

Chapter 4

GENERAL HAZARDS FOR TANKER AND TERMINAL

This Chapter deals primarily with general hazards on board a tanker and/or at a terminal and the precautions to be taken to mitigate them. Reference should be made to the appropriate Chapters for precautions relating to specific operations such as cargo handling, ballasting, tank cleaning, inerting or entry into enclosed spaces.

4.1 General Principles

In order to eliminate the risk of fire and explosion on a tanker, it is necessary to prevent a source of ignition and a flammable atmosphere being present in the same place at the same time. It is not always possible to exclude both these factors simultaneously and precautions are therefore directed towards excluding or controlling one of them.

In the case of cargo compartments, pumprooms, and at times the tank deck, flammable gases are to be expected and the strict elimination of all possible sources of ignition in these locations is essential.

Cabins, galleys and other areas within the accommodation block inevitably contain ignition sources such as electrical equipment, matches and/or electric cigarette lighters. While it is sound practice to minimise and control such sources of ignition, for example by designation of approved smoking rooms, it is essential to avoid the entry of flammable gas.

Air intakes must be set to ensure that the atmospheric pressure inside the accommodation is greater than that of the external atmosphere. In engine and boiler rooms, ignition sources such as those arising from boiler operations and electrical equipment cannot be avoided (see also Section 4.2.4). It is essential therefore to prevent the entry of flammable gases into such compartments. Residual fuel oils and gas oils may present a flammability hazard (see Section 2.7) and the routine checking of bunker spaces for flammability by tanker and terminal personnel is to be encouraged.

It is possible, by good design and operational practice, for both flammable gases and ignition sources to be safely controlled in deck workshops, store rooms, dry cargo holds etc. However, the means for such control must be rigorously maintained and may be subjected to local regulation.

Although the installation and the correct operation of an inert gas system provide an added measure of safety, it does not preclude the need for close attention to the precautions set out in this Chapter.

Oil spillage and leakage present a fire hazard and can lead to pollution. They can also cause slips and falls. Spills and leaks should therefore be avoided and, if they occur, immediate attention should be given to stopping the source and to cleaning contaminated areas.

4.2 Control of Potential Ignition Sources

4.2.1 Naked Lights

Naked lights must be prohibited on the tank deck and in any other place where there is a risk that flammable gas may be present

4.2.2 Smoking

Smoking is known to present significant risks on board tankers and therefore requires careful management. While the text of this Section refers explicitly to smoking, the controls should also be applied to the burning of other products such as incense and joss sticks. As with tobacco products, smouldering smoke-producing products should never be left unattended or allowed near bedding or other combustible materials.

4.2.2.1 Smoking While a Tanker is Under Way

While a tanker is under way, smoking should be permitted only at times and in places specified by the tanker's Master. Smoking is prohibited outside the accommodation or any other place where flammable gas may be present.

4.2.2.2 Smoking in Port and Controlled Smoking

Smoking in port should only be permitted under controlled conditions and preferably not during cargo operations, ballasting and gasfreeing. Difficulties perceived in introducing a restrictive smoking policy, including a total ban, should not impede the implementation of such a policy if it is in the interest of safe operations. Appropriate measures should be in place, both on the ship and the shore, to ensure full compliance.

Smoking should be strictly prohibited within the restricted area enclosing all tanker berths and on board any tanker while at a berth. Attention should be given to local (port) regulations.

Certain craft, such as barges designed without a permanent propulsion system, may have an accommodation block or lesser structure affixed directly to the tank deck. The spaces beneath such a structure may be designed for the carriage of non-explosive and non-flammable products, but this does not guarantee that such spaces remain gas free.

Some conventional vessels, typically smaller barges and inland watercraft, are similarly at risk through their inability to maintain positive pressure in the accommodation block and other spaces.

In such cases, the inherent difficulty in maintaining a gas free environment either within, immediately outside or below such an accommodation block or lesser structure makes the provision of a safe smoking area impossible. Smoking on board such craft should be strictly prohibited while they remain alongside the terminal or facility.

