CCSD
CLARK COUNTY
SCHOOL DISTRICT

Flammable and Combustible Liquids

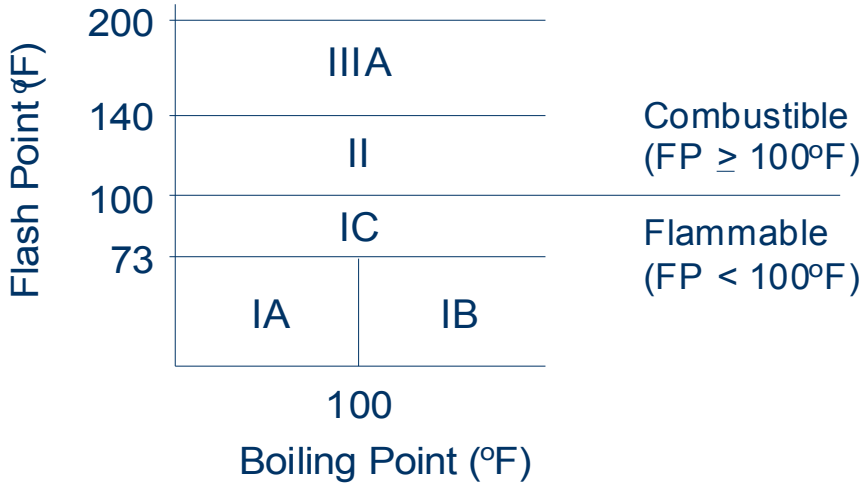
Introduction

- The two primary hazards associated with flammable and combustible liquids are *explosion* and *fire*
- Safe handling and storage of flammable liquids requires the use of approved equipment and practices per OSHA standards

Flash Point

- Flash point means the minimum temperature at which a liquid gives off enough vapor to form an ignition
- In general, the lower the flash point, the greater the hazard
- Flammable liquids have flash points below 100°F, and are more dangerous than combustible liquids, since they may be ignited at room temperature
- Combustible liquids have flash points at or above 100°F
- Although combustible liquids have higher flash points than flammable liquids, they can pose serious fire and/or explosion hazards when heated

Classes of Flammable and Combustible Liquids



Classes of Some Flammable Liquids

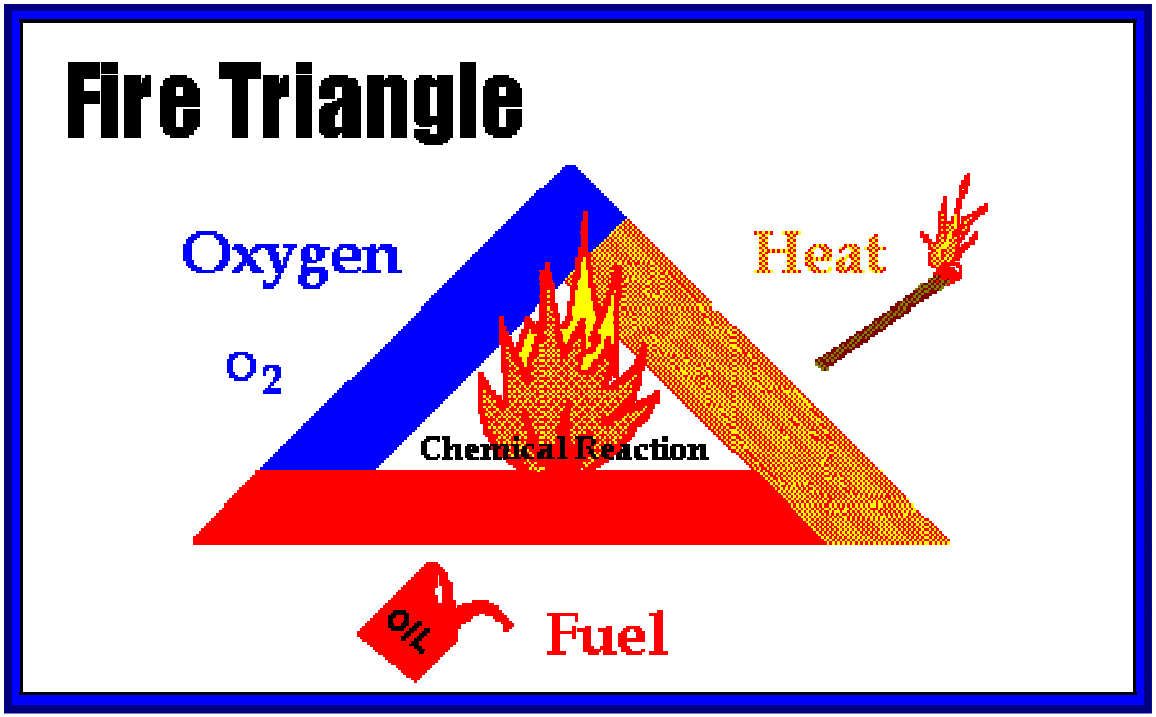
	Common Name	Flash Point (°F)
CLASS IA	Ethyl Ether	-49
CLASS IB	Gasoline	-45
	Methyl Ethyl Ketone	21
	Toluene	40
CLASS IC	Xylene	81-115
	Turpentine	95

