

Fire Safety and Prevention

Topics

- Goals of a Fire Prevention Program
- Fire Prevention Strategy
- Housekeeping Issues
- Flammable and Combustible Liquids
- Electrical Fire Hazards
- Compartmentalization

Fire Prevention Goals

- Life Safety

- The primary goal of fire safety efforts is to protect building occupants from injury and to prevent loss of life.

- Property Protection

- The secondary goal of fire safety is to prevent property damage.

- Protection of Operations

- By preventing fires and limiting damage we can assure that work operations will continue.

The Strategy of Preventing a Fire

• A fire must have three things to ignite and maintain combustion:

- Fuel
- Heat
- Oxygen

• The basic strategy of fire prevention is to control or isolate sources of fuel and heat in order to prevent combustion.

If all three are not present in sufficient quantities a fire will not ignite or a fire will not be able to sustain combustion

Housekeeping

- Good housekeeping habits are an important part of a safe workplace.

- Why is good housekeeping important?

- To reduce amounts of flammable and combustible materials.
- To reduce ignition hazards.
- To ensure safe emergency evacuation of occupants.
- To allow for quick emergency response.

General Housekeeping Guidelines

- Work areas, aisles, walkways, stairways, and equipment should be kept clear of loose materials, trash, scraps, etc.
- **Never block aisles, fire exits, emergency equipment, or alarm pull stations with equipment or materials.**
- Avoid build up of combustible trash and waste such as paper, wood, cardboard, etc.
- **Keep use and storage of flammables and combustibles to a minimum.**
- Clean up all spills such as grease, oil, or water immediately. A delay could result in accidents.

Storage Guidelines

No storage is allowed in corridors and stairwells. A cluttered hallway could slow down emergency evacuation.

Storage must not exceed a plane of 18 inches below sprinkler heads or smoke detectors. Storage that breaks this plane may prevent sprinkler heads from fully covering room during a fire.



A simulated example of how storage can protrude into 18 inch plane below sprinkler heads.

Storage Guidelines

All storage must be at least 3 ft from electrical panels. In some emergency situations it will be necessary to access these panels quickly.

- Maintain at least a 3ft clearance from heating surfaces, air ducts, heaters, and lighting fixtures.
- Storage of combustible materials in mechanical rooms is prohibited.

Improper Storage in front of Electrical Panel



Improper Mechanical Room Storage



Flammable and Combustible Liquids

- Flammable and combustible liquids are potential fuel sources for fires and are present in almost every workplace.
- It is actually the vapor created by flammable and combustible liquids that ignites and burns.
- It is important to understand what materials in your work area are flammable and combustible so that you may properly store and isolate them from ignition sources.

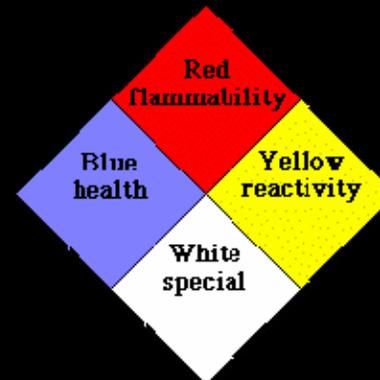
How do I tell what's flammable?

NFPA classification system

- The NFPA diamond is an easy way to determine the safety risks associated with hazardous materials. To determine a materials flammability refer to the **red section** of the diamond. A number in this section will indicate the flammability rating of the material.

The following numbering system is used to indicate flammability

- 0- will not burn
- 1- must be preheated to burn
- 2-ignites when moderately heated
- 3-ignites at normal temperature
- 4-extremely flammable



NFPA Diamond

NFPA Classification System Continued...

- **Where can I find NFPA diamonds?**
 - Product labels
 - Material Safety Data Sheets (ask your supervisor for them)
- **How do I determine the flammability of chemicals that don't use the NFPA classification system?**
 - The flashpoint of a chemical may be used to determine its flammability. Flashpoint information may be found on product labels or MSDS sheets.

Flammable and Combustible Liquids Continued...

- Flammable liquids are considered flammable because their flashpoints are $< 100^{\circ}\text{F}$. This means that flammable liquids burn easily at normal working temperatures.
- Combustible liquids have a flashpoint at or above 100°F . These liquids are less hazardous than flammable liquids but still pose a risk.
- The volatility of flammable and combustible liquids requires special storage and handling requirements

Storing Flammable and Combustible Liquids

Flammable liquids must be stored away from ignition sources in cool, well ventilated areas away from incompatible materials

Limit the amount of flammable and combustible liquids to the minimum amount necessary.

As a general rule, No more than 10 gallons of flammable materials should be outside of approved flammable liquid storage cabinets or approved storage rooms.

Room storage limits of flammable and combustible materials depend on various factors such as sprinklers, and storage cabinets. Refer to the table on the following slide for storage guidelines.

I.S.U. Flammable Liquid Storage Limits

1. Room Storage Limits for Flammable and Combustible Liquids

Flash point (°F)	Boiling point (°F)	Non Sprinkled Building	Non Sprinkled Bldg. & Flammable Liquid Storage Cabinet	Sprinkled Building	Sprinkled Bldg./Flammable Liquid Storage Cabinet
<73 °F	<100 °F	10 gal.	20 gal.	10 gal.	40 gal.
<73 °F	>100 °F	10 gal.	40 gal.	10 gal.	80 gal.
> 73 & <100 °F	NA	10 gal.	60 gal.	10 gal.	120 gal.
>100 & <140 °F	NA	30 gal.	60 gal.	60 gal.	90 gal.
>140 & <200 °F	NA	50 gal.	100 gal.	100 gal.	150 gal.

