BASIC FIRE FIGHTING

PVA Safety & Security Committee

Passenger Vessel Association
103 Oronoco Street, Suite 200
Alexandria, VA 22314
800-807-8360

www.passengervessel.com

This training program is dedicated to the memory of *Roger Murphy*, whose leadership and companionship inspired, and continues to inspire us all.

"Thou were my guide, philosopher, and friend"
(Alexander Pope, Essay on Man)

This training program was created through the generous support of:

Passenger Vessel Foundation
c/o B.B. Riverboats, Inc.
101 Riverboat Road
Newport, KY 41071
Contact: Alan Bernstein
859-292-2449
fax: 859-292-2452

INTRODUCTION

A fire on a passenger vessel is a serious hazard that threatens the lives of everyone aboard. Even small fires can be deadly, due to the toxic byproducts of combustion – especially when modern plastics, laminates, adhesives, epoxies and other chemically complex materials are involved. Fires aboard vessels present unique dangers that are not normally found with shoreside exposures. One of the most important aspects to consider when planning for fire safety aboard your vessel is that you and the rest of the crew are the “Fire Department” unless your vessel is moored at a location accessible to municipal firefighters. The passengers and crew on your vessel cannot usually run away from the fire to avoid danger.

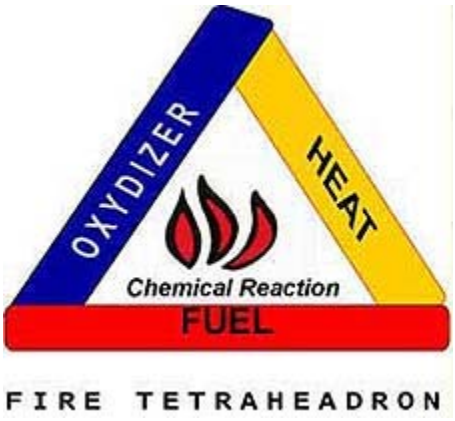
It is important to remember that the easiest fire to extinguish is the one that never starts. Passenger vessels are designed and built to strict standards and inspected by the U.S. Coast Guard. Structural fire protection, such as fire-rated bulkheads, fire doors and dampers are an integral part of every modern passenger vessel. Strong emphasis should be placed on fire prevention and “good housekeeping” on your vessel. If a fire does start, you must be able to extinguish it during the early stages before it overwhelms the capabilities of the equipment and crew. The alternative is to abandon the vessel.

This manual, in conjunction with the PVA Firefighting Video, is designed to provide the crewmember of a passenger vessel with basic knowledge o fire prevention, firefighting techniques and extinguishing equipment carried aboard.

CHAPTER 1 – THE CHEMISTRY OF FIRE

Several conditions must be met before a fire can start or continue to burn. The chemical and physical components and reactions involved in a fire are very complex. This chapter provides a very basic understanding of the processes and principles ainvolved during combustion.

THE FIRE TETRAHEDRON



A fire requires four components in order to ignite and continue to burn. the “fire tetrahedron” is a simple means of graphically illustrating how the four components combine to create the process of combustion.

For many years the concept of fire was symbolized by the Triangle of Combustion and represented, fuel, heat, and oxygen. Further fire research determined that a fourth element, a chemical chain reaction, was a necessary component of fire. The fire triangle changed to a fire tetrahedron to reflect this fourth element. A tetrahedron can be described as a pyramid which is a solid having four plane faces. Essentially all four elements must be present for fire to occur, fuel, heat, oxygen, and a chemical chain reaction. Removal of any one of these essential elements will result in the fire being extinguished.

In addition, some of these components must be present in proper proportions.

➲ FUEL

The proper ratio of fuel to oxygen must be present in order to have combustion. The presence of too much fuel and not enough oxygen creates a mixture that is “too rich”. A mixture of not enough fuel and an abundance of oxygen in “too lean”.

- **Solids** – Solid materials tend to burn slower and give off less heat than liquids or gasses.

- **Liquids** – Liquids burn faster and hotter than solids.

  Flashpoint – The temperature at which a liquid gives off sufficient vapors or form an ignitable mixture. Example: the flashpoint of gasoline is -45 degrees (F). This means that gasoline is producing enough vapors to ignite whenever it is 45 degrees below zero (0) or warmer. The flashpoint of #2 diesel fuel is about 120 degrees (F), and it will not ignite when you throw a match in it, but the match just goes out when you throw it into a puddle of diesel fuel.

- **Gasses** – Gasses ignite easier than solids or liquids, and burn much hotter. This is why gasses are used for heating and cooking.

➲ HEAT

When sufficient heat is present with the proper proportions of fuel and oxygen, a chemical reaction (called combustion or burning) is initiated. Heat can come from a flame, a spark, friction, electrical arc, electrical resistance, compression of a material and from other sources. Heat sufficient to cause combustion may also be produced by chemical or biological actions within a substance (spontaneous ignition).

➲ OXYGEN

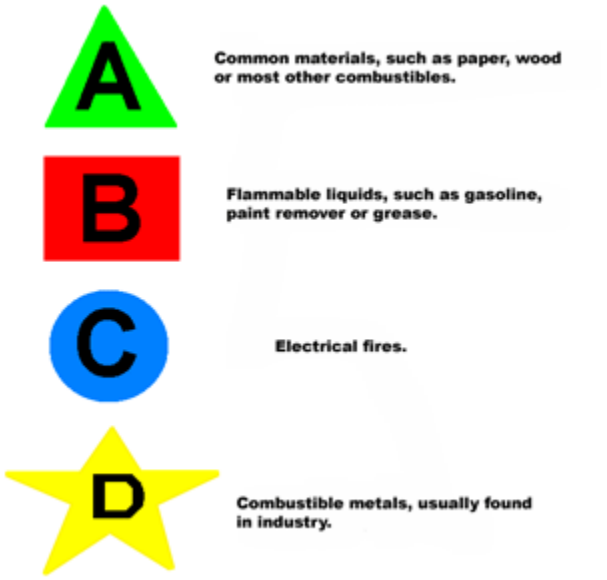
Ordinarily, a minimum concentration of at least 16% oxygen in the air is needed to support flaming combustion. However, smoldering combustion can take place in as little as 3% oxygen. The air we breathe normally contains approximately 21% oxygen at sea level (as well as 78% nitrogen and 1% other gasses).

