CITY OF APPLETON PERSONNEL POLICY	FLAMMABLE AND COMBUSTIBLE LIQUIDS POLICY	
ISSUE DATE: July 2008	LAST UPDATE: October 2009 August 2014 April 2020	SECTION: Safety
POLICY SOURCE: Human Resources Department	AUDIENCE: All employees that handle, use and store flammable and combustible liquids	TOTAL PAGES: 22
Reviewed by Legal Services Date: October 2009 April 2020	Committee Approval Date: October 28, 2009 May 28, 2020	Council Approval Date: November 4, 2009 June 10, 2020

I. PURPOSE

To protect employees from hazards that may exist when handling and storing of flammable and combustible liquids.

II. POLICY

To provide guidance for City of Appleton employees in the safe handling, use and storage of flammable and combustible liquids (in 60 gallon containers and smaller), and/or the safe use of compressed gas cylinders as part of their daily work activities. Violations of this policy will be subject to disciplinary action, up to and including discharge.

III. DISCUSSION

This policy outlines the regulations mandated by law and how the City of Appleton will administer these requirements.

IV. DEFINITIONS

A. Aerosol - A material which is dispensed from its container as a mist, spray, or foam by a propellant under pressure. Classified as a Class I flammable liquid.

B. Boiling Point – The temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure. It is when a liquid transitions into a gas or vapor in its surrounding atmosphere. Generally, the lower the boiling point the greater the fire risk.

C. Bonding – The process of providing an electrically conductive pathway between a dispensing container and a receiving container.

D. Combustible Liquids – Liquids with flash points at or above 100^{o}F. Combustible liquids are subdivided into Class II, IIIA and IIIB liquids.

E. Compressed Gas Cylinder - Any cylinder specifically designed to contain gases under pressure of greater than one atmosphere, and having the capability of dispensing the gas by means of a control valve mechanism to assure safe and proper use of the gas at a point of operation.

F. Container – Any can, barrel or drum holding 60 U.S. gallons or less of a flammable or combustible liquid that is constructed of glass, plastic or metal for use. Fuel tanks on a motor vehicle or a portable or stationary engine are excluded. Also excluded are containers filled with paints, oils, varnishes or similar mixtures used for painting when not kept in excess of 30 days.

G. Dip Tank – A tank, vat or container of flammable or combustible liquid in which articles or materials are immersed for the purpose of coating, finishing, treating or similar processes.

H. Flammable Liquid – A liquid with a flashpoint below 100º F. Flammable liquids are subdivided into Class IA, IB, and IC liquids.

I. Flammable Storage Cabinet - A "flammable storage cabinet" is an Underwriters Laboratory (UL) listed storage cabinet designed in accordance with National Fire Protection Association (NFPA) 30 guidelines.

J. Flash Point – The temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

K. Grounding (Earthing) – The process of providing an electrically conductive pathway between a dispensing container and an earth ground. This pathway allows static electrically to dissipate into the ground.

L. Ground and Bonding Process - When flammable and combustible liquids travel through a pipe or through the air, static charges are accumulated. Grounding and bonding is necessary during the transfer of Class I flammable liquids to prevent a static spark from igniting the flammable vapors.

M. Lower Flammable Limit – Flammable gases and the vapors of flammable liquids generally ignite readily when they are mixed with air and exposed to a source of ignition. The minimum concentration of gas or vapor in air below which a substance does not burn when exposed to an ignition source is called the lower explosive limit. The range between the two limits in which a substance can explode is called the explosive range. The limits are sometimes referred to as flammable limits.

N. Safety Can – An approved container, of not more than 5 gallons capacity, having a spring-closing lid and spout cover which is designed to safely relieve internal pressure when subjected to fire exposure. A recommended feature for a safety can is a flame arrestor (heat dissipating screen) inside the spout.

O. Ventilation - The process to allow for airflow and for the prevention of fire and explosion of combustible and flammable liquids. It is considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in

concentration over one-fourth of the lower flammable limit of the materials being used, handled or stored.

P. Flammable and Combustible Classifications – The liquids are classified according to flashpoint and, if applicable, boiling point.