4.2.2.3 Location of Designated Smoking Places

The designated smoking places on shore should be agreed in writing between the Responsible Person and the Terminal Representative before operations start. The Responsible Person should ensure that all persons on board the tanker are informed of the selected places for smoking.

Criteria for designating smoking places on shore include:

- Smoking places should be confined to locations within the buildings¹.
- Smoking places should not have doors or windows that open directly onto open spaces.
- Account should be taken of conditions that may suggest danger, such as an indication of unusually high petroleum gas concentrations, particularly in the absence of wind, and when there are operations on adjacent tankers or on the jetty berth.

While the tanker is moored at the terminal, even when no operations are in progress, smoking can only be permitted in designated smoking places or, after there has been prior agreement in writing between the Responsible Person and the Terminal Representative, in any other closed accommodation, subject to local (port) regulations.

4.2.2.4 Matches and Cigarette Lighters

Safety matches or fixed (car type) electrical cigarette lighters should be provided in approved smoking locations.

All matches used on board tankers should be of the safety type. The use of matches and cigarette lighters outside the accommodation should be prohibited. Matches and cigarette lighters should not be carried on the tank deck or in any other place where flammable gas may be present.

The use of all mechanical lighters and portable lighters with electrical ignition sources should be prohibited on board tankers.

Disposable lighters present a significant risk as an uncontrolled ignition source. The unprotected nature of their spark producing mechanism allows them to be easily activated accidentally.

The carriage of matches and lighters through terminals should be prohibited. Severe penalties may be levied under local regulations for non-compliance.

¹ Local legislation may prohibit having a smoking location within buildings. A formal risk assessment should be in place to ensure an acceptable safety standard.

4.2.2.5 Notices

Portable and permanent notices prohibiting smoking and the use of naked lights should be displayed conspicuously on the tanker and at the exits from the accommodation area. Within the accommodation area, instructions concerning smoking should be displayed conspicuously.

4.2.3 Galley Stoves and Cooking Appliances

The use of galley stoves and other cooking appliances that employ naked flames should be prohibited while a tanker is at the terminal.

It is essential that personnel be instructed in the safe operation of galley equipment. Unauthorised and inexperienced persons should not be allowed to use such facilities.

A frequent cause of fires is the accumulation of unburnt fuel or fatty deposits in galley ranges, within flue pipes and in the filter cowls of galley vents. Such areas require frequent inspection to ensure that they are maintained in a clean condition. Oil and deep fat fryers should be fitted with thermostats to cut off the electrical power and so prevent accidental fires.

Galley staff should be trained in handling fire emergencies and appropriate responses. Appropriate fire extinguishers and fire blankets should be readily available.

The use of portable stoves and cooking appliances on board tanker should be controlled and, when in port, their use should be prohibited.

Cookers and other equipment heated by steam may be used at all times.

4.2.4 Engine and Boiler Rooms

4.2.4.1 Combustion Equipment

As a precaution against funnel fires and sparks, burners, tubes, uptakes, exhaust manifolds and spark arresters should be maintained in good working condition. If there is a funnel fire or sparks are emitted from the funnel, the tanker should, if under way, consider altering course as soon as possible to avoid sparks falling on the tank deck. Any cargo, ballasting or tank cleaning operations in progress must be stopped and all tank openings closed.

4.2.4.2 N.A.

4.3 Portable Electrical Equipment

4.3.1 General

All portable electrical equipment, including lamps, for operation in hazardous areas must be of an approved type. Before use, portable equipment should be examined for possible defects such as damaged insulation and a check made that cables are securely attached and that they will remain so throughout the work. Special care should be taken to prevent any mechanical damage to flexible cables or wandering leads.