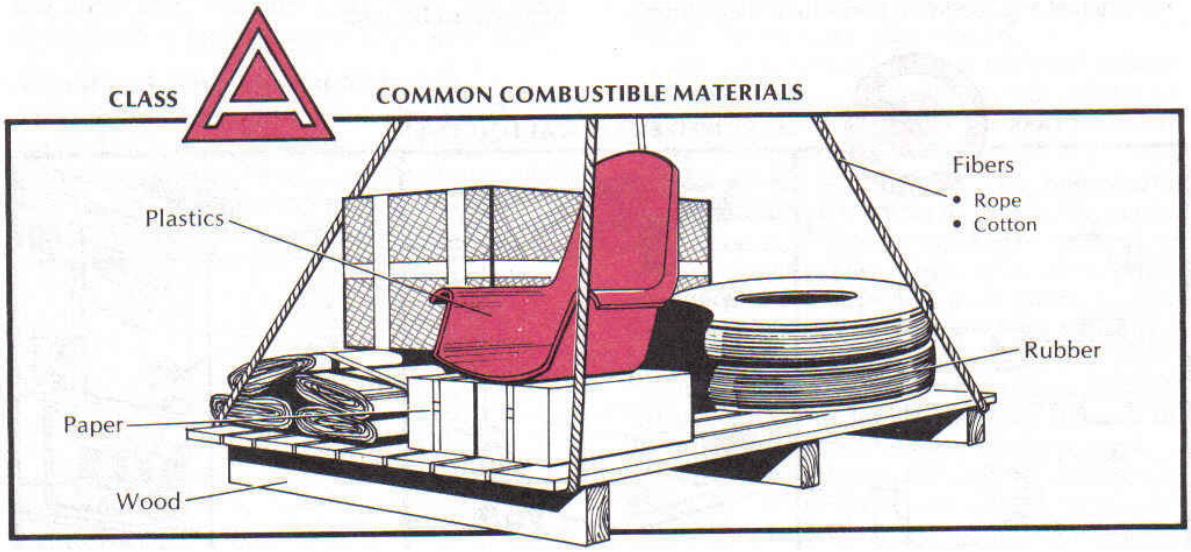
➲ CHAIN REACTION

The process of combining the proper amounts of fuel, heat and oxygen creates a “chain reaction”. Combustion is supported and sustained through the chain reaction – it ties the other three sides of the fire tetrahedron together. In simple terms, the fuel molecules combine with oxygen molecules, causing a chemical reaction called “oxidation”. When sufficient heat is applied, the fuel/oxygen molecules are ignited and begin to combust (burn). The burning fuel creates heat, some of which is absorbed by the fuel, causing more of the fuel to vaporize. The vaporized fuel continues to combine with oxygen and burn, creating more heat – which vaporizes more fuel, etc. This process continues until one or more of the sides of the fire tetrahedron are removed, thus extinguishing the fire.

CLASS OF FIRE

Successful extinguishment of a fire requires a determination of the most suitable type of extinguishing agent. The most useful extinguishing agent is one that will accomplish the task in the last amount of time, cause the least damage, and result in the least danger to crewmembers. The job of selecting the most suitable extinguishing agent has been simplified by categorizing fires into four types, or classes. Each class of fire involves materials with similar burning properties and characteristics, and requires similar extinguishing agents.

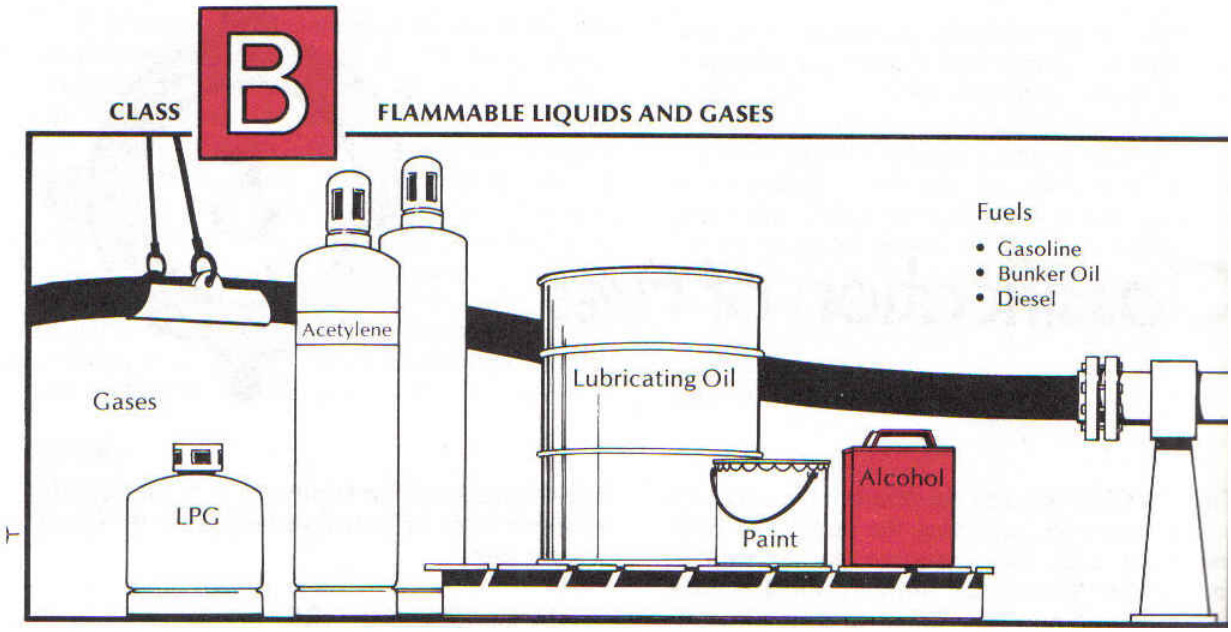




1. Class A fire

The symbol for a Class A fire is a green triangle. A Class A fire involves common ash-producing combustible materials, such as wood, paper, cloth, rubber and most plastics.

