

CITY AND COUNTY OF DENVER

<b>Flammable and Combustible Safe Use Policy</b>		
Occupational Safety and Health Management System No. 65.5.10  This policy was developed and shall be implemented under the authority of Executive Order No. 65 and the Risk Management Office.	January 1, 2008	Prepared / Revised By:  Risk Management – Safety Unit

**1.0 Introduction**

This policy has been developed to minimize the potential for fire and explosion from the storage, handling and application of flammable gases and liquids. It is intended to reduce the hazard to a degree consistent with reasonable employee safety, without undue interference with employee convenience and necessity of operations that require the use of flammable and combustible liquids. Compliance with this policy does not eliminate all hazards in the use of flammable and combustible liquids.

**2.0 Scope**

The effectiveness of this policy depends upon the active support and involvement of all employees.

City and County employees are required to comply with the procedures outlined in this document. Individual departments / agencies who have an existing Flammable and Combustible Safe Use Policy or Program in place may continue to use that program if it provides the same degree of protection.

**3.0 Definitions**

*Auto-ignition Temperature* – The temperature in which, a closed or almost closed container must be heated so that when, the liquid is introduced into the container, it ignites spontaneously and burns.

*Boiling Point* - The boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) (760 mm).

*Bonding* – The connection of two objects with a metal chain or strap in order to neutralize the static electrical charge between them.

*Combustion* – This is the self-sustaining process of rapid oxidation of a material, producing heat and light.

*Fire Area* - An area of a building separated from the remainder of the building by construction having a fire resistance of at least 1 hour and having all communicating openings properly protected by an assembly having a fire resistance rating of at least 1 hour.

*Flammable Aerosol* - An aerosol that is required to be labeled "Flammable" under the Federal Hazardous Substances Labeling Act (15 U.S.C. 1261).

*Flashpoint* - 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.

*Flammable Gas* - A gas that may ignite or explode in the presence of oxygen and an ignition source.

*Combustible Liquid* - Any liquid having a flashpoint at or above 100 deg. F. (37.8 deg. C).

Combustible liquids shall be divided into two classes as follows:

- Class II Liquids – Generally, any liquid having a flashpoint at or above 100 deg. F. (37.8 deg. C.) and below 140 deg. F. (60 deg. C.).
- Class III Liquids – Any liquid having a flashpoint at or above 140 deg. F. (60 deg. C.)  
Class III liquids are subdivided into two subclasses:
  - *Class IIIA Liquids* – Generally means any liquid having a flashpoint at or above 140 deg. F. (60 deg. C.) and below 200 deg. F. (93.3 deg. C.)
  - *Class IIIB Liquids* - Means any liquid having a flashpoint at or above 200 deg. F. (93.3 deg. C.)

*Flammable Liquid* - Generally, any liquid having a flashpoint below 100 deg F (37.8 deg C) is considered a Flammable liquid and shall be known as Class I liquids. Class I liquids are divided into three classes as follows:

- Class IA - Shall include liquids having flash points below 73 deg. F. (22.8 deg. C) and having a boiling point below 100 deg. F. (37.8 deg. C)
- Class IB - Shall include liquids having flash points below 73 deg. F. (22.8 deg. C) and having a boiling point at or above 100 deg. F. (37.8 deg. C)
- Class IC - Shall include liquids having flash points at or above 73 deg. F. (22.8 deg. C) and below 100 deg. F. (37.8 deg. C)

*Grounding* - Grounding reduces the difference in electrical potential between an item and the ground by the use of a conductor.

*Ignition Source* – A method (either purposeful or incidental) that provides a means for initiation of self-sustained combustion. Open flames, lightning, smoking, cutting and welding, hot surfaces, physical-chemical reactions, electrical arcs, equipment that produces sparks, static and friction sparks or heating elements can act as an ignition sources.

*Safety Can* - An approved container, of not more than 5 gallons capacity, having a spring closing lid and spouts cover, flame arrestor and so designed that it will safely relieve internal pressure when subjected to fire exposure.

*Static Electricity* – An accumulation of electrical charges on opposing surfaces created by the separation of unlike materials or by the movement of surfaces.

*Ventilation* – Shall be defined in the context of this written program, as the amount of fresh air ventilation required preventing a fire or an explosion. The fresh air ventilation will be considered adequate if it prevents the accumulation of significant quantities of flammable vapor-air mixtures in concentrations of 10% of the lower flammable limit.

