Fire on Board
Part I. FIRE FIGHTING ON BOARD SHIP

- A fire on a ship is one of the most dangerous incidents which can happen on board. If the fire is **detected** in good time, the crew can prevent larger damages by taking immediate measures – such as fighting the fire by use of a fire hose under breathing protection.
- If the fire has already **spread**, professional aid is absolutely needed, which can be rendered via helicopter or by ship.

Multiple Choice Test

- A fire on a ship is one of the most dangerous incidents which can happen on ***broad / board / breadth***.
- If the fire is ***covered / found / detected*** in good time, the crew can prevent larger damages by taking immediate measures – such as fighting the fire by use of a fire ***nose / host / hose*** under breathing protection.
- If the fire has already ***sprung / spread / sparkled***, professional aid is absolutely needed, which can be rendered via helicopter or by ship.

- Every year more and more ships are lost through fire and collision. Shipboard fire alone, however, results in more total losses of ships than any other form of casualty.
- The most common causes of shipboard fire are the most obvious: maintenance burning and welding are responsible for nearly 40 per cent of all outbreaks. Smoking leads to countless fires that break out when no one expects. Lack of attention, spontaneous combustion and electrical faults are the major causes. The engine room is at special risk from flashbacks in oilfired boilers, leaky pipings carrying oil, overheated bearings and even the accumulation of rubbish (oil rags, dirty oil, tins of oil, etc.).
- Fire fighting at sea includes three distinct stages: detection, - locating the fire; alarm- informing the rest of the ship; control – actuating the means of extinguishing the fire.

Supply the missing term

- Every year more and more ships are lost through _____ and collision.
- Shipboard fire alone, however, results in more total losses of ships than any other form of _____.
- The most common causes of shipboard fire are the most obvious: maintenance _____ and welding are responsible for nearly 40 per cent of all _____.
- Smoking leads to countless fires that break _____ when no one expects.
- Lack of attention, spontaneous combustion and electrical _____ are the major causes.
- The engine room is at special risk from _____ in oilfired boilers, _____ pipings carrying oil, _____ bearings and even the accumulation of rubbish (oil rags, dirty oil, tins of oil, etc.).
- Fire fighting at sea includes three distinct stages: _____, -locating the fire; alarm- informing the rest of the ship; _____ – actuating the means of extinguishing the fire.

Common Causes of Shipboard Fires

- The causes of engine room fires can usually be traced back to a **lack of maintenance** or **bad watchkeeping practices**. They are usually caused by **fuel spills**, **overheating components** or **careless use of electric welding** or gas brazing gear.

What are the most common causes of ship's fire?

- The causes of engine room fires can usually be traced back to a
  - lack of _____
  - bad _____
- They are usually caused by
  - fuel _____ ,
  - _____ components or
  - careless use of _____ or
  - _____ gear.

- ***braze***: to make a joint between (two metal surfaces) by fusing a layer of brass or high-melting solder between them

- There are two ways of fighting fire on board a ship - by using **portable** marine fire fighting equipments or by using different types of **fixed** fire fighting installations.
- The type of system used for fighting fire depends on the intensity and type of fire. Moreover, not all types of fixed fire installation systems can be used for any type of ship.
- A specific type of fixed fire fighting installation can be used only for a certain type of ship. In this article we will learn about a ship's **fire main** or the main fire fighting installation system.

Complete the following sentences

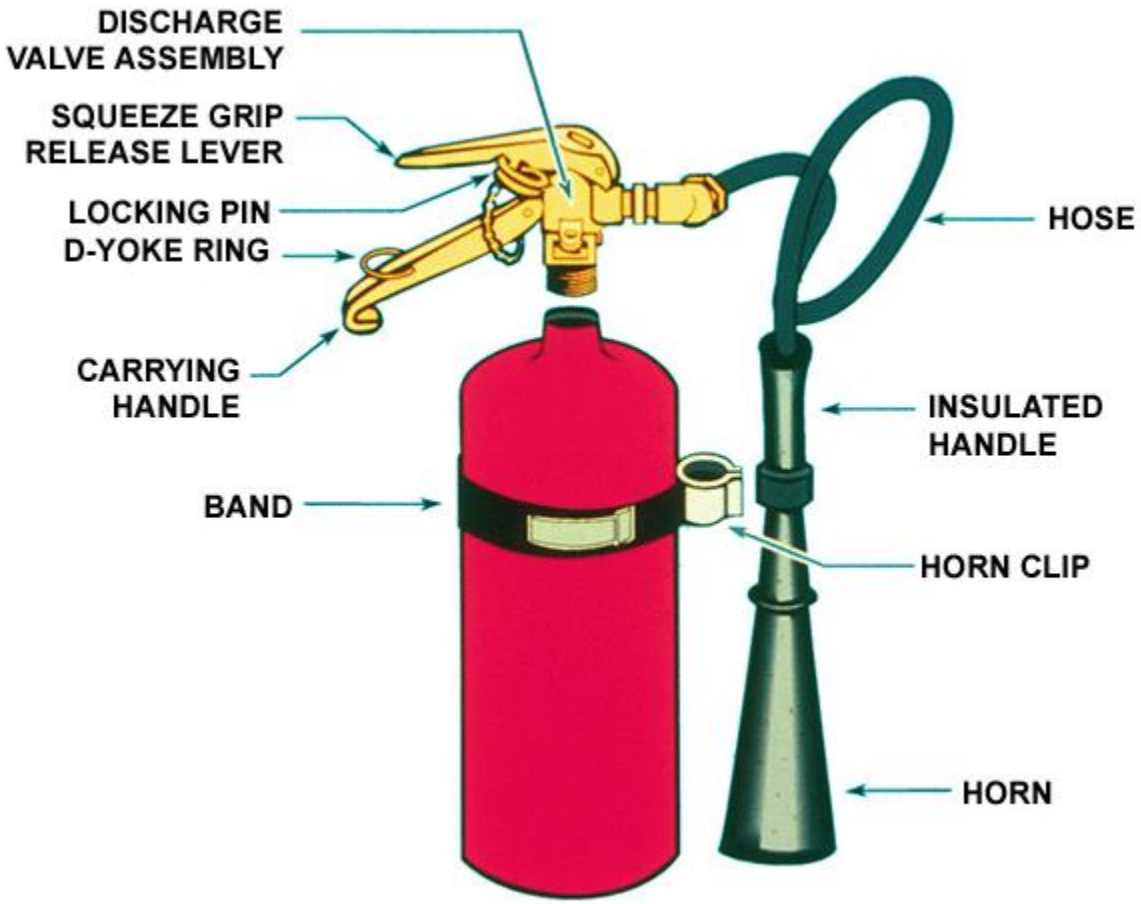
- There are two ways of fighting fire on board a ship - by … … … … … or by using different types of **fixed** fire fighting installations.
- The type of system used for fighting fire depends on … … … … … … .
- Moreover, not all types of fixed fire installation systems can be used … … … … … … .
- A specific type of fixed fire fighting installation can be used only … … … … … … .
- In this article we will learn about a … … … … … or the main fire fighting installation system.