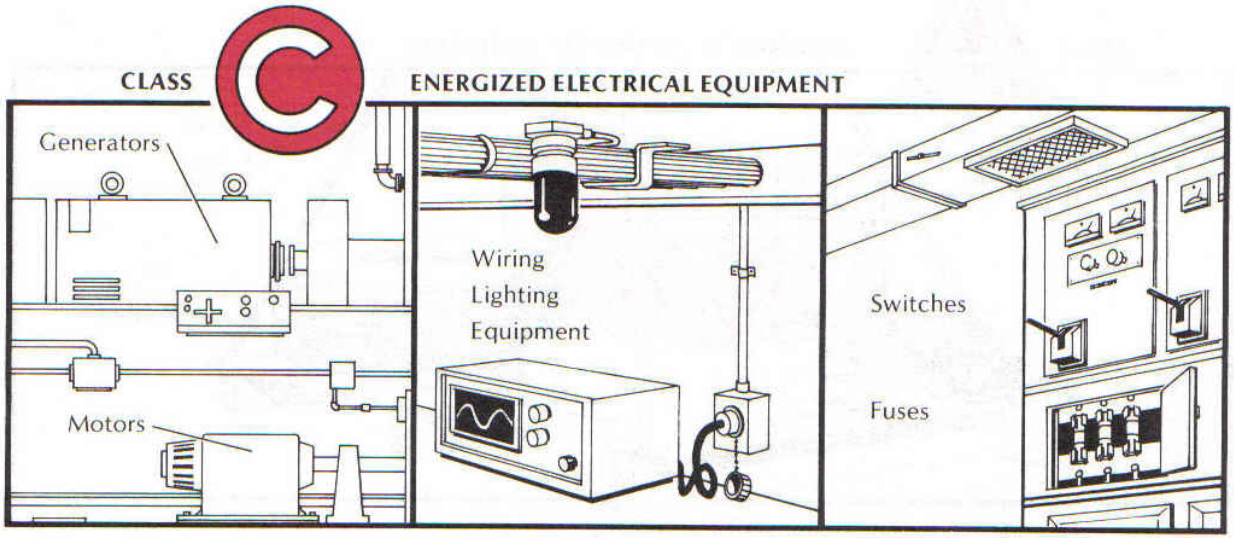
Class A fires may best be extinguished with water. Dry chemical, carbon dioxide, and halon are also effective. Foam is particularly effective on Class A material that is difficult to penetrate with water, such as baked rags or mattresses.



2. Class B fire

The symbol for a Class B fire is a red square. A Class B fire involves liquids and gasses such as gasoline, diesel fuel, lubricating oils and greases, alcohols, acetylene and propane.

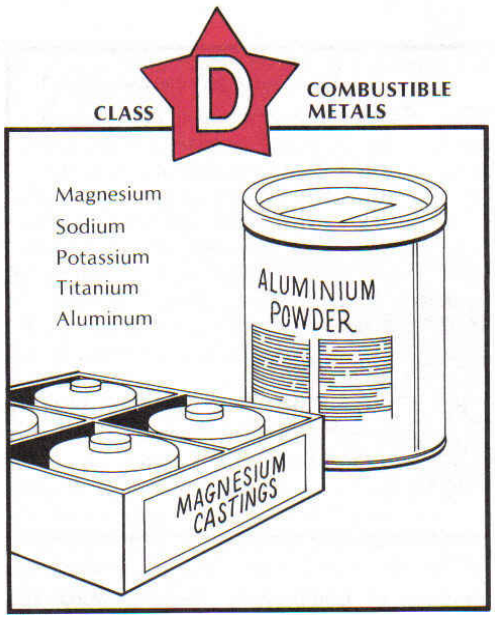
Class B fires in large space or open areas are best extinguished with dry chemical or foam. When contained in a smaller space, carbon dioxide or halon is effective.



3. Class C fire

The symbol for a Class C fire is a blue circle. A Class C fire is one which involves electrical or electronic equipment such as a computer, communication equipment, navigation equipment, a generator, an electric motor, etc.

Class C fires must only be extinguished with agents that are non-conducting, in order to avoid injury to the fire fighter. Halon and carbon dioxide are effective and do not conduct electricity. Dry chemical is also very effective and does not conduct electricity. However, it is extremely corrosive to equipment and may cause more damage to sensitive electronics than the fire.



4. Class D fire

The symbol for a Class D fire is a yellow star. A Class D fire involves combustible metals such as magnesium, sodium, potassium and others. Class D fires burn extremely rapidly and produce very high temperatures. The only Class D materials of any usual concern in a fire aboard a vessel is found in the pyrotechnical devices (flares) found in the wheelhouse.

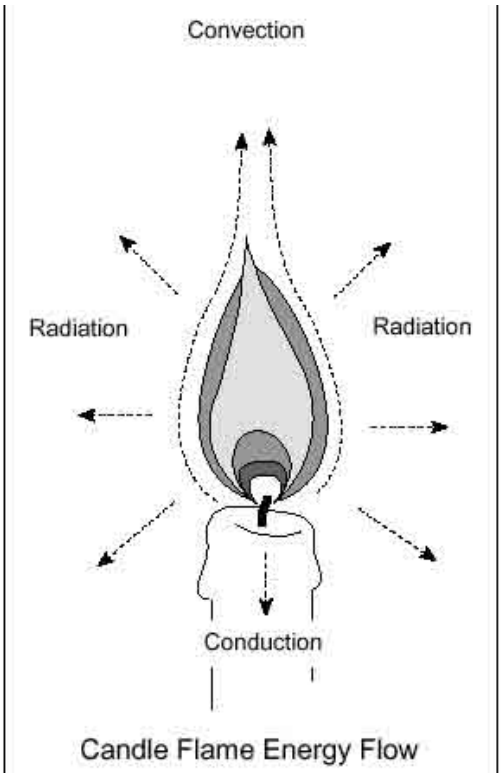
Class D fires require special extinguishing agents called “dry powders” (these are not the same as dry chemicals). Passenger vessels do not normally carry dry powders aboard, so the most effective technique is to jettison the burning material overboard if possible. Another alternative is to cool the surrounding areas with large quantities of water to prevent the fire from spreading while the flare

burns itself out. Placing a stream of water directly on the burning flare could result in a violent reaction.

CHAPTER 2 – FIRE SPREAD

HEAT TRANSFER

A fire that is attacked early and efficiently can easily be confined and extinguished. If a fire is allowed to burn unchecked, it will generate enough heat to travel away from the immediate fire area and ignite other combustible materials, causing the fire to grow greatly in size or causing multiple fires. Heat from a fire is transferred by one or more of three methods:



Candle Flame Energy Flow

1. Conduction

Conduction is the transfer of heat by direct contact from one body to another. For example, a steam pipe in contact with wood transfers heat to the wood by contact with the steam pipe. Metals are generally excellent conductors of heat, while wood is a poor conductor. The transfer of heat through decks and bulkheads can be halted or slowed by applying water to the materials – this is called boundary cooling. To further prevent the spread o fire, combustible materials should be moved away from bulkheads and decks can be halted or slowed by applying water to the materials – this is called boundary cooling. To further prevent the spread of fire, combustible materials should be moved away from the bulkheads and decks that are exposed to fire.

