

Flammable and Combustible Liquids



Introduction

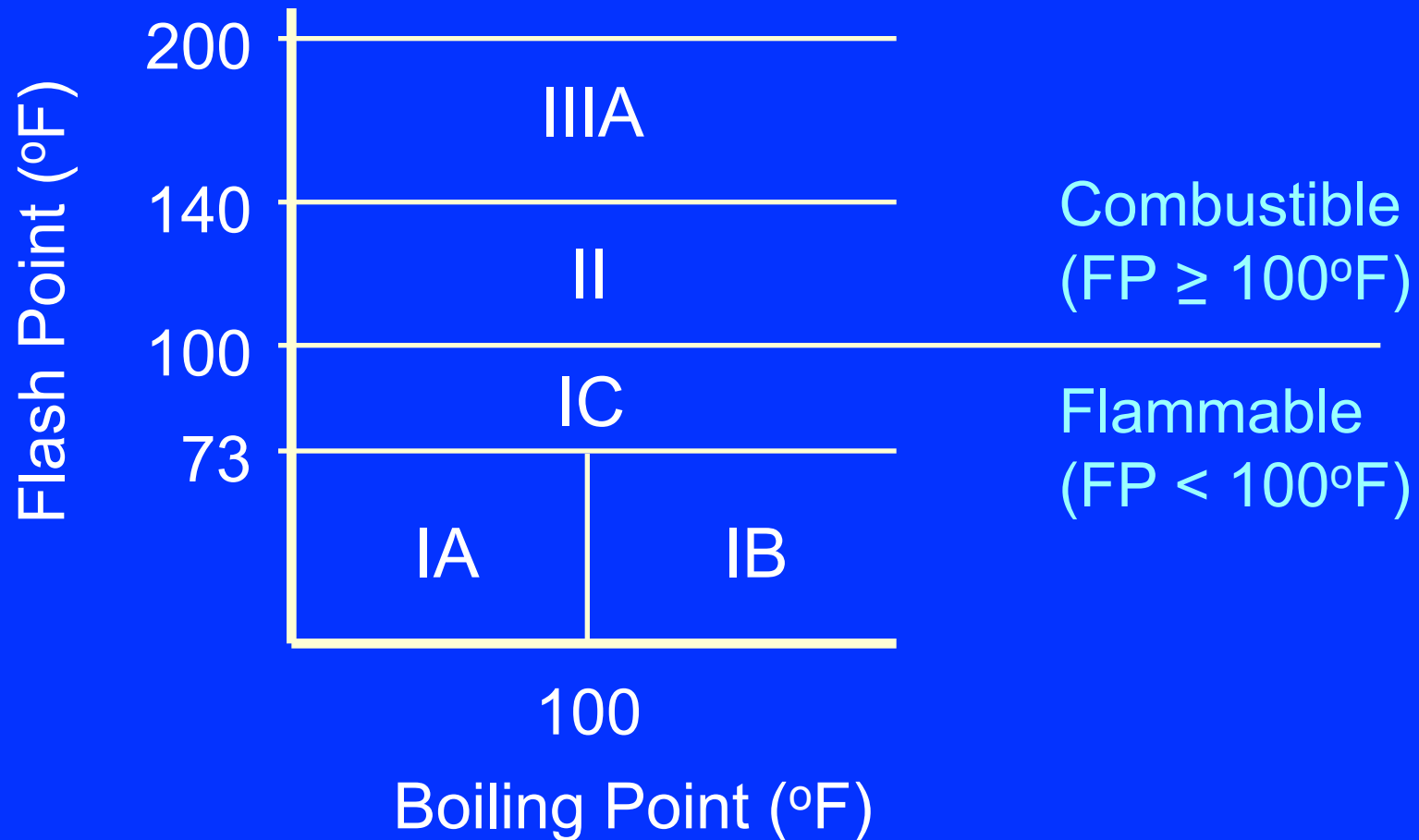
- ! The two primary hazards associated with flammable and combustible liquids are *explosion* and *fire*
- ! Safe handling and storage of flammable liquids requires the use of approved equipment and practices per OSHA standards



Flash Point

- ! Flash point means the minimum temperature at which a liquid gives off enough vapor to form an ignitable mixture
- ! 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

