



TEEKAY

Lightering 101

An Introduction to Lightering



What is Lightering?

Lightering is defined as the process involving ship-to-ship transfer of oil and liquefied gas cargo.



Why is Lightering Conducted?

Economical shipment of crude oil from its source or to the United States requires the use of very large crude carriers (VLCCs) and ultra large crude carriers (ULCCs).

When ports are too shallow, have a narrow entrance, or too small of a berth to accommodate large crude oil carriers, lightering allows offshore loading and unloading of the crude oil cargoes.

How is Lightering Conducted?

The process consists of maneuvering a tanker (maneuvering vessel) alongside the constant heading tanker typically with both vessels underway. The two vessels are moored together with lines while using large rubber bumpers called fenders between the two vessels to prevent damage.

A portion of the crude oil cargo is discharged through hoses connected between the two vessels. The two vessels may be anchored or may continue underway while the transfer takes place depending upon sea conditions. It may be a regular or reverse lightering.

As the name suggests, reverse lightering is opposite to the regular lightering and involves discharge from one or more smaller ships into a larger ship.



Glossary of Terms

Discharging Ship

The ship containing cargo for transfer to the Receiving Ship. May also be known as the Ship to be Lightered (STBL).

Receiving Ship

The ship to which cargo is transferred from the Discharging ship. The Receiving ship may also be known as the Lightering ship or Service ship.

Notice of Readiness

Notice served by the master to inform the terminal/charterer that the vessel is ready in all respects to load or discharge cargo.

Constant Heading Vessel

During maneuvering and mooring, the constant heading ship maintains course and speed to allow the maneuvering ship to approach and moor.

Maneuvering Vessel

During maneuvering and mooring, the maneuvering ship approaches the constant heading ship for mooring operations.

Dropping Outward Pilot

Frequently used provision in a time charter to determine the time and place of redelivery of a ship to the owner by the charterer. The hire ceases at the moment the pilot disembarks.

Glossary of Terms (Continued)

Fenders

Specially designed air-inflated rubber “cushions” placed on either the Discharging ship or Receiving Ship that float on the water and will absorb the forces of bringing the two vessels together.

Mooring Master

A person who is designated to assist a ship’s Master in the mooring and/or unmooring of the ships. For transfers involving MARPOL Annex I cargoes, they may also fulfil the role of Person in Overall Advisory Control (POAC).

Hoses

Specially designed 12” diameter, 11/4” reinforced rubber hoses that the crude oil flows through from the Discharging Ship to the Receiving Ship.

Mooring Master Assistant

A person who may be assigned to assist the Mooring Master in operational tasks such as rigging fenders, hose handling, mooring and unmooring, and surveillance and tending of fenders, moorings and hoses during the STS operation.

Laydays/Laycan

A spread of dates between which a vessel is to present for loading. Too early and she may have to wait. Too late and she risks being canceled by charterers.

Lightering Support Vessel (LSV)

Workboat (220’ long) which carries the fenders and hoses and assists in putting the fenders on the tanker.

Tankers

Some tankers are equipped with fenders and hoses. These tankers may also have Captains who are Mooring Masters. If this is the case, and the Captain is in compliance with the USCG work-hour regulations, he may conduct the mooring between the Discharging Ship and the Receiving Ship without assistance.

If the ship is not so-equipped or the Captain is not able to do the mooring operation, an LSV with Mooring Master is needed.



Lightering Support Vessels

The job of the LSV is to deliver the Mooring Master and Mooring Master Assistant to the Discharge Ship and Receiving Ship; and deploy and recover the fenders and hoses needed for the lightering operation.

They are also on standby throughout the operation in case of emergencies. LSVs carry the fenders, hoses, and personnel needed to conduct the lightering operation. In addition, some LSV's are equipped with fire-fighting and oil-spill response equipment.



The Lightering process

Depending on weather, cargo transfers can be made while underway, drifting, or at anchor. At the lightering position in the designated lightering area, up to 70 nautical miles offshore, the LSV fenders one of the tankers involved in the transfer and delivers the Mooring Master. At this time, the cargo transfer hoses may also be loaded onto one of the tankers.



A constant heading tanker with fenders already in place awaiting the maneuvering tanker.

The Mooring Master

The Mooring Master is stationed on the bridge of the maneuvering ship during approach and mooring.

Under normal conditions, both vessels will be under way at a pre-agreed speed until the vessels are safely moored together. The speed and course of the constant heading vessel, as well as the relative movement between the two vessels must periodically be verified through the ARPA/radar or other available means.



A Mooring Master stationed on the bridge of the maneuvering ship.

The Approach

As the constant heading vessel maintains her set course and slow speed, the maneuvering vessel approaches alongside.

