SBM Standard Wheel and Rail CALM Buoy.

12.5m Diameter x 4.8m Deep Buoy, complete with 2 x 24” and 1 x 16” Inlet/outlets at 225psi

DETAIL AS FOLLOWS:

Note: Photographs taken during installation in March 2005.
Technical Description of a Standard Wheel and Rail CALM Buoy
The buoy hull is a circular, all-welded steel structure, subdivided into six main watertight compartments located around a cylindrical watertight central chamber. The 25-year-in-the-water hull design is 12.5 meters in diameter and approximately 4.8 meter in depth.

Two (2) of the watertight peripheral compartments are designated as access compartments. Access to these compartments is through watertight dogged hatches on the main deck. A watertight door provides access between the access compartments and the central chamber.
Selected welds of the buoy body and rotating assembly are ultrasonically tested. This is complemented by radiographic inspection of not less than 10% of the total length of butt welds.

Watertightness of the buoy and its compartments is verified by pressure testing the buoy with a pressure of 2 psig. All butt weld seams, corner welds and hatch seals are coated with a soap solution for visual examination.

The buoy is designed to have sufficient reserve buoyancy to remain afloat with two adjacent peripheral main compartments open to the sea.

The stability of the buoy is adequate to prevent the buoy's capsizing in the event any combination of two anchor legs fails.

**SUMMARY OF THE BUOY HULL COMPONENTS**

Major components in the Standard Wheel and Rail Buoy are as follows:

A. **General**

   Manufacturer: SBM-IMODCO
   Model Designation: Single Point Mooring
   Type: Standard Buoy
   Primary Hull Material: A-36

B. **Buoy Dimensions**

   Diameter: 12.5 meters
   Height: 4.8 m
   Hawse Pipes-Quantity: Six (6) – Diameter: 24-inch
C. Multi-Product Distribution Unit (MPDU)

Product Grade: Two (2)
Operating Pressure: 225 psig
Inlets/Outlets: Two (2) 24-inch, One (1) 16-inch

D. Rotating Cargo Manifold (RCM)

Piping: Two (2) 24-inch, One (1) 16-inch
Valves: Butterfly

E. Central Chamber

Piping: Two (2) 24-inch, One (1) 16-inch
Valves: Butterfly

CHAIN HAWSES AND CHAIN STOPPERS

Integral with each of the radial watertight bulkheads is a vertical mooring chain hawse pipe to ensure long chain life. A chain stopper for securing mooring chains is fitted to the top of each hawse pipe. The chain stoppers are designed for adjustment of chain tension from the main deck.

Sufficient space is provided in a chain well above each chain stopper for storage of a small amount of chain. Access to the chain wells is from the main deck.

The chain stoppers are of self-closing and cast steel type, welded inside each of the six chain lockers at the top of the buoy hawse pipe to secure the anchor chain pendants to the buoy. The chain stoppers will be designed for the anchor
chain link size and are designed to permit chain pretension adjustment from the deck of the rotating assembly. The chain stoppers will be fitted with lifting lugs.

The "flapper stopper" design also facilitates rapid and accurate setting of the chain, from the buoy deck without divers and simplifies chain tensioning, which is especially important in shallow water. The chain stopper can be inspected from the deck of the buoy. Additionally, the special bell mouth distributes chain wear over several links and thus increases chain life and safety.

**ROTATING ASSEMBLY FOUNDATION**

The buoy deck provides a reinforced structural steel foundation for the mounting of the rotating assembly. The foundation provides a means for metal-to-metal seating and fastening of the rotating mooring collar to the buoy deck and will be designed to accommodate any axial loads, radial thrust loads, and overturning moments that are transmitted from the mooring arm.

A crane rail, fabricated in sections, is attached with bolted clips to a "T" section welded to the deck for support of the wheel assemblies on the outboard end of each rotating arm. The reinforced structural steel foundation is provided in the buoy deck under the crane to carry the mooring loads.

**TERMINAL FENDERING**

Above the waterline, the hull is protected by diagonal steel half pipe fenders fitted about the entire buoy hull secured to the buoy hull by welding.

Below the waterline, a circular steel fender skirt projecting approximately 1 meter beyond the hull at the lower deck level is fitted about the entire circumference of the terminal. This fender, consisting of steel pipe and plate reinforced by webs, helps protect the hull and the floating hose string from damage in the event the moored tanker should ride up on the terminal.
ROTATING ASSEMBLY

The rotating arm connectors, welded to the lower end of the rotating section of the Product Distribution Unit (PDU), are supported by the main roller bearing.

The following rotating major components are attached to the arm connectors by means of a pin arrangement permitting rapid removal of each unit:

1. Mooring Arm
2. Balance Arm
3. Piping Arm

The PDU, the arm connectors and the three rotating arms rotate together as one unit.