Fire Main

- A ship's main emergency fire system consist of a specific number of **fire hydrants** located at strategic positions across the ship. A series of **dedicated pumps** are provided to supply to these fire hydrants. The number and capacity of pumps required for a particular type of ship is decided by an international governing authority.
- All these pumps are supplied power from the main power system. Apart from that, an emergency fire pump is also provided , which is located remote from the machinery space. The **emergency fire pump** has its own independent means of power source, which can be used to take over in case of main power failure.

Supply the missing terms (Fire Main)

- A ship's main emergency fire system consist of a specific number of _____ located at strategic positions across the ship. A series of **dedicated** _____ are provided to supply to these fire hydrants. The number and capacity of pumps required for a particular type of ship is decided by an international governing _____.
- All these pumps are supplied power from the _____ power system. Apart from that, an _____ fire pump is also provided , which is located remote from the machinery space. The **emergency fire pump** has its own independent means of power source, which can be used to take over in case of main power _____.



Portable Fire Extinguishers

firemain and hose reel system (manual actuation)

- Moreover, all the **hydrant outlets** are provided with an isolating valve so as to isolate those valves which are not in use. The fire hydrants are also provided with standard size **flanges** in order to attach **hoses** which have **nozzles** attached to them. All the hoses are provided with snap in connectors for easy and quick engaging and disengaging operation.
- The nozzles attached to the hoses are generally of two types - **jet** and **spray** , depending on the type of discharge required for extinguishing the fire. Both the nozzles can be adjusted according to the type of spray and flow required, which could be played over the fire to cool it without spreading.

Complete the following sentences

- All the **hydrant outlets** are provided with an isolating valve so as to ....
- The fire hydrants are also provided with standard size **flanges** in order to ....
- All the hoses are provided with snap in connectors for ....
- The nozzles attached to the hoses are generally of two types - .... , depending on the type of discharge required for extinguishing the fire.
- Both the nozzles can be adjusted according to .... , which could be played over the fire to cool it without spreading.

- The pumps are connected with the **main sea water connection**, having appropriate **head** to prevent any type of suction problem.
- The **valves** supplying water to these pumps are always kept open to provide a constant supply of sea water to fight fire at any point of time.
- Though sea water is the best mode of fighting fire, the main emergency fire fighting system can only be used on fires of **Type A**.
- However, in case of **class B** fires, if all modes for extinguishing fire fails, sea water from main emergency system can be used.

Say which is TRUE or FALSE

- The pumps are connected with the **main fresh water connection**
- The **head** of a pump is the power of the pump expressed in tonnes.
- The appropriate **head** of the pump will prevent any type of suction problem
- The **valves** supplying water to these pumps are always kept closed to provide a constant supply of sea water to fight fire at any point of time.
- The sea water is the best mode of fighting fire
- The main emergency fire fighting system cannot be used on fires of **Type A**.
- In case of **class B** fires, if all modes for extinguishing fire fails, sea water from main emergency system can be used.

Requirements regarding fire protection and extinguishing equipment :

- For pumps involved in fire-fighting, a **performance test** is to be carried out in the manufacturer's workshop under GL supervision
- The foam concentrate should be of an **approved** alcohol-resistant type suitable for oil and chemical fires
- Each monitor supply pump is to be **connected** to at least one sea chest/sea connection
- Pipelines for fire-fighting purposes (monitor supply, foam, water spray, etc.) installed on open deck should have effective **protection** against corrosion
- The **water velocity** inside suction pipes shall normally not exceed 2 m/s and inside delivery pipes not exceed 4 m/s.

MCT

- For pumps involved in fire-fighting, a ***preference / performance / capacity*** **test** is to be carried out in the manufacturer's workshop under GL supervision
- The foam concentrate should be of an ***allowed / dispproved / approved*** alcohol-resistant type suitable for oil and chemical fires
- Each monitor supply pump is to be **connected** to at ***last / least / lost*** one sea chest/sea connection
- Pipelines for fire-fighting purposes (monitor supply, foam, water spray, etc.) installed on open deck should have effective ***detection / protection / reaction*** against corrosion
- The **water velocity** inside suction pipes shall normally not exceed 2 m/s and inside delivery ***pipes / lines / pipelines*** not exceed 4 m/s.

- *Fire is classified* depending on the fuel that causes fire.

FIRE TRIANGLE

Fire is classified depending on the fuel that causes fire.

Type of fire	Fuel
Class A (General fire)	Wood,Paper,Cloths etc.,
Class B (Oil fire)	Flammable liquids – gasoline, oil, grease etc.,
Class C (Electrical fire)	Electrical cables and electrical motors,switchboards etc.,
Class D (Chemical fire)	Chemicals – Reactive chemicals and Active metals

Supply the type of fuel (burning material) for each type of fire

Type of fire	Fuel
Class A (General fire)	
Class B (Oil fire)	
Class C (Electrical fire)	
Class D (Chemical fire)	

The four types of fire equipment

1. Dry Powder Fire Extinguisher– it has a black band around the body and is used for extinguishing electrical and liquid fires.
2. Foam Fire Extinguisher – this has a yellow band around the body and is used for extinguishing oil fires.
3. Water Fire Extinguisher – this has a red band contained between two thin white bands around the body. It is used to extinguish paper, wood and cloth.
4. CO2 Fire Extinguisher – this has a black band around the body and is used to extinguish electrical and liquid fires.

Remember, only the Dry Powder and CO2 extinguishers should be used on electrical fires.

Give the four types of fire equipment

1. _____ Fire Extinguisher– it has a black band around the body and is used for extinguishing electrical and liquid fires.
2. _____ Extinguisher – this has a yellow band around the body and is used for extinguishing oil fires.
3. _____ Extinguisher – this has a red band contained between two thin white bands around the body. It is used to extinguish paper, wood and cloth.
4. _____ Extinguisher – this has a black band around the body and is used to extinguish electrical and liquid fires.