The maneuvering vessel slowly edges closer to the constant heading vessel until it matches course and speed.

The approach angle between the two vessels should decrease as the parallel distance decreases. When the distance is approximately 500 feet, the approach angle should not exceed 3-5 degrees.



The Approach

The preferred speed during final approach and mooring is usually between 4 and 6 knots. However, the speed must be adjusted in each case to optimize the maneuverability of both vessels.

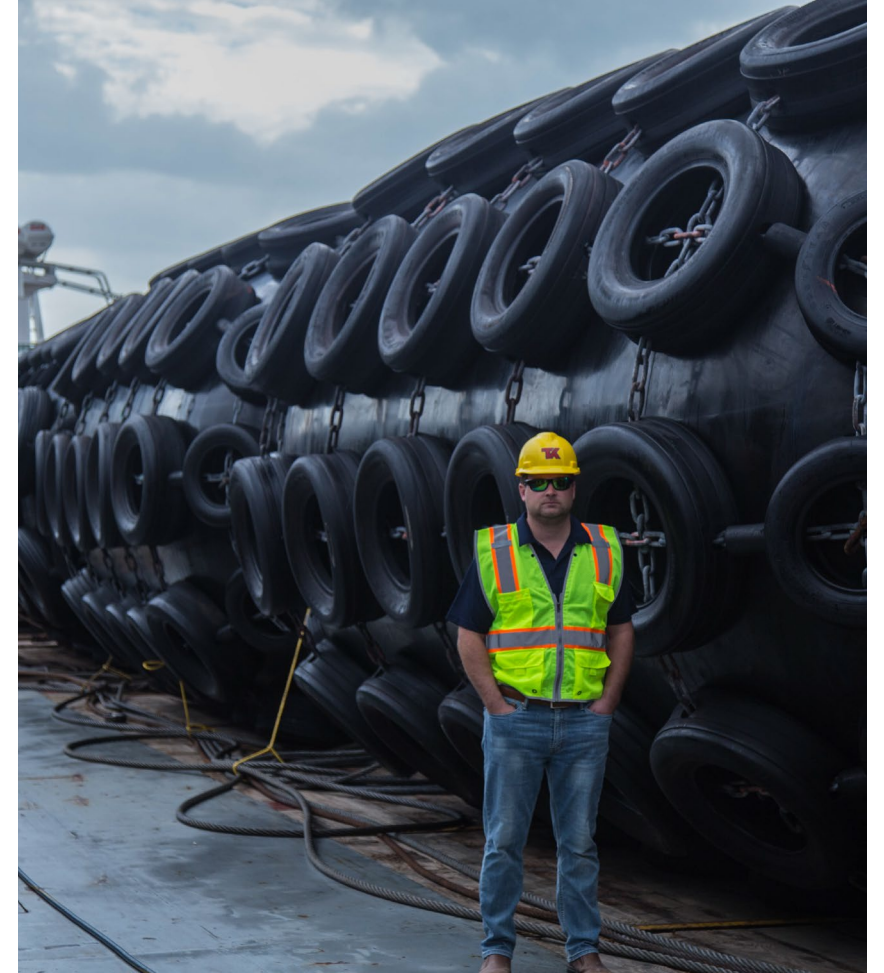
As the two vessels come near together, they should be as close to parallel as possible, so that all four fenders simultaneously share the load of the impact.



The Fenders

Primary fenders are large fenders capable of absorbing the impact energy of berthing and are wide enough to prevent contact between the ships should they roll while alongside one another.

The Primary fenders are normally pneumatic and pressurised to either 50 kPa or 80 kPa gauge pressure. In the US Gulf, we only use four jumbo primary fenders with diameter of 4.5m. The length varies from 6.4m to 9.0m.



Mooring Lines

Mooring is to be done by the crew of each vessel involved in the operation.

As a minimum, the following lines will be passed to the Constant heading vessel from the maneuvering vessel: 4 to 6 headlines, 2 forward spring lines, 2 aft spring lines, and 4 to 6 stern lines. The Constant heading vessel will also be required to supply 2 to 4 mooring lines aft and forward.

Upon completion of mooring operations, both vessels must ensure that messenger lines and stoppers are made ready in proper position for fast cast off of the mooring lines should that be necessary at some point.

