Conventional Buoy Mooring Systems
A safe, reliable and cost effective tanker loading / offloading solution
Conventional Buoy Mooring (CBM) systems, sometimes referred to as Multiple Buoy Mooring (MBM) systems, are in use for the transfer of products such as crude and LPG between tankers and shore facilities all over the world.

A CBM system provides a safe and attractive solution to tanker loading / offloading requirements in shallow water, offering a more reliable, efficient and cost effective alternative to jetty systems. (Moreover, offshore terminals give a far greater scope and flexibility for location).

CBM systems are ideally suited to shallow water applications up to some 30m depth in benign environmental conditions and conditions with a dominant directional character.

With safety and environmental considerations foremost in the design, and a design life of 20 to 25 years, Bluewater’s CBM systems assure the integrity and value of your investment.

Conventional Buoy Mooring Systems

A Conventional Buoy Mooring (CBM) system restricts tankers from weathervaning and, as such, it is often applied on projects where smaller tankers are employed, in areas where the environmental conditions are moderate or directional and / or where the frequency of loading / offloading operations is limited.

The system can be designed to berth all sizes of tankers but, in general, tanker size typically ranges from 5,000 to 60,000 DWT.

The Benefits

The CBM system allows the tankers to safely maintain position for the period required to load or offload their products. Typically, 3 or 4 mooring buoys are used for station keeping of the tanker. When berthed, the tanker remains on location without using its own anchors. On the tanker side, the ships mooring ropes are connected on either side to the bow and the stern and on the buoy side to the quick release hooks on the buoy.

After mooring the tanker to the buoys, picking up a submerged hose string and connecting this hose to its midship manifold, the loading or offloading operation may start. The other end of the hose string is connected to a Pipeline End Manifold (PLEM), which in turn is fixed to a subsea pipeline, transferring the product to or from any installation located onshore.

On completion of the loading operation, the hose string is laid down on the seabed, ready for being picked up again when the next tanker arrives.
Pipeline End Manifold

Located on the seabed, the Pipeline End Manifold (PLEM) serves to connect the subsea hose string to the submarine pipeline(s). By means of valves on the PLEM, the hose string can be isolated and the pipeline closed off. The PLEM structure consists of a base frame, a protective structure, piping, valves, a subsea control module, and if required, pressure and temperature indicators.

Mooring System

The mooring system comprises Mooring Buoys and Mooring Legs, where the buoys are generally moored to the seabed with chain legs and high holding power anchors or piles, depending on soil characteristics. A typical CBM includes 3 or 4 buoys and each buoy has a mooring assembly through the centre of the unit, terminating in a mooring eye on the bottom and padeyes on top for the fitting of quick release hooks.

On the buoy structure, ladder access is provided to the deck level in order to safely access the utility equipment, including marine lantern, radar reflector and a solar power system. To allow safe and easy access by boats, safety handrails, mooring bollards and fendering are also provided.

Subsea Control System

Certain controls are required to ensure safe operation of the system and these can range from a simple umbilical attached to the loading hose and operated by the tanker crew, to a sophisticated Subsea Control System installed on the PLEM. However, for any such control system, a primary purpose will be control and operation of the ESD valve(s).

For a shore-based control system, there will either be a cable running from shore to the PLEM or a telemetry link with an antenna located on a small control buoy moored above the PLEM. This allows an onshore control station to monitor product flow, pressure and temperature and to operate the ESD valve(s).

Offloading Hose String

The hose string provides the interface between the midship loading manifold on the berthed tanker and the PLEM. Its total length depends on the possible excursions of the moored tanker, which in turn are determined by the water depth and the environmental conditions expected during loading / offloading activities.

When the system is not in use, the hose string is laid down on the seabed away from the influence of the waves. The end of the hose is provided with a pick-up line and a marker buoy. The hose string is picked-up by a small support vessel that also assists the tanker with mooring to the buoys. CBM’s can be operated with up to 3 or 4 separate product lines.
Leaders in Buoy Technology

Since 1978, Bluewater has been a leader in the design of buoy systems for the safe and efficient conveyance of fluids. With a global client portfolio built upon flexibility, versatility and customer-client collaboration, Bluewater is today responsible for some of the most innovative buoy systems in service throughout the world.

Bluewater’s client commitment extends beyond the installation of your buoy system, with comprehensive training and documentation packages and a dedicated after sales support service focused on customer satisfaction through the life of your system:

- Advice, problem solving and knowledge exchange
- Engineering and supervision services
- Operational training
- Maintenance refreshment courses
- Rapid response to queries
- Single point of contact
- Spare parts service

Worldwide Applications of Bluewater Buoy Systems
Proven in the Past, Prepared for the Future

Bluewater ensures that each system is tailored to the exact needs of your application, from terminal to tanker. Employing dedicated professionals to identify and fully analyse all safety, environmental and operational impacts, Bluewater's buoy systems are designed to operate to the highest standards of safety and to minimise risk to personnel and/or damage to the environment.

Looking to the future, Bluewater is preparing today for the operating imperatives of tomorrow. The markets are changing.

The key to success and viability in the face of this and other future challenges is Bluewater's unique, precise combination of technology, know-how and flexibility, underpinned by the vital ingredient: commitment.

Bluewater's Conventional Buoy Mooring Systems are currently employed in a diverse range of applications including:

- Crude Oil
- Refined and clean products (Kerosene, Gasoline, Diesel)
- LPG
- Heavy Fuel Oil (HFO)
- Clean water
- Orimulsions and other slurries

Adding Value

The terminal consists of two main components – the CBM system and the pipeline(s) connecting the buoy system to the onshore terminal. The client can choose to contract each component to a specialist, and to manage those contracts, the interface between the contracts and the interface with the shore terminal itself. Alternatively, the client can select an EPIC contractor responsible for the complete terminal facility. The client then has to manage a single turnkey contract and a single interface. Bluewater is experienced in both contracting roles.

For further information on Bluewater's Buoy Systems, please contact:
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