

Storage and Control of Flammables and Chemicals

Line of Business: Property, General Liability, Public Official Liability, Educators Legal Liability, and Worker's Compensation

Risk Control Strategy/Key Issues: Establish proactive controls and inspections to reduce the potential for improperly stored material to create or add to combustion.

Suggested Program Elements:

- 1. Program Statement:** A general statement noting that the program establishes guidelines and procedures for storage of flammable and combustible materials. It should also include a statement regarding the commitment of management to the success of the program.
- 2. Employee Responsibilities:** Written guidelines should be established that assign responsibilities and accountability for program enforcement. It is recommended that one individual within the organization be granted the authority to implement all written procedures and controls of the program. The program should also include what is expected of employees in regards to storing, using, inspecting, and reporting unsafe practices.

3. Storage and Control:

A. Chemicals:

- An inventory of chemicals should be in place for all chemicals and hazardous materials. The chemical inventory should include name of substance, quantity, date purchased, expiration date (if any), locations stored, and any other pertinent information; such as use and disposal procedures.
- Container content information, including precautionary information, should be provided directly on all original and subsequent containers of hazardous chemicals, except those being used in ongoing experiments. Storage cabinets, storage space or other accessible locations should also be appropriately marked.
- Material safety data sheets (MSDS) should be obtained from manufacturers and/or suppliers of laboratory chemicals, cleaning chemicals and other hazardous materials to assist with the recognition, evaluation and control of hazardous or potentially hazardous materials. The material data safety sheets should be kept on file in an accessible location for review by those that use the material or may be affected by the use of the material.

Important: All control information and procedures indicated in the material safety data sheets should be reviewed and implemented to help ensure that personnel exposed to hazardous materials are adequately protected from identified hazards.

- All chemicals that are not needed, or over one year old, should be disposed of properly.
- Laboratory chemicals should be stored by their hazardous classification in cabinets designed for chemical storage. Chemicals should be classified by the following hazardous properties: unstable, flammable / combustible, corrosive, explosive, reactive, oxidizer, toxic, and radioactive. Refer to the Chemistry laboratory guide for more information on this subject.
- Storage cabinets should meet NFPA/OSHA specifications for the appropriate hazardous classification. Acids should be stored in a separate acid cabinet, and flammable and combustible liquids should be stored in a flame proof cabinet.

- The chemical storage area should be secured when not in use; and access to it should be limited.

Important: Any deficiencies in the current procedures for the storage, use and/or disposal of hazardous materials should be corrected immediately to reduce the potential for future injuries or illnesses. Maintaining up to date material data safety sheets information is an ongoing process; material safety data sheet information should be periodically reviewed and updated as needed to ensure that current information is available for reference.

B. Flammable Storage: All flammable and combustible liquids storage should be in compliance with NFPA 30, Flammable and Combustible Liquids Code.

- If large amounts of flammable liquids are required to be on the premises for your operations, a flammable liquids storage room should be installed. The room should meet the following minimum standards in accordance with the current edition of NFPA 30, to reduce the hazard associated with the presence and use of flammable liquids:
 - **Location:** The storage room should be on the ground floor. Upper floor storage may cause problems for fire fighters and present floor leakage problems. Basement locations for liquids with a flash point below 100 degrees Fahrenheit should be avoided. Storage of liquids with a flash point of 100 degrees Fahrenheit and above is permissible in basements when the storage area is sprinkle red.
 - **Construction:** The construction should be of fire resistive material with fire rating of at least two hours. It is desirable for one wall of the room to be an outside wall.
 - **Openings:** Door openings should be protected by a U.L. listed fire door assembly, with a fire resistive rating equal to the wall. The doors should be self-closing or automatic closing. Non-combustible liquid-tight sills 6 inches in height should be provided at the door opening, or open trenches that drain to a safe location.
 - **Explosion Venting:** Explosion venting facilities that provide at least one square foot of vent area for every 50 cubic feet of room volume should be provided.
 - **Electrical Equipment:** All electrical equipment such as lights, motors, electrical fixtures, etc., should be suitable for Class I, Division I, Hazardous locations, as defined in the current edition of the National Electrical Code (NFPA 70).
 - **Ventilation:** The storage room should be provided with a continually operating positive ventilating system, sufficient to remove flammable vapors. Exhaust air should be taken from a point near a wall on one side and within twelve inches of the floor, with one or more make-up inlets located on the opposite side of the room within 12 inches from the floor. Since most flammable liquid vapors are heavier than air, the ventilation system should be capable of removing one cubic foot of air per minute, per square foot of floor area, but not less than 150 cubic feet per minute total capacity.
 - **The exhaust fan and motor** should be approved for Class I, Division I, and Hazardous Locations in accordance with the current edition of the National Electrical Code (NFPA 70).
 - **Protection:** The flammable liquid storage room should be protected by an automatic extinguishing system. This system can be automatic sprinkle red, dry chemical, foam, or Halon type system.
- All flammable or combustible liquids, which are in excess of one day's supply, should be stored in a separate non-combustible building or in an approved flammable liquids storage cabinet. A working day's supply should be dispensed from UL listed safety cans.

