

# CHAPTER 3

## FIRE PREVENTION AND FIRE FIGHTING

### I. YOUR INDIVIDUAL RESPONSIBILITY IN FIRE PREVENTION

A. Basic Fire Prevention - Three basic supporting elements are required to initiate or sustain fire. They are: Fuel, air oxidant and heat. The objective of fire prevention is to keep the three separated. Remove any one and the fire will be prevented or extinguished. Observe the following good housekeeping and fire prevention practices.

1. Store safely - place oily rags or waste in metal cans which have automatic closing covers. Rubbish and shredded packing material is to be placed in suitable containers equipped with covers.
2. Flammable liquids - solvents, thinners or oils should be kept in covered metal containers and stored where they will not be exposed to excessive heat or flame. All solvent cleaning pans and containers are to be covered with a non-combustible cover when not in use.
3. Cleaning solvents - solvents used for cleaning must meet the regulatory standards. No flammable liquid will be used to clean floors, walls or ceilings. All cleaning solvents must have a flash point of 100 EF or higher.
4. Access to fire fighting equipment - fire extinguishers and hoses must never be blocked by anything.
5. Sparks from grinding or buffing - bench grinders or buffers must be located where sparks will not be thrown on or near explosives or other flammable material.
6. Gasoline - is never to be used for washing or cleaning parts, clothing or hands. It is to be used for motor fuel only.
7. Cleaning clothes - clothing or gloves are not to be washed with solvents indoors. Care must be taken when washing clothing with solvents to ensure that the solvent is safe to use in this manner.
8. Spray solvents - solvents are never to be used as a spray or atomized in any way. This includes using solvents or any flammable liquid in a "Chem-Quip" unit.
9. Work near open flames - handling solvents, radioactive materials or any other flammable material is strictly prohibited within 10 feet of open flames such as gas water heaters or steamers.
10. Ventilation - all types of lacquers and synthetic enamel must be used in cool, well ventilated places, outside main buildings and well away from open flames such as gas water heaters or steamers.
11. Storage of flammable liquids - cans of paint, thinner, lacquer or any type of volatile

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flammable cleaning liquid must be stored in approved closed metal or metal-lined cabinets after the seal is broken or the can has been opened. Lighter fluid is not to be kept in lockers. Solvents shall be stored outside of buildings in metal drums or tanks.

12. Paint brushes - avoid using paint brushes with synthetic bristles when applying flammable type paint or varnish.

13. Gas water heaters and equipment steamers - are to be kept clear of flammable material for a minimum of 10 feet.

14. Trash burning - trash burning is not allowed.

15. Engine priming - avoid putting gasoline in carburetor air intake. If done at all, pump small quantity out of a pump style can, then always replace the air cleaner before attempting to start the motor. Be extremely careful to assure that no gasoline remains on the hands or clothes while working around motors or other possible sources of spark or flame. Be careful when using ether starting fluids - they are very flammable.

16. Tire pressure - avoid overheating truck tires by running a tandem or dual-wheeled unit with a flat tire. They will catch fire and special procedures are required to extinguish them. Check tire inflation prior to driving and as required in route.

## **II. YOUR INDIVIDUAL RESPONSIBILITY IN FIRE FIGHTING**

A. Overcome Fear - Everyone has an inborn fear of fire, but a frightened person cannot act intelligently; rather, one is likely to become panic stricken and harm oneself and / or others.

B. Proper Respect - Horseplay is unwise and may complicate fire fighting. A wholesome respect for the power of fire will develop fire prevention thinking and will lead to aggressive but safe attack on fires that may occur.

C. Develop Self-Confidence - "Knowledge is power" a famous philosopher once said. So, with increased knowledge of fire protection comes an increased confidence in one's ability to prevent fires in most cases, and to attack those that do start effectively.

## **III. THE FIRE TRIANGLE**

A. Fires Basic Ingredients - The fundamentals of all fire fighting are very similar to the three physical laws of fire prevention.

1. Air - may be kept from fuel and heat. Usually, this method is not practicable, but it is important in fighting petroleum fires. Sometimes, chemical oxidants are involved and can be isolated / removed.

