

## Chapter 24

# PRECAUTIONS ON TANKER AND TERMINAL DURING CARGO HANDLING

This Chapter provides guidance on precautions to be observed by both tanker and shore when cargo handling, ballasting, bunkering, tank cleaning, gas freeing and purging operations are to be carried out in port. Eliminating the risk of fire and explosion is paramount. The hazards associated with smoking, galleys, electrical equipment and other potential sources of ignition are discussed in Chapter 4, to which reference should be made.

Detailed information on equipment and operations that are principally related to either the tanker or the terminal is contained in Parts 2 and 3 of this Guide respectively.

### 24.1 External Openings in Accommodation and Engine Rooms

A tanker accommodation and machinery spaces contain equipment that is not suitable for use in flammable atmospheres. It is therefore important that volatile cargo vapours are kept out of these spaces.

During loading, unloading, gas freeing, tank cleaning and purging operations, all external doors, ports and similar openings on the tanker should be closed.

A screen door cannot be considered a safe substitute for an external door. Additional doors and ports may have to be closed in special circumstances or due to structural peculiarities of the tanker

If external doors have to be opened for access, they should be closed immediately after use. Where practical, a single door should be used for working access in port. Doors that must be kept closed should be clearly marked.

Doors should not normally be locked in port. However, where there are security concerns, measures may need to be employed to prevent unauthorised access while at the same time ensuring that there is a means of escape for the personnel inside. Although discomfort may be caused to personnel in accommodation that is completely closed during conditions of high temperatures and humidity, this discomfort should be accepted in the interests of safety.

## **24.2 Air Conditioning and Ventilation Systems**

On tankers with air conditioning units, it is essential that the accommodation is kept under positive pressure to prevent the entry of cargo vapours. Intakes for air conditioning units are usually positioned in a safe area and vapours will not be drawn into the accommodation under normal conditions. A positive pressure will be maintained only if the air conditioning system is operating with its air intakes open and if all access doors are kept closed, except for momentary entry or exit. The system should not be operated with the intakes fully closed, that is in 100 % recirculation mode, because the operation of extraction fans in galley and sanitary spaces will reduce the atmospheric pressure in the accommodation to less than that of the ambient pressure outside.

There is a benefit from having a gas detection and/or alarm system fitted to air conditioning intakes. In the event that hydrocarbon vapours are present at the inlets, the ventilation system should be shut down and transfer of cargo suspended until such time as the surrounding atmosphere is free of hydrocarbon vapours.

The same principles of positive pressure and gas detection apply to tankers that have alternative air conditioning systems or where additional units have been fitted. The overriding consideration in all cases is that hydrocarbon vapours must not be permitted to enter the accommodation.

Externally located air conditioning units, should not be operated during any of the operations listed in Section 24.1 unless they are either located in safe areas or are certified as safe for use in the presence of flammable vapours.

On tankers that depend on natural ventilation, ventilators should be kept trimmed to prevent the entry of vapours. If ventilators are located so that vapours can enter regardless of the direction in which they are trimmed, they should be covered, plugged or closed.

## 24.3 Openings in Cargo Tanks

### 24.3.1 Cargo Tank Lids<sup>1</sup>

During the handling of volatile products and the loading of non-volatile products into tanks containing hydrocarbon or chemical vapour, all cargo tank lids should be closed and secured.

Cargo tank lids or coamings should be clearly marked with the number and location (port, centre or starboard) of the tank they serve.

Tank openings of cargo tanks that are not gas free should be kept closed, unless gas freeing and/or depressurising operations are being conducted.

### 24.3.2 Sighting and Ullage Ports<sup>1</sup>

During any of the cargo and ballast handling operations referred to in Section 24.1, sighting and ullage ports should be kept closed, unless required to be open for measuring and sampling and when agreed between the tanker and the terminal.

If, as a result of the system design, sighting or ullage ports are required to be open for venting purposes, the openings should be protected by a flame screen/arrester which may be removed/opened for a short period during ullaging, sighting, sounding and sampling. These screens/arresters should be a good fit and should be kept clean and in good condition.

