gas system the following questions should be answered:

| Inert Gas System | OTT | Terminal | Code | Remarks |
|---|---|---|---|---|
| 37. Is the Inert Gas System sully operational and in good working order? | | | P | |
| 38. Are deck seals in good working order? | | | R | |
| 39. Are liquid levels in P/V breakers correct? | | | R | |
| 40. Have the fixed and portable oxygen analyzers been calibrated and are they working properly? | | | R | |
| 41. Are fixed IG pressure and oxygen content recorders working? | | | R | |
| 42. Are all cargo tank atmospheres at positive pressure with an oxygen content of 8 % or less by volume? | | | PR | |
| 43. Are all the individual tank IG valves (if fitted) correctly set and locked? | | | R | |
| 44. Are all the persons in charge of cargo operations aware that in the case of failure of the Inert Gas Plant, discharge operations should cease and the terminal be advised? | | | R | |

If the ship is planning to tank cleaning alongside, the following questions should be answered.

| Inert Gas System | Ship | Terminal | Remarks |
|---|---|---|---|
| Are tank cleaning operations planned during the ship's stay mooring at the TERMINAL installation? | | Yes/No | |
| If so, have the OTT Master and Terminal authority been informed? | Yes/No | Yes/No | |

**DECLARATION**

We the undersigned have checked, where appropriate jointly, the items on this check list and have satisfied ourselves that the entries we have made are correct to the best of our knowledge.

We have also made arrangements to carry out repetitive checks as necessary and agreed that those items with the letter 'R' in the column 'Code' should be re-checked at intervals not exceeding ___ hours.

| **For Ship** | | **For Shore** | |
|---|---|---|---|
| Name: | | Name: | |
| Rank: | | Rank: | |
| Signature: | | Signature: | |
| Date: | Time: | Date: | Time: |

**ATTACHMENT 8 – Revalidation (Sign by Mooring Master)**

Revalidation of Ship/Terminal Safety Checklist and Anti-Pollution Checklist where applicable. Inspections to be carried out at intervals not exceeding ___ hours.

We have concluded a routine inspection and can confirm all the Checklist (s) questions continue to be answered in the affirmative.

| **For Ship** | | **For Terminal** | | **Date** | **Time** |
|---|---|---|---|---|---|
| ***Name*** | ***Signature*** | ***Name*** | ***Signature*** | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**ATTACHMENT 9 – Tanker Notice of Readiness (Sign by Mooring Master)**

FROM : MASTER OF ENTITLEMENT OFFTAKE TANKER
URGENT TO : OPERATOR
URGENT CC : ENTITLEMENT OFFTAKE SHIPPING REPRESENTATIVE

DATE:

SUB.: _____ OFF _____ AT FPSO BRAVO
(Vessel name) (date of arrival)

**CARGO NUMBER:**

**Notice of Readiness**

DEAR SIRS,

PLEASE BE ADVISED THAT THE ABOVE MENTIONED SUBJECT VESSEL HAS ARRRIVED AT FPSO BRAVO (OR NEARBY SAFE ANCHORAGE) AT _____ HOURS ON _____(DATE) AND IS READY IN ALL RESPECTS TO COMMENCE HER LOADING OF (APPROX) _____(QUANTITY) OF CRUDE OIL IN BULK FROM _____HOURS ON _____(DATE) IN ACCORDANCE WITH THE TERMS, CONDITIONS AND EXCEPTION OF THE BM-C-39 OFFTAKE AGREEMENT.

YOURS TRULY,

***MASTER OF ENTITLEMENT HOLDER'S TANKER***

NOTICE OF READINESS TENDERED AT _____ HOURS ON _____

NOTICE OF READINESS RECEIVED AT _____ HOURS ON _____

NOTICE OF READINESS ACCEPTED AT _____ HOURS ON _____

**ATTACHMENT 10 – Certificate of Quality and Quantity (Sign by Field Superintendent)**

# FPSO BRAVO

## FPSO BRAVO CRUDE OIL OFFLOAD

## QUALITY CERTIFICATE

| | |
|---|---|
| Shipment No: | BRAVOXX |
| Vessel: | VESSEL NAME |
| Loading Concluded on: | 0 |
| Product: | Tubarão Martelo Crude Oil |
| API at 60 deg. F: | 0,0 |
| Density at 15 deg C: | 0,0000 |
| BS & W (%): | ### |
| Salinity (ptb): | 0 |
| Density at 20 deg C: | 0,0000 |

| | GROSS (GSV) | NET (NSV) |
|---|---|---|
| US Barrels @ 60 deg. F. | 0,000 | 0,000 |

We certify that the above loading volumes and quality determination, were completed by the vessel in accordance with the appropriate API publications and ASTM-IP Petroleum Measurement Tables.

**For FPSO Bravo**

# FPSO BRAVO

## FPSO BRAVO CRUDE OIL OFFLOAD

## QUANTITY - CERTIFICATE

**COMMENCE LOADING ON 0/1/00 0:00**
**FINISHED LOADING ON: 0/1/00 0:00**

The undersigned company PETRO RIO O&G EXPLORACAO E PRODUCAO DE PETROLEO LTDA. hereby certifies that the entire quantity of the following described shipment, loading of which was concluded on Xth MM, YYYY at FPSO BRAVO, BRAZIL, on board the vessel VESSEL NAME

| At 60 degree F. | GROSS (GSV) | NET (NSV) |
|---|---|---|
| U.S. Barrels | 0,000 | 0,000 |

consists exclusively of Tubarão Martelo Crude Oil and is of current quality originating from the Tubarão Martelo oil and gas production field, BRAZIL, and that it has been subject to no process other than dehydration and stabilization.

| Shipment No. |
|---|
| BRAVOXX |

**For FPSO BRAVO**

**ATTACHMENT 11 – Certificate of Origin and Authenticity (Sign by FIRJAN)**

# FPSO BRAVO CRUDE OIL OFFLOAD

## CERTIFICATE OF ORIGIN

The undersigned company PETRO RIO O&G EXPLORACAO E PRODUCAO DE PETROLEO LTDA. hereby certifies that the entire quantity

| At 60 degree F. | GROSS (GSV) | NET (NSV) |
|---|---|---|
| U.S. Barrels | 0,000 | 0,000 |

consists exclusively of Tubarão Martelo Crude Oil, loading of which was concluded on Xth MM, YYYY at FPSO BRAVO, Brazil, on board the vessel VESSEL NAME and is of current quality originating from the Tubarão Martelo oil and gas production field, BRAZIL, and that it has been subject to no process other than dehydration and stabilization.

| Shipment No. |
|---|
| BRAVOXX |

For FPSO BRAVO

**ATTACHMENT 12 – Time Sheet**

## PETRO RIO O&G EXPLORACAO E PRODUCAO DE PETROLEO LTDA

BRAVO FPSO Terminal

### TIME SHEET

| | | | |
|---|---|---|---|
| **VESSEL** | | Call Sign | |
| Flag | | Port of Registry | |
| Summer | | Voyage Number | |
| Captain's Name | | | |
| Arrival Draft | Forward (m) | Aft (m) | |
| Departure Draft | Forward (m) | Aft (m) | |

### TIMES

| EVENT | DATE | TIME | EVENT | DATE | TIME |
|---|---|---|---|---|---|
| Anchored at **Rio** | | | Mooring group on Board | | |
| Anchor aweigh **Rio** | | | Mooring group disembark | | |
| Start of Sea **Rio** | | | End of Sea Passage **OSX-3** | | |
| Arrival at **OSX-3 TERMINAL** | | | Vessel sailed from **OSX-3** | | |
| Notice of Readiness | | | Notice of Readiness | | |
| Initial tank inspection | | | Tank inspection completed | | |
| Weather Condition - Wind | | | Weather condition | | |
| Tug fast Aft | | | Tug released | | |
| **Commence Mooring** | | | **All fast** | | |
| **Commence hose connection** | | | **Complete hose connection** | | |
| Ship/Shore Checklist | | | Vessel ready to load | | |
| Commence line | | | Line displacement | | |
| **Commence loading** | | | **Complete loading** | | |
| Commence deballasting | | | Complete deballasting | | |
| Final tank inspection | | | Tank inspection completed | | |
| **Commence hose** | | | **Complete hose** | | |
| Final displacement | | | Final displacement | | |
| Weather Condition - Wind | | | Weather condition | | |
| **Commenced unmooring** | | | **Clear of berth** | | |
| Documents on board | | | Documents completed | | |