2. Fuel - may be kept from air and heat. Sources of ignition are harmless if no fuel is present.

3. Heat - may be kept from air and fuel. Smoking, match carry and other well site fire safety regulations must be strictly observed. Electrical heaters and other devices are to

be used properly - rated loads and circuits may not be exceeded.

## **IV. CLASSES OF FIRES AND THEIR EXTINGUISHMENT**

Fires normally encountered in the field, shop or on the job can be grouped into four classes. They have been grouped according to the fuels involved. This helps greatly in selecting the most suitable extinguishing method.

A. Class "A" Fires - Are those involving miscellaneous combustible materials such as wood, paper, fabrics and most other combustible materials other than those described in class "B" and "C" fires.

1. Use water to extinguish - quenching with water is the most effective method of extinguishing fires in nearly all class "A" fires. Water hose, soda-acid or water type extinguishers are generally useful.

2. Foam extinguishers - may be used but special care is required and therefore they are not recommended.

3. Dry chemical - is also effective for smothering class "A" fires but must be followed by water to extinguish glowing embers. Glowing embers may remain after the fire is apparently out. Careful follow-up with additional extinguishing materials is necessary to ensure that all parts of the fuel are wet.

4. All-purpose ("ABC") dry chemical - while water is still accepted as the best extinguishing agent for class "A" fires, a new all-purpose powder is available for class "A", "B" and "C" fires. It is an effective agent on class "A" fires and is especially effective on tire fires.

B. Class "B" Fires - Are those involving flammable liquids and vapors. While petroleum and its products comprise the greatest volume in this class, paints, varnishes, lacquers and thinners also come under this heading.

1. Starving, smothering and quenching - are used in fighting class "B" fires, which are divided into two types. The first is the two-dimensional fire, where the source of the fire is substantially in a single plane on a flat surface, as in a spill from a tank. The second type is the three-dimensional fire, where the fire is complicated by a jet or a falling stream of free fuel or vapors.

2. Dry chemical - is the most effective agent. If fog spray is available, it is very helpful when combined with the dry chemical agent. On the two-dimensional fire, direct the flow of the extinguishing material at the base of the fire and rapidly work the extinguisher from one side of the fire to the other, never advancing until all the fire is eliminated behind the extinguishing material.

Never put yourself in a position where the flash-back into the extinguished area could envelope you in flames. If a dry chemical extinguisher is not available, carbon dioxide should be used. Never use soda-acid, pressurized water, pyrene extinguishers or a direct stream of water on a petroleum fire of significant size since the stream of water will only spread the fire.

The three dimensional fire is best controlled by dry chemical agents also, but the extinguishing agent is to be directed to the point of the flame furthest from the fuel source. Work toward the fuel source. Water fog or spray is helpful in keeping the area cool during extinguishing. If dry chemical is not available, carbon dioxide may be used, but it is not very effective unless the agent can be confined to the fire area by a natural housing of some type which will prevent rapid dissipation.

3. Carbon tetrachloride - is not an approved extinguishing agent of the Company due to the extremely toxic vapors it produces when in use.

4. Dry chemical extinguishers - there are three types of dry chemical powders commonly in use today. These are: all-purpose powder for use on "A", "B" and "C" type fires; "Purple K" (potassium bicarbonate) for "B" and "C" type fires; and standard dry chemical (sodium bicarbonate) for "B" and "C" type fires.

"Purple K" and "ABC all purpose" extinguishers are usually considered twice as effective as the standard dry chemical. The standard dry chemical is considered to be three times more effective than carbon dioxide.

C. Class "C" Fires - Class "C" fires are those involving electric circuits. Smothering and quenching are the best methods of fighting electrical fires. Killing the circuit should always be done first, if at all possible, to prevent damage to the equipment and to eliminate all possible hazard of electric shock to the fire fighter. Non-conducting extinguishers must always be used as they allow for the immediate resumption of operation and to prevent injury to the fire fighter. CO<sub>2</sub> and dry chemical extinguishers are required to fight class "C" fires.

D. Class "D" Fires - These occur in combustible metals such as magnesium, titanium, zirconium and sodium. Specialized techniques, extinguishing agents and equipment have been developed to control fires of this type. Normal extinguishing agents generally should not be used on metal fires as there is a danger, in most cases, of increasing the intensity of the fire due to a chemical reaction between some extinguishing agents and the burning metals.

