

M/Y Pelorus

Fire Training Manual

Fire Equipment
&
Fire Fighting Techniques





Contents

THEORY OF FIRE FIGHTING	4
Basic Fire Precautions onboard Ship.....	5
Types of Fire	7
Combustible Material Fires	7
Liquid Petroleum Fires	7
Liquefied Petroleum Gas Fires	8
Electrical Equipment Fires.....	8
EXTINGUISHING AGENTS.....	9
Smothering Agents.....	10
Flame Inhibitors	11
Portable Fire Extinguishers on Pelorus	12
Firefighting apparatus.....	14
General Operating procedures for Fire Extinguishers MY Pelorus.....	16
Actions on discovering a Fire.....	17
FIREFIGHTING EQUIPMENT	18
Emergency escape breathing apparatus (EEBD).....	20
The emergency fire pump	21
International shore connection	22
Fire blankets	23

THEORY OF FIRE FIGHTING

To control or prevent the possibility of fire all crew must be aware of the elements required to create combustion. The three elements involved (fuel, heat and oxygen) are often shown as the three sides of a triangle. These three components are inter-dependent on each other and therefore if any one of the components is removed combustion cannot take place.

Also if any one of the three components is reduced below an established value, combustion will not be possible.



Therefore fires can be controlled and extinguished by the removal of heat, fuel or air and the main aim when fighting a fire is to reduce the temperature, remove the fuel and/or exclude the supply of oxygen

Basic Fire Precautions onboard Ship

Cleanliness and Tidiness

- Garbage is a primary source of fuel and may also self-heat. Do not let it accumulate ensure its safe delivery to the garbage room in the Focsle
- Keep all areas tidy – particularly store rooms
- Use the appropriate bins. Ensure that lids are on oily rag bins
- Clean up spills and mess immediately, particularly oils and chemicals
- Empty waste paper baskets regularly
- Filters and vents should be kept clean – especially tumble driers in the Laundry.

Electricity

- Electricity is a major cause of fire, so make sure all systems and appliances are safe
- Always take faulty equipment out of service
- Disconnect all equipment when not in use
- Ensure people are trained in how to use electrical equipment safely
- Circuit breakers or trip switches should not be obstructed. They must be free to operate as they protect the circuit
- The Code of Safe Working practices has further practical information

The Galley

- Turn off Ovens when not in use and never leave unattended pans on a stove
- Keep ventilation hoods and filters free from grease and dust by cleaning them regularly. A fire starting here can easily spread through the trunking to other parts of the ship.
- All equipment in the galley should be kept clean and free from dust.
- Pay attention to electrical hazards. Do not overload sockets as the wiring can heat up and cause a fire.
- Look out for frayed wires and broken plugs – a bad connection can cause an electrical arc, resulting in a fire.
- Isolate all electrical appliances when not in use

The Engine Room

- Oily rags should be kept in a lidded metal container which should be emptied regularly. Cotton if impregnated with oil may spontaneously ignite. Even wet cotton waste can generate heat and is a potential fire risk
- Keep the bilge free of oil and scrupulously clean.
- Engine room plates should be kept free from oil
- Replace lagging that has become impregnated with oil
- Report any oil leaks immediately
- Cladding and sheathing serve to prevent oil leaks coming into contact with hot surfaces. Double skin pipe fittings, if properly maintained, do the same job.
- The engine room contains electrical equipment, which can provide sources of ignition if not properly maintained and regularly inspected.
- Procedures regarding hot work such as burning, cutting and welding must always be followed.

Cigarettes and Smoking

- Statistics show that many ship fires are caused by people smoking and by smoking materials. Prevention of fire from these causes is directly within control of the persons involved. Remember when you light a cigarette – you light a fire.
- The designated Smoking area on Pelorus is the Fore Deck. It is not permitted to smoke anywhere else onboard the ship.
- Only carry cigarettes or smoking and lighting materials in the designated areas.
- Use self-extinguishing ashtrays.
- Never leave lit cigarettes unattended
- When emptying ashtrays, make sure they do not contain smouldering materials.
- All visitors must be warned about the no smoking rules before they come onboard.

Types of Fire

Combustible Material Fires

Examples of such fires are bedding, clothing, and furnishing, wood, and canvas rope and paper fires.

Cooling by large quantities of water, or the use of extinguishing agents containing a large proportion of water, is of primary importance when fighting fires of such combustible material. Cooling the source and surrounding area should continue long enough to prevent any possibility of re-ignition.