Program Components

A good plan for safe use of flammable and combustible liquids contains at least these components:

- Control of ignition sources
- Proper storage
- Fire control
- Safe handling

Controlling Fires



Sources of Ignition

Must take adequate precautions to prevent ignition of flammable vapors. Some sources of ignition include:

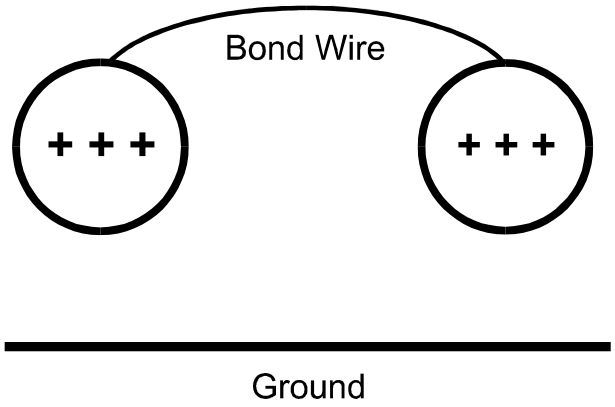
- Open flames
- Smoking
- Static electricity
- Cutting and welding
- Hot surfaces
- Electrical and mechanical sparks
- Lightning

Static Electricity

- Generated when a fluid flows through a pipe or from an opening into a tank
- Main hazards are fire and explosion from sparks containing enough energy to ignite flammable vapors
- Bonding or grounding of flammable liquid containers is necessary to prevent static electricity from causing a spark

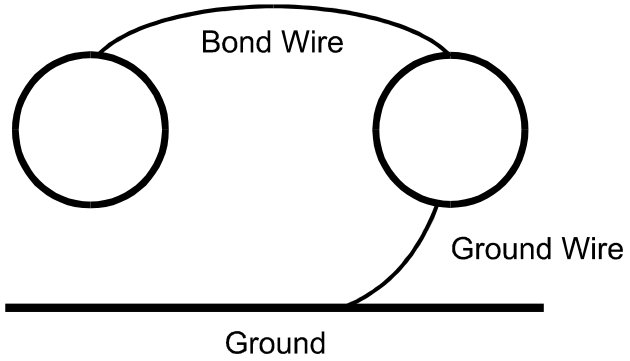
Bonding

- Physically connect two conductive objects together with a bond wire to eliminate a difference in static charge potential between them
- Must provide a bond wire between containers during flammable liquid filling operations, unless a metallic path between them is otherwise present

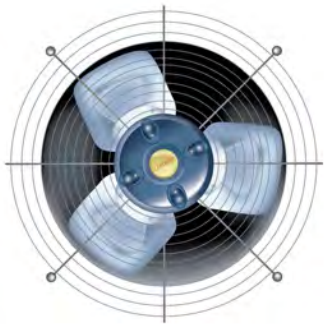


Grounding

- Eliminates a difference in static charge potential between conductive objects and ground
- Although bonding will eliminate a difference in potential between objects, it will not eliminate a difference in potential between these objects and earth unless one of the objects is connected to earth with a ground wire