4.3.2 Lamps and Other Electrical Equipment on Flexible Cables (Wandering Leads)

The use of portable electrical equipment on wandering leads should be prohibited within cargo tanks and adjacent spaces or over the tank deck, unless, throughout the period the equipment is in use:

- The compartments within which, or over which, the equipment and the leads are to be used are safe for Hot Work (see Section 9.4).
- The adjacent compartments are also safe for Hot Work, or have been purged of hydrocarbon to less than 2% by volume and inerted, or are completely filled with ballast water, or any combination of these (see Section 9.4).
- All tank openings to other compartments not safe for Hot Work or purged as above are closed and remain so; or
- the equipment, including all wandering leads, is intrinsically safe; or
- the equipment is contained within an approved explosion-proof housing. Any flexible cables should be of a type approved for extra hard usage, have an earth conductor, and be permanently attached to the explosion-proof housing in an approved manner.

In addition, there are certain types of equipment that are approved for use over the tank deck only.

The foregoing does not apply to the proper use of flexible cables used with signal or navigation lights or with approved types of telephones.

4.3.3 Air Driven Lamps

Air driven lamps of an approved type may be used in dangerous/hazardous areas although, to avoid the accumulation of static electricity at the appliance, the following precautions should be observed:

- The air supply should be fitted with a water trap.
- The supply hose should be of a low electrical resistance.

Permanently installed units should be earthed.

4.3.4 Torches (Flashlights), Lamps and Portable Battery Powered Equipment

Only torches that have been approved by a competent authority for use in flammable atmospheres may be used on board tankers.

Handheld UHF/VHF portable transceivers must be of an intrinsically safe type.

Small battery powered personal items such as watches, miniature hearing aids and heart pacemakers are not significant ignition sources.

Unless approved for use in a flammable atmosphere, portable radios, tape recorders, electronic calculators, cameras containing batteries, photographic flash units, portable telephones and radio pagers, however, must not be used on the tank deck or in areas where flammable gas may be present.

Trimode gauging tapes are battery operated electronic units and should be certified as being suitable for use in flammable atmospheres.

4.3.5 Cameras

There is a wide range of photographic equipment available. Tankers and terminals may encounter various types of camera in different situations - film crews with complex professional equipment and large batteries or the personal still or video equipment. The following general guidelines should be considered when deciding whether or not it is safe to use a particular camera. This guidance refers only to ignition hazards and does not consider security concerns that may require other restrictions on the use of cameras in some ports.

Camera equipment that contains batteries may produce an incendive spark from the flash or the operation of electrically powered items, such as aperture control and film winding mechanisms. This equipment should therefore not be used in a hazardous area (see Section 4.4.2) unless it is certified as being suitable for use in a hazardous area. Disposable cameras are available with a built-in flash capability and care must be taken to ensure that these are not used in hazardous areas.

Photographic equipment is available which does not have a flash, or any battery or power operated parts, such as the non-flash plastic disposable types. These cameras can be considered safe for use in hazardous areas.

Cameras that are operated by a clockwork mechanism, or with direct mechanical devices for aperture setting and film winding, are also available and can be considered safe for use in a hazardous area.

4.3.6 Other Portable Electrical Equipment

For guidance on the use of mobile telephones and pagers, see Sections 4.8.6 and 4.8.7.

Any other electrical or electronic equipment of non-approved type, whether mains or battery powered, must not be active, switched on or used within hazardous areas. This includes, but should not be limited to, radios, calculators, photographic equipment, laptop computers, handheld computers and any other portable equipment that is electrically powered but not approved for operation in hazardous areas.

In view of the ready availability and widespread use of such equipment, appropriate measures should be taken to prevent its use within hazardous areas. Personnel must be advised of the prohibition of non-approved equipment, and terminals should have a policy for informing visitors of the potential dangers associated with the use of portable electrical equipment. Terminals should also reserve the right to require any non-approved items of equipment to be deposited at the entrance to the port area or other appropriate boundary within the terminal.

4.4 Management of Electrical Equipment and Installations in Dangerous Areas

4.4.1 General

This Section describes the different approaches to the classification of dangerous areas on board tankers and of hazardous areas in terminals with regard to electrical installations and equipment. General guidance is given on the safety precautions to be observed during maintenance and repair of electrical equipment. It should be noted that the standards for electrical equipment and its installation are considered to fall outside the scope of this Guide.

