Flammable Liquids

OSHA®

Directorate of Training and Education

Introduction

- The two primary hazards associated with flammable 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

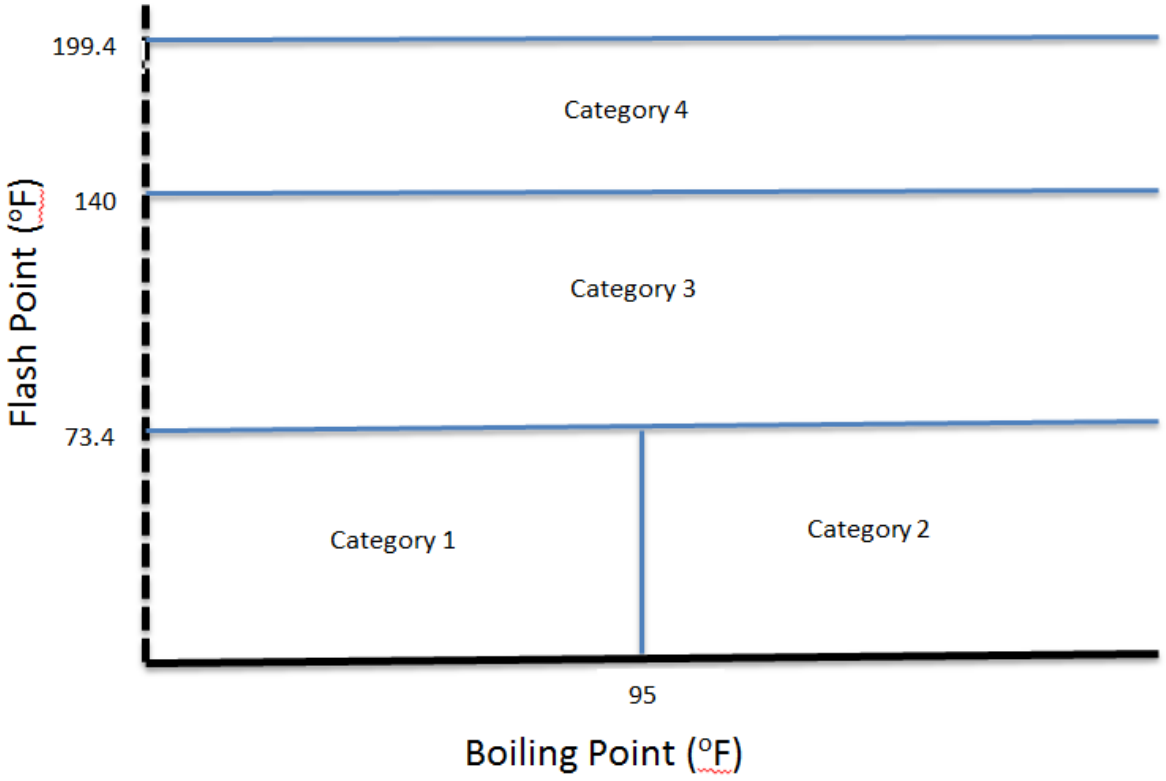
- **Flash point** means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.
- In general, the lower the flash point, the greater the hazard
- **Flammable liquids** have flash points at or below 199.4°F (93°C)

Program Components

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

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

Categories of Flammable Liquids



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Classes of Some Flammable Liquids

	Common Name	Flash Point (°F)
Category 1	Ethyl Ether	-49
Category 2	Acetone	0
Category 3	m-xylene	82
CLASS IC	Kerosene	140-162

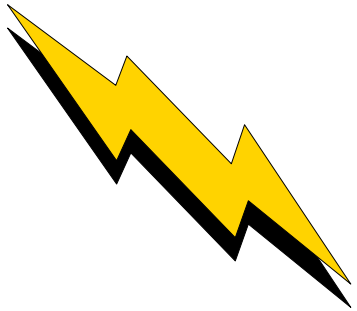
Sources of Ignition

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

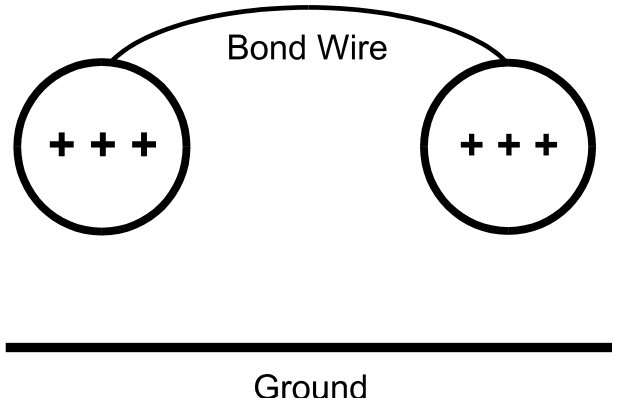
Static Electricity

- 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



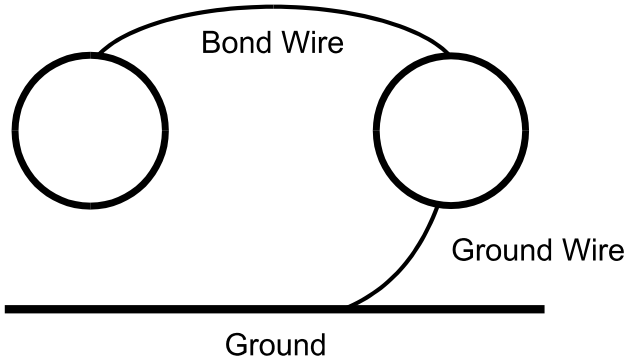
Bonding

- 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 Safety Data Sheets
- 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 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

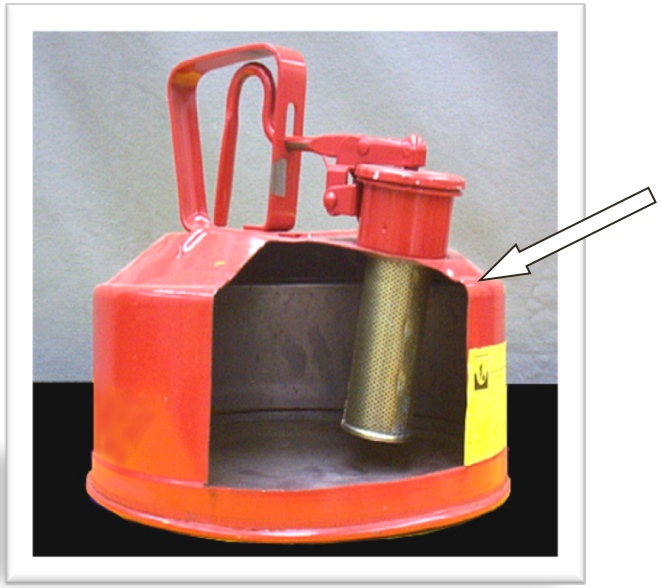
Inside storage room

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 gallons of Category 1, 2, or 3 flammable liquids, nor more than 120 gallons of Category 4 flammable liquids may be stored in a storage 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 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 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 drum22

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

Flammable 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 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 Liquids and Combustible Code*