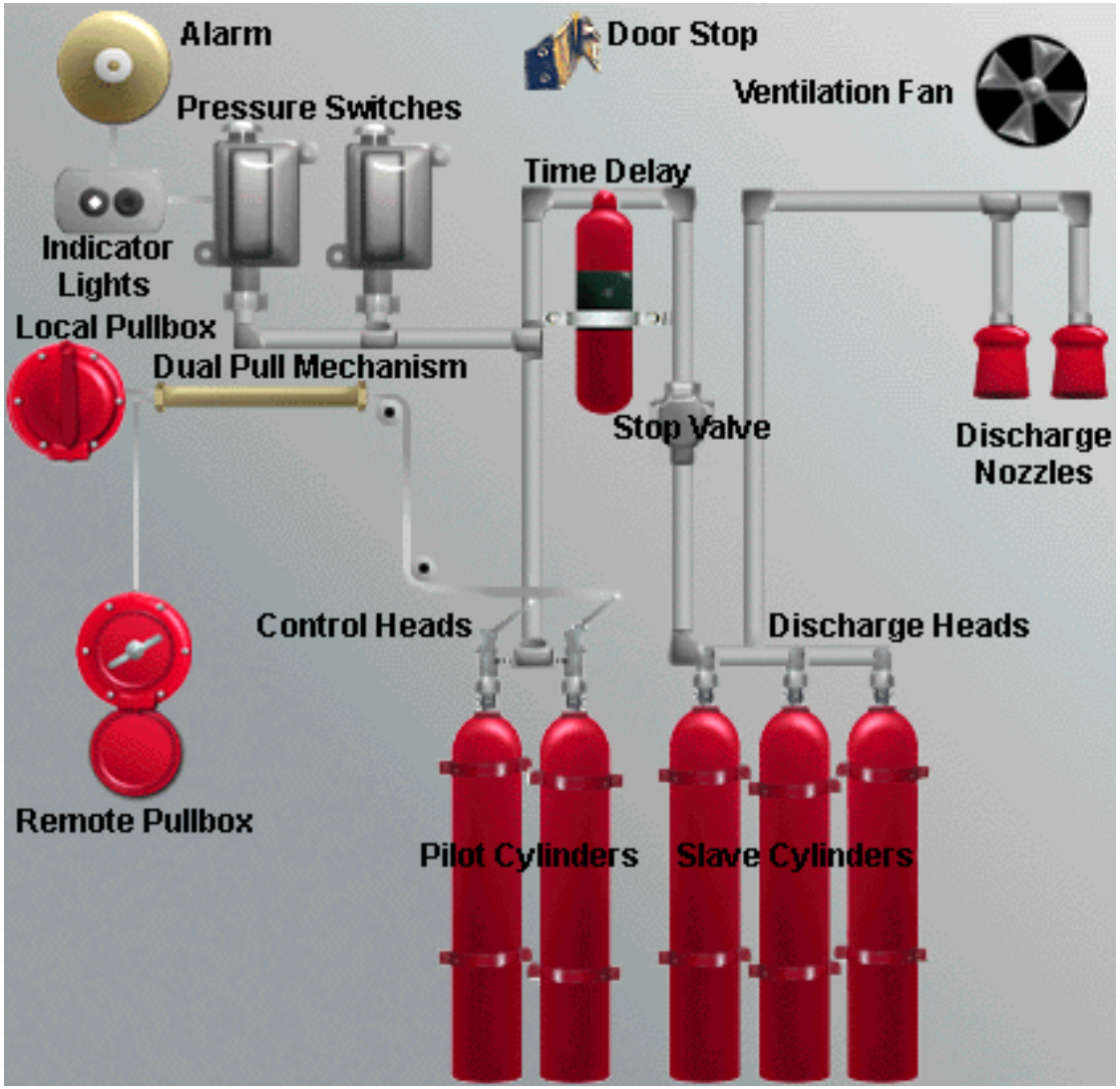
Remember, only the Dry Powder and CO2 extinguishers should be used on electrical fires.

Complete the sentences below

1. Dry Powder Fire Extinguisher– it has a black band around the body and is used for … … … …
2. Foam Fire Extinguisher – this has a yellow band around the body and is used for … … … … .
3. Water Fire Extinguisher – this has a red band contained between two thin white bands around the body. It is used to … … … … .
4. CO2 Fire Extinguisher – this has a black band around the body and is used to … … … … .

Remember, only the Dry Powder and CO2 extinguishers should be used on electrical fires.

Sprinkler system
(automatic actuation)



CO_2Flooding system (manual or automatic actuation)for machinery compartments

Fire on Board – Part II.

Detection Systems and Fire Alarm

Detection Systems and Fire Alarm

- A fire, if detected quickly, can be fought and brought under control with a minimum of damage. The use of fire detection devices is, therefore, increasing particularly in view of reduced manning and unmanned machinery spaces.
- Three phenomena associated with fire are used to provide the alarm: smoke, flames, and heat.
- The smoke detector makes use of two ionisation chambers, one open to the atmosphere and one closed.

Complete the text below

- …. ….. ….., a fire, can be fought and brought under control with a minimum of damage.
- The use of fire detection devices is, therefore, increasing particularly because of reduced ….. and …. ….. ……
- Three phenomena associated with fire are used to provide the alarm: …. ….. …..,
- The smoke detector makes use of two ionisation chambers, one …. ….. …..,

- The fine particles or **aerosols** given off by the fire alter the resistance in open ionisation chamber, resulting in operation of a cold cathode gas-filled tube. The alarm sounds on the operation of the tube to give warning of fire. **Smoke detectors** are used in machinery spaces, accomodation areas and cargo holds.

Supply the right verb

- The fine particles or **aerosols** given _____ by the fire _____ the resistance in open ionisation chamber, _____ in operation of a cold cathode gas-filled tube. The alarm _____ on the operation of the tube to _____ warning of fire. **Smoke detectors** are _____ in machinery spaces, accomodation areas and cargo holds.

- Flames, as opposed to smoke, are often the main result of gas and liquid fires and flame detectors are used to protect against such hazard. Flames give off ultraviolet and infra-red radiation and detectors are capable to respond to either. Flame detectors are used near to fuel handling equipment in the machinery spaces and in such spaces as boiler rooms. Heat detectors can use any of a number of principles of operation, such as liquid expansion, low melting point materials or bimetallic strips. The most usual detector nowdays operates on either a set temperature rise or a rate of temperature rise being exceeded. Thus an increase in temperature occuring quickly could set off the alarm before the set temperature was reached.

MCT

- Flames, as opposed to smoke, are often the main result of gas and liquid fires and flame ***injectors/inspectors/detectors*** are used to protect against such hazard.
- Flames give ***out/off /on*** ultraviolet and infra-red radiation and detectors are capable to respond to either.
- Flame detectors are used near to fuel handling ***pump/tool/equipment*** in the machinery spaces and in such spaces as boiler rooms.
- Heat detectors can use any of a number of principles of operation, such as liquid expansion, low melting ***spot/post/point*** materials or bimetallic strips.
- The most usual detector nowdays operates on either a set temperature ***fall/rise/rose*** or a rate of temperature rise being exceeded.
- Thus an increase in temperature occuring quickly could set ***on/about/off*** the alarm before the set temperature was reached.