4.4.2 Dangerous and Hazardous Areas

4.4.2.1 Dangerous Areas in a Tanker

In a tanker, certain areas/spaces are defined by international convention, flag administrations, legislation and classification societies as being dangerous/hazardous for the installation or use of electrical equipment either at all times or during specific periods such as loading, ballasting, tank cleaning or gas freeing operations.

Definitions of dangerous areas on tankers, detailed in the classification society rules, are derived from recommendations by the International Electrotechnical Commission (IEC) as to the types of electrical equipment that can be installed in them. It should be noted that for terminals the IEC definitions follow a rigid classification based on a zonal concept (see Section 4.4.2.2 below).

4.4.2.2 Hazardous Areas at a Terminal

At a terminal, account is taken of the probability of a flammable gas mixture being present by grading hazardous areas into three zones. The IEC classifies hazardous areas into zones based upon the frequency of the occurrence and duration of an explosive gas atmosphere as follows:

- **Zone 0**
A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.
- **Zone 1**
A place in which an explosive atmosphere consisting of a mixture with air or flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.

- **Zone 2**
A place in which an explosive atmosphere consisting of a mixture with air or flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will only persist for a short period.

4.4.2.3 Application of Hazardous Area Classifications to a Tanker at a Berth

When a tanker is at a berth, it is possible that an area in the tanker that is regarded as safe may fall within one of the hazardous zones of the terminal. If such a situation should arise and, if the area in question contains unapproved electrical equipment, then such equipment may have to be isolated whilst the tanker is at the berth. During cargo, bunkering, ballasting, tank cleaning, gas freeing, purging or inerting operations, all unapproved electrical equipment should be isolated.

4.4.3 Electrical Equipment

4.4.3.1 Fixed Electrical Equipment

Fixed electrical equipment in dangerous areas, even in locations where a flammable atmosphere is to be infrequently expected, must be of an approved type. This equipment should be properly maintained so as to ensure that neither the equipment nor the wiring become a source of ignition.

4.4.3.2 Closed Circuit Television

If closed circuit television is fitted on a tanker or on a jetty, the cameras and associated equipment must be of an approved design for the areas in which they are located. If they are of an approved design, there is no restriction on their use. When a tanker is at a berth, any servicing of this equipment should be subject to prior agreement between the tanker's Responsible Person and the Terminal Representative.

4.4.3.3 Electrical Equipment and Installations on board Tanker

Fixed electrical equipment and installations in tankers will be in accordance with classification society or national requirements, based on the recommendations of the IEC. Additional recommendations in respect of the use of temporary electrical installations and portable electrical equipment are given in Sections 4.3 and 10.9.4.

4.4.3.4 Electrical Equipment and Installations at Terminals

At terminals, the types of electrical equipment and methods of installation will normally be governed by national requirements and, where applicable, by the recommendations of the IEC.

4.4.4 Inspection and Maintenance of Electrical Equipment

4.4.4.1 General

All apparatus, systems and installations, including cables, conduits and similar equipment, should be maintained in good condition. To this end, they should be inspected regularly.

Correct functional operation does not necessarily imply compliance with the required standards of safety.

4.4.4.2 Inspections and Checks

All equipment, systems and installations should be inspected when first installed. Following any repair, adjustment or modification, those parts of the installation that have been disturbed should be checked in accordance with National requirements.

If at any time there is a change in the area classification or in the characteristics of the flammable material handled at a terminal, a check should be made to ensure that all equipment is of the correct group and temperature class and that it continues to comply with the requirements for the revised area classification.

4.4.4.3 Maintenance of Electrical Equipment

The integrity of the protection afforded by the design of explosion-proof or intrinsically safe electrical equipment may be compromised by incorrect maintenance procedures. Even the simplest of repair and maintenance operations must be carried out in strict compliance with the manufacturer's instructions and national requirements in order to ensure that such equipment remains in a safe condition.