Liquid Petroleum Fires

Foam is an efficient agent for extinguishing most liquid petroleum fires. It should be applied so as to flow evenly and progressively over the burning surface, avoiding undue agitation. This can best be achieved by directing the foam jet against any vertical surface adjacent to the fire, both in order to break the force of the jet and to build up an unbroken smothering blanket. If there is no vertical surface the jet should be advanced in oscillating sweeps with the wind, taking care to avoid plunging it into the liquid. Foam spray streams, while limited in range, are also effective.



Volatile oil fires of limited size can be extinguished by water fog or water spray if the whole of the burning surface is accessible. The surface of the liquid transfers its heat rapidly to the water droplets which present a very large cooling surface and the flame can be extinguished with advancing and oscillating sweeps of fog or spray across the whole width of the fire.

Any oil fire which has been burning for some time is more difficult to extinguish with water, since the oil will have been heated to a progressively greater depth and cannot readily be cooled to a point where it ceases to give off gas. Furthermore, the use of a water jet may spread the burning oil by splashing or overflow. Spreading can

also occur through agitation of the oil caused by violent boiling of the water. Water should only be applied to oil fires as a spray or fog, although jets of water can play a valuable role in cooling hot bulkheads and tank walls.

The best way of dealing with such fires in tanks is by means of a smothering agent, such as foam, carbon dioxide, or in some cases dry chemical, coupled if possible with sealing off the tank and cooling adjacent areas or spaces.

The risk of re-ignition of a liquid petroleum fire must be borne constantly in mind. Having extinguished such a fire, a watch should be maintained and fire fighting equipment and personnel kept in a state of immediate readiness.

Liquefied Petroleum Gas Fires

Fires involving escaping liquefied petroleum gas should, where possible, be extinguished by stopping the gas flow. If the flow of gas cannot be stopped it may be safer to allow the fire to continue to burn, at the same time using water spray to cool and control the effect of radiant heat.

Extinguishing the flame may result in a wide spread of un-ignited gas and subsequent wider spread of flame if it is re-ignited.

In order to reach and close the valve controlling the flow of gas it may be necessary to extinguish flames from small leaks in its vicinity. In this case dry powder extinguishers should be used.

Water jets should never be used directly into a liquefied petroleum gas fire. Foam will not extinguish such fires.

Electrical Equipment Fires

These may be caused by short circuit, over heating or the spreading of a fire from elsewhere. The immediate action should be to isolate the equipment and a non-conductive agent, such as carbon dioxide or dry chemical, should then be used to extinguish them.

EXTINGUISHING AGENTS

Water and High Fog

The HI-FOG marine sprinkler system is an alternative to conventional sprinkler systems and is approved by all major marine authorities and classification societies. The high fog sprinkler system protects the accommodation and machinery spaces onboard.

The HI-FOG marine sprinkler system comprises a number of HI-FOG sprinklers connected by fresh water filled stainless steel small bore tubing to a pump unit via section valves.

Water is the most common cooling agent. This is largely because water possesses very good heat absorbing qualities and is available in ample quantities at terminals and on ships.

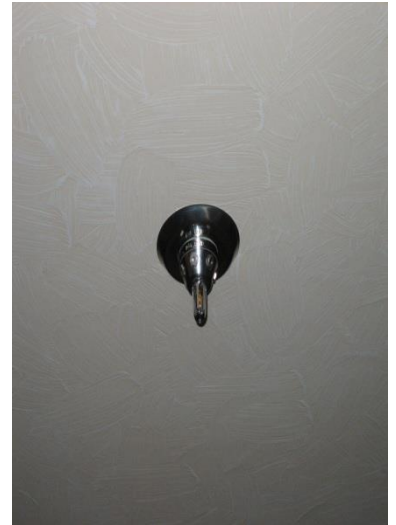
A water jet, although excellent for fighting fires involving combustible materials, should not be used on burning oil, or on burning cooking oil or fat in galleys, because of the danger of spreading the fire.

Water spray and water fog may be used effectively against oil fires and for making a screen between the fire fighter and the fire.

Owing to the danger of electrical shock, water should not be directed towards any electrical equipment.

A wetting agent may be added to water when it is to be used on tightly packed combustible materials. This has the effect of lowering its surface tension and thus increasing its effective penetration.

High fog is a fixed system fitted in the owners interior – it is a pressurized system that when the glass bulb in the detector head is broken – a fine fresh water mist is emitted – smothering the fire.



Smothering Agents

a) Foam

Foam is an aggregation of small bubbles, of lower specific gravity than oil or water, which flows across the surface of a burning liquid and forms a coherent smothering blanket. It will also reduce the surface temperature of the liquid by the absorption of some heat.