*Sources of Ignition* - Sources of ignition may include open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical and mechanical), spontaneous ignition, chemical and physical-chemical reactions and radiant heat. In locations where flammable and combustible vapors or gases may be present, precautions shall be taken to prevent ignition by eliminating or controlling sources of ignition.

#### **4.0 Flammable Liquids, Combustible Liquids Inventory**

All agencies/departments shall conduct an inventory to identify potential hazard areas where flammable liquids and /or combustibles are stored, used, mixed or dispensed. Check for secondary containers, labeling, appropriate safety cans, aerosol can storage, housekeeping, combustible materials, ignition sources and document and train accordingly. (See attachments for example)

#### **5.0 Storage of Flammable and Combustible Liquids**

All flammable and combustible liquids shall be stored in properly designed and constructed storage rooms or buildings.

A.) Constructed storage rooms or buildings. \* For areas where use of flammable and combustible liquids is incidental, i.e. areas other than paint lines, approved storage cabinets may be used under the following conditions:

1. *Not more than 120 U.S. gallons of flammable and combustible liquids can be stored in a flammable liquid storage cabinet. Of this total not more than 60 gallons shall be flammable liquids.*
2. *Not more than three such cabinets shall be located in a single area. Additional cabinets or groups of not more than three cabinets shall be separated by at least 100 ft. (OSHA 1910.106(d)(3)(1))*
3. *Combustibles such as cardboard, rags, papers, etc. shall not be stored in cabinets.*
4. *Spilled liquids in cabinets must be cleaned immediately.*

5. *The quantity of liquid that may be located outside of a storage cabinet shall not exceed 25 U.S. gallons of flammable liquids and 120 U.S. gallons of combustible liquids.*

*\* Outside storage areas may be utilized for storage of sealed and labeled drums of flammable and combustible liquid waste, unopened original drums of paint and solvent provided that all requirements of NFPA 30 Sections 4-7 are met.*

- B.) The storage capacity of a storage room or building shall be in accordance with the requirements of NFPA 30 and shall be clearly posted at or near the entrance.
- C.) Flammable and combustible liquids shall be stored in original containers, in Factory Mutual approved safety containers or approved spray delivery vessels. All containers and vessels shall be labeled following the guidelines of 29 CFR 1910.1200 (*OSHA Hazard Communication Standard*) and 29 CFR 1910.144 (*Safety Color Code for Marking Physical Hazards*).
- D.) Original containers shall be either a steel drum, typically 55 U.S. gallons in size, steel buckets typically 1 -5 U.S. gallons in size or one-gallon steel cans. (*For the purpose of this section original containers are those that can be opened for transferring or removal of the contents. Containers such as aerosol cans and those with threaded swab tops are addressed later*).
- E.) Original containers shall be kept closed when not actually in use. Closed for open top drums means the sealing ring is in place with the bolt tightened sufficiently to prevent the release of liquid shall the drum fall or otherwise be upset from its normal upright position. For buckets closed means a sufficient number of the sealing tabs on the lid are engaged to prevent the release of liquid should the bucket fall or otherwise be upset from its normal upright position. For containers with threaded access caps closed means that the cap is securely threaded in place.
- F.) Drums shall not be stacked upon each other. Buckets may be stacked if the lids are of a nesting design. When stacked, the height of the stack shall not exceed 5 feet. Rows of stored drums or buckets shall have a minimum of 4 feet between them.
- G.) FM approved safety containers shall be maintained in original condition and kept closed when not actually in use.
- H.) Flammable Liquid Storage Cabinets – The design and storage practices of all flammable liquid storage cabinets shall comply with all of the following:

*Maximum Capacity* - Shall not exceed 60 gallons of Class I or Class II liquids and not more than 120 gallons of Class III liquids shall be stored in a storage cabinet.

*Fire Resistance* – Flammable liquid storage cabinets shall be designed and constructed in compliance with NFPA 251-1969. In addition, flammable liquid storage cabinets shall be labeled with conspicuous lettering, "Flammable - Keep Fire Away."