### 24.3.3 Cargo Tank Vent Outlets<sup>1</sup>

The cargo tank venting system should be set for the operation concerned. High velocity vents should be set in the operational position to ensure the high exit velocity of vented gas.

When volatile cargo is being loaded into tanks connected to a venting system which also serves tanks into which non-volatile cargo is to be loaded, particular attention should be paid to the setting of pressure/vacuum valves and the associated venting system, including any inert gas system, in order to prevent flammable and/or toxic vapours entering the tanks to be loaded with non-volatile cargo.

Whenever tanks are isolated to prevent cross-contamination, the likelihood of oxygen entering the tank due to pressure variations on passage should be taken into consideration and measures may need to be planned to restore the inert condition prior to discharge.

### 24.3.4 Tank Washing Openings<sup>1</sup>

During tank cleaning or gas freeing operations, tank washing cover plates should only be removed from the tanks in which these operations are taking place and should be replaced immediately upon completion. Any openings in the deck should be covered by gratings. Other tank washing covers may be loosened in preparation, but they should be left in their fully closed position.

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<sup>1</sup> Attention should be given to International or National Dangerous Goods legislation with specific requirements in this respect.

## 24.4 Inspection of Tanker Cargo Tanks Before Loading<sup>2</sup>

Inspection of cargo tanks before loading generally should be made without entering the tanks.

It may sometimes be necessary to remove tank cleaning opening covers to sight parts of the tank not visible from the ullage or sighting ports, but this should only be done when the tank is gas free. The covers must be replaced and secured immediately after the inspection. The person carrying out the inspection should take care not to inhale vapours or inert gas when inspecting tanks that have not been gas freed.

Cargo tank atmospheres which are, or which have been, inerted should be handled with care due to the risk of low oxygen contents. Inerted cargo tanks should be marked with appropriate warning signs.

Before entering a tank that has been inerted, it must be gas freed for entry and, unless all tanks are gas freed and the inert gas system is completely isolated, each individual tank to be entered for inspection must be isolated from the inert gas system (see Sections 7.1.6.12).

If, because the cargo to be loaded has a critical specification, it is necessary for the inspector to enter a tank, all the precautions contained in Section 10.5 must be followed.

## 24.5 Segregated Ballast Tank Lids

Segregated ballast tank lids may be opened before discharge of ballast is commenced, to allow the surface of the ballast to be inspected e.g. for contamination. Segregated ballast tank lids should, however, normally be kept closed when cargo or ballast is being handled because petroleum or chemical vapours could be drawn into them.

Segregated ballast tank lids must be clearly marked to indicate the tank they serve.

## 24.6 Tanker and Shore Cargo Connections

### 24.6.1 Flange Connections

Flanges for tanker-to-shore cargo connections at the end of the terminal pipelines and on the tanker's manifold should be in accordance with International or National legislation.

Flange faces, gaskets and seals should be clean and in good condition. When in their storage location, flange faces should be suitably protected from corrosion/pitting.

Where bolted connections are made, all bolt holes should be used. Care should be taken when tightening bolts as uneven or over tightened bolts could result in leakage or fracture. Improvised arrangements using 'G' clamps or similar devices must not be used for flange connections.

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<sup>2</sup> Attention should be given to International or National Dangerous Goods legislation with specific requirements in this respect.

### 24.6.2 Removal of Blank Flanges

Each tanker and terminal manifold flange should have a removable blank flange made of steel or other approved material, such as phenol resin, and preferably fitted with handles.

Precautions should be taken to ensure that, prior to the removal of blanks from tanker and terminal pipelines, the section between the last valve and blank does not contain product under pressure. Precautions must also be taken to prevent any spillage.

Blank flanges shall be capable of withstanding the working pressure of the line or system to which they are connected. Blank flanges should normally be of a thickness equal to that of the end flange to which they are fitted.

### 24.6.3 Reducers and Spools

Reducers and spools should be made of steel and be fitted with flanges that conform to ANSI B16.5, Class 150 or equivalent. Ordinary cast iron should not be used

There should be an exchange of information between the tanker and terminal when manifold reducers or spools are made of any material other than steel, since particular attention is necessary in their manufacture to achieve the equivalent strength of steel and to avoid the possibility of fracture.