1. Flammable Liquids
   - Class IA - Flashpoint below 73 degrees F/22.8 degrees C. Boiling point below 100 degrees F/37.8 degrees C.
   - Class IB - Flashpoint below 73 degrees F/22.8 degrees C. Boiling point at or above 100 degrees F/37.8 degrees C.
   - Class IC - Flashpoint of 73 degrees F/22.8 degrees C to 99 degrees F/37.8 degrees C.

2. Combustible Liquids
   - Class II - Flashpoint of 100 degrees F/37.8 degrees C to 140 degrees F/60 degrees.
   - Class IIIA - Flashpoint of 140 degrees F/60 degrees C to 200 degrees F/93 degrees C.
   - Class IIIB - Flashpoint of 200 degrees F/93 degrees C and above.

V. PROCEDURES

A. Flammable Storage Cabinets

1. Not more than 120 gallons of Class I, Class II and Class IIIA liquids shall be stored in a storage cabinet. Of this total, not more than 60 gallons shall be of Class I and Class II liquids (including flammable aerosols).

2. Not more than three such cabinets shall be located in a single fire area. Additional cabinets shall be permitted to be located in the same fire area if the additional cabinet or group of not more than three cabinets is separated from other cabinets or groups of cabinets by at least 100 feet.

3. Cabinets shall be marked in conspicuous lettering “FLAMMABLE – KEEP FIRE AWAY” legend.

4. A cabinet is not required to be vented for fire protection purposes. Venting a cabinet could compromise the ability of the cabinet to protect its contents from involvement in a fire.

5. Storage cabinets shall be constructed to meet the NFPA criteria.

B. Flammable and Combustible Containers and Portable Tanks

1. According to their classification, flammable and combustible liquids are required to be stored according to the following chart:

Maximum Allowable Size of Containers and Portable Tanks

Container Type	Flammable Liquid			Combustible Liquid	
	CLASS IA	CLASS IB	CLASS IC	CLASS II	CLASS III
APPROVED PLASTIC	**1.3 GAL**	**5.3 GAL**	**5.3 GAL**	**5.3 GAL**	**5.3 GAL**
DOT POLYETHYLENE	**1.3 GAL**	**5.3 GAL**	**5.3 GAL**	**119 GAL**	**119 GAL**
SAFETY CANS	**2.6 GAL**	**5.3 GAL**	**5.3 GAL**	**5.3 GAL**	**5.3 GAL**
DOT DRUM	**119 GAL**	**119 GAL**	**119 GAL**	**119 GAL**	**119 GAL**
APPROVED METAL PORTABLE TANKS	**793 GAL**	**793 GAL**	**793 GAL**	**793 GAL**	**793 GAL**

2. Only approved containers and portable tanks may be used to store flammable and combustible liquids. Metal containers and portable tanks meeting the requirements of the Department of Transportation DOT (49 CFR 178) are deemed acceptable when containing products authorized by the DOT (49 CFR 173).

3. Portable tanks must have a provision for emergency venting. Top-mounted emergency vents must be capable of limiting internal pressure under fire exposure conditions. Portable tanks are also required to have at least one pressure-activated vent.

C. General Storage Requirements

1. Interior Storage Rooms (See Appendix A)
   a. Openings to other rooms or buildings shall be provided with non-combustible liquid-tight raised sills or ramps at least four (4) inches in height, or the floor in the storage area shall be four (4) inches below the surrounding floor. The room shall be liquid tight where the walls join the floor.

   b. Openings shall be provided with approved self-closing fire doors. Doors must be kept closed at all times.

   c. Inside storage rooms shall be constructed to meet the required fire-resistant 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. Use NFPA 30 as a guide.

