




SAFETY BRIEF: FLAMMABLE LIQUIDS & FLAME LOCKERS

Flammable liquids are present in nearly every workplace. There are many flammable liquids commonly found in workshops, garages, and high school chemistry, automotive or woodshop classrooms. Some commonly found flammable liquids include; gasoline, diesel fuel, oils and lubricants, waxes and polishes, brake cleaner and other “spray solvents,” paints and thinners. Everyone who works with and, or around these liquids must be aware of their hazards and how to work safely with them. Storing these items in a flammable storage cabinet is a great way to reduce the risk of fire in your facility.

OSHA defines a *flammable liquid* as any liquid having a flashpoint at or below 199.4 Fahrenheit. Flammable liquids are classified, or grouped by their flashpoints. The *flashpoint* of a volatile material is the lowest temperature at which it can vaporize to form an ignitable mixture in air. The lower the flash point is, the easier it is for the liquid to ignite (catch on fire), and it’s actually the vapor that burns, not the liquid. To find the flashpoint, refer to the flammable liquids’ corresponding Safety Data Sheet (SDS) or label.

Flammable liquids are divided into 4 categories with Category 1 being the most flammable. For example, gasoline has a flashpoint of approximately -40 Fahrenheit, and is a Category 1 flammable liquid and therefore requires the highest level of attention when used and stored.

Table 1: Classification Criteria and Label Elements

Category	Category 1	Category 2	Category 3	Category 4
Description	Flash point < 23°C (73.4°F) and initial boiling point ≤ 35°C (95°F)	Flash point < 23°C (73.4°F) and initial boiling point > 35°C (95°F)	Flash point ≥ 23°C (73.4°F) and ≤ 60°C (140°F)	Flash point > 60°C (140°F) and ≤ 93°C (199.4°F)
Pictogram				No symbol
Signal Word	Danger	Danger	Warning	Warning
Hazard Statement	Extremely flammable liquid and vapor	Highly flammable liquid and vapor	Flammable liquid and vapor	Combustible liquid

As the diagram above depicts, the lower the category, the greater the hazard and signal word. Category 3 and 4 use “Warning” as the signal word, whereas Category 1 and 2 use “Danger.” Category 4 is considered a combustible liquid because the flashpoint is above 140 degrees Fahrenheit and below 199.4 degrees Fahrenheit.

Storage Requirements

The most common OSHA violations occur from the mismanagement of flammable liquids in four areas; category of liquid; amount of liquid stored; storage container type; and storage area. The table below shows the maximum allowable size of containers and portable tanks for flammable liquids in correspondence to the Category type of the flammable liquid.

Container Type	Category 1	Category 2	Category 3	Category 4
Glass or approved plastic	1 pint	1 quart	1 gallon	1 gallon
Metal (other than DOT drums)	1 gallon	5 gallons	5 gallons	5 gallons
Safety Cans	2 gallons	5 gallons	5 gallons	5 gallons
Metal Drum (DOT specifications)	60 gallons	60 gallons	60 gallons	60 gallons
Approved portable tank	660 gallons	660 gallons	660 gallons	660 gallons

Storage cabinets, or flame lockers, must meet OSHA and NFPA fire cabinet regulations. No more than 60 gallons of Category 1, 2, or 3 flammable chemicals can be stored in a locker; and no more than 120 gallons of Category 4 flammables can be stored in a locker. Flame lockers are not required by OSHA unless the total amount of flammables reaches a given amount. The quantity of flammable liquid that may be stored outside of an inside storage room or storage cabinet in a building cannot exceed:

- 25 gallons of Category 1 liquids in containers
- 120 gallons of Category 2, 3, or 4 liquids in containers
- 660 gallons of Category 2,3, or 4 liquids in a single portable tank

NFPA states that flammable liquid storage cabinets must be “constructed to limit the internal temperature at the center of the cabinet and 1 inch from the top of the cabinet to 325 degrees F, when subjected to a 10-minute fire test.” There are specific construction requirements that must be met.