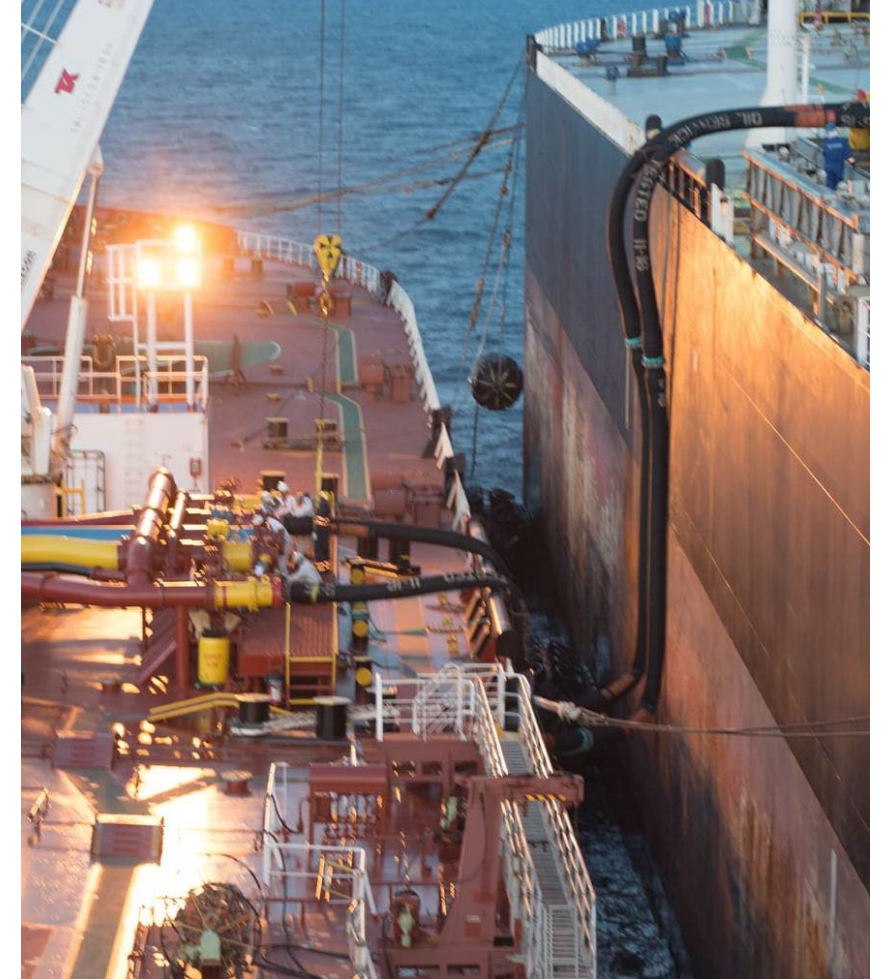
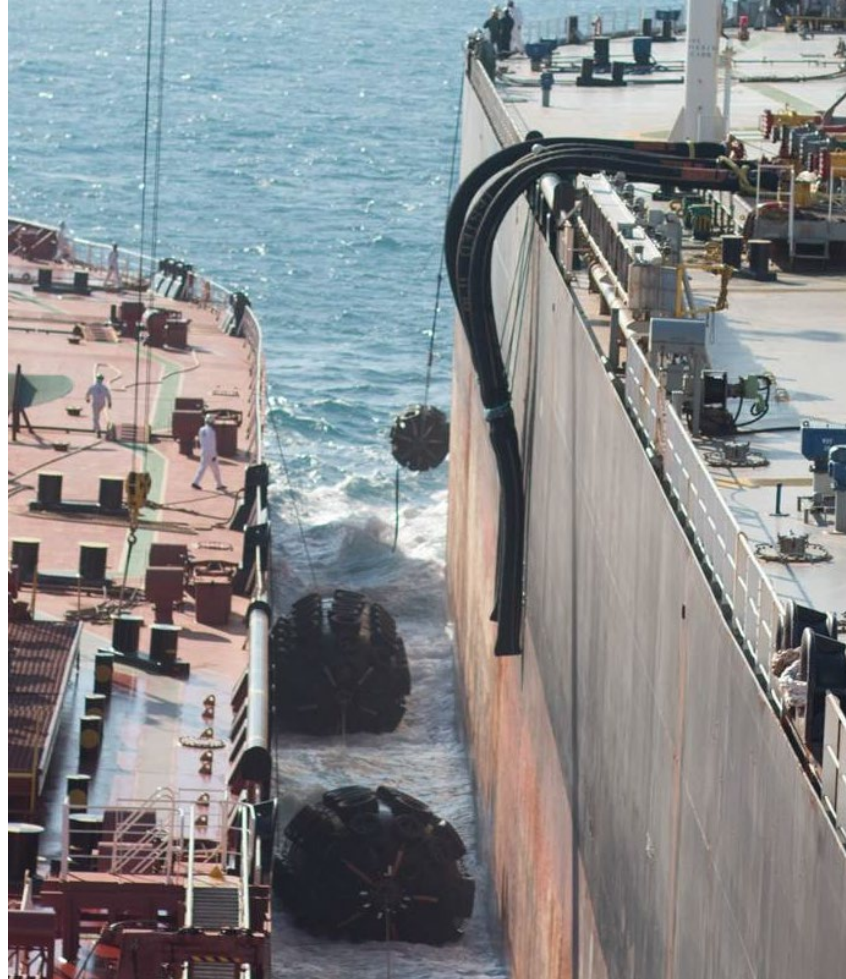


Hose Connection

Next comes connecting the 12-inch, 90-foot cargo transfer hoses and the gauging of the tanks.