2. Convection

Convection occurs most commonly aboard vessels when air in a space involved in a fire is heated and travels through the ventilation duct system and ignite material in another space where the superheated air is exhausted. As air is heated, it rises and expands. This explains why the hottest part of a space involved in a fire is at t he ceiling. Remember to stay as low as possible to avoid excessive heat if it becomes necessary to enter the space. The transfer of heat by convection can easily be halted by securing the ventilation to a space and closing doors, scuttles, portholes and other openings.

3. Radiation

Radiation is a form of energy that travels through air as an electromagnetic wave, just like the sun. Surfaces near a fire will absorb radiant heat energy causing their temperature to rise until the surface starts to burn. Radiation energy travels in straight lines in all directions. To prevent the spread of fire by radiation, materials may be moved farther away form a fire which reduced the amount of radiant heat the materials will absorb. Solid, non-combustible materials may also be used to block radiant heat when placed between the fire and the exposed combustible material. Water might also be used to cool the material that is absorbing radiant heat, by transferring the heat by conduction to the water.

Chapter 3: Extinguishing Agents

An extinguishing agent is a substance that will put out a fire. Every extinguishing agent function by attacking one or more side of the fire tetrahedron. Specific actions involved are:

1. Cooling

Cooling attacks the heat side of the fire tetrahedron and reduces the temperature of the fuel below its ignition temperature.

2. Smothering/Oxygen Dilution

Smothering attacks the oxygen side of the fire tetrahedron by separating the fuel from the oxygen source.

3. Chain Breaking

Chain breaking agent disrupt the chemical chain reaction that sustains the fire.

AGENTS

➲Water

Water is primarily a cooling agent that absorbs tremendous amounts of heat. It cools burning materials more effectively than any other common extinguishing agent does. Water is most effect when it reaches 212 degrees (F) and turns to steam. As it converts to steam, it expands 1700 times its original volume, displacing air around the fire and causing a smothering effect.

Advantages: Readily available
Cheap
Large quantities are usually available
Disadvantages: Causes corrosion/equipment damage especially to sensitive electronics
Conducts electricity
Adds weight to the vessel, affecting stability

Uses: Water is effective on Class A fires.

Note: Water will work on some Class B fires (such as heavy fuels with high flashpoints, since water must cool the liquid below its flashpoint in order to extinguish the liquid). Never use a straight stream of water on a contained liquid fire, as the force of the water will spread the fuel.

Water is usually applied to a fire through a hose and nozzle, giving the crewmember control of the pattern that is applied. A solid stream is applied

➲Dry Chemical

Dry chemical extinguishing agents are chemicals in powder for, although they should not be confused with “dry powders” used ot extinguish Class D fires. There are currently at least a half dozen dry chemical extinguishing agents in use for various applications. The two most common types used aboard passenger vessels are:

1. ABC Multipurpose

This type is called multipurpose because it is effective on Class A, B and C fires. Chemicals in the agent interrupt the chain reaction of combustion and form a fire retardant coating that help smother the fire. Dry chemical may not fully extinguish a fire as it only reaches and coats the surface of the burning material.

2. Sodium Bicarbonate (baking soda)

Sodium bicarbonate is the original dry chemical extinguishing agent, and is used because it is the most economical. It is particularly effective on animal fats and vegetable oils (galley ranges and deep fat fryers). because it chemically changes these substances into nonflammable soaps.

Advantages: Multipurpose (effective on A, B and C fires)
Does not conduct electricity

Disadvantages: Messy, may ruin electrical an electronic equipment
Is corrosive

Uses: Dry Chemicals are effective on Class A, B and C fires.

➲Carbon Dioxide

Carbon dioxide (CO_2) is a colorless, odorless gas that extinguishes a fire by smothering. It is one and a half times as heavy as air, so settles low in a compartment while displacing the air, thus removing the oxygen side of the tetrahedron. Although Carbon Dioxide is non-toxic, it can cause injury or death by suffocation. Carbon dioxide is found in portable extinguishers and in fixed systems used to protect certain spaces such as the engine room.

Advantages: Does not leave a residue; no clean up
Does not conduct electricity

Disadvantages: Must be contained, does not work well on open decks
Can cause death or injury by suffocation
Fires extinguished with CO_2 are prone so sudden reignition if oxygen is reintroduced.

Uses: Carbon dioxide is effective on Class B and C fires, and to some extent on Class A fires.

➲Halon

There are many types of Halon extinguishing agents with varying properties and uses. Two types approved for marine applications are Halon 1211 and Halon 1301. Halon 1211 is usually found in portable extinguishers, while 1301 is commonly found in installed fixed systems. Both work in much the same manner; by interrupting the chain reaction of combustion. Halons are stored as liquids under pressure, but applied as gasses upon expulsion from the cylinder. The manufactures of Halon systems are banned because they destroy the ozone layer; however, existing supplies and installations are numerous and will be around for a number of years.

Advantages: Does not leave a residue; no clean up
Does not conduct electricity
One of the most effective agents on a volume comparison

Disadvantages: Chemically decomposes into toxic gases at fire temperatures

Uses: Halon are effective on Class B and C fires, and to some extent on Class A fires.

CHAPTER 4: PORTABLE FIRE EXTINGUISHERS

Portable Fire Extinguishers are used for a quick response to knock down and extinguish fires during the early stages. They contain a limited supply of agent, and should be backed up with additional fire extinguishers or a hose line.

Portable Fire Extinguishers used aboard vessels must be Underwriter's Laboratories (UL) listed and have a U.S. Coast Guard Approval Number shown on the label.

The Coast Guard classifies extinguishers by a combination letter and number symbol. The letter indicates which type of fire the unit can be expected to extinguish and the number indicates the relative size of the extinguisher. The number designations for size start with "I" for the smallest to "V" for the largest. Sized I and II are considered hand portable fire extinguishers, while sizes III through V are semi-portable. Semi-portable fire extinguishers are usually larger cylinders bolted to the bulkhead with a small hose-reel unit attached. The hose and nozzle are run out to the fire to apply the agent.

The Underwriters Laboratory (UL) classification is also found on the label. The UL classification system also uses a combination letter and number symbol, with the letter designating the class of fire the extinguisher is effective on. The number designation indicates the size, or amount of fire the extinguisher will put out. In this example, 2A;40B:C indicates that this extinguisher will put out two class A test units (approximately 2 cubic feet), approximately 40 square feet of flammable liquid, and may also be used on class C fires (no size rating for class C fires).

Portable fire extinguishers also have a pictograph to easily illustrate which types of fires the extinguisher may be used on.