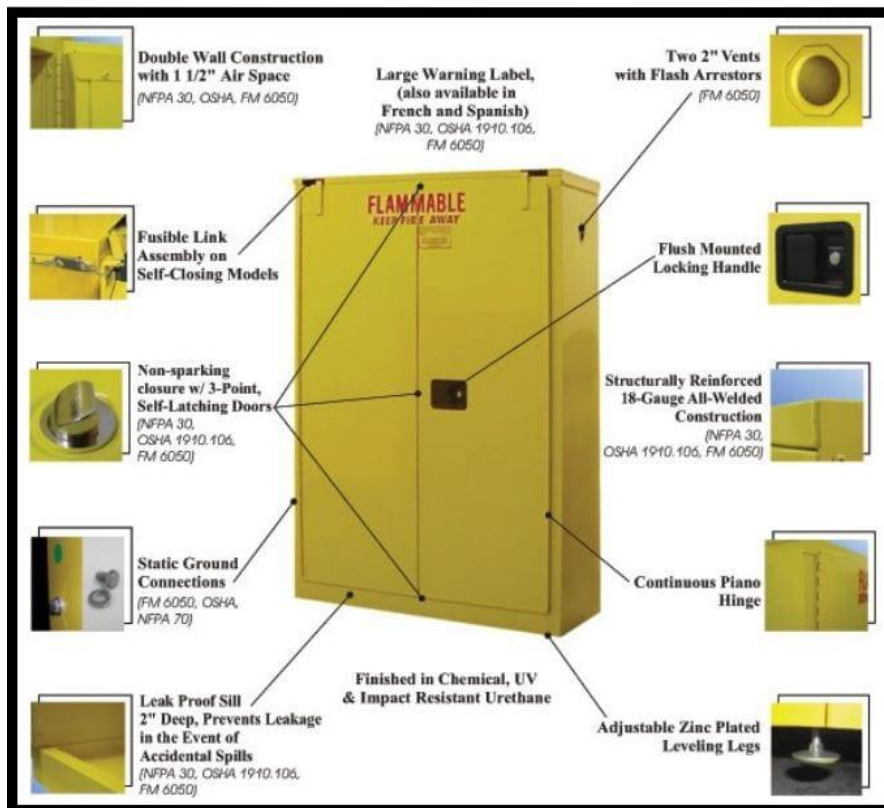
Metal cabinets

1. The cabinet, including door(s), must be constructed of 18-gauge steel and double-walled
2. All joints must be riveted, welded or “made tight by some equally effective means.”
3. The door must have a 3-point latch attachment

4. The sill must be at least 2 inches high

Wooden cabinets

1. The cabinet must be constructed with exterior grade plywood that is at least 1 inch thick and does not break down during fire conditions
2. All joints must be rabbeted and fastened with screws in 2 directions
3. Cabinets with multiple doors must have at least 1 inch rabbeted overlap
4. The sill must be at least 2 inches high



Tips for storing and using flammable liquids:

- Only use safety cans or other approved portable fuel containers for all flammable liquids. Do not use random containers; plastic buckets, soda/water bottles, etc.
- Store the most flammable liquids first. Refer to the Safety Data Sheet (SDS) to determine what category the substance is. Liquids listed in Category 1 and 2 are the most flammable and should be stored in a flammable cabinet.



- Oils and greases may be considered flammable but have a lower hazard. These may be stored in a flammable storage cabinet, but give priority to higher flammable liquids first.
- Never store flammable gases (propane, butane, acetylene) with flammable liquids.
- Keep all flammable liquid containers closed when not in use.
- Limit storage of flammable liquids to only what is really needed.
- Store flammable liquids away from all ignition sources, and consider storing away from operations such as welding, cutting and similar tasks.
- Never store flammable liquids or materials in furnace or boiler rooms.
- Keep flammable liquids away from exits, access areas, or areas where containers may be subject to damage from vehicles or equipment.
- Never store flammable liquids under stairwells.
- Keep all cloth, paper and other items with flammable liquid residues (oily rags) stored in approved disposable containers with a tight fitting lid.

Questions to consider when examining your facilities flammable liquid inventory:

- How are flammables stored?
- Do I have flammable liquid cabinets? Do they meet NFPA standards?
- How many gallons of each category are stored?
- Are the flammable liquids grounded and/or bonded when dispensing?
- Are flammables stored outside?
- Is there adequate fire protection?

Additional training is available through the AMLJIA Online University at www.amljia.org. Log on to the Online University for courses related on this topic such as “Fire and Explosion Hazards,” and “Fire Prevention.” For more information about the Online University, contact the AMLJIA at 800-337-3682.