Ventilation

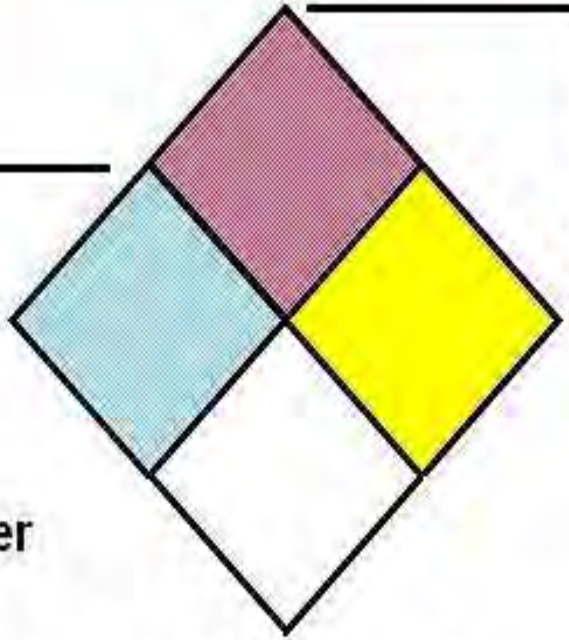


Always provide adequate ventilation to reduce the potential for ignition of flammable vapors.

Storage Fundamentals

- Identify incompatible chemicals – check the Material Safety Data Sheet
- Isolate and separate incompatible materials
  - Isolate by storing in another area or room
  - Degree of isolation depends on quantities, chemical properties and packaging
  - Separate by storing in same area or room, but apart from each other

NFPA Label



Chem. name

Fire Hazard (red)
Flash Point Temp.
4 – below 73F - v.flam.
3 – 73 to 100F – flam.
2 – 101 to 200F- comb.
1 – over 200F –slightly combustible
0 – will not burn

Health (blue)
4 – deadly
3 – extreme danger
2 – hazardous
1 – slightly hazardous
0 – normal material

Reactivity (yellow)
4 – may detonate
3 – shock or heat may detonate
2 – violent chem. reaction
1 – unstable if heated
0 – stable

Specific Hazard
OXY - oxidizer
ACID – acid
ALK – Alkali
COR – corrosive
W – use no water
RAD - radiation haz.

Storage of Flammable and Combustible Liquids

- Storage must not limit the use of exits, stairways, or areas normally used for the safe egress of people
- In office occupancies:
  - Storage prohibited except that which is required for maintenance and operation of equipment
  - Storage must be in:
    - closed metal containers inside a storage cabinet, or
    - safety cans, or
    - an inside storage room

Inside storage room

Safety Cans for Storage and Transfer

- Approved container of not more than 5 gallons capacity
- Spring-closing lid and spout cover
- Safely relieves internal pressure when exposed to fire

Flame Arrester Screen

- Prevents fire flashback into can contents
- Double wire-mesh construction
- Large surface area provides rapid dissipation of heat from fire so that vapor temperature inside can remains below ignition point

Storage Cabinets

- Not more than 60 gal of Class I and/or Class II liquids, or not more than 120 gal of Class III liquids permitted in a cabinet
- Must be conspicuously labeled, “Flammable - Keep Fire Away”
- Doors on metal cabinets must have a three-point lock (top, side, and bottom), and the door sill must be raised at least 2 inches above the bottom of the cabinet

Fire Control

- Suitable fire control devices, such as small hose or portable fire extinguishers must be available where flammable or combustible liquids are stored
- Open flames and smoking must not be permitted in these storage areas
- Materials which react with water must not be stored in the same room with flammable or combustible liquids