Containers other than safety cans shall not be greater capacity than one (1) gallon. The number of gallon safety cans shall not exceed five (5). The number of one (1) gallon safety cans in use storage cabinets shall not exceed ten (10).



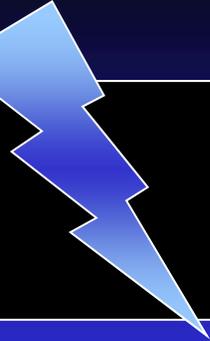
Fire Safety-Electrical Issues



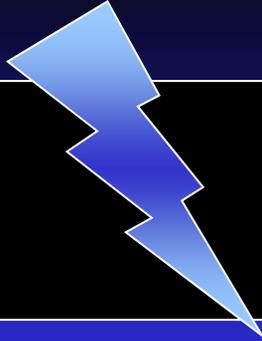
- Electrical hazards are the cause of numerous workplace fires each year. Faulty electrical equipment or misuse of equipment produces heat and sparks that serve as ignition sources in the presence of flammable and combustible materials.

- **Examples of common ignition hazards:**

- overloading circuits
- use of unapproved electrical devices
- damaged or worn wiring



Electrical **Fire** Safety

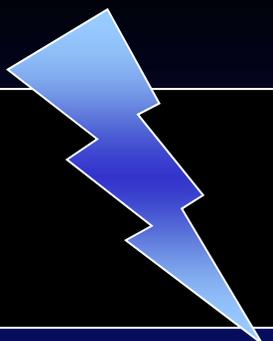


- **Extension cords**

- Extension cords are only approved for temporary use. They may only be used for a period of three days or less. Instead of using extension cords contact Facilities to install permanent wiring.
- When using extension cords check for defaults such as frays, brittleness, or broken wires.
- Never place extension cords in high traffic areas where they can be damaged by being stepped on or run over by equipment.



Electrical **Fire** Safety



- Multi-plug strips

- Should only be used for office equipment such as computers, printers, and fax machines.
- Other common items such as microwaves, refrigerators, and copy machines must be plugged directly into wall outlets. This is a requirement of the State Fire Marshal.
- Multi-plug strips should have a fuse or circuit breaker and be UL approved.

Electrical **Fire** Safety

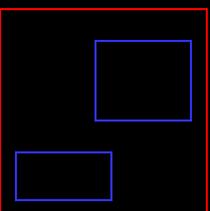
Avoid the following improper and hazardous practices:

- Never use three prong adapters that allow a three pronged plug to plug into a two prong outlet.
- Never use any item with a damaged or frayed electrical cord.
- Space Heaters are not allowed in campus buildings unless approved.

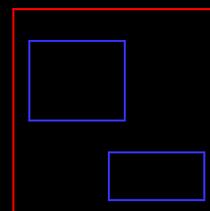
- Never daisy chain or piggy back multi-plug strips and electrical cords (plugging strips and cords into each other).



Piggy-backed multi-plug strips



Compartmentalization



Buildings are designed to prevent fire, heat, and smoke from spreading beyond locations of origination. Building elements such as fire walls, fire dampers, and fire doors, are designed to seal off one location from the next. This system is called compartmentalization.

Compartmentalization increases the safety of evacuating building occupants because smoke and fire are not able to escape into exit passageways.

Containment of fire and smoke reduces property damage and prevents small fires from growing into large fires.

In order for compartmentalization efforts to be effective

What's A Fire Door?

Fire doors are designed to withstand fire, heat and smoke for a period of 20-minutes to 3 hours.

Did you know that corridor office doors are fire doors and should have a 20 minute rating?

Corridor laboratory doors should have a 60 minute rating.

Fire Doors are required to:

- **Be Self Closing:** fire doors should have a door closure that pulls doors completely shut after the door has been opened
- **Have Positive latching:** a positive latch locks a door in place so can



4 Reasons Not to Wedge Open Fire Doors

For the safety of your buildings occupants.

- If a fire occurs in a location where the fire door has been wedged, smoke and heat will travel freely into exit corridors hindering or preventing occupant evacuation.

It's State Law

- Periodically the Texas State Fire Marshal inspects our campus and issues numerous citations for wedging or blocking open doors.

3 To reduce or prevent damage to property, research, personal belongings, etc.

- Keeping your door shut will keep out smoke or fire originating in other locations.

4 To hold open your door you may have an electro-magnetic device installed.

- This device releases a fire door upon activation of the fire alarm allowing it to close and latch.

Maintaining Fire Barriers

- Fire doors need occasional maintenance and repairs to function properly and should be periodically checked. To test a fire door:
 - Open the door fully and allow it to swing shut.
 - The door should close and latch completely by itself. Give the door a push after it closes to ensure that the latch has engaged.
 - If the door is not operating properly contact FP&M for repairs.
- Ceiling, Floor, Wall Penetrations
 - All areas should be properly sealed to prevent the escape of fire, heat and smoke.
 - Common penetrations include holes in walls, around ducts, pipes, etc. These types of penetrations should be sealed with appropriate fire-stopping material.

Points To Remember

• Housekeeping Issues

- Keep your worksite clean and free of trash and debris.
- Follow proper storage guidelines.

• Flammable and Combustible Liquids

- Use and store the minimum amounts necessary.
- Follow correct storage guidelines.

• Electrical Fire Hazards

- Don't use unapproved electrical devices.
- Avoid improper uses of multi-plugs.

• Compartmentalization

- Maintain compartmentalization systems.
- Don't wedge or block open doors.