Class A

Class B

Class C

If an extinguisher should not be used on a particular class of fire, the appropriate symbol has a line drawn through it:

PORTABLE FIRE EXTINGUISHER USE

Discovering a Fire:

Upon discovery of a fire, your first action must be to inform somebody that there is a fire aboard, so that the alarm may be sounded and assistance summoned. If the fire is relatively small, you may then proceed to extinguish it, or at least prevent it from growing in size. If you must leave the area to inform someone, be sure to close doors behind you. An easy acronym to remember that illustrates the steps that should be taken is “FIRE”:

F – Find the fire
Fires may be indicated by the presence of smoke and/or heat.

I – Inform someone
Always let someone else know that there is a fire.

R – Restrict the fire
Close the doors, portholes, ventilation, and cool exposures to prevent the fire from spreading.

E – Extinguish
Put the fire out using appropriate agents and methods. Make sure the fire is completely out and that there are no embers or smoldering materials.

There is a right way, and many wrong ways, to use a portable fire extinguisher.

An easy way to remember how to use a fire extinguisher is the acronym PASS:

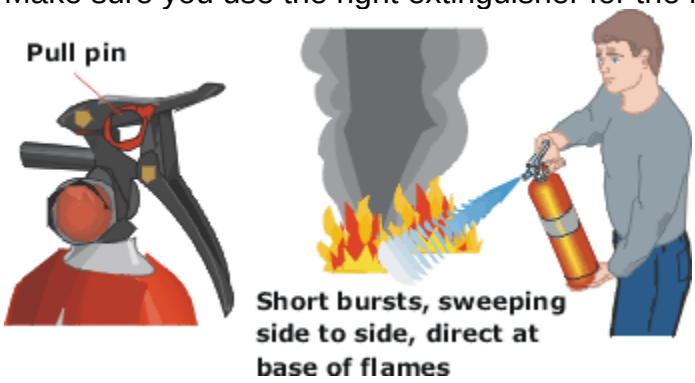
Pull the pin.
This will allow you to discharge the extinguisher.

Aim at the base of the fire.
If you aim at the flames (which is frequently the temptation), the extinguishing agent will fly right through and do no good. You want to hit the fuel.

Squeeze the top handle or lever.
This depresses a button that releases the pressurized extinguishing agent in the extinguisher.

Sweep from side to side
until the fire is completely out. Start using the extinguisher from a safe distance away, then move forward. Once the fire is out, keep an eye on the area in case it re-ignites.

Make sure you use the right extinguisher for the right fire.



Fire Extinguishers should always be visible, never blocked or used to hang clothing. They should be inspected monthly by checking the pressure gauge, hose, tamper seal, pin and mounting bracket for defects. Dry chemical extinguishers should also be removed from the bracket and turned upside down to loosen the powder during the monthly inspection. Portable fire extinguishers require annual servicing from a professional licensed technician.

CHAPTER 5: FIRE PREVENTION

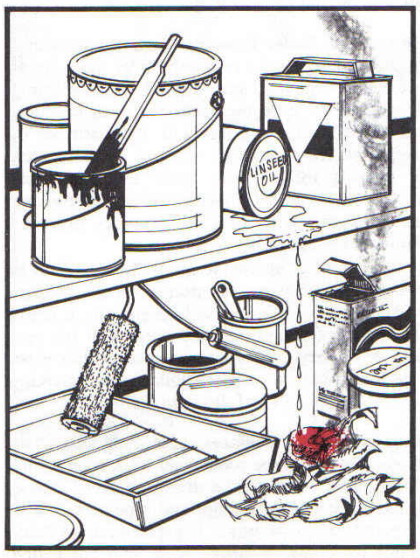
Obviously, the easiest fire to extinguish is the one that never starts. Fire prevention is one of the most important considerations of marine vessel operations. Some aspects of fire prevention are designed and built into the vessel. The majority of prevention efforts, however, depend on the crew.

GENERAL

One of the leading causes of fires, aboard ship and on land, is careless smoking. Smoking in bed is extremely dangerous –a smoldering fire can be started by just touching a lit cigarette to a mattress or pillow.

Improper disposal of lit materials is equally as dangerous. Passenger and untrained crew may discard cigarettes, cigars or pipe tobacco over the side of the vessel – where the wind may blow it back aboard. Of course, smoking is prohibited by federal regulation while the vessel is fueling.

Spontaneous ignition is also a cause of vessel fires. This phenomenon occurs when a material begins to oxidize and produce heat faster than the heat is dissipated, and ignition is caused without any outside source of heat. A common example is a rag soaked with linseed oil, vegetable oil or paint thinner that has been thrown in a corner. The oil will begin to oxidize and produce heat which may be sufficient to ignite the rag.

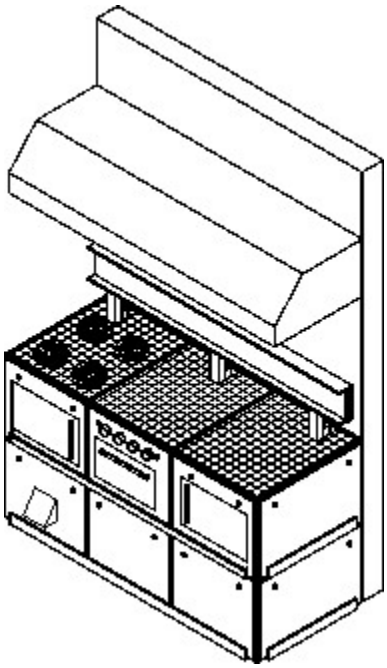


When electrical equipment wears out, is misused or improperly maintained, it can convert electrical energy to heat. Electrical arcing is also a source of ignition. Electrical equipment must be installed, maintained, tested and repaired only by qualified personnel in accordance with existing regulations. Electrical and electronic equipment should be periodically inspected for defects.

When storage batteries are being charge, the produce hydrogen, a highly flammable gas. If ventilation is not provided, hydrogen will collect at the highest points of a space as it is lighter than air. Any source of ignition

may cause an explosion and fire.

GALLEYS



The activities that take place in a galley generates plenty of fuel for carelessly caused fires. The heat produced by cooking appliances can be a source of ignition. Clothing towels, rags , cardboard boxes and other combustibles materials can be ignited through carelessness. Cooking appliances (ranges, deep fat fryers, toasters, ovens, etc.) should never be left unattended while in operation. Grease accumulation in and around the range, particularly in the hoods, filters and ductwork, can cause an intense fire that is difficult to extinguish. They should be thoroughly cleaned periodically. Fixed extinguishing systems for ductwork and range hoods are valuable and efficient in extinguishing grease fires.