Manifold pressure gauges should be fitted to the spool pieces on the outboard side of the manifold valves.

### 24.6.4 Lighting

During darkness, adequate lighting should be arranged to cover the area of the tanker-to-shore cargo connection and any hose handling equipment, so that the need for any adjustment can be seen in good time and any leakage or spillage of product can be quickly detected.

### 24.6.5 Emergency Release

A special release device can be used for the emergency disconnection of cargo hoses or arms.

If possible, the hoses or arms should be drained, purged or isolated as appropriate before emergency disconnection so that spillage is minimised (see Section 11.1.15.1).

Periodic checks should be made to ensure that all safety features are operational.

(See also Section 18.1.10 - Powered Emergency Release Couplings (PERCs).)

## 24.7 Accidental Product Spillage and Leakage

### 24.7.1 General

Tanker and shore personnel should maintain a close watch for the escape of product at the commencement of and during cargo transfer operations. In particular, care should be taken to ensure that pipeline valves, including drop valves, are closed when not in use.

The ullages of cargo or bunker tanks that have been topped-up should be checked from time to time during the remaining loading operations to ensure that overflows do not occur as a result of leaking valves or incorrect operations.

On double hull tankers, attention should be given to stability during ballast and cargo operations. Care should be taken not to reduce the transverse metacentric height (GM) such that it can induce an angle of list or loll when deballasting double bottom tanks after some cargo tanks have been topped-off, as this could cause an overflow of cargo. (See Section 11.2.)

If leakage occurs from a pipeline, valve, hose or metal arm, operations through that item should be stopped until the cause has been ascertained and the defect has been rectified. If a pipeline, hose or arm bursts or if there is an overflow or other spill, all cargo operations should be stopped immediately and should not be restarted until the fault has been rectified and all hazards from the released oil or chemicals have been eliminated. If there is any possibility of the released oil/chemicals or associated vapours entering an engine room or accommodation space intake, appropriate preventive measures must be taken quickly.

Means should be provided for the prompt removal of any spillage on deck. Any oil spill should be reported to the terminal and port authorities and the relevant shore and tanker oil pollution emergency plans should be activated.

Harbour authorities and any adjacent tanker or shore installations should be warned of any potential hazard caused by the spill.

### 24.7.2 N/A

### 24.7.3 Scupper Plugs

Before cargo handling commences, all deck scuppers<sup>3</sup> and, where applicable, open drains on the jetty must be effectively plugged to prevent spilled products escaping into the water around the tanker or terminal. Accumulations of water should be drained periodically and scupper plugs replaced immediately after the water has been run off.

Product contaminated water should be transferred to a slop tank or other suitable receptacle. The tank pressure should be reduced to facilitate draining, if necessary.

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<sup>3</sup> Attention should be given to International, National or local legislation with specific requirements in this respect.

#### 24.7.4 Spill Containment

A permanently fitted drip tray, provided with suitable means of draining, should be fitted under all tanker and shore manifold connections. If no permanent means are fitted, portable drip trays should be placed under each connection in use to retain any leakage. The use of plastic should be avoided unless provision for bonding is made.

#### 24.7.5 Tanker and Shore Cargo Pipelines not in Use

The tightness of valves should not be relied upon to prevent the escape or seepage of products. All shore pipelines, loading arms and hoses not in use at a berth must be securely blanked.

All tankers cargo pipelines not in use must be securely blanked at the manifold.

### 24.8 Fire-Fighting Equipment

When a tanker is alongside a berth, fire-fighting equipment is to be ready for immediate use.

On board the tanker, this is normally achieved by having fire hoses with spray/jet nozzles ready for use. Having portable dry chemical powder extinguishers available in the cargo area provides additional protection against small flash fires.

On the jetty, fire-fighting equipment should be ready for immediate use. While this may not involve the rigging of fire hoses, the preparations for emergency operation of the fire-fighting equipment should be apparent and communicated to the tanker. Consideration should be given to having portable extinguishers available for use adjacent to the jetty manifold area.