### CARGO QUANTITIES

| | | | |
|---|---|---|---|
| Bill of Lading Bbls @ 60°F | | Ship's BBLS @ 60°F | |
| Difference (G.Bbls @ 60F) | | Difference (%) | |

### REMARKS

| |
|---|
| |

**Master** **Mooring-Master**

**ATTACHMENT 13 – Crude Oil Shipment Manifest (Sign by Agency)**

**CRUDE OIL SHIPMENT MANIFEST**

**Vessel:** **Shipment:**

**Master:** **Departure:**

**From:** **To:**

| Nº BL | Shipper | Consignee | Destination / Marks of Cargo | | Metric Tons | Volume CBM | | Volume US Barrels |
|---|---|---|---|---|---|---|---|---|
| | | | | | | @ 60°F | @20°C | |
| | | | | GROSS | | | | |
| | | | | NET | | | | |
| | | | | B.S.W. | | | | |

**ATTACHMENT 14 – Master Receipt for Documents (Sign by Master)**

# FPSO BRAVO

## MASTER'S RECEIPT FOR DOCUMENTS

Shipment No: BRAVOXX

Vessel: VESSEL NAME

Consignee: TO THE ORDER OF PETRORIO LUXEMBOURG SARL

Date: 0

I, Capt. Dimitrios Lapanaitis the undersigned Master of M.V. VESSEL NAME certify that I have received from PETRO RIO O&G EXPLORACAO E PRODUCAO DE PETROLEO LTDA. the following documents in respect of this cargo:

| Documents | Copies |
|---|---|
| FPSO BRAVO Bill of Lading | 0 |
| Certificate of Origin | 1 |
| Cargo Manifest | 0 |
| Quality Certificate | 1 |
| Quantity Certificate | 1 |
| Timesheet | 1 |
| Masters Receipt of Documents | 1 |
| Masters Receipt of Sample | 1 |

_____
Master

**ATTACHMENT 15 – Receipt for Samples (Sign by Master)**

# FPSO BRAVO

## MASTER'S RECEIPT OF SAMPLE

| | |
|---|---|
| Shipment No: | BRAVOXX |
| Vessel: | VESSEL NAME |
| Consignee: | TO THE ORDER OF PETRORIO LUXEMBOURG SARL |
| Date: | Xth MM, YYYY |

I, Capt. Nnnnnn the undersigned Master of M.V. VESSEL NAME certify that I have received from FPSO BRAVO, Two (2) liters samples, representative of the cargo loaded at FPSO BRAVO on Xth MM, YYYY.

_____
Master

## ATTACHMENT 16 – Ullage Report (Sign by Mooring Master)

**Terminal:** **FPSO BRAVO** **Shipment:**

**Vessel:** **Date:**

**ATTACHMENT 17 – Sailing Advice (Sign by Mooring Master)**

Sailing Advice Telex / Email from FPSO BRAVO

| CARGO – OFFTAKE TANKER DATA | OPERATION DATA |
|---|---|
| CARGO Nº : | NOR: |
| OFFTAKE TANKER: | MOORING COMMENCE: |
| FLAG: | MOORING FINISHED: |
| CALL SIGN: | HOSE CONECTION COMMENCE: |
| LINE DIPLACEMENT: | HOSE CONECTION FINISHED: |
| MASTER: | LOADING COMMENCE: |
| DESTINATION: | LOADING FINISHED: |
| ETA DESTINATION: | FLUSHING COMMENCE: |
| AGENCY ATTENDING: | FLUSHING FINISHED: |
| SAILING DRAFT: | HOSE DISCONECTION COMMENCED: |
| DEPARTURE FPSO: | HOSE DISCONECTION FINISHED: |
| | CARGO SURVEYOR: |
| | SHIPPING NUMBER: |
| | NXP NUMBER: |
| | CUSTOMS NUMBER: |
| | BILL OF LADING DATE: |

| CARGO QUANTITY / QUALITY RECEIVED FROM FPSO | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross BBls @15º | Net BBls @15º | Gross BBls @20º | Net BBls @20º | Gross Metric Tons | Net Metric Tons | Gross Long Tons | Net Long Tons | API | Specific gravity | BSW % | Temp. |
| | | | | | | | | | | | |

| SLOP QUANTITY RECEIVED FROM FPSO | | |
|---|---|---|
| Cubic Meters | Metric Tons | Temperature |
| | | |

**REMARKS:**

Date:

Name:

Signature:

**ATTACHMENT 18 – Statement of Compliance for Operation in Brazilian Waters (Check by Mooring Master)**

**ANEXO 1-F**

(SELO DA CP/DL)

# MARINHA DO BRASIL
# (CAPITANIA DOS PORTOS/DELEGACIA)

**DECLARAÇÃO DE CONFORMIDADE PARA OPERAÇÃO EM AJB**
***(STATEMENT OF COMPLIANCE FOR OPERATION IN BRAZILIAN WATERS)***

Nº de inscrição - -

Certifica que o navio .....*(nome do navio)*....., bandeira .....,
*It is to certifies that the ship .....(name of ship)....., flag..... ,*
nº IMO....., classificado pela .....*(nome da sociedade classificadora do navio)*.....,
*IMO Number ....., classified by .....(name of the Classification Society of the ship)..... ,*
foi submetido a PERÍCIA TÉCNICA para emissão de Atestado de Inscrição Temporária – AIT, em
*was submitted to a TECHNICAL APPRAISAL for emission of Certificate of Temporary Registration - AIT, in*
...../...../....., no Porto / Terminal ....., em conformidade com o estabelecido no
*...../...../..... , at Port / Terminal ..... , in Conformity with established in the*
Capítulo 1 da NORMAM 04.
*Chapter 1 of NORMAN 04.*

A perícia constatou que o navio está em conformidade com os requisitos estabelecidos nas
*The appraisal shows the ship is in conformity with the requirements established at*
Convenções e Códigos Internacionais ratificados pelo Brasil e na Regulamentação Nacional
*Conventions and Internationals Codes ratified by the Brazilian Government and the national applicable regulation*
aplicável para operar em Águas sob Jurisdição Nacional – AJB.
*to operate in Waters Under National Jurisdiction - AJB.*

Emitido em .....em...../...../..... .
*Issued at.....in...../...../..... .*
Válido até...../...../.....
*Valid until ...../...../.....*

.....
(Nome e Assinatura)
***(Name and signature)***
Capitão dos Portos/Delegado
***(Representative Authority)***

- 1- F -1 - NORMAM 04/DPC

**ATTACHMENT 19 – Disclaimer (Sign by FPSO)**

THE REGULATIONS AND TERMINAL INFORMATION CONTAINED IN THIS DOCUMENT ARE INTENDED TO ACQUAINT OWNERS, CHARTERERS AND MASTERS OF VESSELS CALLING AT THE FPSO TERMINAL WITH THE GENERAL CONDITIONS, FACILITIES AND SERVICES AVAILABLE AT THIS TERMINAL.

THE TERMINAL IS OPERATED ON BEHALF OF PETRORIO, WHO, WITH THEIR AFFILIATE AND PARENT COMPANIES AND CONTRACTORS ARE REFERRED TO INDIVIDUALLY AND COLLECTIVELY AS "THE PARTIES".