- A maximum of 60 gallons of flammable liquids or 120 gallons of combustible liquids may be stored in a cabinet inside the building in a UL listed flammable liquids storage cabinet. No flammable material should be stored outside a listed flammables storage cabinet. Flammables kept outside a cabinet should be in listed safety cans.
- All flammable liquids used in daily operations should be kept in UL listed safety cans and labeled as to its contents. Such containers should have spring-loaded caps with tight fitting closures and flame arresters inside the spouts. Flame arresters will help prevent flash fires created by sparks. These fires may flash back into the can resulting in an explosion.
- Wiring and lighting in locations storing hazardous material should be approved for that location in accordance with the current edition of the National Electric Code (NFPA 70).
- Dip tanks using flammable liquids should have a cover that closes automatically in the event of a fire.
- Spray painting operations should meet the standards of NFPA 33; i.e., metal spray booth with a fire resistance rating of a least one hour, a fixed pipe automatic extinguishing system, UL approved electrical system for hazardous location, filtered explosion proof mechanical ventilation, explosion proof light fixtures, appropriate signage, cleaning program, among other considerations. NFPA 33 should be reviewed.
- Oxygen and fuel gas cylinders should be separated by a minimum distance of 20 feet, or separated by a non-combustible barrier at least 5 feet high and having a fire resistance rating of at least one-half hour.
- Fuel cylinders should be stored in an upright position, secured by a substantial chain, or placed in a storage rack. Cylinders should have their valves closed and protection caps in place.
- LP gas cylinders should be secured upright in an area remote from vehicular traffic.
- Aboveground fuel storage tanks should have a dike in accordance with NFPA 30 Chapter 2. A general rule of thumb is if the tank is over 650 gallons a dike is required. Some tanks less than 650 gallons also have to have a dike depending on location, fuel, etc. It is recommended that you contact the State Fire Marshall's Office to determine if a dike is necessary. Other items to consider to protect both the tank and the surrounding property and structures from damage:
 - Post signs on all above ground tanks identifying their contents and hazards.
 - Clear a twenty-five (25) foot area around each above ground tank. This area should be kept clear of high weeds, grass, brush or other combustibles.
 - Post "No Smoking Within 50 Feet" signs on all above ground tanks.
 - To protect above ground tanks from physical damage a fence, guardrail or steel posts filled with concrete around the above ground tanks are some options to consider.

C. Containers:

- All containers of hazardous material should be labeled with an NFPA placquered noting its Health, Flammability, and Reactivity ratings. Also the appropriate fire fighting methods should be adhered.
- All flammable liquids used in daily operations should be kept in UL listed safety cans and labeled as to its contents. Such containers should have spring-loaded caps with tight fitting closures and flame arresters inside the spouts. Flame arresters will help prevent flash fires created by sparks. These fires may flash back into the can resulting in an explosion.

D. Bonding and Grounding: Proper grounding while dispensing flammables will help to eliminate the build-up of a static spark that could cause a fire or explosion.