- Fig.20.2. shows the **electro-pneumatic type** which gives the alarm when rising air pressure in a sealed chamber deflects a diaphragm to make electrical contact; this indicates a rapid rate of temperature rise.

- **Heat detectors** are used in places such as the galley and laundry where other types of detectors would give off false alarms.
- Associated with fire detectors is the electric circuit to ring an **alarm bell**. This bell will usually sound in the machinery space, if the fire occurs there, and also on the bridge. Any fire discovered in its early stages will require the finder to give the alarm or make the decision to deal with it himself if he can.
-

Supply the missing term

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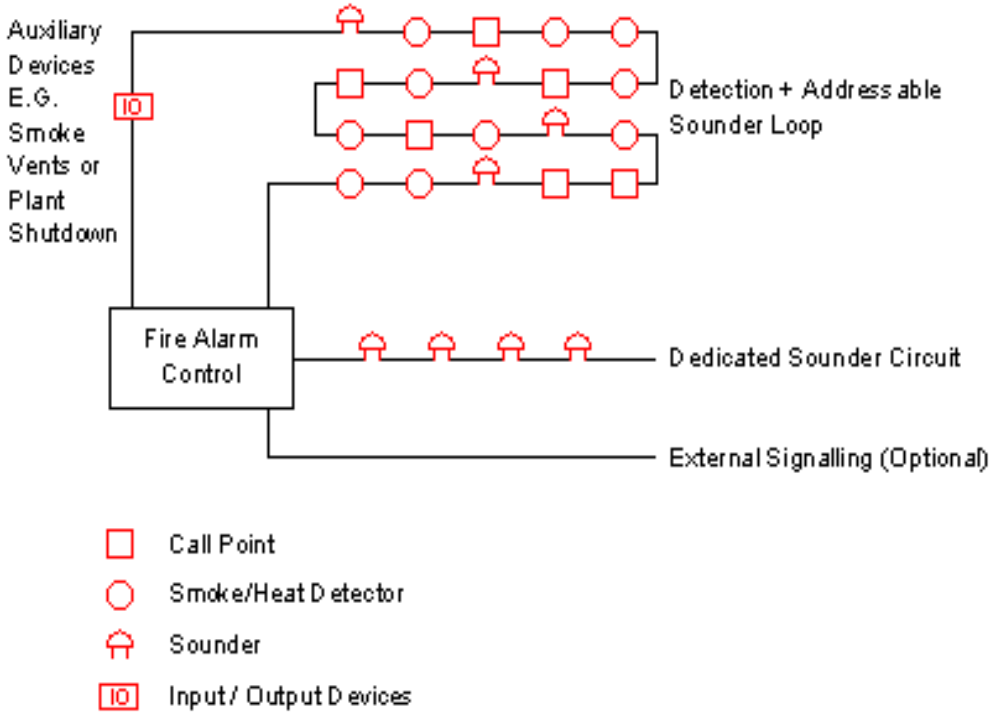
Smoke Detectors

International Shore Coupling



Fire Alarm Arrangement

Part III.

Firefighting Equipment in Ship's Engine Room

Firefighting Equipment in Ship's Engine Room

- Ships engine rooms are susceptible to fires and explosions, as well as the engines themselves. However, there is **firefighting equipment** in a ship's engine room to combat these hazards, such as hand held **fire extinguishers** and seawater **hydrants/ hoses**; **CO2** or mist injection being used in engine spaces
- Ship's engine rooms are the usual sources of shipboard fires; either from a fire in the engine room, or an engine internal fire or explosion causing a subsequent fire. The main **portable** means of fire fighting equipment are the different types of hand held extinguishers. These are located throughout the engine room at different levels, along with **hoses** and **hydrants** supplied by the seawater pumps. Fires in the engine internal spaces can be attacked and extinguished using **inert gas** such as **CO_2, foam**, or **water mist sprays**.

Insert the missing words

- Ships engine rooms are _____ to fires and explosions, as well as the engines themselves.
- However, there is firefighting equipment in a ships engine room to combat these hazards, such as hand held fire _____ and seawater _____ hoses; _____ or mist injection being used in engine spaces
- Ship's engine rooms are the usual _____ of shipboard fires; either from a fire in the engine room, or an engine internal fire or explosion causing a subsequent fire.
- The main _____ means of fire fighting equipment are the different types of hand held extinguishers.
- These are located throughout the engine room at different levels, along with _____ and hydrants supplied by the seawater pumps.
- Fires in the engine internal spaces can be attacked and _____ using inert gas such as CO_2, foam, or water _____ sprays.

Common Causes of Shipboard Fires

- The causes of engine room fires can usually be traced back to a **lack of maintenance** or **bad watchkeeping practices**. They are usually caused by **fuel spills**, **overheating components** or **careless use of electric welding** or gas brazing gear.

Common Causes of Shipboard Fires:

The causes of engine room fires can usually be traced back to:

- a **lack of** _____ or **bad** _____.

They are usually caused by

- **Fuel** _____
- _____ **components** or
- **careless use of** _____ or
- **gas** _____ **gear.**

Oil Spills

- It is imperative to combat the risk of engine room fires by **maintaining the fuel and lube oil systems**, more so on diesel engine ships than steam turbines; although I have had a few hairy oil-fired boiler room moments where the donkey man has used sawdust to mop up burner oil spills, instead of sand from the old red-painted sand bucket. There must be constant **vigilance against leaking oil** of any type, pipes and unions being especially vulnerable. Any leaking or damaged fuel pipe should be reported to the senior engineer immediately. There is not much you can do about oil spraying onto a hot exhaust, except **shut off the supply** and **fight the fire**, however but engine room housekeeping is another matter, this is something that we can all participate in.

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- There must be constant vigilance …… of any type, pipes and unions being especially vulnerable.
- Any leaking or damaged fuel pipe should be reported to ……
- There is not much you can do about oil spraying onto a hot exhaust, except …… and fight the fire, however, but …… is another matter, this is something that we can all participate in.

Engine room Housekeeping

- The engine room should be kept clean and tidy, free from inflammable materials such as wooden crates, cardboard boxes, oily rags and paper. Any oil spills should be cleaned up immediately and the source investigated, repaired and logged. An engine room No Smoking Policy should be enforced, which should stop people stubbing out their cigarette ends in a sand bucket!