This is particularly relevant in the case of explosion-proof lights where incorrect closing after changing a light bulb could compromise the integrity of the light.

In order to assist with routine servicing and repair, tankers should be provided with detailed maintenance procedures and/or manuals for the specific systems and arrangements fitted on board.

4.4.4.4 Insulation Testing

Insulation testing should only be carried out when no flammable gas mixture is present.

4.4.4.5 Alterations to Terminal and Tanker's Equipment, Systems and Installations

No modification, addition or removal should be made to any approved equipment, system or installation at a terminal and on a tanker without the permission of the appropriate authority, unless it can be verified that such a change does not invalidate the approval.

No modification should be made to the safety features of equipment that relies on the techniques of segregation, pressurising, purging or other methods of ensuring safety, without the permission of the Responsible Person.

When equipment in a hazardous zone is permanently withdrawn from service, the associated wiring should be removed from the hazardous zone or should be correctly terminated in an enclosure appropriate to the area classification.

When equipment in a hazardous zone is temporarily removed from service, the exposed conductors should be correctly terminated as above, or adequately insulated, or solidly bonded together and earthed.

The cable cores of intrinsically safe circuits should either be insulated from each other or bonded together and insulated from earth.

4.4.4.6 Periodic Mechanical Inspections

During inspections of electrical equipment or installations, particular attention should be paid to the following:

- Cracks in metal, cracked or broken glasses, or failure of cement around cemented glasses in flame-proof or explosion-proof enclosures.
- Covers of flame-proof enclosures, to ensure that they are tight, that no bolts are missing, and that no gaskets are present between mating metal surfaces.
- Each connection to ensure that it is properly connected.
- Possible slackness of joints in conduit runs and fittings.
- Clamping of cable armouring.
- Stresses on cables that might cause fracture.

4.4.5 Electrical Repairs, Maintenance and Test Work at Terminals

4.4.5.1 General

All maintenance work on electrical equipment should be undertaken under the control of a permit or an equivalent safety management system, with procedures that ensure that electrical and mechanical isolations are effectively managed.

The use of mechanical lock-off devices and safety tags is strongly recommended.

4.4.5.2 Cold Work

Cold Work should not be carried out on any apparatus or wiring, nor should any flame-proof or explosion-proof enclosure be opened, nor the special safety characteristics provided in connection with standard apparatus be impaired, until all electrical power has been cut off from the apparatus or wiring concerned. The electrical power should not be restored until work has been completed and the above safety measures have been fully reinstated. Any such work, including changing of lamps, should only be done by an authorised person.

4.4.5.3 Hot Work

For the purpose of repairs, modifications or testing, the use of soldering apparatus or other means involving a flame, fire or heat, and the use of industrial type apparatus, is permitted in a hazardous area within a terminal, provided that the area has first been made safe and certified gas free by an authorised person and is then maintained in that condition as long as the work is in progress. When such Hot Work is considered necessary on a berth where a tanker is alongside or on the berthed tanker, the joint agreement of the Terminal Representative and the Responsible Person should first be obtained and a Hot Work Permit issued.

It is also permissible to restore voltage to apparatus for testing during a period of repair or alteration, subject to the same conditions.

Before undertaking any Hot Work, reference should be made to Section 9.4.

4.5 Use of Tools

4.5.1 Grit Blasting and Mechanically Powered Tools

It should be noted that grit blasting and the use of mechanically powered tools are not normally considered as falling within the definition of Hot Work in the shipping industry. However, these activities have a significant potential for producing sparks and should be carried out under the control of a Permit to Work system, or under the control of the tanker's Safety Management System.