THIS BOOKLET DOES NOT REPLACE OR MODIFY ANY OFFICIAL PUBLICATIONS COVERING THE WATERS, AREAS OR SUBJECTS TO WHICH IT PERTAINS, AND IS PROVIDED SUBJECT TO THOSE CONDITIONS SET OUT IN THE "DISCLAIMER" AND "CONDITIONS OF USE OF THE FPSO TERMINAL FACILITIES" INCLUDED HEREIN. REFERENCE SHOULD BE MADE TO THE APPROPRIATE HYDROGRAPHIC OFFICE PUBLICATIONS, ADMIRALTY PUBLICATIONS AND OFFICIAL CHARTS FOR PURPOSE OF OBTAINING NAVIGATIONAL INFORMATION.

IN ALL CASES WHERE THE PARTIES REPRESENTATIVE IS REFERRED TO, THIS SHALL BE THE FPSO OIM OR THE MOORING MASTER (WHEN PRESENT).

THOSE CONSULTING THESE **FPSO TERMINAL PORT REGULATIONS AND INFORMATION** ARE ADVISED TO SATISFY THEMSELVES THOROUGHLY AS TO THE INFORMATION, PROCEDURES AND GUIDELINES AS THEY APPLY TO THE MATTERS IN WHICH THEY ARE INTERESTED. ANY USER OF THESE **REGULATIONS AND INFORMATION** SHOULD BE AWARE OF THE POTENTIAL FOR ERROR IN THE INFORMATION IN VIEW OF BOTH ITS SCOPE AND THE PASSAGE OF TIME. MOREOVER, NO ONE SHOULD USE THE INFORMATION CONTAINED IN THESE **REGULATIONS AND INFORMATION** WITHOUT INDEPENDENT VALIDATION AND ANY PERSON WHO USES OR RELIES ON THE INFORMATION AND GUIDELINES CONTAINED HEREIN DOES SO AT HIS OR THEIR OWN RISK. PETRORIO, BW AND THEIR AFFILIATED AND PARENT COMPANIES EXPRESSLY DISCLAIM ALL LIABILITY OR RESPONSIBILITY FOR ERRORS, OMISSIONS OR INACCURACIES OR FOR ANY MISAPPLICATION OR MISINTERPRETATION OF ANY OF THE PROCEDURES, GUIDELINES OR INFORMATION, OR FOR ANY CONSEQUENCES THEREOF. NO EXPRESS OR IMPLIED WARRANTIES OF ANY TYPE WHATSOEVER ARE MADE WITH REGARD TO THE USE OR APPLICATION OF THESE TERMINAL REGULATIONS AND INFORMATION.

AS MASTER OF THE SS/MV ("VESSEL"), I HAVE READ AND HAVE FAMILIARISED MYSELF WITH THE FPSO TERMINAL PORT REGULATIONS AND INFORMATION. I SPECIFICALLY ACKNOWLEDGE AND AGREE TO THE PROVISIONS OF SECTIONS 5 AND 7 OF SUCH RULES. I ALSO ACKNOWLEDGE AND AGREE TO THE FOLLOWING:

1. THAT I HAVE RECEIVED A COPY OF THE FPSO TERMINAL PORT REGULATIONS AND INFORMATION.

2. THAT THE SERVICES AND FACILITIES EXTENDED BY PETRORIO AND BW (WHO WITH THEIR AFFILIATES, PARENT COMPANIES AND CONTRACTORS ARE INDIVIDUALLY AND COLLECTIVELY CALLED "THE PARTIES") AT FPSO TERMINAL ARE PROVIDED IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THOSE REGULATIONS AND INFORMATION.

3. THAT A VISITING VESSEL, OWNER AND CREW SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGES OR CLAIMS WHICH MAY ARISE FROM THE USE OF THE SERVICES AND FACILITIES REGARDLESS OF ANY NEGLIGENCE OF THE MOORING MASTER AND OF THE PARTIES'S EMPLOYEES, AGENTS, OR SERVANTS.

4. THAT I, MY VESSEL, ITS CREW, EMPLOYEES, AGENTS, AND REPRESENTATIVES AGREE TO ABIDE BY THE TERMS AND CONDITIONS OF THOSE RULES.

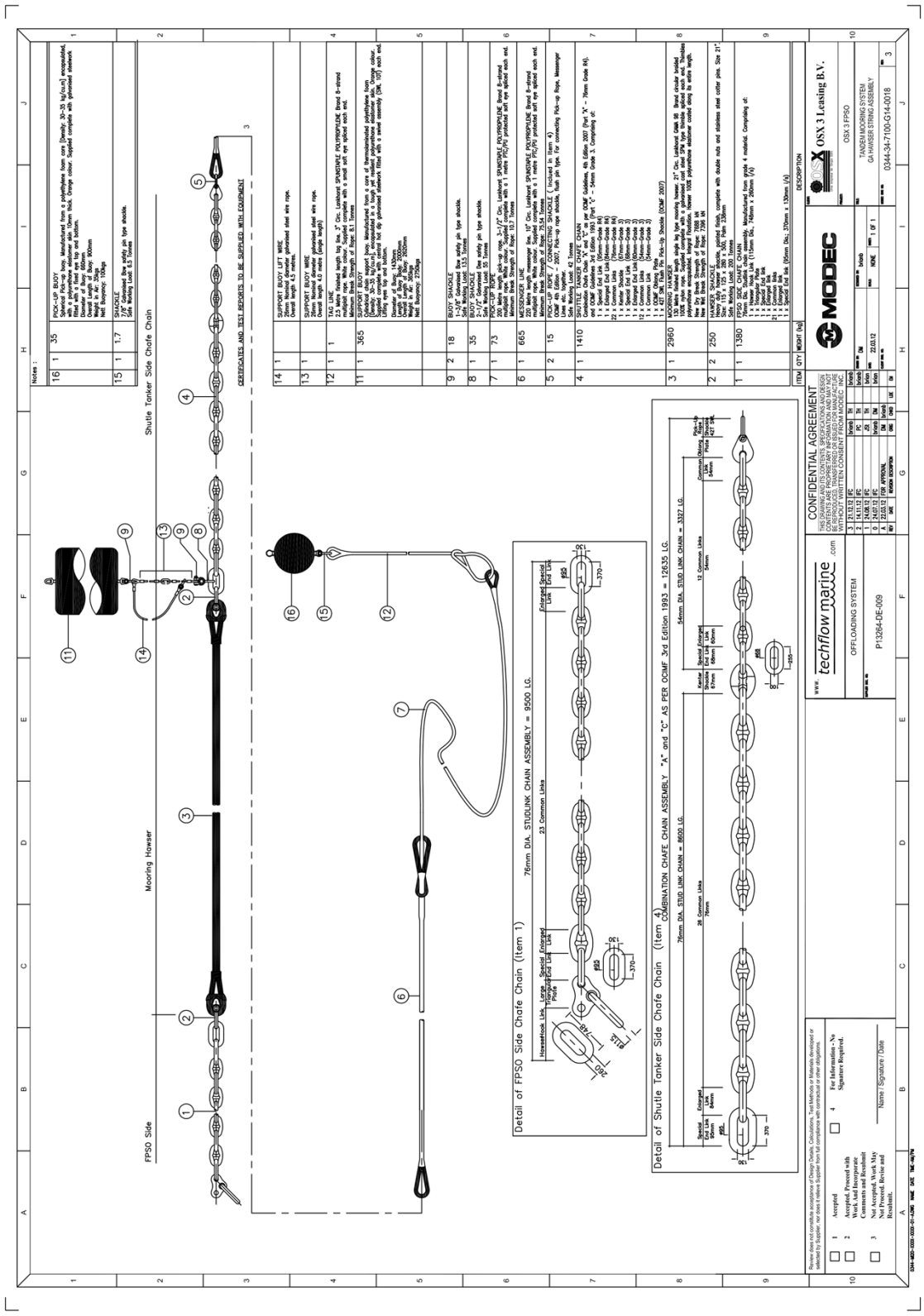
5. THAT I HAVE SPECIFICALLY READ AND AGREED TO THE "DISCLAIMER" WHICH IS LOCATED ON PAGE 4 APPENDIX A HEREOF AND HAVE READ AND AGREED TO "CONDITIONS OF USE OF THE FPSO TERMINAL FACILITIES" LOCATED ON PAGE 2 AND 3 of APPENDIX A.