ENGINE ROOM AND MACHINERY SPACES

Fires may occur in bilge areas due to excessive accumulation of oil in the bilge. Most often,oil leaks into the bilge from undetected leaks in the fuel or lubricating oil lines. Bilge areas should be checked frequently, and kept free of accumulated oil.

Small leaks occur around fittings and valves. Drip cans should be placed to catch the leaking oil until repairs can be made. Fittings that are likely to cause a spray of fuel or lube oil under pressure should be fitted with spray shields. The shields can be made from metal cans that are cut lengthwise and placed around the fittings. Should a leak occur under pressure, the shields prevent the fuel from atomizing – which may prevent a fire or explosion.

A common cuase of engine room fires is the presence of oil soaked insulation (lagging). Insulation that becomes saturated with oil should be replaced.

Smoking should be prohibited in the engine room and machinery spaces due to the abundance of liquid fuels.

OBSERVE ALL “NO SMOKING” SIGNS

QUIZ

1. The four components required for a fine to exist are:

a. Fuel, sparks, air, chain reaction
b. Vapor, heat, oxygen, chian reaction
c. Fuel, heat, oxygen, chain reaction
d. Fuel, heat, air, chemical reaction

2. All matter exist in one (or more) of three physical states, however, fuel must be in one of these states in order to burn:

a. Solid
b. Liquid
c. Gas (or “vapor”)
d. All of the above

3. Ignition sources can include:

a. Sparks, arcing, friction
b. Flame, electrical resistance, compression
c. Chemical and biological decomposition
d. All of the above

4. The atmosphere normally contains approximately 21% oxygen. What minimum level of oxygen is required to support flaming combustion?

a. 21%
b. 16%
c. 15%
d. 3%

5. A Class A fire involves:

a. Combustible metals
b. Electrical equipment
c. Gasoline, diesel fuel, acetylene
d. Wood, paper, cloth

6. A Class C fire involves:

a. combustible metals

b. electrical equipment
c. Flammable/combustible liquids
d. Wood, paper, cloth

7. A Class B fire involves:

a. Combustible metals
b. Electrical equipment
c. Flammable/combustible liquids and gasses
d. Wood, paper, cloth

8. A fire spreading through the ventilation duct would be an example of heat transfer by:

a. Convection
b . Radiation
c. Flame
d. Conduction

9. To prevent heat transfer and the spread of fire by conduction, you would:

a. Close the vents and dampers
b. Cool bulkheads and decks with water
c. Use dry chemicals
d. Close doors and hatches

10. A backdraft explosion is caused by ignition of superheated fire gases coming in contact with oxygen. This is most likely to occur during which phase of the fire?

a. Incipient
b. Fast burning
c. Free burning
d. Smoulding

11. The phase in which a fire is easiest to extinguish is the”

a. Incipeint
b. Free burning
c. Fast burning

d. Smouldering

12. The extinguishing agent that absorbs the most heat is:

a. Dry chemical
b. Carbon dioxide
c. Water
d. Sodium bicarbonate

13. The proper fire extinguisher to use to extinguish a Class C fire is:

a. Water
b. Dry powder
c. Foam
d. Carbon Dioxide

14. Dry chemical fire extinguishers may be used on:

a. Class A fires
b. Class B fires
c. Class C fires
d. All of the above

15. Which extinguishing agents conduct electricity:

a. Halons
b. Water and foam
c. Dry chemicals
d. Carbon dioxide

16. If you discover a fire, the first thing yhou should do is:

a. Put it out
b. Inform someone
c. get a fire extinguisher
d. Abandon ship

17. The flow of agent from a fire extinguisher should be directed:

a. At the base of the flames
b. Into the flames
c. Just above the fire
d. At the fuel

18. The best method of fire prevention is:

a. No smoking
b. Using only gas cooking appliances
c. Fixing oil leaks
d. Good housekeeping practices

19. The acronym “PASS” stands for:

_____ _____ _____ _____

20. The acronym “FIRE” stands for:

_____ _____ _____ _____

ANSWERS TO QUIZ

1. C
2. C
3. D
4. B
5. D
6. B
7. C
8. A
9. B
10. D
11. A
12. C
13. D
14. D
15. B
16. B
17. A
18. D
19. Pull, Aim, Squeeze, Sweep
20. Find, Inform, Restrict, Extinguish

QUIZ ANSWER SHEET

NAME: DATE:

I have viewed the PVA Video on Fire Safety ❑
I have read the manual on Basic Fire Fighting ❑

Signature

INSTRUCTIONS:

Fill in the circle for the correct answer or write in the correct answer in the fill in the blanks section. A score of 70% or higher is considered passing

1. a O b O c O d O
2. a O b O c O d O
3. a O b O c O d O
4. a O b O c O d O
5. a O b O c O d O
6. a O b O c O d O
7. a O b O c O d O
8. a O b O c O d O
9. a O b O c O d O
10. a O b O c O d O
11. a O b O c O d O
12. a O b O c O d O
13. a O b O c O d O
14. a O b O c O d O
15. a O b O c O d O
16. a O b O c O d O
17. a O b O c O d O
18. a O b O c O d O
19. _____
_____
_____
_____
20. _____
_____
_____
_____

SCORE: _____
Passed: ❑ Failed: ❑

RECOMMENDATIONS: TAKE ACTION BY:

Review video ❑ Date: _____
Review manual ❑ Date: _____
Review Deck plans ❑ Date: _____
Re-take Exam ❑ Date: _____
Answer sheet and results to be kept in candidates training file

Graded by:_____
NAME TITLE

SCORE: _____

Passed ❑ Failed: ❑

RECOMMENDATIONS: TAKE ACTION BY:

Review video ❑ Date: _____

Review manual ❑ Date: _____

Review Deck plans ❑ Date: _____

Re-take Exam ❑ Date: _____

Graded by: _____

PERSONAL SAFETY

FOR THE CREW MEMBER

PVA Safety & Security Committee

Passenger Vessel Association
103 Oronoco Street, Suite 200
Alexandria, VA 22314
800-807-8360

www.passengervessel.com

.

This training program is dedicated to the memory of *Roger Murphy*, whose leadership and companionship inspired, and continues to inspire us all.

"Thou were my guide, philosopher, and friend"

(Alexander Pope, Essay on Man)

This training program was created through the generous support of:

Passenger Vessel Foundation
c/o B.B. Riverboats, Inc.
101 Riverboat Road
Newport, KY 41071
Contact: Alan Bernstein
859-292-2449
fax: 859-292-2452

PERSONAL SAFETY FOR THE CREW MEMBER

INTRODUCTION

Personal safety is one of the most important parts of your job as a crewmember. Personal safety covers all aspects of your duties while you are on the job, starting when you first report on board, from spot cleaning, to special duties, engine room work, line handling, taking care of passengers, maintenance work and final clean up before leaving for the day. Personal safety is about thinking safely, acting responsibly and being provided with and using the proper tools for the job, including personal protective equipment. This and other safety procedures are known as the ABC's of Safety.