## I.) Design, Construction and Rules for Inside Flammable Liquid Storage Rooms

- *Construction* - Construction of inside storage rooms shall be constructed to meet the required fire-resistive rating for their use. Such construction shall comply with the test specifications set forth in Standard Methods of Fire Tests of Building Construction and Materials, NFPA 251-1969. Where an automatic sprinkler system is provided, the system shall be designed and installed in an acceptable manner. Openings to other rooms or buildings shall be provided with noncombustible liquid-tight raised sills or ramps at least 4 inches in height or the floor in the storage area shall be at least 4 inches below the surrounding floor. Openings shall be provided with approved self-closing fire doors. The room shall be liquid-tight where the walls join the floor. Where other portions of the building or other properties are exposed, windows shall be protected as set forth in the Standard for Fire Doors and Windows, NFPA No. 80-1968.
- *Electrical wiring* - electrical wiring and equipment for inside storage rooms shall be approved for class I, Division 1 and class I, Division 2 Hazardous Locations. (Reference: OSHA Subpart S – (1910.301.399))
- *Ventilation* - every inside storage room shall be provided with either gravity or a mechanical exhaust ventilation system. Such system shall be designed to provide for a complete change of air within the room at least six times per hour. If a mechanical exhaust system is used, a switch located outside of the door shall control it. The same switch shall operate the ventilating equipment and any lighting fixtures. Where gravity ventilation is provided, the fresh air intake, as well as the exhaust outlet from the room, shall be on the exterior of the building in which the room is located.
- *Storage methods in inside storage rooms* - in every inside storage room there shall be maintained one clear aisle at least 3 feet wide. Containers over 30 gallons capacity shall not be stacked one upon the other. Dispensing shall be by approved pump or self-closing faucet only.
- *Open flames, smoking, cutting and welding* - open flames, smoking and cutting or welding shall not be permitted in flammable or combustible liquid storage areas. Furthermore, cutting and welding shall not be performed within 35 ft of any entrance to flammable liquid storage rooms, flammable liquid storage cabinets, hazardous waste storage area or any other area where flammable liquids or gases are stored.

### 6.0 **Control of Ignition Sources**

Smoking shall be prohibited adjacent or within 35 ft of a flammable liquid storage area, hazardous storage area or an entrance to a paint line. Those who are smoking shall not be adjacent or within 35 ft of flammable gas storage or an industrial battery charging area.

*Cutting, Welding, Grinding & Open Flames* – Produce a very large amount of heat and sparks. The Hot Work Permit System shall be utilized anytime welding will be performed outside a designated welding booth. When a Hot Work Permit is issued, an agency/department supervisor

and the employee performing the hot work shall inspect the hot work area and the surrounding area (35 ft diameter) to ensure that no flammable or combustibles are present.

Due to the high potential for fire from cutting, welding, grinding and open flames the following areas shall be treated with extreme caution during Hot Work Operations (See 65.5.12 Hot Work Safety Policy):

- In or within 35 feet of a flammable liquid storage area
- In or within 35 feet of a hazardous waste storage area.
- In or within 35 feet of an industrial battery charging area.
- Within 35 feet of a flammable gas storage area.
- Within 35 feet of a natural gas transfer station.

*Note: All the above-mentioned areas shall be clearly marked with the appropriate signs.*

*Spontaneous combustion hazards* – solvent soaked paper, cardboard and rags have the potential to spontaneously combust if the conditions are right. So to prevent such a fire, all solvent soaked paper, cardboard and rags shall be placed in approved waste containers and removed from the area at the end of each shift.

*Note: All waste containers shall be grounded.*

#### *Non-sparking tools*

- Only non-sparking tools (copper or brass) shall be used in areas where flammable vapors are present or may be present. (Flammable liquid storage rooms, cabinets and battery charging areas, etc.).

#### *Portable fire suppression equipment*

- In areas where use of flammable and combustible liquids are incidental, a fire extinguisher with minimum rating of 10A:60B:C shall be located not more than 25 feet from any storage, transfer or use area.

#### *Transfer of flammable and combustible liquids*

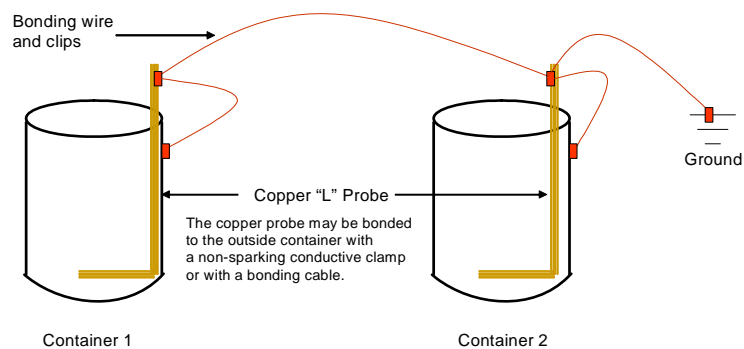
- 1.) Agency/Department shall develop Job Hazard Analysis concerning the transfer, bonding and grounding of flammable liquids.
- 2.) Employees shall wear the appropriate PPE based upon the hazards of their job.
- 3.) Non-vented safety goggles or safety glasses with a face shield shall be worn if there is a potential for liquid splash to the eyes or face.
- 4.) Gloves may be needed to reduce potential for skin contact. Refer to container label, MSDS, Department Safety Professional or Risk Management to assist in proper glove selection.

