

EC Toolbox

Know how to inventory flammable liquids

Hospitals use a number of liquid chemicals to provide care, keep the environment clean, and maintain utilities, among other applications. Some of these liquids are flammable. Knowing how to handle, store, and use them safely is critical to the safety of everyone in the health care facility. This installment of EC Toolbox describes different types of flammable liquids commonly found in hospitals, using Joint Commission standards as a foundation. It also offers some tips for safe storage of these materials.

Joint Commission requirements

Environment of Care (EC) standards require hospitals to plan activities to minimize risks in the environment of care and to have written plans to manage hazardous materials and waste and the associated risks (EC.01.01.01, EC.02.02.01). One way to manage these risks is to maintain an inventory of the hazardous chemicals, that the organization uses, including flammable liquids. Standards also require that hospitals have written procedures to follow in response to hazardous material spill or exposure. These procedures should include the use of appropriate precautions and personal protective equipment (PPE) in the event of a spill or exposure.

OSHA classification

The US Occupational Safety and Health Administration (OSHA) describes and classifies both flammable and combustible liquids based on their flash point and the boiling point. In general, OSHA classifies flammable liquids as having a lower flash point than combustible liquids. OSHA further divides these based on temperature ranges for flash

point and, for flammable liquids, boiling point. For details on the OSHA classification system, refer to OSHA standard 29 CFR 1910.106.

A checklist of flammable and combustible liquids commonly used in hospitals is on page 5. It is organized according to the OSHA classification system, which is also used by the National Fire Protection Association (NFPA). (While the US Department of Transportation [DOT] follows a nearly identical system, a few differences bring it into compliance with international regulations. Refer to the DOT regulations for details, <https://www.fmcsa.dot.gov/regulations/hazardous-materials/how-comply-federal-hazardous-materials-regulations>.)

Storage tips

To maintain safety, storage of flammable liquids is regulated under OSHA and NFPA standards. The following are some issues to keep in mind when planning flammable liquid storage.

Storage cabinets

A single storage cabinet may contain no more than 60 gallons of Category I, II, or III liquid. Cabinets to contain these materials can be metal or wood and must follow very specific construction parameters.

For example, metal cabinets must be double-walled with 1½ inch airspace and utilize a door sill that is raised at least 2 inches above the cabinet bottom, to contain liquid if it spills. Wood cabinets must be constructed of exterior-grade plywood at least 1 inch thick and may not use plywood that breaks down or delaminates under fire conditions. All cabinets, metal, or wood,



Improperly stored flammable liquids in a health care organization pose tremendous risks to patients, staff, and the public.

must be clearly labeled “Flammable—Keep Fire Away.”

Some commercially available storage cabinets for flammable liquids have features that are not required under OSHA or NFPA regulations. These might include grounding screws or exhaust ventilation systems. These types of features should be used only when appropriate to the materials being stored in the cabinet and according to the manufacturer’s instructions.

Storage rooms and warehouses

Storage cabinets are not required if the flammable liquids are kept in a dedicated liquid storage room or liquid warehouse. Limited amounts are allowed to be stored in a particular room or warehouse. These limits vary based on the degree of fire protection provided by the room’s construction.

Liquid storage rooms cannot exceed 500 square feet for 2-hour construction or 150 square feet for 1-hour construction. This may be completely within the footprint of the building, with no exterior wall. A liquid warehouse can be a separate building or part of a larger building. If it is part of another building, at least 25% of its perimeter must be an exterior wall.

Flammable liquids can be stored in rooms that are not specifically designed or constructed for liquids storage. However, there are additional requirements regard-

Checklist of Flammable Liquids

This checklist of flammable liquids commonly found in hospitals is organized according to the OSHA classification system. Use this to account for which materials you are storing.

Class IA Flammable Liquids				
<i>(flash point below 73°F, boiling point below 100°F)</i>				
	1-1 Dichloroethylene		Ethyl chloride	Pentane
	Acetaldehyde		Isopentane	Petroleum ether
	Collodion		Isopropyl chloride	Propylene oxide
	Ethylamine		Methyl ethyl ether	
	Ethyl ether		Methyl formate	
Class IB Flammable Liquids				
<i>(flash point below 73°F, boiling point at or above 100°F)</i>				
	Acetone		Gasoline	Octane
	Benzene		Hexane	Propyl acetate
	Butyl alcohol		Methyl acetate	Isopropyl acetate
	Carbon disulfide		Methyl alcohol	Isopropyl alcohol
	1,2-Dichloroethylene		Methylcyclohexan	Toluene
	Ethyl acetate		Methyl ethyl ketone	Butyl acetate
	Ethyl alcohol		Methyl propyl ketone	
	Ethyl benzene		VM&P naphtha	
Class IC Flammable Liquids				
<i>(flash point at or above 73°F and below 100°F)</i>				
	Amyl acetate		Isopropanol	Methyl lactate
	Amyl alcohol		Methyl alcohol	Mineral spirits
	Butyl		Naptha (coal tar)	Varsol
	Dibutyl ether		Naptha (high flash)	
	Isoamyyyl acetate		Methyl cellosolve	
Class IIIA Combustible Liquids				
<i>(flash point at or above 140°F and below 200°F)</i>				
	Aniline		Formic acid	Isophorone
	Butyl cellosolve		Furfural	Nitrobenzene
	Carbolic acid		Furfuryl alcohol	Phenol
	Cyclohexanol		Naphthalenes	Pine oil
Class IIIB Combustible Liquids				
<i>(flash point at or above 200°F)</i>				
	Cellosolve solvent		Formalin	Picric acid
	Ethylene glycol		Glycerine	

ing fire safety protections and maximum container size, storage height, and total quantity stored. These are detailed in Section 12.8 of NFPA 30 Flammable and Combustible Liquids Code.

Check first

This article lists only a few of the parameters that are necessary for safe storage of flammable liquids. Health care organizations should consult all

applicable guidelines and regulations, including those from OSHA, NFPA, and local authorities, as part of their risk management plans. 