Foam applicators should be directed away from liquid petroleum fires until any water in the system has been flushed clear.

Foam should not come into contact with any electrical equipment.

Foam concentrates may deteriorate with time depending on the storage conditions. Storage at high temperatures and in contact with air will cause sludge and sediment to form. This may affect the extinguishing ability of the expanded foam. Samples of the foam concentrate should therefore be returned periodically to the manufacturer for testing and evaluation.

b) Carbon Dioxide

Carbon dioxide is an excellent smothering agent for extinguishing fires, when used in conditions where it will not be widely diffused. Carbon dioxide is therefore effective in enclosed areas such as machinery spaces, pump rooms and electrical switch rooms where it can penetrate into places that cannot be reached by other means. On an open deck or jetty area carbon dioxide is comparatively ineffective.

Carbon dioxide does not damage delicate machinery or instruments and, being a non-conductor, can be used safely on or around electrical equipment.

Due to the possibility of static electricity generation, carbon dioxide should not be injected into any space containing a flammable atmosphere that is not on fire.

Carbon dioxide is asphyxiating and cannot be detected by sight or smell. No one should enter confined or partially confined spaces when carbon dioxide must be fully ventilated before entry without breathing apparatus.

c) Steam

Steam is inefficient as a smothering agent because of the substantial delay that may occur before sufficient air is displaced to render the atmosphere incapable of supporting combustion. Steam should not be injected into any space containing an un-ignited flammable atmosphere due to the possibility of static electricity generation.

d) Sand

Sand is relatively ineffective as an extinguishing agent and is only useful on small fires on hard surfaces. Its basic use is to absorb small spills.

Flame Inhibitors

Flame inhibitors are materials that interfere chemically with the combustion process, and thereby extinguish the flames. However cooling or removal of fuel is necessary if re-ignition is to be prevented.

a) Dry Chemical Powder

Dry chemical powder is discharged from an extinguisher as a free flowing cloud. It is most effective in dealing initially with a fire resulting from an oil spill on a jetty or on the deck of a tanker but can also be used in confined spaces. It is especially useful on burning liquids escaping from leaking pipelines and joints. It is a non-conductor and therefore suitable for dealing with electrical fires. It must be directed into the flames.

Dry chemical powder has a negligible cooling effect and affords no protection against re-ignition, arising, for example, from the presence of hot metal surfaces.

Certain types of dry chemical powder can cause a breakdown of a foam blanket and only those labeled 'foam compatible' should be used in conjunction with foam.

Portable Fire Extinguishers on Pelorus

There are 3 main portable fire extinguishers onboard. These are as follows:

DRY POWDER

RECOGNITION: Red casing with blue band / sticker

TO OPERATE: Pull pin, depress yellow button located on top of extinguisher, aim nozzle at fire and squeeze handle on end of ext.

FOR USE ON: Fires caused by petrol, oil, fat, paint, solvents, grease, propane, butane and natural gas, as well as electrical equipment. Also wood, cloth, paper, rubber, plastics.

IF IN DOUBT USE THIS EXTINGUISHER FOR ALL FIRES (except cooking fat /oils)



CARBON DIOXIDE (CO2)

RECOGNITION: Red casing with black band / sticker

TO OPERATE: Pull pin, squeeze handle whilst holding nozzle using designated handle (or your hand will freeze) and make quick sweeping motions at the base of the fire.

FOR USE ON: Primarily Electrical Fires / Electrical Equipment. Also can be used on flammable liquid fires (but not alcohol or cooking fats)



FOAM

RECOGNITION: Red casing with cream band / sticker

TO OPERATE: Pull pin (some have yellow button feature at pin, if so depress to prime), squeeze handle whilst holding nozzle and aiming at the base of the fire. Slow steady sweeps to create a foam layer on top of fire. *FOR USE ON:* Primarily Flammable liquid fires, fuels, oils etc. Also can be used on organic solids such as paper, wood, cloth, bed sheets etc



There is only one Wet Chemical Extinguisher onboard.
It is located in the galley and is only for Cooking oils (deep fat fryer).

WET CHEMICAL

RECOGNITION: Red casing with yellow band / sticker and WET CHEMICAL written on the band.

TO OPERATE: Pull pin, squeeze handle whilst holding the nozzle and aiming it on top of the source. Slow sweeping motions whilst trying to make a layer of wet chemical on top of fire,

FOR USE ON: Designed specifically for cooking oils and Galley fires.