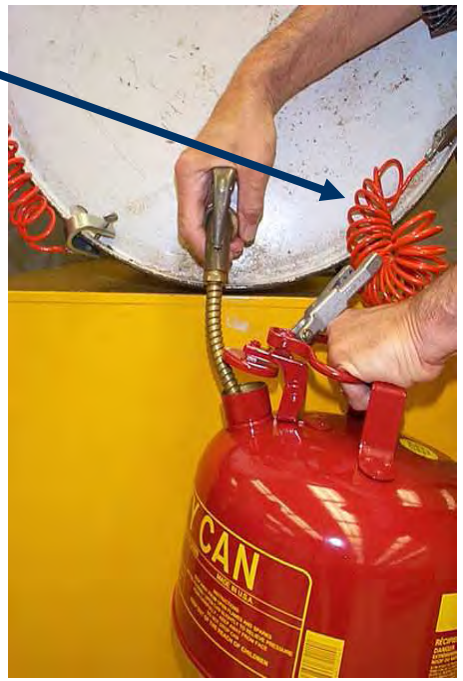
Transferring Flammable Liquids

Since there is a sizeable risk whenever flammable liquids are handled, OSHA allows only four methods for transferring these materials:

- Through a closed piping system
- From safety cans
- By gravity through an approved self-closing safety faucet
- By means of a safety pump

Self-Closing Safety Faucet

- Bonding wire between drum and container
- Grounding wire between drum and ground
- Safety vent in drum



Safety Pump

- Faster and safer than using a faucet
- Spills less likely
- No separate safety vents in drum required
- Installed directly in drum bung opening
- Some pump hoses have integral bonding wires

Waste and Residue

Combustible waste and residue must be kept to a minimum, stored in covered metal receptacles and disposed of daily.

Waste drum with disposal funnel

Safety disposal can

Oily-waste can (self-closing lid)

HAZARDOUS CHEMICAL DISPOSAL

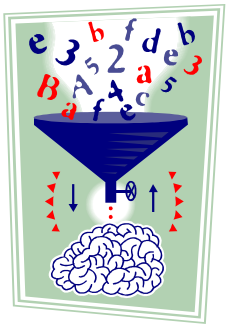
- Use Proper Chemical Disposal Methods

- Controlled Waste
  - Used oil & used antifreeze
- Hazardous Waste
  - Paint & thinner
  - Solvent & cleaners

Safe Handling Fundamentals

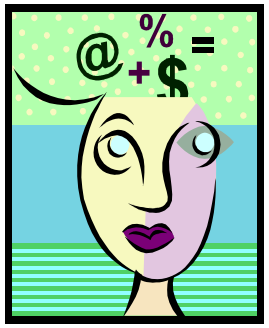
- Carefully read the manufacturer's label on the flammable liquid container before storing or using it
- Practice good housekeeping in flammable liquid storage areas
- Clean up spills immediately, then place the cleanup rags in a covered metal container
- Only use approved metal safety containers or original manufacturer's container to store flammable liquids
- Keep the containers closed when not in use and store away from exits or passageways
- Use flammable liquids only where there is plenty of ventilation
- Keep flammable liquids away from ignition sources such as open flames, sparks, smoking, cutting, welding, etc.

Summary



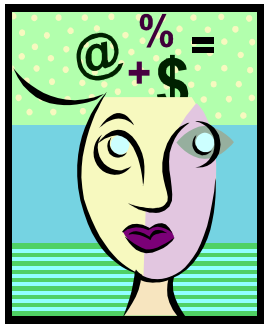
- The two primary hazards associated with flammable and combustible liquids are explosion and fire
- Safe handling and storage of flammable liquids requires the use of approved equipment and practices per OSHA standards
- An excellent reference on this topic is National Fire Protection Association Standard No. 30, *Flammable and Combustible Liquids Code*

Quiz



1. Flammable liquids have a flash point below 100 degrees F? True or False
2. Physically connecting two conductive objects together is called grounding? True or False
3. What's the best source to identify incompatible chemicals? _____
4. Flammability on the NFPA label is colored Red? True of False
5. Flammable safety cans:
   a. cannot be more than 60 gal.
   b. Must have a self-closing lid
   c. Must be made of durable plastic

Quiz



1. Flammable liquids have a flash point below 100 degrees F?
   True or False
2. Physically connecting two conductive objects together is called grounding?
   True or ***False***
3. What's the best source to identify incompatible chemicals?
   MSDS
4. Flammability on the NFPA label is colored Red? ***True*** of False
5. Flammable safety cans:
   a. cannot be more than 60 gal.
   b. Must have a self-closing lid
   c. Must be made of durable plastic