STORAGE IN INSIDE ROOMS			
FIRE PROTECTION SYSTEM PROVIDED[1]	FIRE RESISTANCE	MAXIMUM FLOOR AREA (FT^2)	TOTAL ALLOWABLE QUANTITIES (GAL/FT^2 FLOOR AREA)
YES	**2 HR.**	**500**	**10**
NO	**2 HR.**	**500**	**4**
YES	**1 HR.**	**150**	**5**
NO	**1 HR.**	**150**	**2**

Storage in inside storage rooms shall comply with the following:

d. Storage in inside storage rooms shall meet the requirements specified in NFPA 30. If there is no fire protection and the walls have a 2-hour fire resistant rating, the maximum size of the room allowed is 500 square feet with only 2,000 gallons of material being allowed. Please reference the following f
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STORAGE LIMITATIONS FOR INSIDE ROOMS		
TOTAL FLOOR AREA (SQ FT)	**AUTOMATIC FIRE PROTECTION SYSTEM PROVIDED?**	**TOTAL ALLOWABLE QUANTITY (GAL PER SQ FT OF FLOOR AREA)**
≤ 150	**NO** **YES**	**2** **5**
> 150 AND ≤ 500	**NO** **YES**	**4** **10**

NOTE 1: THE FIRE PROTECTIVE SYSTEM SHALL BE AUTOMATIC SPRINKLERS, WATER SPRAY, CARBON DIOXIDE, DRY CHEMICALS OR OTHER APPROVED SYSTEM.

e. Every inside storage room shall be provided with either a gravity or mechanical exhaust ventilation system designed to provide for a complete change of air within the room at least six (6) times per hour. If mechanical exhaust is used, a switch located outside of the door shall control it. Where gravity ventilation is provided, the fresh air intake, as well as the exhaust outlet for the room, shall be on the exterior of the building in which the room is located.

f. The ventilating equipment and any lighting fixtures shall be operated by the same switch. All light fixtures shall be explosion-proof.

g. Electrical wiring and equipment located in inside storage rooms used for Class I liquids shall be approved under Subpart S, Electrical, for Class I, Division 2 Hazardous Locations; for Class II and Class III liquids, shall be approved for general use. (Reference National Electrical Code, No. 70).

h. There shall be one maintained clear aisle at least three (3) feet wide within the storage area.

i. Containers over 30 gallons capacity shall not be stacked on each other.

j. Flammable and/or combustible liquids shall be stored so as not to limit the use of exits, stairways or other areas used for the safe egress of people.

k. The quantity of liquid that may be stored outside of an inside storage room or a cabinet in any one fire area of a building may not exceed: 25 gallons of Class IA liquids in containers; 120 gallons of Class IB, IC, II, III liquids in containers; 660 gallons of Class IB, IC, II, III liquids in a single portable tank.

l. Portable propane tanks intended for use on powered industrial trucks/fork lift equipment may be stored inside shop/garage areas within the following limits:
   - Seven 35 pound cylinders in a sprinklered area.
   - Three 35 pound cylinders in a non-sprinklered area.

m. All storage of flammable or combustible liquids shall remain tightly sealed except when transferred, poured or applied.

n. Flammable and combustible interior storage rooms are not permitted in basement areas.

2. Storage Outside Building (See Appendix A)
   a. Storage of flammables and combustible liquids outside of buildings shall comply with detailed and specific requirements of OSHA and State fire codes as to the capacity, location, construction, spill containment, security and fire control of the structure.

b. Where quantity stored exceeds 1,100 gallons, a minimum distance of 10 feet between buildings and the nearest container of flammable or combustible liquid must be maintained.

c. The storage area must be graded in a manner to divert possible spills away from buildings or other exposures or must be made for draining of accumulations of ground or rain water or spills of flammable or combustible liquids. Drains must terminate at a safe location and must be accessible to operation under fire conditions.

d. Storage areas must be protected against tampering or trespassers and must be kept free of weeds, debris, and other combustible material not necessary to the storage.

e. A fire extinguisher must be accessible within 25 feet of the outside storage area.

D. Liquid Dispensing and Transfer

1. Flammable liquids shall be kept in covered containers when not actually in use.

2. Where flammable or combustible liquids are used or handled, except in closed containers, a means shall be provided to dispose promptly and safely of leakage or spills.

3. Flammable or combustible liquids shall be drawn from or transferred into vessels, containers or portable tanks within a building only in the following manner:

   a. Through a closed piping system,

   b. From safety cans,

   c. By means of a device drawing through the top, or

   d. From containers or portable tanks by gravity through an approved self-closing valve.