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Engine Room Fire Fighting Equipment Engine room Sprinkler System

- The more modern type of **water nozzles** supply a very fine mist rather than a flow of water. These systems cover of different areas of the engine room, but not the switchboard or the electrical generating component of the power generators. The **sprinkler system** can be operated automatically by sensors or manually by the engineer. This *starts* the **water booster pump** and *opens up* the compressed air supply which can be from dedicated **high pressure air bottles** or the **engine air-start receivers**.
- As we all know water is not normally used on oil fires but, because fine mist is injected into the area it not only *starves* the fire of oxygen, but also *dissipates* the smoke.

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- As we all know water is not normally used on oil fires but, because fine mist is injected into the area it not only starves the fire of oxygen, but also dissipates the smoke.

Engine room Fire Extinguishers

- There are four main types of fire extinguishers all colored red nowadays, with a different colored band around the top of the body, denoting the type of **medium** it contains. They are operated by removing the **protective pin**, before pulling the **trigger** smartly.
- Fire extinguishers are usually stored in a **container** together as shown below in a group of four; one of each type. The containers are positioned at different levels in the engine room at high fire risk locations.

Engine room Fire Extinguishers

- There are four main types of _____ all colored red nowadays, with a different _____ around the top of the body, denoting the type of medium it contains.
- They are operated by removing the protective pin, before pulling the _____ smartly.
- Fire extinguishers are usually stored in a _____ together as shown below in a group of four; one of each type.
- The containers are positioned at different levels in the engine room at _____ .

Fire Hydrants and Hoses

- These are positioned throughout the engine room; a fire axe is sometimes alongside the fire hoses. The hydrant valves should be opened; hoses run out and discharged to the bilges at regular intervals to ensure operation.

Fire Hydrants and Hoses

- These are positioned _____ t the engine room; a fire _____ is sometimes alongside the fire hoses. The _____ should be opened; _____ should be run out and discharged to the _____ at regular intervals to ensure operation.

Aqueous Film Forming Foam

- Known as **AFFF** and (pronounced A triple F) was developed in the sixties and is a great innovation to firefighting not only in ship's engine rooms, but on oil and gas platforms worldwide. AFFF is supplied in its own containers and added to an AFFF **storage tank** and is operated by pressurized seawater. The seawater *mixes with* the specialist liquid and exits the $1^{1/2"}$ **rubber hose** through a **brass nozzle** as a pressurized film of thick, viscous foam. This is directed to the base of the fire, quickly *smothering* the flames, *dissipating* the heat, smoke and fumes.

- Known as AFFF and (pronounced A triple F) was developed in the sixties and is a great innovation to firefighting ..... in ships engine rooms, ... also on oil and gas platforms worldwide.
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- The seawater ..... the specialist liquid and exits the $1^{1/2}$" rubber hose through a brass nozzle ..... a pressurized film of thick, viscous foam.
- This is directed to the base of the fire, quickly ..... the flames, ... the heat, smoke and fumes.

Prevention and Control

- The two main causes of engine room fires are scavenge fires and crankcase explosions occurring on the main diesel engines. Both can be detected and prevented if discovered early enough. The scavenge fire is detected by high exhaust temperature, paint peeling of the scavenge door or the Mate phoning down to inform us of black smoke and sparks emitting from the fuel.
- The much more serious crankcase explosion is caused by a build up of lube-oil mist inside the crankcase. This triggers the oil-mist detector and the alarm will sound, giving the engineer enough time to slow down the engine allowing it cool. In the event of an explosion, the explosion relief devices on the crankcase doors will lift. This device prevents injury from a flying crankcase door; the fine wire mesh in the relief valve taking the heat out of the flames, reducing the risk of fire. The explosion door re-closes immediately, preventing any entry of fresh oxygen entering the crankcase promoting further explosion and fire.
- Both the above hazards have similar fire control methods; injection of CO2 or water mist into the scavenge space and injection of CO2 into the crankcase. The inspection doors must remain shut until the relevant components and spaces have cooled down.

Prevention and Control

- The two main causes of engine room fires are _____and _____ occurring on the main diesel engines.
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- This _____ the oil-mist detector and the alarm will _____ , giving the engineer enough time to slow down the engine allowing it cool. In the event of an explosion, the explosion relief devices on the crankcase doors will _____ .
- This device prevents injury from a _____ crankcase door; the fine wire mesh in the relief valve takes the heat out of the flames, reducing the _____ .
- The explosion door re-closes immediately, preventing any entry of fresh _____ entering the crankcase _____ further explosion and fire.
- Both the above hazards have similar _____ methods; injection of CO2 or _____ into the scavenge space and injection of CO2 into the crankcase.
- The inspection doors must remain _____ until the relevant components and spaces have cooled down.

Firefighting Team and Equipment

- **Firefighting Team and Equipment**
- This is a dedicated team with a team leader in charge, who attend regular courses when on leave. The team is usually made up from members of the crew, engine room and deck officers. They practice fire drill, evacuation and rescue operations regularly on the deck, accommodation and engine room areas.

Firefighting Team and Equipment

- This is a dedicated team with a _____ in charge, who _____ regular courses when on leave.
- The team is usually _____ from members of the crew, engine room and deck officers.
- They _____ fire drill, evacuation and _____ regularly on the deck, accommodation and engine room areas.

- **Breathing Apparatus Set**
- The BA set consists of an oxygen tank which is strapped to the firefighters back, supplying a full face mask with oxygen.
- **Personal Protection**
- This consists of loose fitting fire retardant clothes, fire retardant boots and a yellow fireman's safety helmet; team leader having a red band around his helmet.

Read more:
http://www.brighthub.com/engineering/marine/articles/61661.aspx#ixzz1bsA4oipt

- **Breathing Apparatus Set**
- The BA set consists of an _____ which……, supplying a full face mask with oxygen.
- **Personal Protection**
- This consists of loose fitting fire _____ clothes, fire retardant boots and a yellow fireman's safety helmet; the team leader has …… .

EXERCISES

Arrange in the table below the fire detection devices currently available on board ship indicating the best use of each.

TYPES OF FIRE DETECTOR	SPACES ON BOARD WHERE INSTALLED

- Give a brief description of the various operating principles of heat detectors.

- Label Fig.20.3. and describe the operating principle of the type of detector represented.

IV . Fill in the blanks in the following sentences in order to for VERB + PREPOSITION / ADVERBAL PARTICLE collocations.

Choose among : ***in, of, off, out, under, with, on***

1. When World War II broke _____ my grandfather was sailing on a merchant vessel.
2. Flooding in the engine room is being brought _____ control.
3. Wars have always resulted _____ heavy casualties.
4. He doesn't want to associate himself _____ what has been said about the engine condition.
5. If a fire should break out on a ship how best can it be dealt _____ ?
   By making use _____ fire-fighting appliances.
6. This chemical gives _____ toxic vapours.
7. Auxiliary boilers may be operated _____ the main engine exhaust gases.

FIRE FIGHTING ON BOARD SHIP

Part IV.