- All drums used for the dispensing of flammable liquids should be provided with UL listed pressure relief devices designed to relieve internal pressure when the drums are subjected to fire.
 - All faucets, spigots, and transfer pumps on drums used for dispensing flammable liquids should have UL listed self-closing, spring loaded devices and flame arresters to help prevent static spark which could flash back into the drum.
 - A grounding wire and clamp should be provided on all drums used to dispense flammable liquids.
 - Drum dispensing nozzles and equipment should be positively bonded to the container being filled. Proper bonding while dispensing flammables will help to eliminate the build-up of a static spark that could cause a fire or explosion.
- E. *Inspections:* A self inspection program should be developed to aid in identifying and correcting hazardous chemical storage as they might arise. The program should be done on a regular basis and incorporate the use of a written form to guide the inspection. Also, a written follow-up system should be developed to establish a time frame for correcting hazardous conditions brought forth by the self-inspection program. The follow-up system will assure that hazardous conditions are corrected in a timely manner.
- F. *Fire Extinguishers:* Fire extinguishers should be located in all chemical, flammable and combustible material storage areas. The extinguisher should be the appropriate classification for the material being stored, easily identified, and routinely inspected and tagged that it is in good working order. All occupants of the area should be trained in the use of fire extinguishers.
- G. *Training:* Routine training should be conducted with all individuals who handle, store and inspect chemicals and flammable / combustible materials. The training should be documented and filed in a safe place.

Program Activities Calendar:

- Annual complete audit of chemicals first quarter of calendar year
- Monthly self inspection check

Web Site Links:

- National Institute for Occupational Safety and Health
www.niosh.org
- National Fire Protection Association
www.nfpa.org/index.asp

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Flammable Liquids Self-Inspection Sheet

Items to be reviewed:	Yes	No
1. Storage of chemicals on the floor		
2. Eliminate all chemical storage on the top shelf		
3. Eliminated chemicals stored above the eye level		
4. No chemicals should be stored above 6'		
5. Secured shelves to the wall		
6. Provided anti-roll-off lips on all shelves		
7. Provided shelving of wood		
8. Adequate aisle spacing		
9. An aisle at least 3 ft wide		
10. Eyewash/Body Drench shower should be within 25' of Storage or working areas		
11. Do you have spill control and clean-up materials		
12. Do you have chemical-resistant gloves and aprons		
13. Chemical splash goggles		
14. Everyone exposed to chemicals required to wear them		
15. Telephone available for emergency use		
16. Chemical first aid kit		
17. Fire blanket		
18. Provided ventilation		
19. Training on Material Safety Data Sheets		
20. Safety Training to employees or students on the Hazardous materials		
21. Laboratory safety test conducted annually		
22. Fume hood		
23. Tested for good exhausting		
24. Tested at least annually		
Electrical outlets:	Yes	No
1. Provided with ground fault interruption		
2. Tested annually		
Is a master utility cut-off valve accessible and marked for:	Yes	No
1. Gas		
2. Electricity		
3. Easily accessible and marked		
Have smoke detectors been installed and:	Yes	No
1. In both the storage area and adjacent area		
2. Will both units go off together should fire/smoke develop in either area		

Air make up:	Yes	No
1. Chemical storage room has at least 4 air changes per hour		
2. Is the air pulled from the floor level		
3. Exhausted directly to the outdoors		
Storage room provided with:	Yes	No
1. Raised sill of at least 4"		
2. Ramp		
3. Or open gated trench		
4. Secondary containment		
Storage area provided with an approved automatic-closing fire door with:	Yes	No
1. Solid-core		
2. Posted "Authorized Personnel Only"		
3. Is it labeled to identify hazardous contents		
Emergency lighting controls include:	Yes	No
1. Monthly testing		
2. Testing documented		
Located in a sprinklered building:	Yes	No
1. Does it comply with NFPA guidelines		
2. Sprinkler system designed for the intended use		
3. Sprinkler system on contracted or scheduled maintenance		
4. Sprinkler system maintenance documented		
5. Sprinkler system locked in the open position		
6. Sprinkler system monitored by a central station		