



**ALASKA DEPARTMENT OF LABOR
& WORKFORCE DEVELOPMENT**

Flammable and Combustible Liquids



Jobs are Alaska's Future

OSHA Office of Training and Education

Introduction

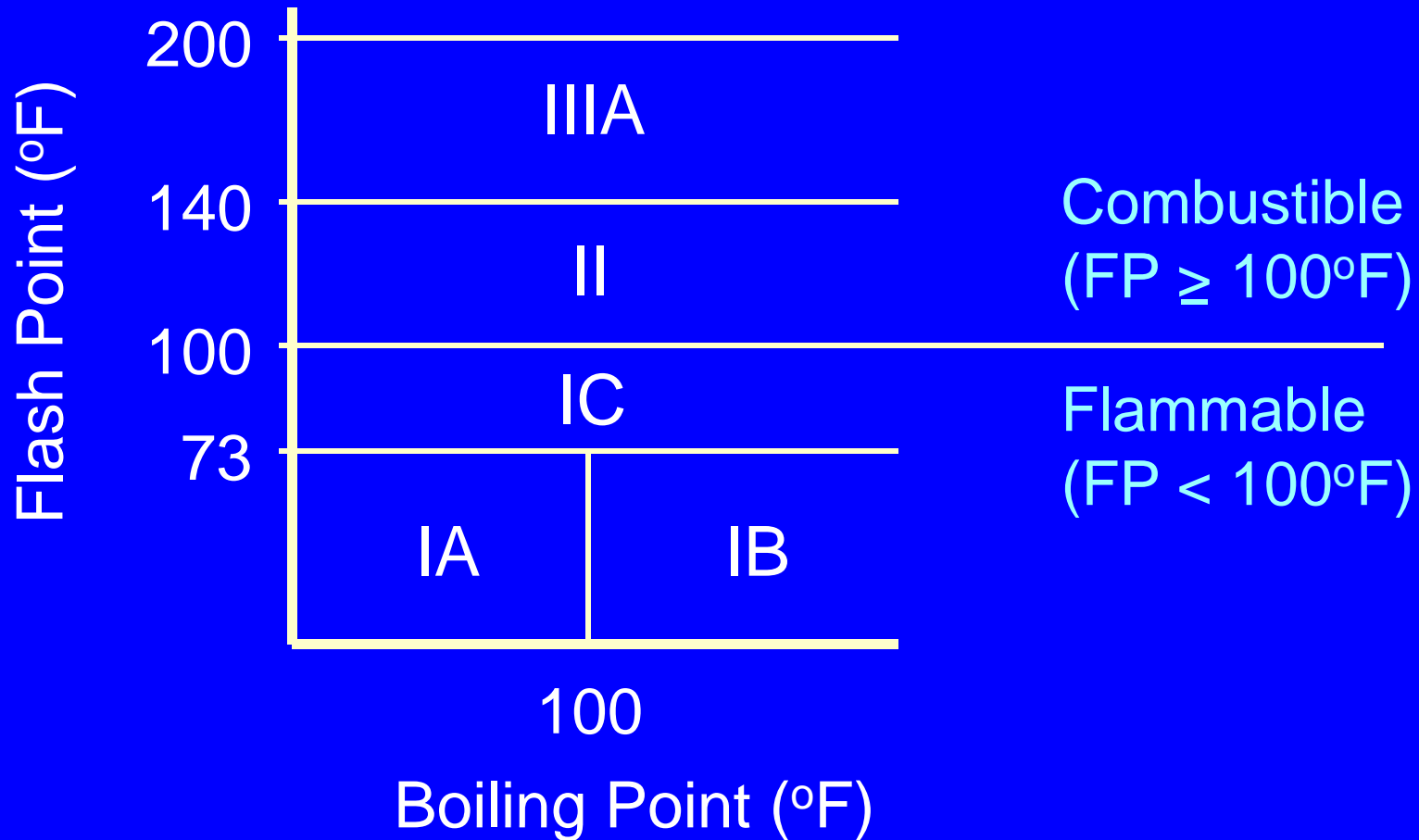
- ✎ The two primary hazards associated with flammable and combustible liquids are *explosion* and *fire*
- ✎ Safe handling and storage of flammable liquids requires the use of approved equipment and practices per OSHA standards



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

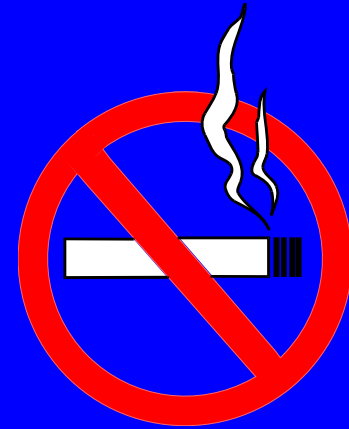
A good plan for safe use of flammable and combustible liquids contains at least these components:

-  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



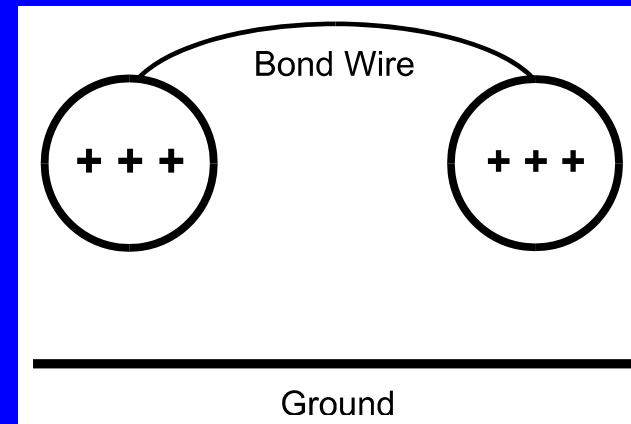
Static Electricity

- ✎ 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



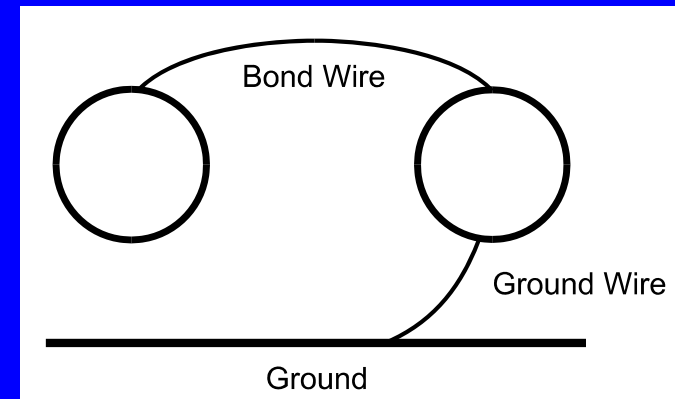
Bonding

- ✎ 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



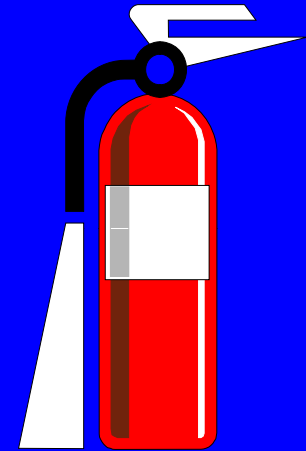
Storage Cabinets

- ✎ 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*