Fire control

Fire control

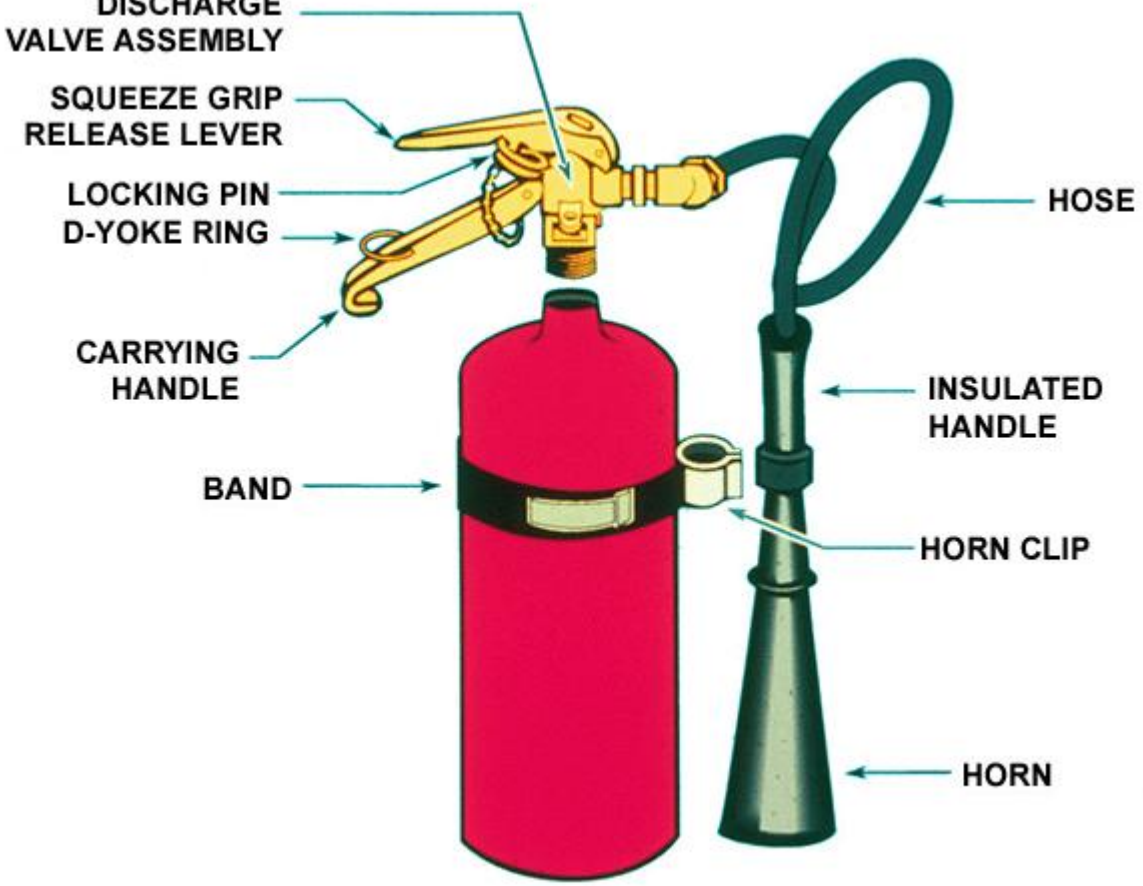
- Two basically different types of equipment are available on board ship for the control of fires. These are small portable extinguishers and large fixed installations.
- Fire buckets, for many years recogised equipment, have been replaced on all but the smallest vessels with more effective portable extinguishers- expelling water, foam, $C0_2$, Halon and dry powder.

- Portable extinguishers are for small fires which, by prompt on-the-spot action, can be readily extinguished or contained before they escalate. However, altough they may be highly effective, their capacity is limited.

- The fixed installation is used when the fire cannot be fought and restrained by portable equipment or there is perhaps a greater danger if adjacent areas were to be set on fire. A variety of different fixed fire installation exist, some of which are specially designed for certain types of ship.

- A sea water supply system to fire hydrants is fitted to every ship. Several pumps in the engine room will be arranged to supply the system. An emergency fire pump will also be located remote from the machinery space and will be independent means of power. A system of hydrant outlets, each with an isolating valve, is located around the ship and hoses with the appropriate snap-in connectors are strategically located together with the nozzles. All the working areas of the ship are thus convered and a constant supply of sea water can be brought to bear at any point to fight a fire (see Fig.20.5.).

- The automatic spray or sprinkler system provides a high level of safety for passenger and crew. A network of sprinkler heads are situated throughout the accomodation areas and the machinery spaces and supplied with water under constant pressure. The sprinkler head is closed by a quartzoid bulb which contains a liquid that expands considerably on heating. When the air temperature rises to a predetermined level, the liquid expands, breaks the bulb and releases a diaphragm seal to allow water flow. A deflector plate on the sprinkler head causes water to spray out over a larger area. (see Fig. 20.6.).
- The advantage of this system is that only areas of direct heat are wetted – more distant heads remain inactive.



Portable Fire Extinguishers

firemain and hose reel system (manual actuation)

1. What fire extinguishing appliances are available on board ship ?
2. Is a bucket an efficient fire-fighting equipment ?
3. What are the advantages and the limits of portable extinguishers ?
4. What types of portable fire extinguishers do you know ?
5. When are fixed fire-fighting appliances brough to use ?
6. Since water is available in unlimited quantities around a ship, what installation is there on board to use it as a fire extinguisher ?
7. What does a sea water supply system consist of ?
8. What is a sprinkler ?
9. Describe the sprinkler head and how it is activated .
10. Where are sprinkler heads arranged ?

- What is the advantage of the sprinkler system ?
-

I. Say which of the fittings listed at random below form:

- Fire pump
- Head
- Hose
- Bulb
- Nozzle
- Emergency pump
- Pressurised tank
- Hydrant
- Diaphragm seal
- Outlet
- Isolating valve
- Deflector plate
- Snap-in connector

the sprinkler system	the fire main

II. Examine the boldface words in the following sentences:

1. A safety device is fitted in case the system **breaks down**.

   1a. *A minor defect not corrected initially will result in serious breakdown.*

2. Fires **break out** when no one expects.

   2a. *Maintenance burning and welding are responsible for nearly 40 per cent of all fire outbreaks.*

Noun + from phrasal verbs

- In technical English nouns are often formed from phrasal verbs by combining the verb with the preposition or adverb particle.
- The joining may occur in two ways:

1. by maintaining the order of the phrasal verb as in 1a.

   A minor defect not corrected initially will result in serious breakdown.

2. by inverting the order as in 2a.

   Maintenance burning and welding are responsible for nearly 40 per cent of all fire outbreaks.

