

## Chapter 23

# MOORING

This Chapter deals with the preparations and procedures necessary to provide and maintain an efficient mooring arrangement whilst the tanker is berthed at a jetty. Exchange of information between the tanker and the terminal on matters relating to mooring arrangements is dealt with in Chapter 22.

The use of mooring equipment is described in detail in applicable (inter)national publications/regulations. Tanker and berth operators are strongly recommended to bring the appropriate information to the attention of their respective workforces to ensure that the mooring operation can be undertaken safely.

### 23.1 Personnel Safety

Mooring and unmooring operations, including tug line handling, are dangerous operations. It is important that everybody concerned is fully aware of the hazards and takes appropriate precautions to prevent accidents.

### 23.2 Security of Moorings

Any excessive movement or the breaking adrift of a tanker from the berth owing to inadequate moorings could cause injury to personnel and damage to the jetty installations and to the tanker.

Although responsibility for the adequate mooring of a tanker rests with the Master, the terminal has an interest in ensuring that tankers are securely and safely moored. Cargo hoses or arms should not be connected until both the Terminal Representative and the tanker Master are satisfied that the tanker is safely moored.

### 23.3 Preparations for Arrival

#### 23.3.1 Tanker's Mooring Equipment

Before arrival at a port or berth, all necessary mooring equipment should be ready for use. Anchors should be ready for use if required, unless anchoring is prohibited. There should always be an adequate number of personnel available to handle the moorings.

### 23.3.2 Assisting Craft

Before tugs or other craft come alongside to assist a tanker during mooring, all cargo and ballast tank lids and ullage ports should be closed, no matter what grade of oil is being or has been carried, unless all the cargo tanks are tested and proven free of flammable vapour. Tugs and other craft must not be permitted to come alongside before the Master has satisfied himself that it is safe for them to do so.

Except in an emergency, tugs or any other craft should not be allowed to come alongside or remain alongside a tanker while it is loading or discharging volatile petroleum or ballasting tanks containing hydrocarbon vapour. While a tug or another craft is alongside the tanker, the wheelhouse of the tug or craft has to be permanently manned. The moorings between the ships should be capable of being released quickly and easily. Any intent by the Master or request from the shore for tugs to remain alongside during any such cargo or ballast activities should be treated as non-routine and must not be undertaken without the full agreement of all parties concerned, and only after a risk assessment has been carried out.

The Master of a tanker should verify that any craft coming alongside fulfils the necessary safety requirements for doing so stipulated in the relevant legislation.

### 23.3.3 Emergency Use of Tugs or Other Craft

In the case of the tanker grounding, it may be necessary to attempt to tow the tanker off. As in many cases the assisting craft will not be suitable for handling dangerous goods, it should only be allowed to approach the tanker close enough to receive a thrown mooring rope.

Ropes which are used for towing off must not be of synthetic material. During the towing operation, the possibility of the towing line parting under strain needs to be considered and personnel should be kept well clear throughout the operation.

## 23.4 Mooring at Jetty Berths

Effective tanker mooring management requires a sound knowledge of mooring principles, information about the mooring equipment installed on the tanker, proper maintenance of this equipment and regular tending of mooring lines.

The safety of the tanker, and hence its proper mooring, is the prime responsibility of the tanker's Master. However, the terminal has local knowledge of the operating environment at the site and knows the capabilities of shore equipment, and should therefore be in a position to advise the tanker's Master regarding mooring line layout and operating limits.

### 23.4.1 Type and Quality of Mooring Lines

Mooring lines should preferably all be of the same material and construction. Ropes with low elastic elongation properties are recommended for all tankers, as they limit the tanker's movement at the berth.

Moorings composed entirely of high elasticity ropes are not recommended as they can allow excessive movement from strong wind or current forces or through interaction from passing tankers. Within a given mooring pattern, ropes of different elasticity should never be used together in the same direction.

Mooring conditions and regulations may differ from port to port.

Standard synthetic fibre ropes will deteriorate more rapidly than steel wires or high modulus synthetic fibre ropes. All ropes and wires should be inspected on a regular basis and replaced when there are signs of damage.