**Signed:** _____ **Name:** _____

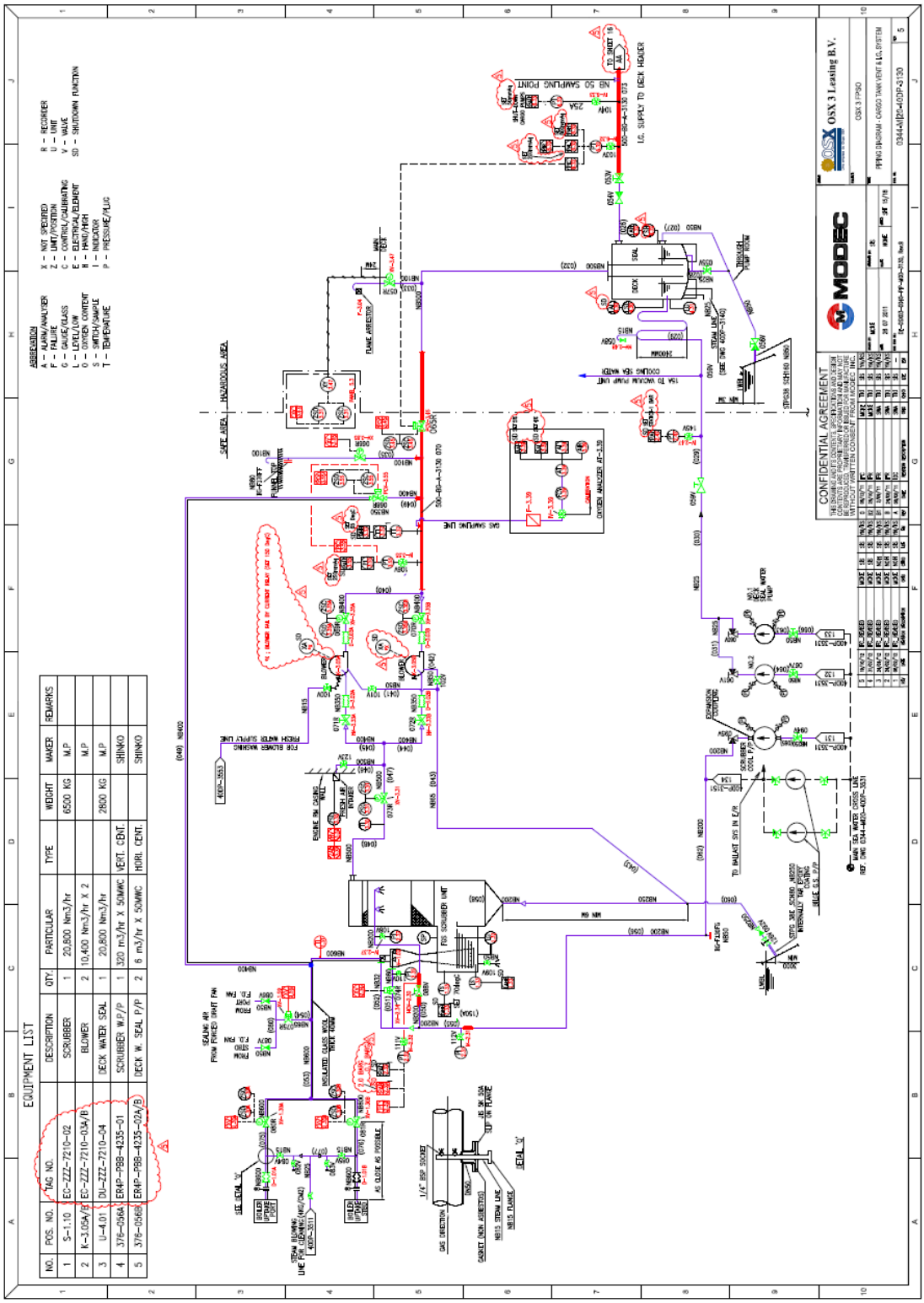
**Master SS/MV:** _____

**Time/Date:** _____

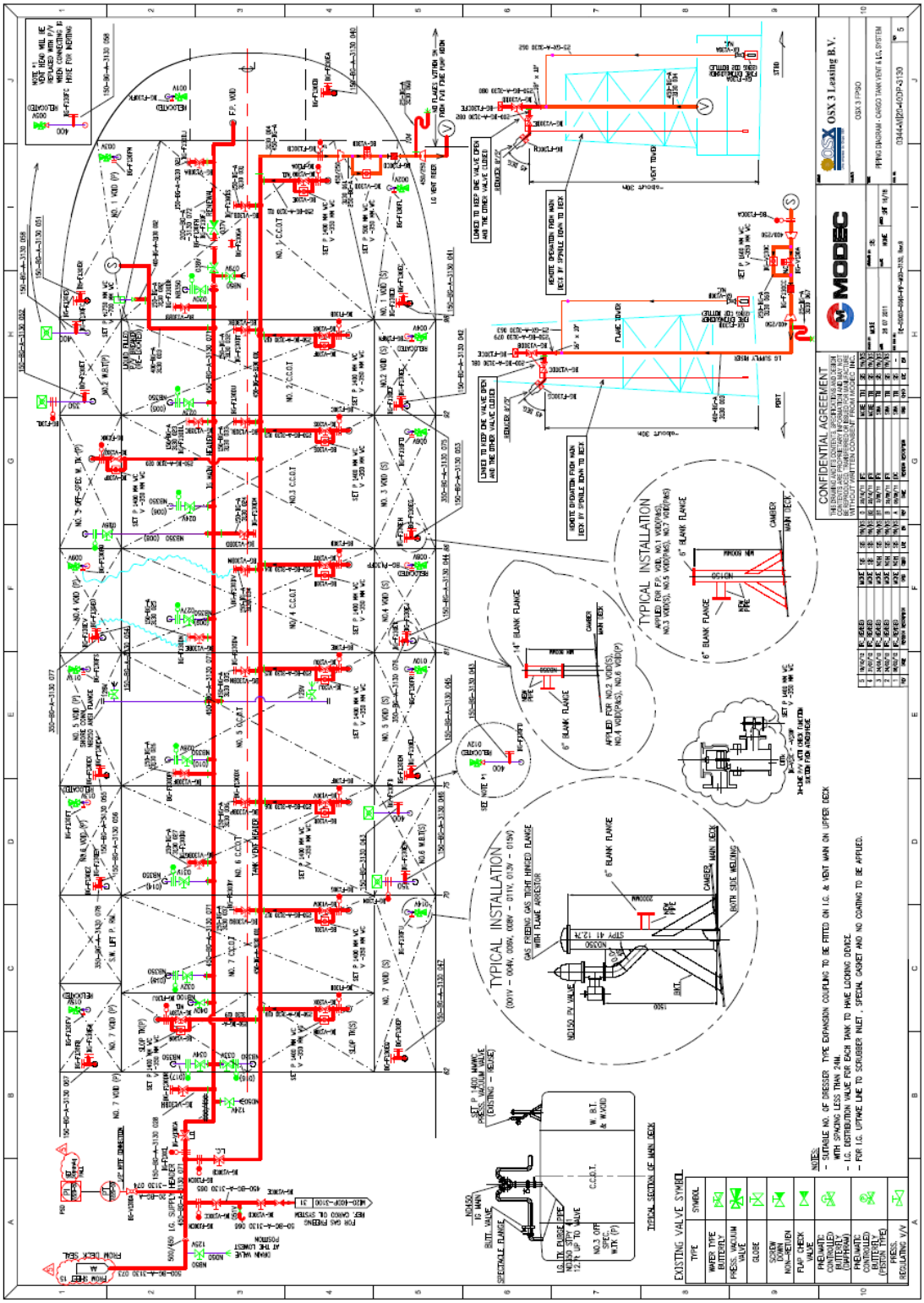
## ATTACHMENT 20 – Shuttle Tanker Hawser Arrangement & Details