The following precautions should be observed:

- The work area should not be subject to vapour release, or a concentration of combustible vapours, and should be free of combustible material.
- The area should be gas free and tests with a combustible gas indicator should give a reading of not more than 1% LEL.
- Mechanical tools should not be used when the tanker is alongside a terminal, unless the express permission of the Terminal Representative has been granted.
- There must be no cargo, bunkering, ballasting, tank cleaning, gas freeing, purging or inerting operations in progress.
- Adequate fire-fighting equipment must be laid out and ready for immediate use.

The hopper and hose nozzle of a grit blasting machine should be electrically bonded and earthed to the deck or fitting being worked on.

There is a risk of perforation of pipelines when grit blasting or chipping, and great care must be taken when planning such work. Before commencing work on cargo lines on deck, they should be flushed. Cargo line valves should be closed and filled with water or inerted. The atmosphere inside the section to be worked on should be confirmed as either inerted to less than 8% oxygen by volume or gas free to not more than 1% LEL. Similar precautions should be adopted for efficient stripping, vapour return, inert gas and crude oil washing lines or tank washing lines, as appropriate.

4.5.2 Hand Tools

The use of hand tools such as chipping hammers, scrapers and scouring equipment for steel preparation, maintenance and painting may be permitted without a Hot Work Permit. Their use must, however, be restricted to deck areas and fittings not connected to the cargo system.

The work area should be gas free and clear of combustible materials. The tanker must not be engaged in any cargo, bunker, ballasting, tank cleaning, gas freeing, purging or inerting operations.

Non-ferrous, so called non-sparking, tools are only marginally less likely to give rise to an incendive spark and, because of their comparative softness, are not as efficient as their ferrous equivalents. Particles of concrete, sand or other rock-like substances are likely to become embedded in the working face or edge of such tools, and can then cause incendive sparks on impact with ferrous or other hard metals. The use of non-ferrous tools is therefore not recommended. Chrome vanadium tools may provide an acceptable alternative.

4.6 Equipment Made of Aluminium

Aluminium equipment should not be dragged or rubbed across steel since it may leave a smear which, if subsequently struck by a hammer or falling object, can cause an incendive spark. It is therefore recommended that the undersides of aluminium gangways, step ladders and other heavy portable aluminium structures are protected with a hard plastic or wooden strip to prevent smears being transferred to steel surfaces.

The use of other aluminium equipment in cargo tanks and on cargo decks should be subjected to a risk assessment and, where necessary, carefully controlled.

4.7 Cathodic Protection Anodes in Cargo Tanks

If magnesium anodes strike rusty steel, they are very likely to produce an incendive spark. Such anodes must not therefore be fitted in tanks where flammable gases can be present.

Aluminium anodes give rise to incendive sparking on violent impact and therefore should only be installed at approved locations within cargo tanks, and should never be moved to another location without proper supervision. Moreover, as aluminium anodes could easily be mistaken for zinc anodes and installed in potentially dangerous locations, it is advisable to restrict their use to permanent ballast tanks.

Zinc anodes do not generate an incendive spark on impact with rusty steel and therefore are not subject to the above restrictions.

The location, securing and type of anode installed in cargo tanks will be subject to approval by the appropriate authorities. Their recommendations should be observed and inspections made as frequently as possible to check the security of the anodes and mountings. Anodes have become more susceptible to physical damage with the advent of high capacity tank washing machines.

4.8 Communications Equipment

4.8.1 General

Unless certified as intrinsically safe or of other approved design, all communications equipment on board tankers, such as telephones, talk-back systems, signalling lamps, search lights, loud hailers, closed circuit television cameras and electrical controls for tankers' whistles, should neither be used nor connected or disconnected when the areas in which they are positioned come within the boundary of a shore hazardous zone.

4.8.2 Tanker's Radio Equipment

The use of a tanker's radio equipment during cargo or ballast handling operations is potentially dangerous.

4.8.2.1 Medium and High Frequency Radio Transmissions

During medium and high frequency radio transmission (300 KHz-30 MHz), significant energy is radiated which can, at distances extending to 500 metres from the transmitting antennae, induce an electrical potential in unearthed 'receivers' (derricks, rigging, mast stays, etc) that is capable of producing an incendive spark. Transmissions can also cause arcing over the surface of antenna insulators when they have a surface coating of salt, dirt or water.

