



Play Training Module

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Flammable Liquids & Combustible Liquids Fire Prevention

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2. Introduction

Welcome to Flammable liquids Fire Prevention. During the next 15 minutes you will learn

- Some simple and practical flammable liquid fire controls
- And what to do if a fire does start

This Training Module will introduce you to some of the most important ways to prevent and reduce damage from flammable and combustible liquid fires. The module will focus on general storage and handling procedures in typical occupancies that do not have large storages of flammable or combustible liquids.

This training is for insurance purposes only. It is not a comprehensive guide and does not ensure compliance with any standards, regulations or statutory obligations. Not all conditions, causes or controls are discussed or contemplated. Rather the module targets the most common conditions and causes along with the most important controls, in order to keep the training brief, practical and effective.

This module is not intended for use in high risk occupancies or processes such as:

- the manufacture of flammable or combustible liquids

- the petrochemical industry
- the use of heated flammable or combustible liquids
- the use of pressurised or reactive processes

For a more comprehensive understanding of flammable and combustible liquid risks and controls please see other appropriate references.

- Section 2 of this Training Module explains why flammable and combustible liquids are so dangerous.
- Section 3 explains the principles of flammable and combustible liquid fires, and identifies the major causes and important controls of flammable and combustible liquid fires.
- Section 4 explains how to detect and extinguish a fire if it starts.

3. Flammable and Combustible Liquids are Dangerous

Every year about 7% of all structural fires begin with the ignition of flammable or combustible liquids and about 15% of industrial fires involve flammable or combustible liquids. These flammable and combustible liquid fires account for 10% of the dollar losses due to fires. Flammable and combustible liquids are dangerous because they are easy to ignite and burn violently. Once alight flammable and combustible liquids can flow and spread fires very quickly. These fires result in serious injuries, deaths, and millions of dollars of damage every year.

4. Avoiding Flammable and Combustible Liquid Fires

4.1. The Basics

Before we discuss how to avoid flammable and combustible liquid fires we need to understand how flammable and combustible liquids ignite and burn. When flammable and combustible liquids burn the liquid is not actually burning. The liquid is producing a vapour which is burning. The only difference between flammable and combustible liquids is that flammable liquids normally produce enough vapour to burn at normal room temperatures. Combustible liquids normally only produce enough vapour to burn when they are heated. This means that flammable liquids are more easily ignited than combustible liquids but once burning, combustible liquids can burn as violently as flammable liquids.

Following some simple storage and handling precautions can avoid most flammable and combustible liquid fires in typical occupancies. All the following controls revolve around some basic principles:

- Minimise volumes in sensitive areas
- Contain vapours and liquids
- Contain potential spills
- Control ignition sources
- Contain potential fires

4.2. Storage

The first set of controls is designed to minimise the volume of flammable and combustible liquids stored in buildings or other sensitive areas and to ensure that they are only stored in appropriate containers and places. The most important controls include:

- Minimise the quantity of flammable and combustible liquid stored on site.
- If flammable and combustible liquid is to be stored on site it is most preferable, from a fire point of view, to store it in an appropriate flammable liquids storage shed which is well separated from any valuable structures or equipment.
- Minimise the quantity of flammable and combustible liquid stored in valuable buildings.
- If flammable and combustible liquid is to be stored inside valuable buildings they should be stored in either, an approved flammable liquids storage room or an approved flammable liquids storage cabinet. These approved rooms and cabinets are designed to help contain flammable vapours and a fire if it starts.
- Only remove enough flammable and combustible liquid from approved rooms or cabinets for the job at hand or a maximum of a one shift supply. The remainder should be returned at the end of the job or the end of the day. All containers carrying flammable or combustible liquid should be approved for the intended use – ie special flammable or combustible liquid containers. Containers should be filled in an approved storage room or in another safe area.
- All flammable or combustible liquid containers should be sealed when not being used, even if they are empty as they will still contain flammable vapours.

4.3. Dispensing

The act of pouring or transferring flammable and combustible liquids from a container to another is hazardous because it can:

- Produce a build up of static electricity which can cause a spark and start a fire.
- Cause a spill.
- Expose flammable vapours to potential ignition sources.

The most important controls to have in place when dispensing include the following.

- The most common control for static sparking is to make sure that all metal containers, pumps, pipes and tubes are connected electrically, normally via a metal wire. This is called grounding and bonding. Before dispensing starts the containers being dispensed into and from should be connected via a wire. Normally the wire is fitted with electrical alligator clips. Then one of the containers, normally the biggest one, should be connected to earth (or ground). This will prevent sparking during the dispensing operation.
- When transferring flammable or combustible liquid via pumps only pumps approved for the purpose should be used to reduce the chance of siphoning, spills and sparks. If transferring from a drum via gravity only approved self closing taps should be used. Dead man nozzles or switches should be used if transferring fuel via pumps which are not hand powered.
- Dispensing should only take place in approved flammable and combustible liquid storage rooms or other appropriate areas which offer spill containment and are free from ignition sources.