CLASSIFICATION OF FIRES

When dealing with a fire it is important to recognise its type, as the correct treatment of one type of fire may only increase the danger if applied to another type. The fire classifications given here are as the ISO Standard 3941 and which prevail in most European and Australasian countries, however the reader should be aware that other nations, including the USA have their own criteria for classifying fires.

CLASS A Fires involving solid materials usually of an organic nature.
E.g. cloth, wood, paper, furniture, plastics, rope, etc. (USA (NFPA) Class A)



CLASS B Fires involving flammable liquids or liquefiable solids. These may be sub-divided into those which will mix with water (miscible) such as alcohol and those which are non-miscible such as petrol, oils, solvents, waxes and paints.
(USA (NFPA) Class B)



CLASS C Fires involving gases or liquefied gases.
E.g. methane, propane, butane, acetylene, etc. (USA (NFPA) Class B)



CLASS D Fires involving metals or powdered metals.
E.g. aluminium, magnesium, sodium, etc. (USA (NFPA) Class D)
Note: within this document only limited reference is made to class D fires which require specialised extinguishing agents and training in their use



ELECTRICAL FIRE Electricity itself does not burn. Any fire which is referred to as an electrical fire would actually be a Class A, B, C, D or F fire as described, but with the additional hazard of live electrical circuits. After the appropriate electrical circuits have been isolated the fire is treated as normal for its class. (USA (NFPA) Class C)



CLASS F Fires involving high temperature (over 360°C) cooking oils in galleys industrial kitchens, restaurants, etc. Because of their high auto-ignition temperatures they are difficult to extinguish with conventional extinguishers which do not cool sufficiently. (USA (NFPA) Class K)



General Operating procedures for Fire Extinguishers MY Pelorus.

All fire extinguishers are designed to discharge a substance onto a fire with the intention of breaking down and removing one side of the fire triangle. We carry a variety of fire extinguishers on Pelorus. They are red in colour. They have a band of colour across the tank that is used to distinguish between the different Types

All Fire Extinguishers onboard MY Pelorus are operated in a very similar way.

- Take the extinguisher from its mounted location
- Place on a flat surface
- Remove the pin or pull out the safety clip



In a crouched position and with your body clear of the cylinder top, hold the discharge nozzle away from you and squeeze the trigger or press the plunger.

- The extinguisher is then tested for use prior to tackling the fire
- Approach the fire at a safe distance keeping low down and at a minimum distance of 2m from the fire
- Activate the extinguisher aiming at the base of the fire.

Actions on discovering a Fire

Remember the acronym F.I.R.E (Find. Inform. Restrict. Extinguish)

- With the above in mind on discovery of a fire – Raise the Alarm. Shout loudly and clearly “FIRE FIRE FIRE”. If you are carrying a UHF radio then broadcast the alert on CH5, 3, & 2. If there is a manual call point nearby press the button. You will not hear an alarm sound when you activate the manual call point, however an alarm will sound on the Bridge to notify the OOW (Officer on Watch) and a red light will light up to show that you have activated the call point.
- Restrict the spread of fire and smoke by closing doors, fire doors & water tight doors in the area.
- If the fire is small and you feel confident to do so – use the nearest fire extinguisher to have one attempt to extinguish the fire.
- Telephone the Bridge on 333 – tell the OOW your name and what you have discovered
- Remain in a safe location, close but away from the fire and wait for the Quick Response Team to arrive – tell them what you have found and what actions you have taken.



FIREFIGHTING EQUIPMENT

Fireman's Outfit

Each vessel shall carry a minimum of two fireman's outfits as detailed below. Masters are expected to be familiar with the flag state requirements for the carriage of this equipment and shall therefore ensure that the correct numbers of outfits are carried and ready for immediate use.



Onboard Pelorus we have two fire fighting lockers. One located Aft of the ship on the Portside of the boat deck and one located forward of the bridge on the portside. Each locker comprises of four complete BA sets with fireman outfit and two spare BA bottles. One extra fireman outfit is also available for the team assistance.

Equipment Checklist

Each fireman's outfit on board shall consist of:

- Protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface shall be water-resistant.
- Boots and gloves of rubber or other electrically non-conducting material.
- Safety helmet.