Therefore, it is recommended that:

- All stays, derricks and fittings should be earthed. Bearings of booms should be treated with electrically conductive grease (such as graphite grease) to maintain electrical continuity or suitable bonding straps installed.
- Transmissions should not be permitted during periods when there is likely to be a flammable gas in the region of the transmitting antennae or if the antenna comes within the shore hazardous zone.
- Main transmitting antennae should be earthed or isolated whilst the tanker is alongside the berth.

If it is necessary to operate the tanker's radio in port for servicing purposes, there should be agreement between tanker and terminal on the procedures necessary to ensure safety. Among the precautions that might be agreed are operating at low power or the use of a dummy antenna load which will eliminate all radio transmissions to atmosphere. In any case, a safe system of work must be agreed and implemented before energising such equipment.

4.8.2.2 VHF/UHF Equipment

The use of permanently and correctly installed VHF and UHF equipment during cargo, bunkering, ballasting, tank cleaning, gas freeing, purging or inerting operations is considered safe. However, it is recommended that the transmission power be set to low power (one watt or less) when used in port operations.

Only portable VHF/UHF radios, which are certified and maintained to intrinsically safe or explosion-proof standards and having a power output of one watt or less, should be used on board and within the terminal.

The use of VHF/UHF radio equipment as a means of communication between tanker and shore personnel should be encouraged.

4.8.2.3 Satellite Communications Equipment

This equipment normally operates at 1.6 GHz and the power levels generated are not sufficient to present an ignition hazard. Satellite communications equipment may be used therefore to transmit and receive messages whilst the tanker is in port.

4.8.3 Tanker's Radar Equipment

Marine radar systems operate in the high Radio Frequency (RF) and microwave range. Radiation from the scanner fans out in an almost horizontal, narrow beam as the scanner rotates. In port, it will pick up cranes, loading arm gantries and other such structures, but it will not normally spread down to the tanker's deck or jetty.

Radar sets, operating on 3 cm and 10 cm wavelengths, are designed with a peak power output of 30 kW and, if properly sited, present no radio ignition hazard due to induced currents.

High Frequency (HF) radiation does not penetrate the human body, but at short ranges (up to 10 m) can cause heating of skin or eyes. Assuming sensible precautions are taken, such as not looking directly into the scanner at close range, there is no significant health risk from marine radar emissions.

Radar scanner motors are not rated for use in dangerous/hazardous areas and, on smaller vessels, may be situated within shore hazardous zones. Caution should therefore be exercised should radars require testing alongside. The radar should be switched off or placed on standby when alongside a terminal and the terminal should be consulted before testing radar equipment during cargo operations.

4.8.4 Automatic Identification Systems (AIS)

On some inland waterways, the AIS is required to be operating while a tanker is underway and while at anchor. Some port authorities may request that the AIS is kept on when a tanker is alongside. The AIS operates on a VHF frequency and transmits and receives information automatically, and the output power ranges between 2 and 12.5 watts. Automatic polling by another station (e.g. by port authority equipment or another tanker) could cause equipment to transmit at the higher (12.5 watts) level, even when it is set to low power (typically 2 watts).

When alongside a terminal or port area where hydrocarbon gases may be present, either the AIS should be switched off or the aerial isolated and the AIS given a dummy load. Isolating the aerial preserves manually input data that may be lost if the AIS is switched off. If necessary, the port authority should be informed.

When alongside a terminal or port areas where no hydrocarbon gases are likely to be present, and if the unit has the facility, the AIS should be switched to low power.

If the AIS is switched off or isolated whilst alongside, it must be reactivated upon leaving the berth.

The use of AIS equipment may affect the security of the tanker or the terminal at which it is berthed. In such circumstances, the use of AIS may be determined by the port authority, depending on the security level within the port.

4.8.5 Telephones

When there is a direct telephone connection from the tanker to the shore control room or elsewhere, telephone cables should preferably be routed outside the dangerous zone.