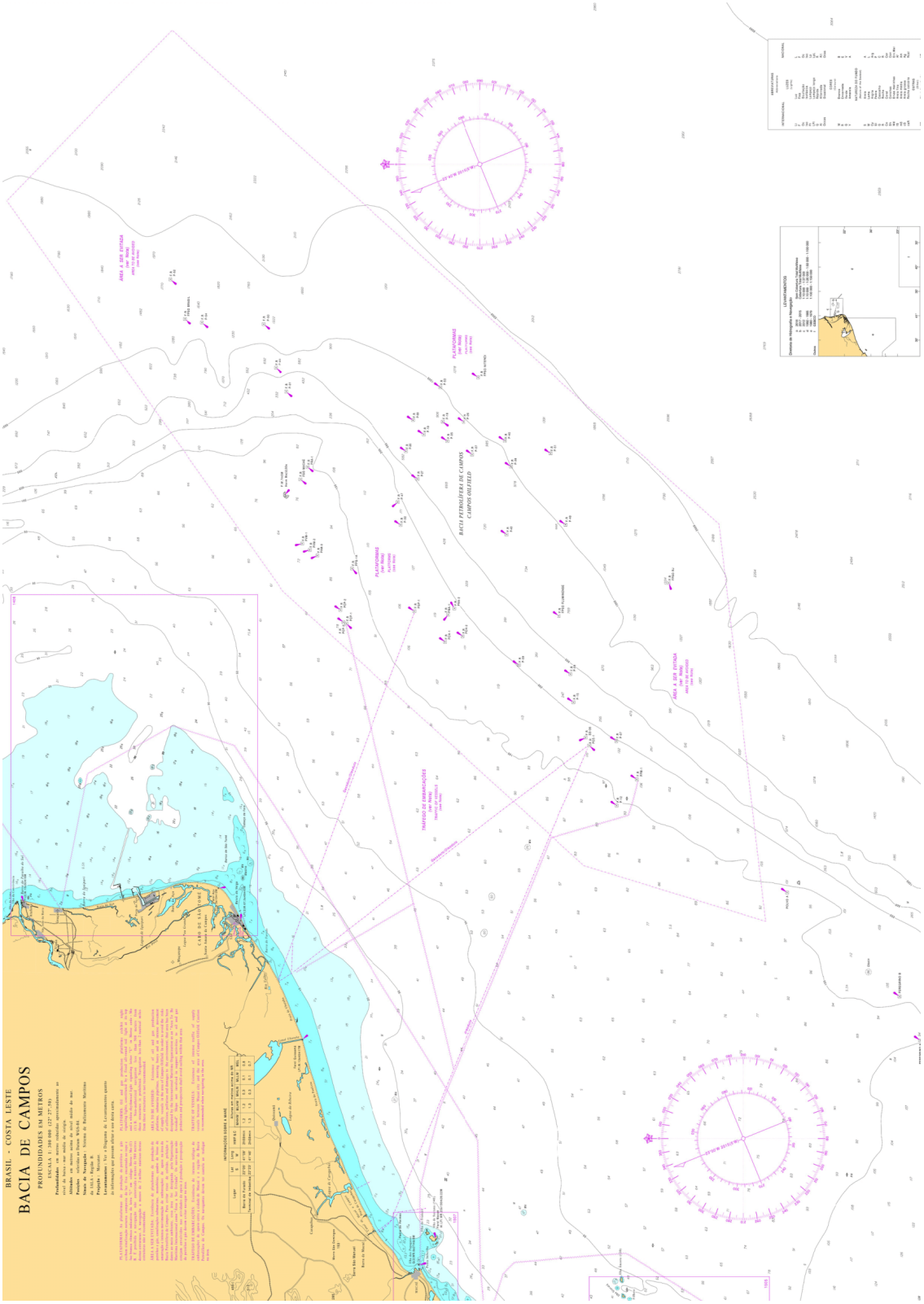
**ATTACHMENT 21 – FPSO BRAVO Inert Gas System - from the Boilers through the Scrubber, blowers and to the Deck Seal**



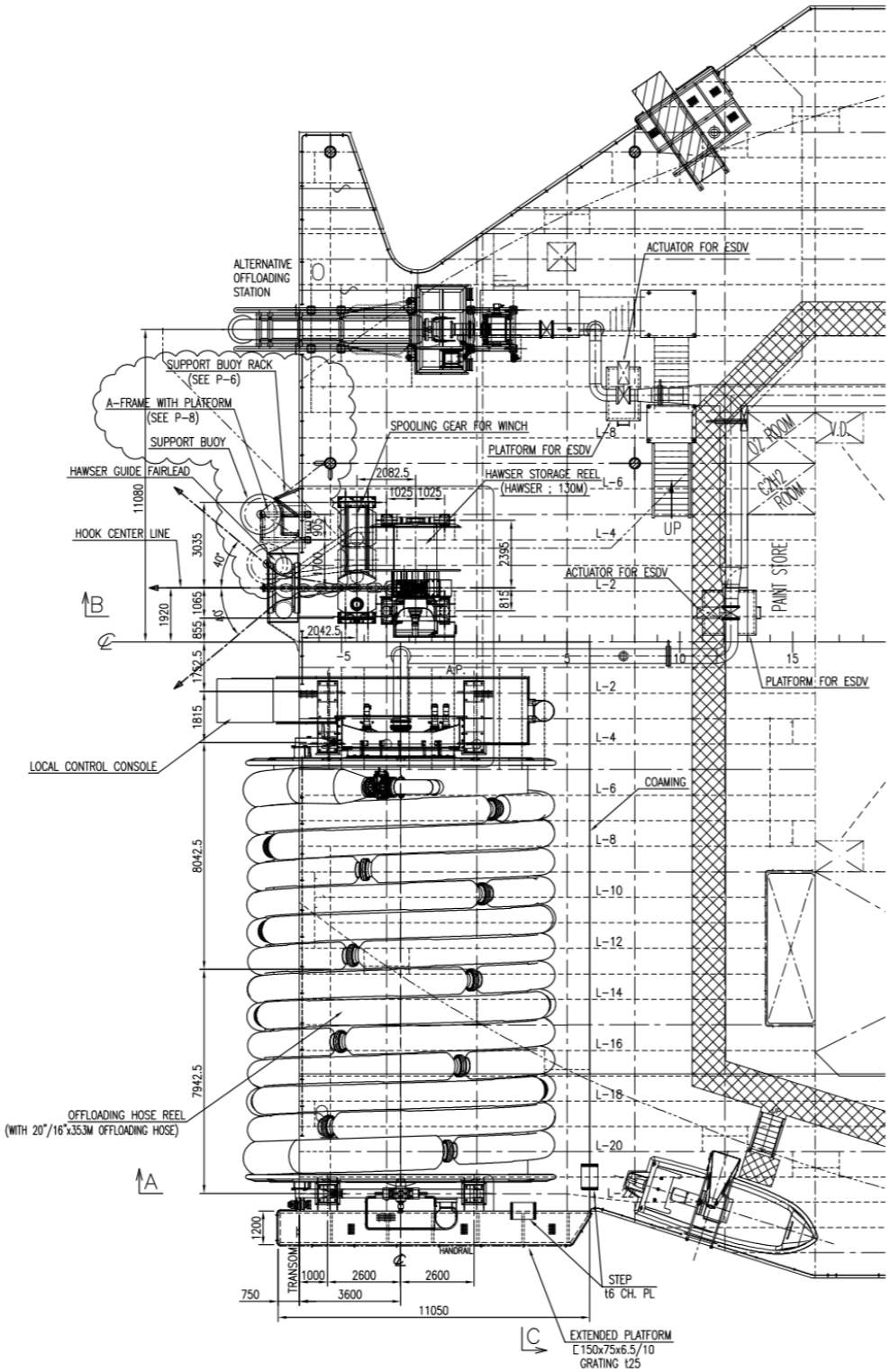

**ATTACHMENT 22 – FPSO BRAVO Inert Gas System - from the Deck Seal to the cargo tanks (purge and supply) and up to the Vent Posts P/S**