4.4. Spontaneous Combustion

Another serious problem with flammable and combustible liquids is that they can react with organic materials and other chemicals to spontaneously combust. A common example of this is when rags contaminated with flammable liquid are thrown into a bin. The rags and the flammable liquid start a chemical reaction which produces heat. If the heat production is large enough, the rags will burst into flame. This reaction takes some time so it often bursts into flame after everyone is gone home.

Because of this reason and others, good housekeeping is very important in preventing flammable and combustible liquid fires. Controls should include:

- Keeping flammable and combustible liquid storage and work areas free from other storage, clean and organised.
- Keeping other hazardous materials separated from flammable and combustible liquids.
- Cleaning up any spills quickly with appropriate materials.

- Place all rags contaminated with flammable and combustible liquids into self closing metal bins and remove the rags from the building at the end of each shift.

4.5. Preventing Vapour Ignition

There are three common ways to prevent vapours igniting:

- Prevent vapours from escaping their containers.
- Vent vapours from buildings, rooms or an enclosures to atmosphere in order to prevent a build up of vapours.
- Eliminate ignition sources in areas which could potentially contain vapours.

Normally we try to use as many of them as we can.

Preventing vapours escaping their containers is as easy as making sure that appropriate containers are used and that containers are properly sealed when not in use.

You should always ensure appropriate ventilation before starting to dispense or open containers of flammable or combustible liquid. For this reason appropriate ventilation is very important in flammable liquid storage sheds, rooms or any other area where vapours could exist. Vapours maybe heavier than air so low point ventilation is also important.

Because vapours can travel long distances and are easily ignited, just about anything which can produce a spark or heat can become an ignition source. Common sources to watch out for are:

- electrical appliances, lights, switches and other equipment,
- heaters, water heaters and gas equipment,
- cutting and welding,
- equipment which produces a open flame, sparks or hot metal
- static electricity while dispensing or pouring flammable liquid
- smoking

Any electrical equipment in areas which could potentially contain vapour should be explosion proof - ie appropriately rated for the type of hazardous environment. This includes lights and switches. Grounding and bonding cables should be used to control static electricity. All other potential ignition sources should be removed from the area or the flammable and combustible liquids should be moved to an area free of ignition sources.

4.6. Storage Rooms and Sheds

Storage rooms and sheds should be designed to minimise the probability of ignition and contain any fire to the immediate area without damaging any adjacent structures or equipment. This is done by using the following principles:

- Containment – bunding should be used to ensure the liquid can not escape the immediate area and help spread a fire. Covered drains can also be used to drain liquids to a safe area.
- Separation – walls or distance should be used to maintain fire separation between storage and other structures and equipment.
- Storage rooms and sheds should also have appropriate low and high point ventilation, explosion proof electricals, grounding and bonding straps, approved pumps and self closing valves for dispensing.
- Appropriate types and sizes of fire extinguishers should be located near flammable and combustible liquid storage areas and process areas as well as throughout your site.

5. Detecting and Reacting to Flammable and Combustible Liquid Fires

The next few controls are designed to make you ready to detect and extinguish a flammable or combustible liquid fire.

If a fire starts you must be ready to detect it and react appropriately. If you can detect a fire early enough you may be able to extinguish the fire while it is still small or you can gain some time to help evacuate safely. Consideration should be given to installing fire detectors or maintaining human supervision in flammable or combustible storage areas and process areas. The reason why flammable and combustible liquid is so dangerous is that fires can start easily and spread so quickly.

When a fire is detected you need to be ready to react appropriately. There are two things you can do. Try and put out the fire if it is safe to do so or evacuate to a safe area and inform emergency services.

If you are going to put out a fire you need to do the right things and you need to do them quickly. In most situations the right type of fire extinguisher will be a great help but only some types of fire extinguisher are recommended for use on flammable liquid fires. If the wrong type of fire extinguisher is used or if an extinguisher is not used properly, you could help spread the fire or you could hurt yourself. We recommend you complete a fire extinguisher training course, especially if you are handling flammable liquids regularly.

Appropriate types and sizes of fire extinguishers should be located near flammable and combustible liquid storage areas and process areas as well as throughout your site.

6. How to implement an effective Flammable Liquids self inspection system

A Flammable Liquids self inspection system is designed to insure that appropriate Flammable Liquids fire prevention controls are in place at all times. The implementation and maintenance of an effective Flammable Liquids self inspection system involves a few simple principles.

- Gain senior management commitment. If the system is not openly supported by senior management it will not be effective.
- Allocate responsibility for completion of regularly scheduled self inspections in each specific area of the site. The inspections should be conducted about monthly. The inspections should be formally documented with reports being reviewed by an appropriate manager and kept on record. Defects should be rectified as soon as possible.
- The records can be shown to you insurance broker or underwriter to demonstrate a proactive approach to managing Flammable Liquids risk.

Congratulations on completing this Training Module.

Please remember these are minimum guidelines only. Additional controls should be considered if the consequences of a fire are large or the likelihood is high. Additional references should be consulted if required and additional controls used if required. Additional references include:

- Australian Standard “AS 1940 - The storage and handling of flammable and combustible liquids”.
- Your insurance company or a fire protection engineer.