Personal equipment comprising:

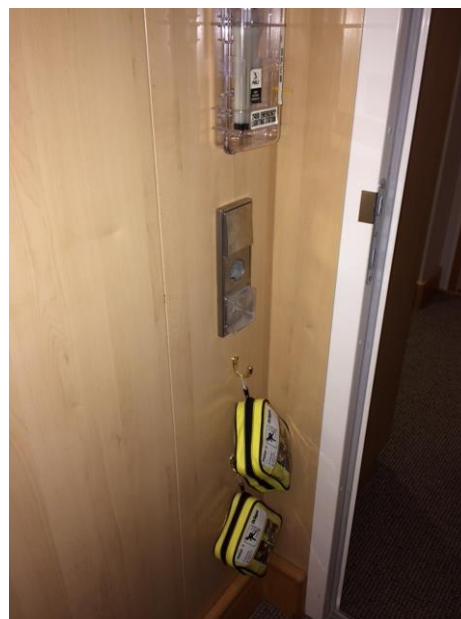
- a) Electric safety lamp (hand lantern) of an approved type with a minimum burning period of three hours.
- b) Axe.
- c) Self-contained compressed-air-operated breathing apparatus, the volume of air contained in the cylinders shall be at least 1,200 liters and capable of functioning for at least 30 minutes.
- d) Dead man alarm unit

Emergency escape breathing apparatus (EEBD)

These are situated in the machinery spaces and accommodation stairwells, they consist of an air bottle and hood and will provide the average wearer with 10 minutes of air, they are to be used FOR ESCAPE ONLY. Each cabin is also equipped with smoke hoods and emergency torch.



EEBD



Cabin smoke hoods and torch

Fire extinguishing

Every vessel is fitted with both portable and fixed fire extinguishing apparatus. All crew members are required to become familiar with all type of fire extinguishing apparatus carried on board the vessel.

The Master must ensure that all crew receive the appropriate training in the operation of each type of extinguisher on board and the type of fire to use each one on.

Fixed Fire Extinguishing Systems

All Officers are required to become fully conversant with the operation procedures for fixed fire extinguishing systems and the engine room.

Spaces protected by fixed systems: Guest Interior, Deck and Engine Spaces

Type of Medium: High Fog

Location of release points: Bridge and ECR

Description of alarms sounded before release: Fire Alarm **Emergency fire pump**

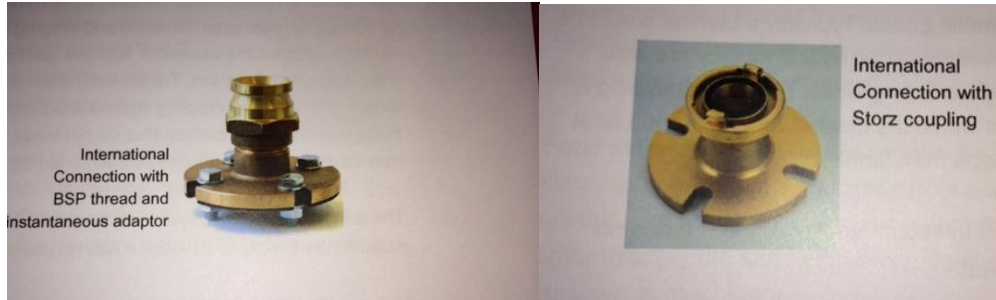
The emergency fire pump

The emergency fire pump onboard Pelorus is located in the bow thruster room.



International shore connection

The international shore connection enables water to be pumped from another vessel or from the shore to the ship's fire main.



SOLAS requirements

SOLAS requires that all vessel of over 500GRT carry at least one international shore connection and that it must be possible to use the connection on either side of the vessel. One side of the connection has a flat face and on the other a coupling that will fit the ship's hydrant and hose.

The international shore connection is located on the boat deck portside aft.



The International shore connection must be kept in a clearly defined and accessible place. This may be in the ship's fire station together with the fire control plan or some other suitable location.

Fire blankets

If possible first remove the source of heat (e.g. for a cooking pan fire turn off the burner). If the fire blanket does not have specific protected hand holds fold back the top edge over the hands to protect them. Allow the blanket to afford protection by letting it hang in front of you. This is achieved by holding your hands up and apart. Hold the blanket so as to keep heat and flame off your face and body. But do not obscure your vision. Advance and lay the blanket over the fire. If it is a liquid fire make sure the blanket is stretched so that it does not dip into the liquid. Do not throw the blanket down, as this may drive air into the fire and cause it to be more intense or cause a plume of flame.

Once the fire has been extinguished do not remove the blanket until the previously burning item has had time to cool. Removing the blanket too soon may allow re-ignition.

When used to extinguish a fire in clothing, wrap the blanket around the casualty and roll him on the deck. When the fire has been extinguished remove the blanket so as to release any trapped heat, and treat the casualty as necessary.

We have two fire blankets located in the main Galley underneath the cupboards