### 24.9 Proximity to Other Vessels

#### 24.9.1 Tanker at Adjacent Berths

Flammable and/or toxic concentrations of product vapours may be encountered if another tanker at an adjacent berth is conducting cargo or ballast handling, purging, tank cleaning or gas freeing operations. In such circumstances, appropriate precautions should be taken as described in Section 24.1.

#### 24.9.2 General Cargo Tankers at Adjacent Berths

It is unlikely that general cargo tankers will be able to comply as fully as tankers with the safety requirements relating to possible sources of ignition, such as smoking, naked lights, cooking and electrical equipment.

Accordingly, when a general cargo tanker is at a berth in the vicinity of a tanker that is loading or discharging volatile petroleum, loading non-volatile products into tanks containing hydrocarbon vapour, or purging or gas freeing after the discharge of volatile products, it will be necessary for the terminal to evaluate any consequential safety hazards and to take precautions additional to those set out in this Chapter. Such precautions should include inspecting the general cargo tanker involved and clearly defining the precautions to be taken on board that tanker.

### 24.9.3 Tanker Operations at General Cargo Berths

Where tanker operations are conducted at general cargo berths, it is unlikely that personnel on such berths will be familiar with safety requirements relating to possible sources of ignition, or that cranes or other equipment will comply with the requirements for the design and installation of electrical equipment in hazardous areas.

Accordingly, it will be necessary for the terminal to take precautions additional to those set out in this Chapter. Such precautions should include restricted vehicular access, removable barriers to control access to the berth, additional fire-fighting equipment and control of sources of ignition, together with restrictions on the movement of goods and equipment and the lifting of loads.

### 24.9.4 Tugs and Other Craft Alongside

The number of craft that come alongside, and the duration of their stay, should be kept to a minimum or be prohibited. Subject to any port authority regulations, only authorised craft having the permission of the tanker's Master and, where applicable, the Terminal Representative, should be permitted to come alongside or remain alongside a tanker while it is handling volatile products or is ballasting tanks containing product vapour. The Master should instruct personnel manning the craft that smoking and naked lights are not allowed on the craft. In the event of a breach of the regulations, it will be necessary to cease operations.

Terminals should issue appropriate instructions to the operators of authorised craft on the use of engines and other apparatus and equipment, so as to avoid sources of ignition when going alongside a tanker or a jetty. These will include provision of spark arresters for engine exhausts, where applicable, and instructions on proper fendering. Terminals should also ask for suitable notices to be posted prominently on the craft, informing personnel and passengers of the safety precautions to be observed.

If any unauthorised craft come alongside or secure in a position that may endanger the operations, this should be reported to the port authority and/or the Terminal Representative, and if necessary, operations should cease.

## 24.10 Notices

### 24.10.1 Notices on the Tanker

Whenever alongside a terminal, a tanker should display notices on deck, visible on two sides, or at the gangway(s) according to the International (Dangerous goods) legislation:



Figure 24.1 - Notices on the Tanker

### 24.10.2 Notices on the Terminal

Permanent notices and signs indicating that smoking and naked lights are prohibited should be displayed conspicuously on the jetty in appropriate languages. Similar permanent notices and signs should be displayed at the entrance to the terminal area or the shore approaches to the jetty.



Figure 24.2 - Notices on the Terminal

In buildings and other shore locations where smoking is allowed, notices to this effect should be displayed conspicuously.

Emergency escape routes from the tanker berth to safe areas ashore should be indicated clearly.

#### **24.11 Manning Requirements**

A sufficient number of personnel to deal with an emergency should be present on board the tanker and in the shore installation at all times during the tanker's stay at a terminal.

Those personnel involved with the operations should be familiar with the risks associated with handling products and should be trained to deal with an emergency.

#### **24.12 Control of Naked Flames and Other Potential Ignition Sources**

The hazards associated with smoking, galleys, electrical equipment and other potential sources of ignition are discussed in Chapter 4.

#### **24.13 Control of Vehicles and Other Equipment**

The use of vehicles and equipment should be controlled, particularly in hazardous zones. Routes to and from work places and parking areas should be clearly indicated. Barriers or fencing should be provided, where necessary, to prevent unauthorised access.

#### **24.14 N/A**