### 23.4.2 Management of Moorings at Alongside Berths

#### 23.4.2.1 Tending of Moorings

Tanker personnel are responsible for the frequent monitoring and careful tending of the moorings, but suitably qualified shore personnel should check the moorings periodically to satisfy themselves that they are being properly tended.

When tending moorings which have become slack or too taut, an overall view of the mooring system should be taken so that the tightening or slackening of individual lines does not allow the tanker to move or place undue loads on other lines. The tanker should maintain contact with the fenders, and moorings should not be slackened if the tanker is lying off the fenders.

Once the mooring lines are secured to the shore, the mooring winch clutches should be dis-engaged, in order to permit release of the moorings in an emergency, for example, a fire rendering electrical systems inoperative.

#### 23.4.2.2 N/A

#### 23.4.2.3 Self-Stowing Mooring Winches

Because their weight and size make manual handling difficult, mooring wires used by tankers may be stored on self-stowing mooring winches, which may be either single drum or split drum. Some features of these winches need to be clearly understood by tanker personnel in order to avoid tankers breaking adrift from berths as the result of slipping winch brakes.

The design holding power of the brake may either have been specified by the tanker owner or be the standard design of the winch manufacturer. All appropriate tanker personnel should be aware of the designed brake holding capacity of the self-stowing mooring winches installed on the tanker.

The physical condition of the winch gearing and brake shoe linings or blocks has a significant effect on brake holding capacity in service. Mooring winch brakes should therefore be tested at regular intervals, not exceeding twelve months. A record, both of regular maintenance and inspections and of tests, should be kept on the tanker. If the deterioration is significant, the linings or blocks must be renewed.

Some of the newer self-stowing mooring winches are fitted with disc brakes, which are less affected by wear.

Kits are available for testing winch brake holding capacity and can be placed on board for use by the crew.

In addition, there are a number of operational procedures that can seriously reduce the holding capacity of winch brakes if they are not correctly carried out. These include:

#### **The Number of Layers of Wire on the Drum**

The holding capacity of a winch brake is in inverse proportion to the number of layers of the mooring wire or rope on the drum. The designed holding capacity is usually calculated with reference to the first layer and there is a reduction in the holding capacity for each additional layer. This can be substantial - as much as an 11% reduction for the second layer.

If the rated brake holding capacity of a split drum winch is not to be reduced, only one layer should be permitted on the working drum.

#### **The Direction of Reeling on the Winch Drum**

On both single and split drum winches, the holding power of the brake is decreased substantially if the mooring line is reeled on the winch drum in the wrong direction. Before arrival at the berth, it is important to confirm that the mooring line is reeled so that its pull will be against the fixed end of the brake strap, rather than the pinned end. Reeling in the contrary direction can seriously reduce the brake holding capacity, in some cases by as much as 50%. The correct reeling direction to assist the brake should be permanently marked on the drum to avoid misunderstanding.

Winches fitted with disc brakes are not subject to this limitation.

#### **The Condition of Brake Linings and Drum**

Oil, moisture or heavy rust on the brake linings or drum can seriously reduce the brake holding capacity. Moisture may be removed by running the winch with the brake applied lightly, but care must be taken not to cause excessive wear. Oil impregnation cannot be removed so contaminated brake linings will need to be renewed.

### **The Application of the Brake**

Brakes must be adequately tightened to achieve the required holding capacity. (This is usually 60% of the line's Minimum Breaking Load (MBL). The use of hydraulic brake applicators or a torque wrench showing the degree of torque applied is recommended. If brakes are applied manually, they should be checked for tightness.

#### **23.4.2.4 Shore Moorings**

At some terminals, shore moorings are used to supplement the tanker's moorings. Where shore personnel handle shore moorings, they must be fully aware of the hazards of the operation and should adopt safe working practices.

#### **23.4.2.5 Anchors**

Whilst moored alongside, anchors not in use should be properly secured by brake and guillotine, but otherwise be available for immediate use.

### **23.5 N/A**