Change the following phrasal verb into nouns:

- 1. keep up _____
- 2. flash back _____
- 3. flow over _____
- 4. let in _____
- 5. shut down _____
- 6. put out _____
- 7. lay out _____
- 8. let out _____
- 9. stand by _____
- 10. ride over _____

- Find similarities and differences of meaning between the **verbs** and **noun**s listed in the previous exercise.
- Use the newly-formed nouns in sentences of your own.

IV. Find in the text words opposite in meaning to the following:

- 1. similar _____
- 2. extinguish _____
- 3. expensive _____
- 4. fixed _____
- 5. escalate _____
- 6. danger _____
- 7. near, close to _____
- 8. fall _____
- 9. dry _____
- 10. force into, admit _____

FIRE FIGHTING ON BOARD SHIP
Part IV.

Gas, Foam,
Dry Chemical Extinguishing System

- Gas extinguishing systems have proved to be most efficient in enclosed spaces, such as machinery rooms, electrical panels and cargo holds.

- Gas extinguishing systems have proved to be most efficient in enclosed spaces, such as
- _____,
- _____ and
- _____.

CO_2 and halon

- **CO_2** puts out fires by reducing the oxygen content of the air. Halon 1301 (BTM) and Halon 1211 (BCF) are high speed suppression agents which, unlike other extinguishing agents, instead of cooling the fire or displacing oxygen interrupt the chemical chain reaction of combustion.

CO_2 and halon

CO_2 puts out fires by …… .

Halon 1301 (BTM) and Halon 1211 (BCF) are high speed suppression agents which, unlike ……, instead of cooling the fire or displacing oxygen interrupt …… .

- Both gasses are widely used in machinery spaces with distribution nozzles being placed throughout protected areas. The effective use of either gas, however, depends upon the area being tottaly sealed off. Any draughts, open ventilators, etc. render gas inefficient.

- Both gasses are widely used in machinery spaces with distribution nozzles being placed …… .
- The effective use of either gas, however, depends upon …… .
- Any draughts, open ventilators, etc. render ……

- **Halon 1301** is far safer for personell aboard. Concentrations needed to extinguish flames on most surface burning materials are only 5-7 per cent by volume, so exposure for up to 5 min will cause no harmful side effects. It discharges, and thus extinguishes the fire faster, weights about 65 per cent less than CO_2, uses much less space and costs less, both initially and in maintenance.

- **Halon 1301** is far safer for _____ aboard.
- Concentrations needed to _____ flames on most surface burning materials are only 5-7 per cent by volume, so _____ for up to 5 min will cause no harmful side _____ .
- It _____ , and thus extinguishes the fire faster, _____ about 65 per cent less than CO_2, uses much less space and _____ less, both initially and in maintenance.

- **Fixed foam extinguishing systems** are used to smoother flammable liquid fires. The foam, working on the principle of excluding air from any burning surface, must be made to flow gently across burning liquid pools.

- **Fixed foam extinguishing systems** are used to _____ flammable liquid fires.
- The foam, working on the principle of excluding air from any _____ surface, must be made to flow _____ across burning liquid pools.

Dry chemical extinguishing systems

- Dry chemical extinguishing systems are designed to combat Class B (flammable liquids and gases) and Class C (electrical) fires. In marine application, portable, wheeled and fixed dry chemical systems are found on loading docks, tanker decks, cargo holds, machinery spaces; in fact any area where fuels, flammable vapours or electrical equipment are present and where fire will spread especially fast.

Dry chemical extinguishing systems

- Dry chemical extinguishing systems are designed to ..... (flammable liquids and gases) and Class C (.....) .
- In marine application, portable, wheeled and fixed dry chemical systems are found on .....;
- In fact they are found in any area where ..... and where .....

Explosion detection devices

- Oil tankers, carrying various flammable cargoes, experience a real danger of explosion when vapours remain in emptied tanks. Therefore, an essential part of their fire protection system are explosion detection devices. As well as these, most oiltankers install inert gas generators which may continuously produce an exhaust gas containing nitrogen and carbon dioxide for fire extinguishing. The inert gas is used to blanket the oil cargo during discharging operations. Empty tanks are also filled with gas which is blown out when oil is loaded.

Explosion detection devices

- Oil tankers, carrying various _____ cargoes, experience a real danger of explosion when vapours remain in _____ tanks.
- Therefore, an _____ part of their fire protection system are explosion detection devices.
- As well as these, most oiltankers install _____ gas generators which may continuously produce an exhaust gas _____ nitrogen and carbon dioxide for fire extinguishing.
- The inert gas is used _____ the oil cargo during discharging operations.
- Empty tanks are also _____ with gas which is blown out when oil is _____.

Engine room fire fighting equipment

- The engine room of a typical bulk oil carrier is recommended to install:
  1. thermal and combustion detectors;
  2. a fire hydrant pump with hydrant points;
  3. hose and adjustable spray nozzles;
  4. foam;
  5. drypowder and CO_2 portable extinguishers; and
  6. a fixed system of either foam, low or high pressure CO_2 , or Halon 1301.

Engine room fire fighting equipment

- The engine room of a typical bulk oil carrier is recommended to install:
  1. _____ detectors;
  2. a _____with hydrant points;
  3. hose and adjustable _____;
  4. _____;
  5. _____ and CO_2 portable extinguishers; and
  6. a fixed system of either foam, low or high pressure CO_2 , or _____.

1. Which gases are used to contain fire in the engine room ?
2. What special fire extinguishing properties have Halon 1301 and 1211 if compared to other agents ?
3. Why is Halon 1301 the safest fire extinguishing agent ?
4. Where are dry chemical systems installed to prevent and extinguish fire ?
5. What is inert gas ?
6. Where does inert gas find its best application ?
7. What advantage has the inert gas-production unit with respect to bottle storage systems containing CO_2, foam or dry chemicals ?
8. What does the fire prevention and protection equipment in an oil carrier consist of ?
9.

-

Technical / Marine Engineering English

In technical English single verbs od **Latin origin** are often preferred to phrasal verbs because of their semplicity and accuracy (phrasal verbs are mostly used in everyday language).

a. Filters are fitted in the lubricating and fuel oil systems to ***remove*** grit and foreign matter. (**remove** instead of **get rid of**)

b. In water-tube boilers a body of cool water descends to the lower drums, while hot water containing bubbles of steam ascends to the upper. (***descend*** and ***ascend*** preferred to **go down** and **move upwards**)

render, treat.