A- Attitude

B- Behavior

C – Control

Attitude –once you have been trained according to your company safety program, it is your responsibility to think about how you should perform your duties in a safe and professional manner, not just for yourself, but also for your fellow crew members and passengers. If you have a question, refer to your company policy or ask your supervisor.

Behavior –Demonstrate your safety awareness by acting responsibly, wearing the correct safety protective equipment provided to you and not taking chances on the job. Also by demonstrating your safety awareness.

Control – Your company policy, safety training and certain agency rules and regulations will affect how you perform your job safely.

These ABC's of Safety impact the way you think and go about your job responsibilities. Personal protective equipment begins with the uniform and extends to the use of gloves, safety eyewear, hearing protection, correct footwear, facial shields, helmets, respiratory gear, work vests and other flotation devices. Your crew duties require you to learn when and how to use the proper safety equipment in a responsible manner. Remember, the results of not wearing or using this equipment in a proper manner can be tragic.

UNIFORM, PERSONAL APPEARANCE & SAFETY

The purpose of a uniform is to make the crewmember easily and immediately identifiable to the passenger in all circumstances. The uniform must also serve as comfortable and safe attire for the crewmember.

Working on a vessel requires some special consideration for uniforms.

- The uniform must stand out in a professional manner. Color consistency, shoulder bars, hats, etc. bring attention to the crewmember. Your uniform allows the passenger instant identification of the crew, and to a degree, grants you some authority In emergency situations. Remember, passengers are more likely to take directions from a professional looking crewmember in a clean uniform, then from a sloppily dressed one. If your company does not require you to wear a uniform, or if your uniform blends in with the passenger's style of clothing, an orange safety vest is highly recommended distinguishing you apart from the passengers during an emergency.

- A professional uniform must fit properly. Baggy pants or shirts can get caught in moving machinery or during line handling situations. If a necktie is part of your uniform requirement, a clip-on is the safest for those crewmembers that may work around moving machinery.

- Jewelry, especially dangling necklaces or bracelets, should not be worn. Long hair should be pulled back and fastened or worn under an approved hat.

- All crew should use extreme caution working around engine room machinery, capstans, block and tackle or any type of machinery that has moving parts.

BIOHAZARD/ GERM TRANSMISSION

Crewmembers performing certain routine or emergency tasks are at risk of exposure to bloodborne pathogens including (but not limited to) Human Immunodeficiency Virus (HIV), Hepatitis B virus (HBV), and Tuberculosis (TB).

Potentially infectious body fluids that may contain bloodborne pathogens include blood, vomit, saliva, urine, feces, and others.

Under normal circumstances, the use of gloves will significantly reduce health risks of exposure to acceptable levels. Employees administering first aid should wear latex gloves.

It is recommended that heavier rubber utility gloves be worn when handling soiled laundry or cleaning heads. Single use latex gloves may also be used by employees, but will not provide the same degree of protection. Any gloves used should be free of holes or tears.

All employees that handle pumping of sewage should be extremely careful to avoid contaminating themselves or clothing with the sewage. This effluent contains large colonies of germs that can cause diseases. Another way to transmit germs is the handling of bodily fluids. Whether cleaning up the vessel, bathrooms or assisting with sick passengers, or those that have suffered cuts or require first aid, gloves, protective clothing, and in certain cases, eye protection should be worn. Spray disinfectants, special granular powders and scoops can also be used to form a barrier between a crewmember and possible contamination. Biohazard kits on vessels are fairly commonplace and hold several different types of gloves, disinfectants and eye protection that should be used for these occasions.

It is recommended that employees that handle sewage or come into contact with any bodily fluids should have the Hepatitis vaccination series. This series provides protection against both Hepatitis A, which is spread by person to person contact and Hepatitis B, which is spread by bodily fluids.

Another defense against germ transmission is personal hygiene. This includes daily showering, trimmed nails to prevent collection of dirt and contaminants and clean, laundered

clothes. Proper hand washing techniques is strongly recommended, before handling food and especially after using the restroom, blowing your nose, coming into contact with any bodily fluids or anything considered to be a possible contaminant. Finally, remember to cover any open wound or scab you may have and change bandages if the old one becomes soiled.

The best prevention against transmission of germs is personal hygiene and common sense.

Workers who might come into contact with blood and other body fluids (such as vomit, blood, urine, saliva, sewage) must adhere to the following practices:

Handwashing

- after handling garbage, diapers, cleaning toilets
- after handling body fluids of any kind
- before and after giving first aid (such as cleaning cuts and scratches or bloody noses)
- after cleaning up spills or objects contaminated with body fluids
- after taking off your disposable gloves
- prior to handling food

Latex Gloves should be worn by all crew members:

- when they may come into contact with blood or body fluids
- when individuals have cuts, scratches, or rashes which cause breaks in the skin of their hands

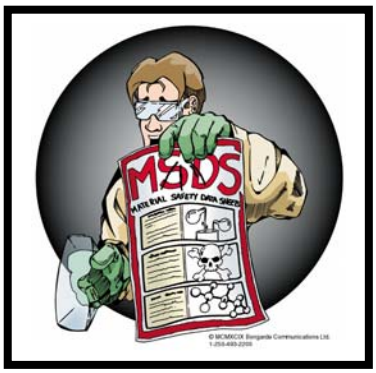
Remember: wearing gloves does not mean that you don't have to wash your hands!

WASTE MANAGEMENT AND CHEMICAL HAZARDS

Other hazards presented aboard are different types of garbage disposal. Normal garbage collection usually doesn't present a problem as long as a liner is used, You should never force garbage down with your hand or foot to make more collection room. Broken glass, medical needles or other objects may be in the garbage. Glass should never be picked up by hand. Also, broken glass should never be placed in a common garbage can. Broken glass should be placed in a specially marked, enclosed metal unit.

Due to some medical problems, passengers aboard may have to use needles to inject prescriptions. On some vessels, usually located in the bathroom facilities, are used needle collection boxes. These have special instructions that you should be familiar with before emptying.