5.) Flammable and combustible liquids shall be drawn from or transferred into vessels or containers in the following manner only:

a.) Any and all containers or vessels used in the transfer or mixing of flammable or combustible liquids shall be properly grounded.

- ✓ When transferring from one container or vessel to another the containers or vessels shall be bonded (connected) by means of a metallic cable or strap.
- ✓ In the event non-conductive (such as plastic) container liners are used, a copper probe must be placed in the liquid that is contained in the liner and submerged to the bottom of the container. The probe shall then be bonded to the metal container, into which it is placed, and to the second container if that container is metal, or to another copper probe if the second container is lined. One of the probes must be grounded.
- ✓ After the liquid transfer is complete the probe(s) must remain in the container(s) for at least 30 seconds. When the probes are removed they shall be cleaned prior to the next use.

**Bonding and Grounding for Liquid Transfer  
When Plastic Container Liners are Used**



b.) From safety cans

c.) Through a closed piping system

d.) From containers by means of a device drawing through an opening in the top of the container.

e.) By gravity through a listed self-closing valve or faucet. When a valve or faucet is used, an FM approved safety drain shall be placed on the floor under the valve or faucet and bonded to the grounded dispensing container.

- f.) Where use of flammable and combustible liquids is incidental, dispensing, liquid transfer or use of flammable or combustible liquids shall not be conducted within 10 feet of any non-rated electrical appliance, fixture, switch or receptacle.
  - g.) Where flammable liquids will be dispensed outside of flammable liquid storage room the following shall apply:
    - Dispensing, liquid transfer or use of flammable liquids shall not be conducted within 35 feet of an open flame, smoking, grinding, cutting or welding, hot surfaces or radiant heat.
    - Dispensing, liquid transfer and use of flammable and combustible liquids shall not be conducted in areas without adequate ventilation.
- 6.) Transportation of Containers
- a.) Flammable and combustible liquids shall be transported only in original containers or in FM approved safety containers. All containers shall be properly labeled. Waste shall also be properly labeled and the drums sealed.
  - b.) Flammable and combustible liquids that are delivered to the using departments shall be properly stored immediately.

## **7.0 Training**

- A. Personnel who work with flammable or combustible liquids shall be trained in the safe storage, handling and use of flammable and combustible liquids.
- B. Training shall be documented and retained by the agency/department.
- C. Retraining shall be conducted annually or sooner if an inspection reveals a lack of employee understanding or compliance.

## **8.0 Inspections**

All agencies/departments that store flammable liquids and combustibles shall conduct monthly inspections. These inspections can be incorporated into their scheduled housekeeping inspection. If non-compliances are found they shall be noted on their inspection report and corrected immediately.

Attachment One

**Inventory Form**

Type of Material	Location	Flammable/ Explosive	Combustible	Oxidizer	Quantity	Approved Cabinets	Comments
Flammable and Combustible Liquids							
Flammable and Combustible Liquids							
Flammable and Combustible Liquids							

**DANGER**

**HAZ Waste Storage**  
**NO SMOKING, OPEN FLAMES**  
**CUTTING OR WELDING**  
**WITHOUT**  
**A HOT WORK PERMIT**

**DANGER**

**Flammable Storage Area**  
**NO SMOKING, OPEN FLAMES**  
**CUTTING OR WELDING**  
**WITHOUT**  
**A HOT WORK PERMIT**

**DANGER**

**FLAMMABLE GAS  
STORAGE**

**NO SMOKING, OPEN FLAMES,  
CUTTING OR WELDING  
WITHIN 35' OF THIS AREA**

**DANGER**

**BATTERY CHARGING  
AREA**

**NO SMOKING, OPEN FLAMES,  
CUTTING OR WELDING  
WITHIN 35' OF THIS AREA**