1. A fire, if found out in its early stages, can be brought under control with a minimum of damage.
2. Flames give off ultra-violet and infra-red radiation and detectors are capable to respond to either.
3. When the air temperature goes beyond a permitted level, the detector will be operated.
4. Each fire must be dealt with according to its own peculiarities with the aim to restrict the fire to the compartment in which it originated.
5. In diesel engines hot air sets the fuel on fire the air being further heated by the combustion.
6. Carbon dioxide puts out fires by reducing the oxygen content of air.
7. While travelling upwards the piston drives out the waste gases through the exhaust valves.
8. Halon breaks in upon the chemical chain reaction of combustion.
9. Any draughts, open ventilators, doors, portholes, etc. will cause the gas to be inefficient.

of fire

(column III) and the main properties, advantages and side effects (column IV) of the extinguishing agents listed in column I.

I EXTINGUIS. AGENTS	I EXTINGUIS. AGENTS	III CLASS OF FIRE	III CLASS OF FIRE	III CLASS OF FIRE
H_2O	H_2O	A B	A B	A B
CO_2	CO_2			
HALON 1301	HALON 1301			
FOAM	FOAM			
DRY CHEMICALS	DRY CHEMICALS			
INERT GAS	INERT GAS			

Concession Clauses

- *Altough portable extinguishers may be highly effective, their capacity is limited*
- *In spite of their efficiency, the capacity of portable extinguishers is limited.*

ALTHOUGH, THOUGH, INSPITE OF

- *Whichever type of detection device is chosen, it will activate an alarm or automatic extinguishing system. (Bez obzira na vrstu uređaja za otkrivanje požara …)*
- *Whatever the cost damaged units must be replaced soon. (Bez obzira na cijenu …)*

Put in spite of, altough, even though or whichever, whatever in the blanks as appropriate:

1. When the pressure is released, the pumping ceases _____ the plunger continues to move upwards.
2. Engine preformance was still unsatisfactory _____ the careful overhauling of machinery and equipment.
3. _____ the provision of settling tank, the high specific gravity of heavy fuels usually demands purification.
4. _____ smoking leads to countless fires, it is not the main cause of fire on tankers.
5. _____ the fact that a rapid alarm was given, the fire was not extinguished
6. _____ the fire was spreading very fast, the crew managed to restrain it quickly.
7. _____ the possible damage may occur by the use of this agent, you must act immediately.
8. _____ its low resistance to fire, wood is still much used in shipbuilding.

THE UNPLUGGED HOLE

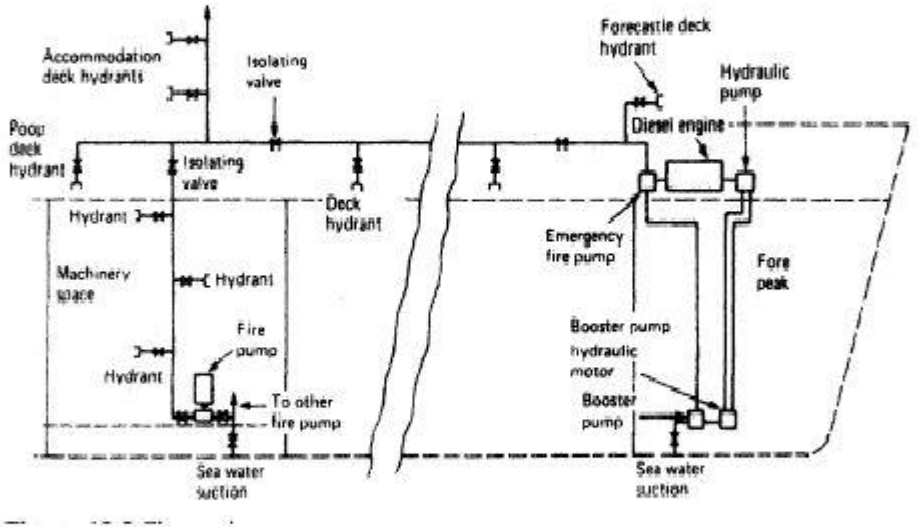
Carelessness in the Engine Room could be fatal

A fishing vessel sailed from Aberdeen one morning en route for the fishing grounds. Normal routine was maintained until the early evening, when the engine suddenly stopped and the Skipper was alerted to smoke pouring out of the Engine Room.
Attempts to enter the space were frustrated at first by the dense smoke. Eventually the Second Engineer, wearing breathing apparatus, managed to get below. He found the Chief Engineer (who had been on watch but was missing when the fire was noticed) in the fore part of the engineroom. His clothing, hair and the upper part of his body were on fire, but the Second Engineer managed to drag him out of the space. The crew then beat out the flames and gave first aid to the badly burned man. The Skipper had meanwhile managed to extinguish the fire.

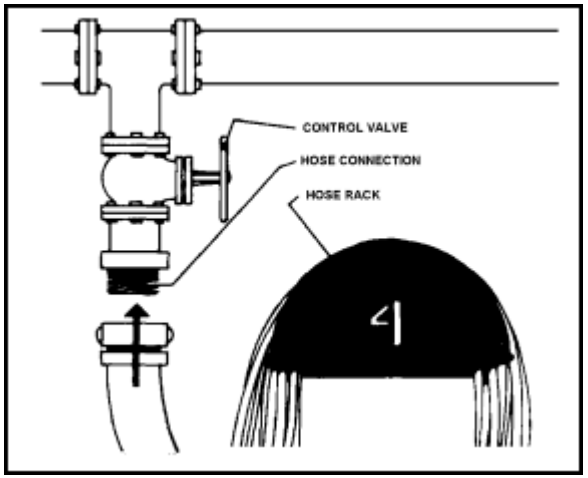
Power was eventually restored and the vessel was able to return to port, where the Chief Engineer was quickly transferred to the intensive-care unit of the local hospital.
Subsequent investigation revealed that it was normal practice to pump up the main engine daily service tank each watch until it overflowed thorough a sight glass back to the bunker tank. On this occasion a 3.5 inch BSP sounding/inspection plug had been removed from the top of the tank and not replaced. The result was that when the service tank was full, the oil flowed out of the hole in the top and down the sides into the saveall, instead of dowa the overflow pipe.

What happened next is only too predictable: the overflow from the saveall onto the main engine exhaust manifold, the inevitable fire, and the Chief Engineer badly burned in his efforts to control it.

Fires in the Engine Room are common, and will continue to be so until Engine Room personnel pay greater attention both to the equipment and to the working environment. This is especially important after an overhaul or period in port.


Accommodation deck hydrants
Isolating valve
Forecastle deck hydrant
Hydraulic pump
Diesel engine
Poop deck hydrant
Isolating valve
Deck hydrant
Hydrant
Machinery space
Hydrant
Fire pump
Hydrant
To other fire pump
Sea water suction
Emergency fire pump
Fore peak
Booster pump
hydraulic motor
Booster pump
Sea water suction

Fire Hydrants – three components

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