E. Tire Fires - Caused by overheating to the point of combustion, fall into a special class. A burning tire presents a combination of class "A" and "B", more closely resembling class "B". If the tire is flaming, what you see is the gas produced by the hot tire burning away. At the time of combustion the gas is ignited by static or mechanical sparks, which in turn accelerates the rate of heat evolution to a temperature sufficient to cause emberizing of the material. This fact makes it difficult to bring the fire under permanent control by usual fire extinguishing methods.

Your truck is equipped with at least one dry chemical extinguisher which will be used on this type of fire. If you discharge the entire contents of the extinguisher on the tire, it will appear to be out, but will burst into flames again as soon as air reaches the embers. You have only temporarily lessened the fuel supply; that is, the vapor produced by the hot rubber. Air has been excluded by the dry chemical to a point below which is required to sustain flame, but only temporarily. Heat has not been materially affected by the dry chemical; consequently, embers and hot steel remain, ready to cause re-ignition. As fuel continues to emanate from the hot mass of rubber, air filters through the dry chemical and you very soon have all the necessary elements to ignite and sustain fire.

1. Successful extinguishment - use only enough of the dry chemical to stop the flames. Hold the remaining chemical ready to do the same thing again and again until the embers are cool. If help is at hand, throw wet dirt or water on the surface to speed up cooling. Water may be used, only with great care, if gasoline lines or tank has ruptured and gasoline is part of the fuel. Use water for cooling and wetting but never where gasoline may be spread by the water.
2. Danger - if other tires have been ignited by the fire and are still inflated, be very sure no one is standing close enough to be struck by burning fragments as tires explode. A flat tire will generally not explode.
3. ABC "All Purpose" extinguishers - if these are available they may be used with great effectiveness, not ordinarily requiring the cooling and quenching effects of water.

## **V. FIRE EXTINGUISHER PLACEMENT AND INSPECTION**

### **A. Fire Extinguisher Placement**

1. Extinguishers must be conspicuously located where they will be readily available in case of a fire. Extinguishers must be located along normal travel routes.

The mounting of extinguishers by doorways, where possible, is recommended. However, the maximum travel distance from any given point to the closest fire extinguisher must not exceed 50 feet (15 meters)

2. Extinguishers must be installed on hangers or in brackets, If the weight of an extinguisher exceeds 40 pounds, the top of the extinguisher, when mounted, cannot exceed 3 feet, 6 inches. If under 40 pounds, the top of the extinguisher cannot exceed 5 feet (1.5 meters).
3. Signs indicating and/or pointing out the location of a fire extinguisher, must be placed in an easily seen location above the extinguisher.
4. The area around and in front of each fire extinguisher is to be open and clear of obstructions, for easy access.

## B. Fire Extinguisher Inspection and Maintenance

1. Extinguishers must be inspected monthly, or more frequently when circumstances require, to ensure that they are in designated places and have neither been discharged nor damaged.
2. At intervals of not more than 1 year, or when indicated by inspection, each extinguisher must be thoroughly inspected and repaired as necessary.
3. Extinguishers removed from their designated place to be recharged must be replaced by spare extinguishers during the time they are gone.
4. A durable tag must be securely attached to each extinguisher to show maintenance or recharge date and must include the initials or signature of the person who serviced it.
5. If an extinguisher is damaged or shows evidence of corrosion, it must be hydrostatically tested or replaced.
6. All extinguishers must be hydrostatically tested every 12 years.

## C. Fire Extinguisher Training

All employees who may have a chance to use an extinguisher must have actual "hands-on" training on its use. Fire Safety training is provided as part of the employees Orientation (E&P BOP) and yearly thereafter. Fire safety may also be addressed during monthly safety meeting.

# VI. FIRE EXTINGUISHER MARKINGS

Most of the currently manufactured extinguishers utilize the National Fire Prevention Association's recommended series of markings. These symbols help the user to more quickly identify the class of fire on which a particular extinguisher is to be used. This code gives the class symbol accompanied by supplementary words to recall the meaning of the letters. Also, color coding is used. Both Underwriter's Laboratories, Inc. and Underwriter's Laboratories of Canada utilize this classification system.