TYPICAL INSTALLATION
TYPICAL INSTALLATION
CONFIDENTIAL AGREEMENT
OSX 3 Leasing B.V.
MODEC
EXISTING VALVE SYMBOL
NOTES:

## ATTACHMENT 23 – Nautical Chart

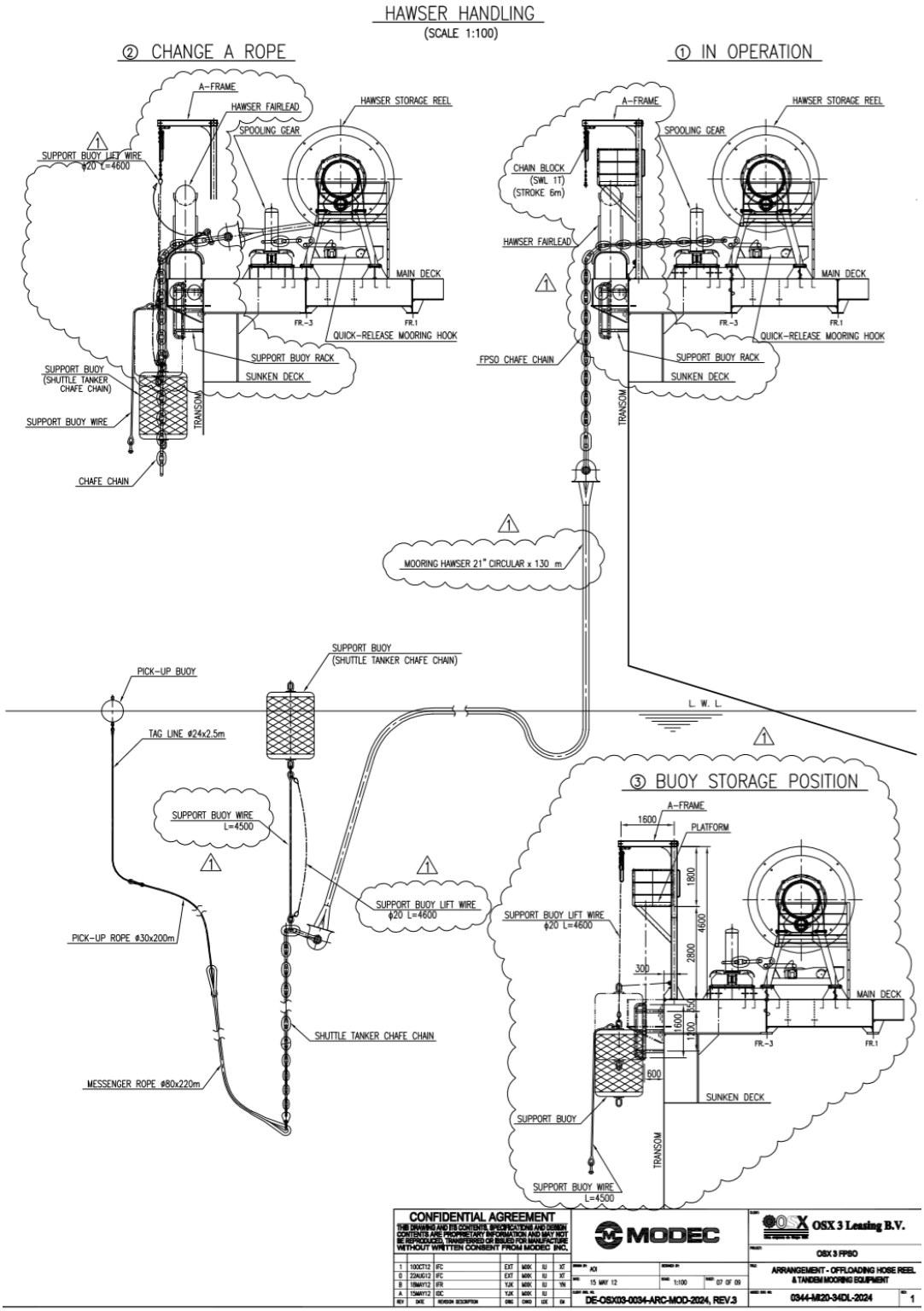


## ATTACHMENT 24 –Offloading Hose Arrangement

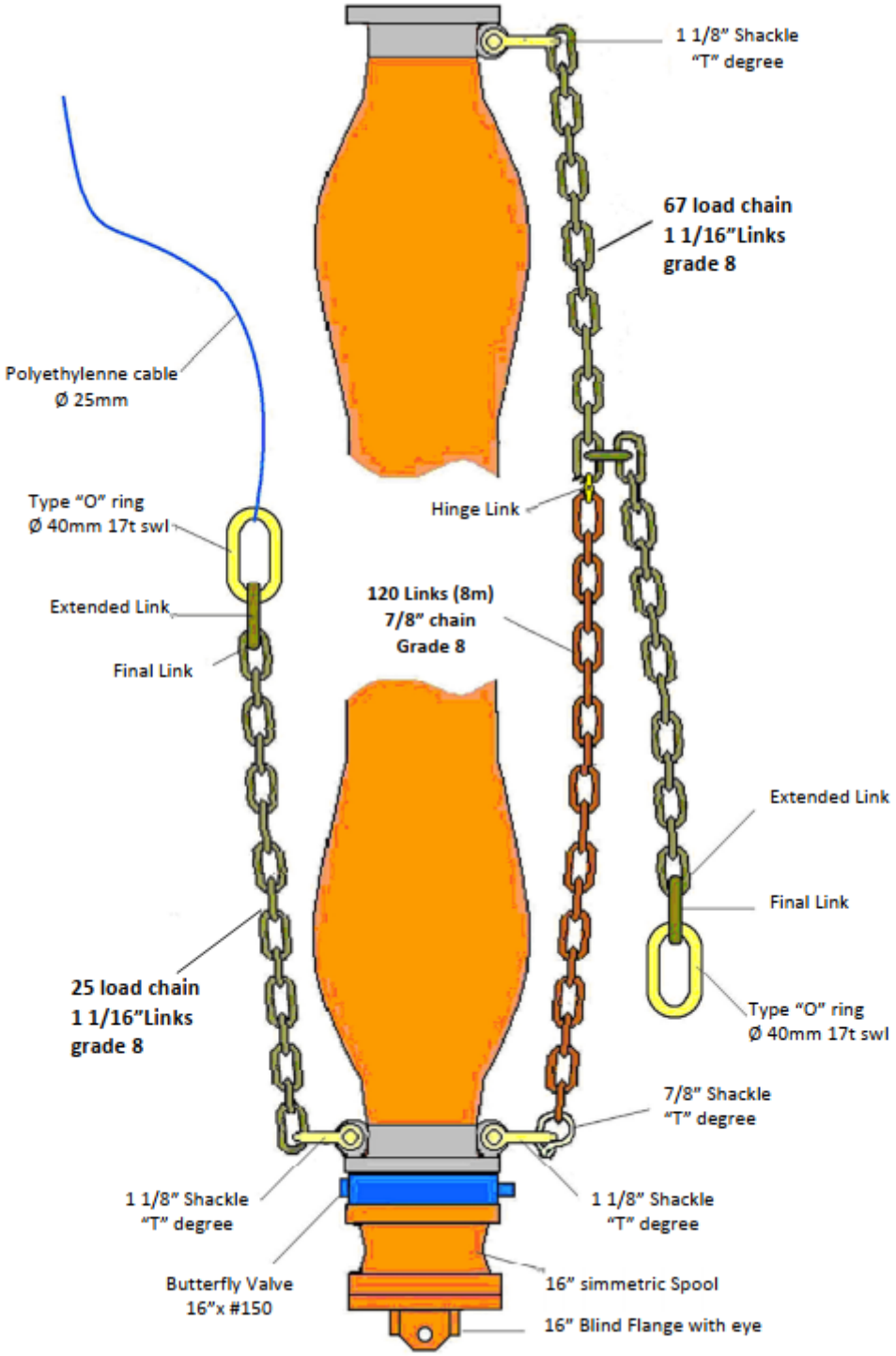


| Seção | Tipo | Diâmetro | L [ft] | Modelo |
|---|---|---|---|---|
| 1 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 2 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 3 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 4 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 5 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 6 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 7 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 8 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 9 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 10 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 11 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 12 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 13 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 14 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 15 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 16 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 17 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 18 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 19 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 20 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 21 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 22 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 23 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 24 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 25 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 26 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 27 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 28 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 29 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 30 | DC Full Floating Line Hose Standard Type | 20" | 35 | 3070F |
| 31 | DC Full Floating Line Hose with Built-InReducer #150 | 20"x16" | 35 | 4070F |
| 32 | DC Full Floating Tail Hose #150 | 16" | 35 | 5070F |
| 33 | DC Full Floating Tanker Rail Hose #150 | 16" | 35 | 6070F |
| Válvula Borboleta 16" - tipo Wafer | | | | |
| Studded Type Camlock 16" | | | | |