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

Program Components

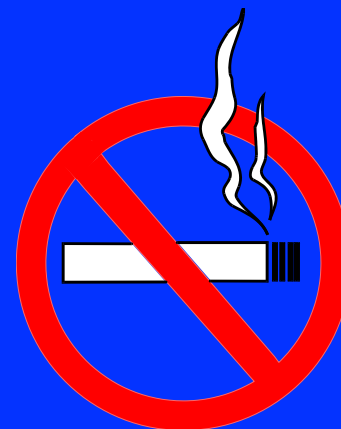
A good plan for safe use of flammable and combustible liquids contains at least these components:

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

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



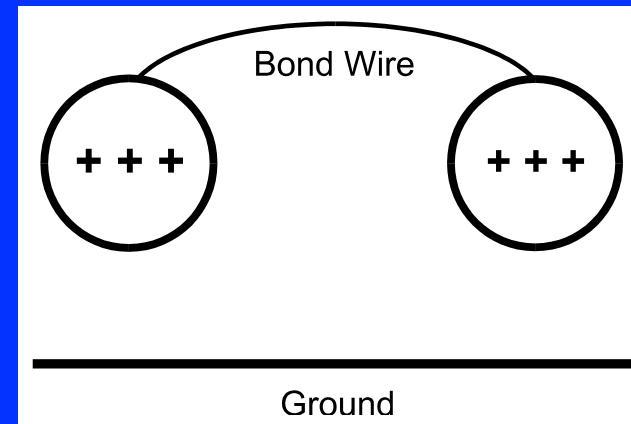
Static Electricity

- ! 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



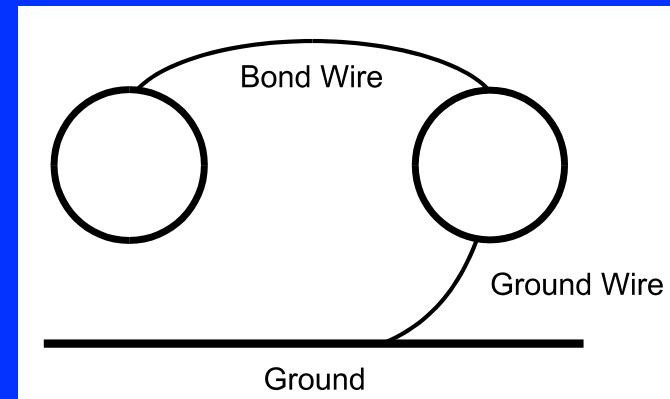
Bonding

- ! 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

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

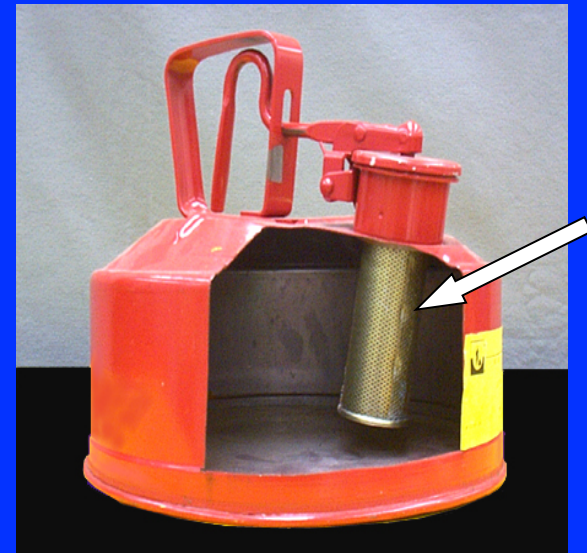
Safety Cans for Storage and Transfer

- ! 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



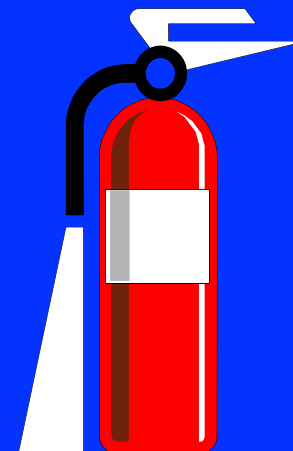
Storage Cabinets

- ! 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:

1. Through a closed piping system
2. From safety cans
3. By gravity through an approved self-closing safety faucet
4. 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)

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*