When this is not feasible, the cable should be routed and fixed in position by qualified shore personnel and should be protected against mechanical damage so that no danger can arise from its use.

4.8.6 Mobile Telephones

Most mobile phones are not intrinsically safe and are only considered safe for use in non-hazardous areas. Mobile phones should only be used on board a tanker with the Master's permission. Unless certified as being intrinsically safe (see below), their use should be restricted to designated areas of the accommodation space where they are unlikely to interfere with the tanker's equipment.

Although transmission power levels of non-intrinsically safe mobile telephones are insufficient to cause problems with sparking from induced voltages, the batteries can contain sufficient power to create an incendive spark if damaged or short circuited. It should be borne in mind that equipment such as mobile telephones and radio pagers, if switched on, can be activated remotely and a hazard can be generated by the alerting or calling mechanism and, in the case of telephones, by the natural response to answer the call. When taken through a terminal, or on to or off a tanker, they should therefore be switched off and should only be re-commissioned once they are in a non-hazardous area, such as inside the tanker's accommodation or clear of the terminal.

Intrinsically safe mobile telephones are available and these may be used in hazardous areas. These telephones must be clearly identified as being intrinsically safe for all aspects of their operation. Terminal staff going on board a tanker, and tanker's staff going into the terminal, carrying mobile telephones that are intrinsically safe should be prepared to demonstrate compliance if requested by the other party. Other visitors to the tanker or terminal should not use mobile telephones unless prior permission has been obtained from the tanker or terminal, as appropriate.

4.8.7 Pagers

Not all pagers are intrinsically safe. Non-intrinsically safe pagers are considered safe for use only in non-hazardous areas. When taken through a terminal, or on to or off a tanker, they should be switched off and should only be re-commissioned once they are in a non-hazardous area, such as inside the tanker's accommodation.

Intrinsically safe pagers may be used in hazardous areas. These pagers must be clearly identified as being intrinsically safe for all aspects of their operation. Terminal staff going on board a tanker, and tanker's staff going into the terminal, carrying pagers that are intrinsically safe should be prepared to demonstrate compliance if requested by the other party. Other visitors to the tanker or terminal should not use pagers unless prior permission has been obtained from the tanker or terminal, as appropriate.

4.9 Spontaneous Combustion

Some materials when damp or soaked with oil, especially oil of vegetable origin, are liable to ignite without the external application of heat as the result of gradual heating within the material produced by oxidation. The risk of spontaneous combustion is smaller with petroleum oils than with vegetable oils, but it can still occur, particularly if the material is kept warm, for example by proximity to a hot pipe.

Cotton waste, rags, canvas, bedding, jute sacking, sawdust or any similar absorbent material therefore should not be stowed in the same compartment as oil, paint etc and should not be left lying on the jetty, on decks, on equipment, on or adjacent to pipelines, etc. If such materials become damp, they should be dried before being stowed away. If soaked with oil, they should be cleaned or destroyed.

Certain chemicals used for boiler treatment are also oxidising agents and, although carried in diluted form, are capable of spontaneous combustion if permitted to evaporate.

4.10 Auto-Ignition

Petroleum liquids when heated sufficiently will ignite without the application of a naked flame. This process of auto-ignition is most common where fuel or lubricating oil under pressure sprays onto a hot surface. It also occurs when oil spills onto lagging, vaporises and bursts into flame. Both instances have been responsible for serious fires. Oil feeder lines require particular attention to avoid oil being sprayed from leaks. Oil saturated lagging should be removed and personnel protected from any ignition or re-ignition of vapours during the process.

4.11 Asbestos

It is important to note that disturbance or removal of asbestos should be carried out by specialist contractors if possible. In cases where the crew is involved in urgent repair work at sea, measures should be in place to ensure that they are adequately protected from asbestos exposure. IMO MSC Circular 1045 provides the necessary guidance on how to handle asbestos safely on board vessels and barges.