## ATTACHMENT 25 – System Configuration of the FPSO

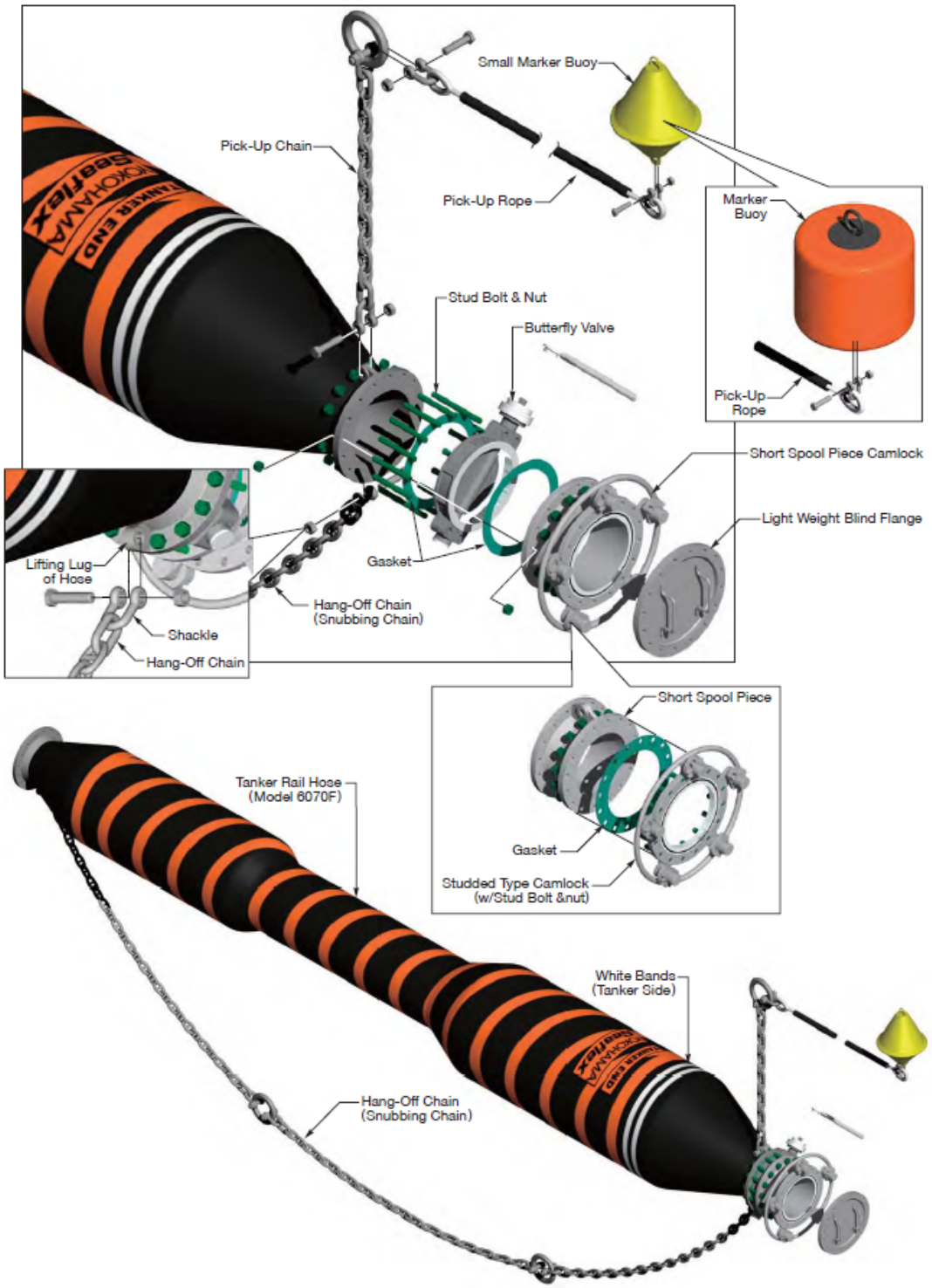


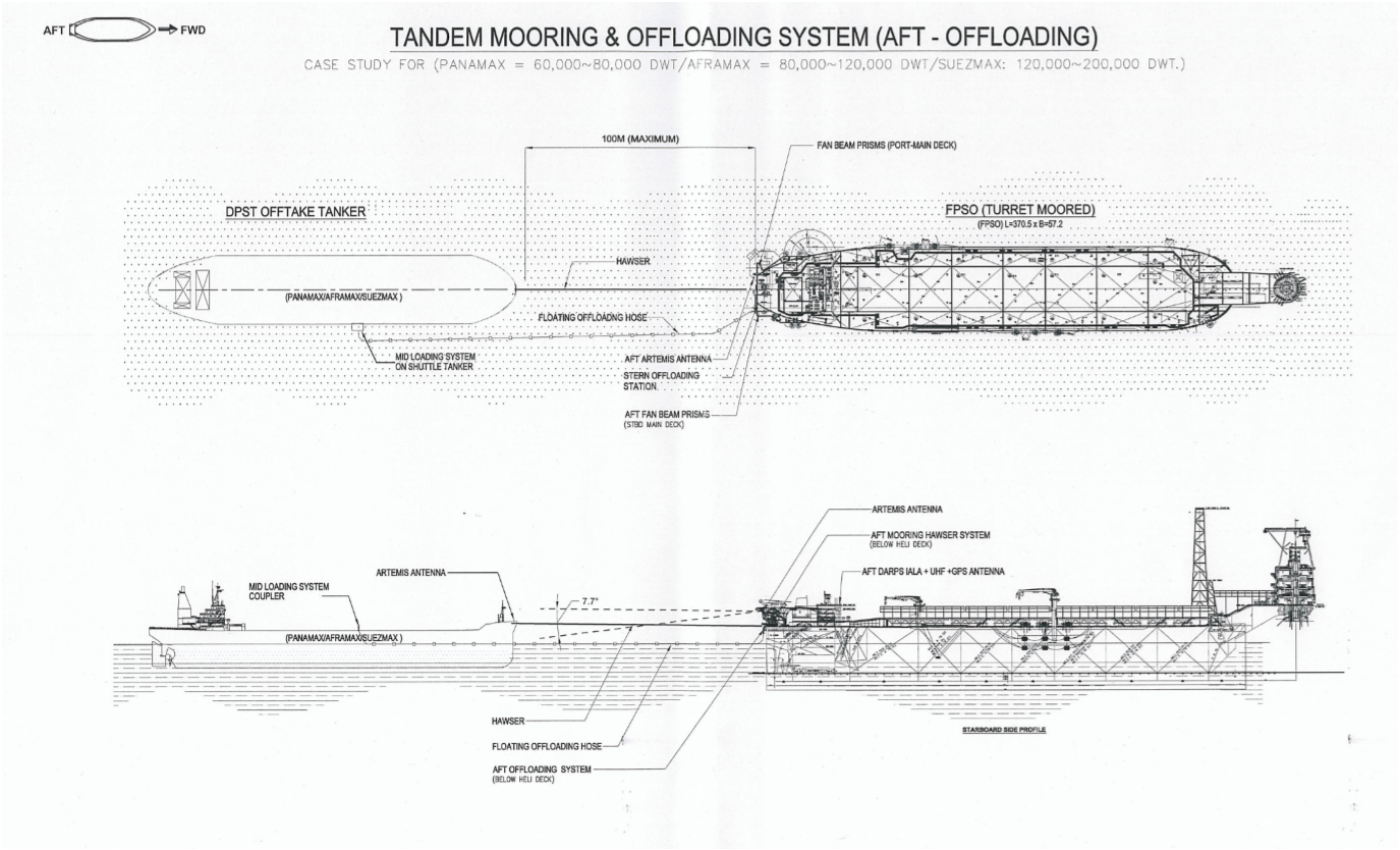

## ATTACHMENT 26 – Description of the 16” Tanker End

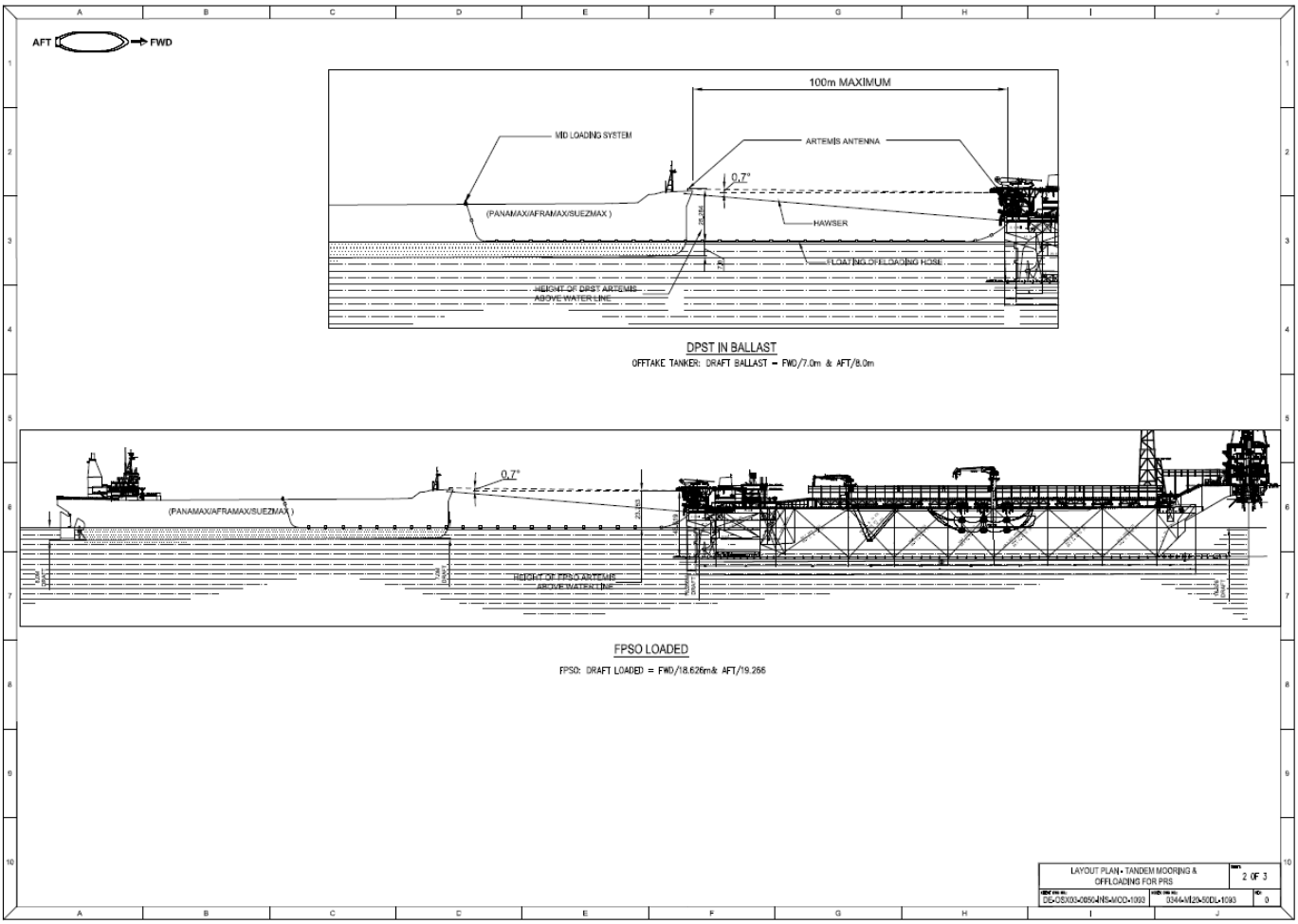

1 1/8" Shackle
"T" degree
67 load chain
1 1/16"Links
grade 8
Polyethylenne cable
Ø 25mm
Type "O" ring
Ø 40mm 17t swl
Hinge Link
Extended Link
Final Link
120 Links (8m)
7/8" chain
Grade 8
Extended Link
Final Link
Type "O" ring
Ø 40mm 17t swl
25 load chain
1 1/16"Links
grade 8
7/8" Shackle
"T" degree
1 1/8" Shackle
"T" degree
1 1/8" Shackle
"T" degree
Butterfly Valve
16"x #150
16" simmetric Spool
16" Blind Flange with eye

# TANKER END GEAR ASSEMBLY

## FOR FLOATING HOSE LINE




AFT
FWD
TANDEM MOORING & OFFLOADING SYSTEM (AFT - OFFLOADING)
CASE STUDY FOR (PANAMAX = 60,000~80,000 DWT/AFRAMAX = 80,000~120,000 DWT/SUEZMAX: 120,000~200,000 DWT.)
100M (MAXIMUM)
FAN BEAM PRISMS (PORT-MAIN DECK)
