

FLAMMABLE & COMBUSTABLE LIQUIDS



Introduction

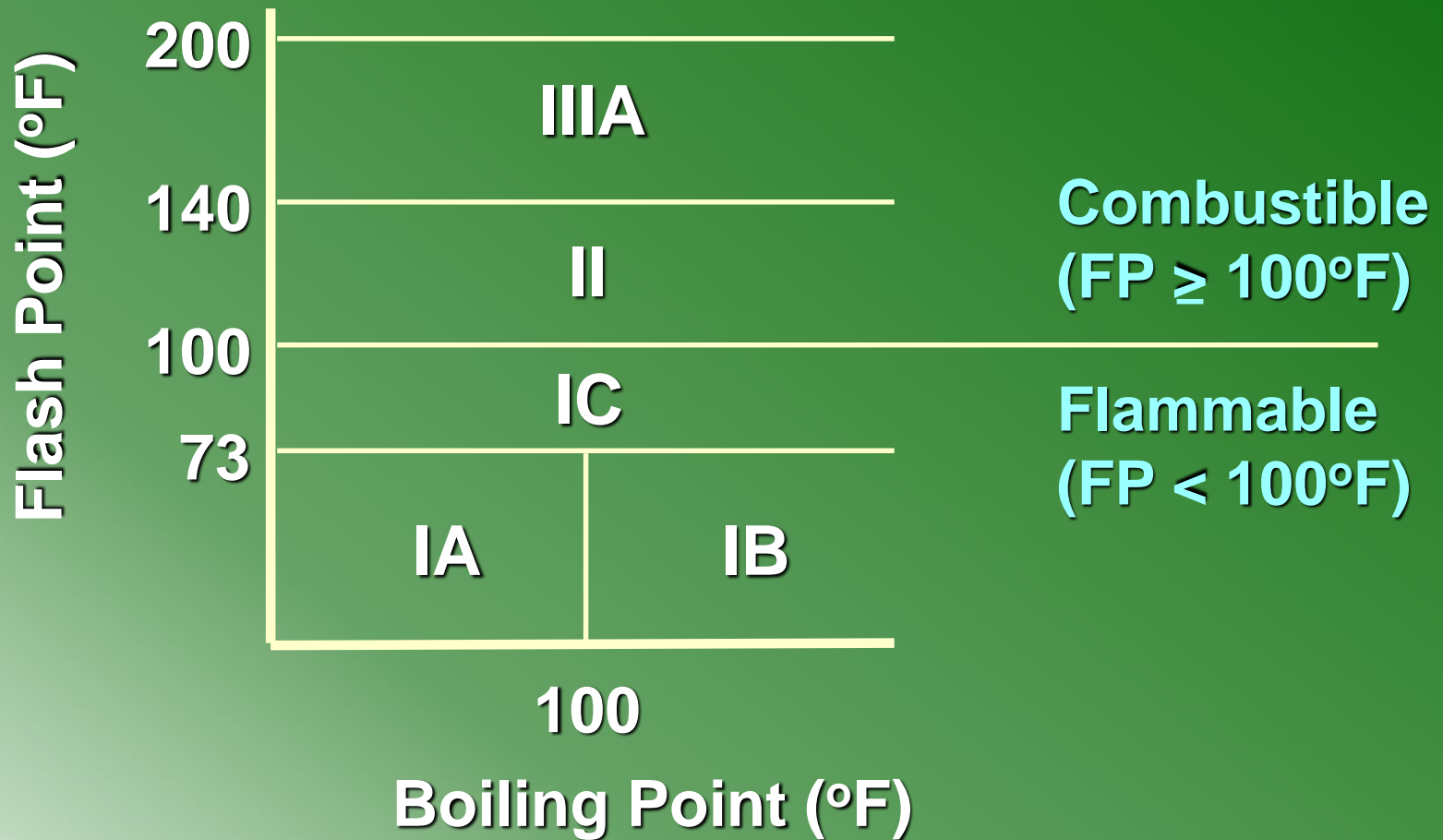
- ❓ The two primary hazards associated with flammable and combustible liquids are *explosion* and *fire*
- ❓ Safe handling and storage of flammable liquids requires the use of approved equipment and practices per OSHA standards



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**



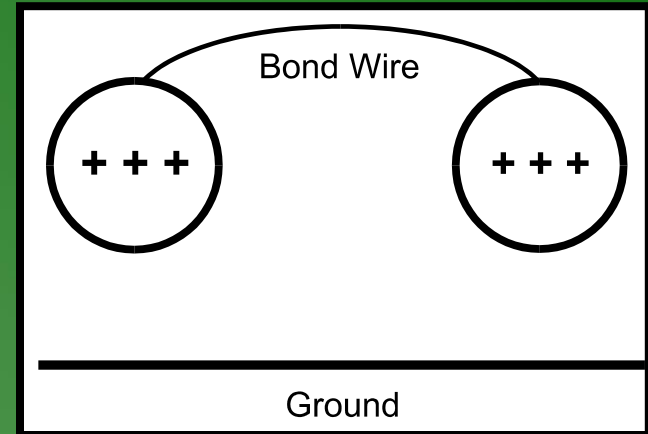
Static Electricity

- ❓ 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



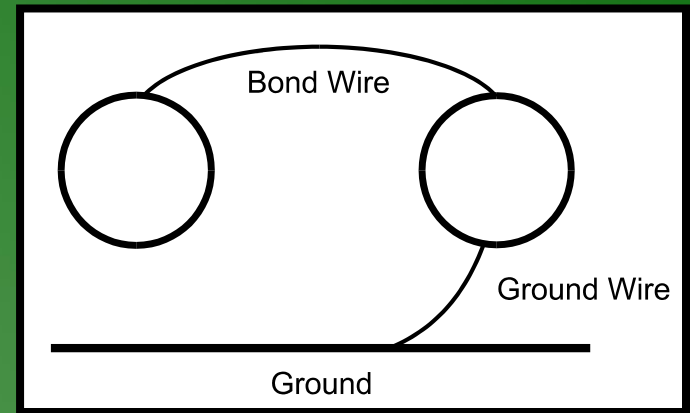
Bonding

- ❓ 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



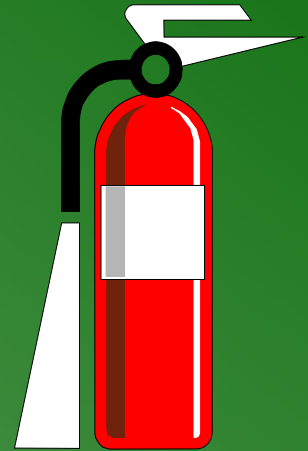
Storage Cabinets

- ❓ 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*