The outboard ends of these three arms are supported by alloy steel wheels that run on a rail on the deck of the buoy. These wheels have alloy steel wheel shafts and have roller type bearings with sealed lubrication cavities. The wheels are subjected to vertical loading only. Horizontal loads are transmitted through the arm connectors and the main roller bearing to the hull structure.

Mooring Arm

The mooring arm is designed to securely and safely moor the largest tanker scheduled to use the SPM terminal.

Two (2) padeyes are provided on top of arm to attach dual mooring hawsers. Single mooring hawsers can be used by including a tri-plate assembly with close fitting pins.

Balance Arm

A means to balance the off-center weight of the piping arm and the mooring arm is required to maintain the terminal buoy on an even trim. This is accomplished
by adding ballast material to a ballast box located on the outboard end of the rotating balance arm.

**Piping Arm**

The rotating piping arm carries the cargo pipe runs connecting the fluid swivel to a floating hose system.

**Wheel and Track Assembly**

A dual-wheel assembly that runs on a crane rail supports the outer end of each of the three (3) rotating arms. The wheels are mounted on sealed grease-filled pillow blocks. Lubrication fittings are provided for lubrication of the wheels.

An "L" shaped structure bolted to the underside of each arm and reaching under the "T" section acts as a stopper to prevent arm uplifting.

**ANCHORING SYSTEM**

The following mooring leg configuration is based on our preliminary analysis. The mooring analysis is based on Client's provided environmental. The arrangement will be confirmed and optimized during the detailed design phase.

**Anchor Chains**

The buoy will be securely held in position by six (6) equally spaced xxx-inch studlink chains. Each chain leg has a length of xxx meters. The anchor chains are secured to the buoy body by six (6) chainhawse and stoppers suitable for 3.75-inch diameter chains.

**Anchor Piles**

Each of the chain legs is secured to the seabed by xxxx.
FLUID TRANSFER

Product Distribution Unit (PDU)

The unique SBM-IMODCO Multi-Product Distribution Unit (MPDU) permits the simultaneous passage of fluid cargo while rotating freely in response to the moored tanker's movements.

The SBM-IMODCO Standard Buoy is equipped with a two-grade MPDU with the following characteristics:

- **Inlets/outlets diameter**
  - Two (2) 24-inch
  - One (1) 16-inch

- **Operating Pressure**
  - 225 psi (gauge)

- **Operating Temperature**
  - 150°F

Incorporated into the MPDU to provide rotational capabilities is a 50-inch diameter, double-row tapered roller bearing, rated for radial loads up to 3,280,000 pounds without sustaining any permanent distortion. The bearing is grease-packed, sealed against the ingress of water, and is virtually maintenance free. A 19-inch diameter double-row tapered roller bearing is located at the upper end of the MPDU to stabilize the rotating outer shell.

Product Piping

The cargo system in the SBM-IMODCO Standard Buoy has a design working pressure of 225 psi and consists of the central chamber piping, the Multi-Product Distribution Unit (MPDU), and the rotating piping arm.

The lower end of the MPDU extends through the main deck into the central chamber and connects to the central chamber cargo piping. Two 24-inch diameter and one 16-inch diameter piperuns are provided in the central
chamber. Each 24-inch diameter piperun is fitted with a flanged, ANSI Class 150, gear operated butterfly valve.

Underbuoy hoses are flange connected to extensions of the central chamber piping, which pass through the bottom deck, using bolt-on flanged concentric reducers as necessary.

The MPDU inlets and outlets are flanged to accept the two 24-inch diameter and one 16-inch diameter central chamber and rotating piping arm piperuns.

The rotating piping arm is fitted with two 24-inch diameter and one 16-inch diameter piperuns. Each piperun is fitted with a flanged, ANSI Class 150, butterfly valve. Floating hoses are flange-connected to the overboard piperuns using bolt-on flanged reducers as necessary.

To accommodate minor changes in perpendicular alignment between the MPDU and the pipe arm, a single arch rubber expansion joint is provided in each rotating piping arm piperun.

Pipe welds in the cargo piping system are 100 percent radiographically inspected.

All flange connection bolting material shall be of carbon steel material in accordance with ASTM A 193 Grade B7 for stud bolts, with nuts conforming to ASTM A 914 Grade 2H. Stud bolts and nuts are protected by a corrosion resistant polytetrafluorethylene (PTFE) coating.

All flanged connections shall have ANSI Class 150 raised face flanges. Gaskets are neoprene-asbestos suitable for use with raised-face flanges.

The complete cargo piping system including the MPDU but excluding the expansion joints is hydrostatically pressure tested at 375 psi gauge without leakage to ensure tightness and leak-proof construction of the cargo system.
Notes:

- Located ‘as is, where is’ Caribbean Sea
- Available Subject to prior sale.
- Inspection upon request.
- Purchaser to perform ‘Due Diligence’.
- Reported by Owners to be in Good Condition
- Price subject to acceptance by Owners of Purchasers Offer