Crew members of each vessel are responsible for connecting the reducers and cargo hoses. The hose body must be supported between the hose and the ship's rail by a nylon strap with rubber "chafe" fitting and suspended from the ship's derrick/crane.

Continuous attention must be given to the manifold area. A qualified member from each vessel must be stationed at the manifold during the entire transfer.



Cargo Transfer

During the cargo transfer, the Constant heading/ anchored ship must keep a proper bridge watch to ensure that a safe anchor position is maintained; or if slow steaming, that safe navigation is carried out.

The pumping of cargo shall commence at a slow rate, but when flow has been established, and no leaks found, the discharging ship may increase pumping pressure to optimum rate. All hose connections shall be continuously monitored for leaks.

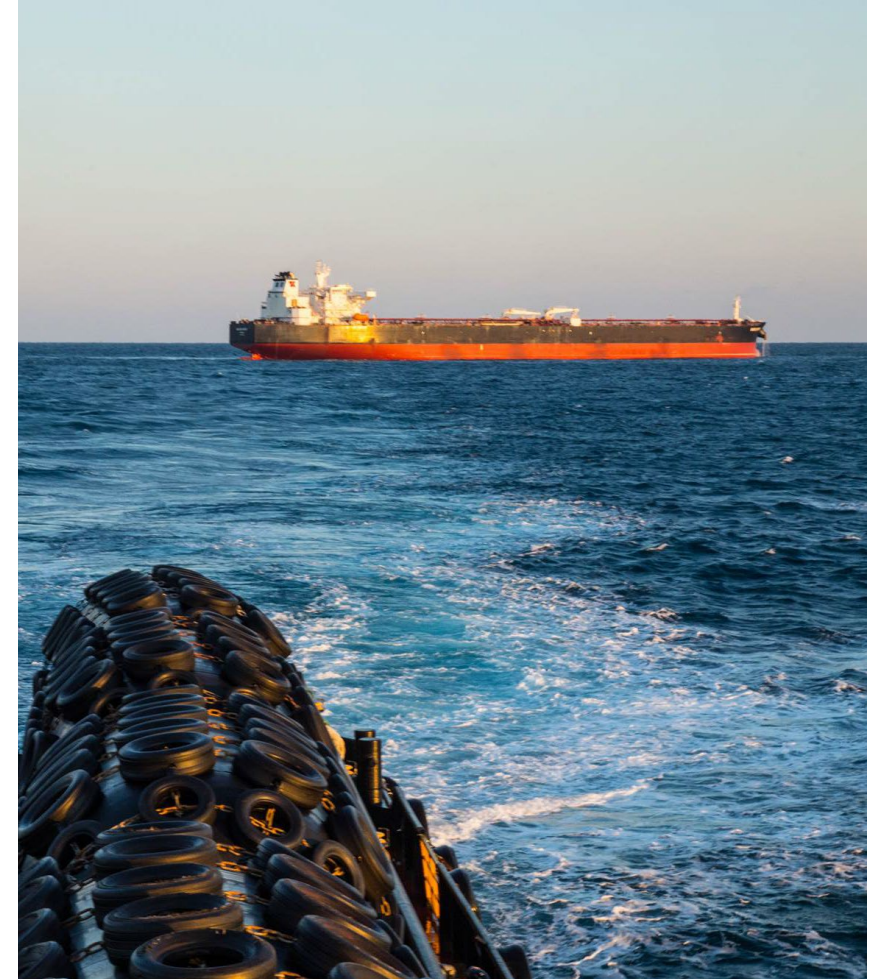
When transfer is completed, hoses are drained and returned to the service ship.



Unmooring Operation

Under normal weather conditions, the unberthing will be carried out with the Constant heading vessel at anchor. It may, however, be necessary to do the operation underway. In that case, the Constant heading vessel will be instructed by the MM to maintain a speed and course previously agreed upon.

During unmooring, plenty of slack must be given on the mooring lines and good quality messenger lines must be used to avoid difficulties in removing the eyes off bitts.



To learn more about
Teekay's Lightering
services, visit
teekay.com/lightering