Cleaning and routine maintenance can require the use of products that contain many different types of chemicals. These chemicals may be considered hazardous in some cases, such as when inhaling or having physical contact with them. Never mix chemicals for either cleaning or maintenance, as the combination may cause a caustic compound, dangerous gas or fire. Ensure that when you are using them, you do so according to their instructions, in well ventilated areas and proper supervision. MSDS, or Material Safety Data Sheet, is a printed sheet specifying the chemicals contained, the antidote or directions on what to do if inhaled or touched.



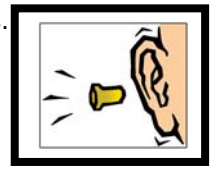
These MSDS's are required by regulations and your supervisor will show you where they are located.

PERSONAL PROTECTIVE EQUIPMENT

There are other types of protective equipment that you may have to wear while working aboard your vessel, whether dockside, underway or at the shipyard. This can include

- Hardhats – hardhats are worn when there is danger of falling objects/ working or even walking in a shipyard/ or working in an area of low overhead clearance, such as engine rooms or voids.

- Hearing protection – this includes ear plugs or earmuffs. The common sense rule for use of hearing protection is this; you must wear hearing protection whenever you need to raise your voice to be heard.
  Most company's require you to wear hearing protection when in an active engine room.



- Respiratory Protection – any type of face mask, such as dust mask or respirators should be worn when working with, or being exposed to chemical solvents, dust or scale.

- Eye Protection – this includes safety glasses, goggles or face shields that should be worn when grinding, chipping or any type of activity that raises dust, involves cutting or sanding.

- Gloves – there are different types of gloves for different types of duties that should be worn. As pointed out earlier there are "one time use" or disposable, inexpensive gloves to prevent germ transmission, these are usually thin latex or non-latex gloves. These are for light cleaning or first aid purposes. For heavy duty cleaning or transferring sewage, heavy gauge, long rubber gloves that cover the hand and forearm are worn. These must be cleaned and disinfected after the transfer is completed. For line handling, grinding or chipping, thick, heavy leather gloves are best.

- Foot protection - proper footwear must be considered for the job to be performed. Nonskid type or deck shoes are a must for working on wet surfaces. A quality shoe with arch support on steel or firm decks can help make a long day on your feet much less tiresome and fatiguing. Shoes must cover the toes and heel and be fitted securely so they can't slip off while climbing a ladder or doing routine work. Shoes or boots with steel or shielded toes should be worn when doing maintenance and may be required in some shipyards.

- Personal Flotation Devices – It is recommended that a work vests, inflatable packs, or flotation suspenders be used when working around the water doing maintenance, line handling or cleaning the outside of the boat. These types of devices are necessary if you fall in the water. Although not as buoyant, in most cases as Type 1 PFD's, these allow you to work without being constrained by the larger and bulkier regular life jacket.

- Safety harness – this harness attaches the body of the crewmember to the boat to reduce the risk of someone falling. A harness is recommended while working over the side or aloft.

CONCLUSION

The first line of safety aboard a vessel is the crewmember, his or her attitude, behavior and compliance with company policy. Your actions and the proper use of safety equipment is a major factor in determining your personal safety, the overall safety of the passengers, crew, vessel and your company.

REMEMBER, THE CREWMEMBER
IS THE FIRST LINE OF SAFETY ABOARD THE VESSEL

PERSONAL SAFETY TEST

1. Personal safety must be considered:
   a. only when using power tools
   b. for every aspect of your job
   c. only when on watch
   d. most of the time

2. Working safely and responsibly means:
   a. wearing personal protective equipment when appropriate
   b. adherence to company policies and procedures
   c. exhibiting a positive safety attitude
   d. all the above

3. Hands should be washed:
   a. after using the toilet
   b. before and after cleaning and bandaging a wound
   c. prior to handling food
   d. all the above

4. Hard hats should be worn:
   a. anytime there is a risk of head injury from falling or flying objects
   b. to keep your head dry in the rain
   c. when painting
   d. at all times aboard the vessel

5.(True / False) A Personal Flotation Device (PFD) is designed to prevent the wearer from falling overboard.

6. For grinding, chipping and handling mooring lines, hand protection should be:
   a. disposable latex gloves
   b. rubber gloves
   c. heavy duty work gloves
   d. cotton glove liners

7. Information on the chemicals you are exposed to in the workplace is found in the:
   a. Bulk Chemical Data Guide
   b. Material Safety Data Sheets
   c. Big Book of Chemicals
   d. Bridge Logbook

8. Personal Protective Equipment required for grinding metal would include:
   a. Eye protection and a respirator
   b. Foot protection and a hard hat
   c. Latex gloves
   d. A PFD and a harness

9. Eye protection can include:
   a. goggles
   b. safety glasses
   c. faceshield
   d. all the above

10. After working in an operating engine room for several hours, you experience a headache and ringing in the ears. This could be an indication that you are damaging your:
    a. sight
    b. hearing
    c. taste
    d. smell

11. While spray painting epoxy in an enclosed space while wearing a respirator, you detect a slight chemical taste. This could be a signal that:
    a. the respirator is not working properly
    b. there is no problem, this is normal
    c. the proper respirator cartridge is being used
    d. it's time to light another cigarette

12. (True / False) The best ways to reduce exposure to diseases like AIDS/HIV, tuberculosis, and hepatitis is to have good personal hygiene (including handwashing) and use personal protection equipment like gloves and masks when appropriate.

13. You are spraying OSPHO on rust spots while working on staging suspended over the side of the vessel, 20 feet above the water. You consulted the MSDS for OSPHO and found that it is a highly corrosive acid used to reduce rust, and that you should wear a respirator, eye and face protection, and gloves for your protection. In addition to these devices, the location of the job also requires that you wear:
    a. a personal flotation device (PFD) and a harness with lanyard
    b. a hardhat
    c. sun tan lotion
    d. earplugs

14. When working or moving around machinery, you should:
    a. tie and tuck in long hair, or secure it under a cap
    b. remove jewelry such as rings, watches and neck chains
    c. button or roll up long sleeve shirts
    d. all of the above

15. An MSDS will give information on chemicals used in the workplace, including;
    a. first aid procedures and protective equipment to wear to prevent exposure
    b. how much of the chemical is carried aboard
    c. where the chemical is stored
    d. all of the above

PERSONAL SAFETY TEST

ANSWERS

1. B
2. D
3. D
4. A
5. False
6. C
7. B
8. A
9. D
10. B
11. A
12. True
13. A
14. D
15. A

# Wrong	Percentage	Comments
0	100	Excellent
1	93.3	Excellent
2	86.6	Very Good
3	80.0	Good
4	73.3	Good
5	66.6	See your supervisor
6	60.0	See your supervisor