DPST OFFTAKE TANKER
FPSO (TURRET MOORED)
(FPSO) L=370.5 x B=57.2
HAWSER
(PANAMAX/AFRAMAX/SUEZMAX)
FLOATING OFFLOADING HOSE
MID LOADING SYSTEM ON SHUTTLE TANKER
AFT ARTEMIS ANTENNA
STERN OFFLOADING STATION
AFT FAN BEAM PRISMS (STBD MAIN DECK)
ARTEMIS ANTENNA
AFT MOORING HAWSER SYSTEM (BELOW HELI DECK)
AFT DARPS IALA + UHF +GPS ANTENNA
MID LOADING SYSTEM COUPLER
ARTEMIS ANTENNA
7.7°
(PANAMAX/AFRAMAX/SUEZMAX)
HAWSER
FLOATING OFFLOADING HOSE
AFT OFFLOADING SYSTEM (BELOW HELI DECK)
STARBOARD SIDE PROFILE


AFT
FWD
100m MAXIMUM
MID LOADING SYSTEM
ARTEMIS ANTENNA
0.7°
(PANAMAX/AFRAMAX/SUEZMAX )
HAWSER
FLOATING OFFLOADING HOSE
HEIGHT OF DPST ARTEMIS ABOVE WATER LINE
DPST IN BALLAST
OFFTAKE TANKER: DRAFT BALLAST = FWD/7.0m & AFT/8.0m
0.7°
(PANAMAX/AFRAMAX/SUEZMAX )
HEIGHT OF FPSO ARTEMIS ABOVE WATER LINE
FPSO LOADED
FPSO: DRAFT LOADED = FWD/18.626m& AFT/19.266
LAYOUT PLAN - TANDEM MOORING & OFFLOADING FOR PRS
2 OF 3