4. Grounding and bonding must be utilized when transferring Class I flammable liquids. (See Appendix B – Grounding Diagrams)

5. Flammable and combustible liquids must be stored only in approved containers.

6. Transferring liquids must be separated from other operations within the building by an adequate distance.

7. Transfer operations must be provided with adequate ventilation, natural or mechanical. Sources of ignition are not permitted in areas where flammable vapor may travel.

8. Transferring liquids by means of air pressure on the container or portable tanks is prohibited.

9. Any flammable or combustible liquids transferred and/or stored in secondary containers shall be properly labeled identifying its contents, health hazards and physical hazards as referenced in the City of Appleton Hazard Communication Policy.

E. Fire Protection and Prevention

1. Suitable fire control, such as a portable fire extinguisher, shall be available at locations where flammable or combustible liquids are stored. Appropriate fire extinguishers are to be mounted within 75 feet of outside areas containing flammable liquids and 10 feet of any inside storage areas.

2. At least one portable fire extinguisher having a U L Classification rating of not less than 20-B units shall be located outside of, but not more than 10 feet from, the door opening into any room used for storage.

3. At least one portable fire extinguisher having a U L Classification rating of not less than 20-B units shall be located not less than 10 feet, nor more than 50 feet, from any flammable liquid storage area located outside of a storage room but inside of a building.

4. Open flames and smoking shall not be permitted in or near flammable or combustible liquid storage areas.

5. Combustible waste material and residues in a building or work area shall be kept to a minimum, stored in covered metal receptacles and disposed of daily.

6. Inside areas in which flammable Class I liquids are stored or handled shall be heated only by means not constituting a source of ignition, such as steam, hot water or forces from central systems located away from area.

7. Ground areas around facilities where liquids are stored and handled, or used shall be kept free of weeds, trash, or other unnecessary combustible materials.

8. Welding, cutting and similar spark-producing operations shall not be permitted in areas containing flammable liquids unless approved from a person of authority.

9. Aisles established for movement of personnel shall be maintained clear of obstructions to permit orderly evacuation and ready access.

10. All fire protection equipment shall be properly maintained, and periodically inspected and tested in accordance with manufacturer's recommendations.

F. Spill Control (clean up kits and spill response procedures)

1. Spill control materials and equipment should be maintained in each area where storage and/or dispensing is conducted. This equipment can include materials such as, but not limited to:
   - Spill control fabric booms, dikes, pillows, etc.
   - Personal protective equipment
   - Absorbent pads and/or absorbent towels
   - Bulk absorbent materials (i.e. sand, "zorb-out")
   - Shovels, brooms, mops and/or pails

2. Spill response:

   a. Assess the situation using professional judgment. If the chemical spill is controllable, involves either a flammable or non-flammable liquid or product, and poses no immediate danger; begin the cleanup process. If the chemical spill is uncontrollable, involves either a flammable or non-flammable liquid or product, and it's creating an extremely dangerous situation (i.e. fire, explosion or asphyxiation hazard), employees should contact 911 immediately and evacuate the facility. NOTE: Activate the fire alarm if a facility emergency exists. Evacuate the facility by the nearest available emergency exit. If a disabled person cannot safely evacuate the facility, assist them to the nearest stairwell away from spill site. Alert emergency personnel of their location.

   b. If the chemical spill is controllable, identify the product and refer to the Material Safety Data Sheet (MSDS) for the spill response procedures, and then put on the appropriate personal protective equipment for the chemical or material (i.e. safety glasses, splash goggles, neoprene gloves, face shield, rubber suit or apron, chemical coveralls, respirator, etc.).

   c. Position a fire extinguisher near the cleanup area (for flammable liquids or products).

   d. Obtain spill control and cleanup materials.

   e. Take the necessary measures to prevent the chemical spill from advancing towards floor drains or catch basins, and other chemicals, products or materials. Use absorbent towels, zorb compound, or absorbent boom dikes and place accordingly. Let the absorbent materials work. NOTE: If a container was the chemical spill source, carefully and quickly put the source container in a larger bucket or drum.

   f. Stop and reassess the chemical release situation. If the situation has changed and is uncontrollable, contact 911 immediately and evacuate the building. If it is still both a controllable and non-dangerous situation, the cleanup can continue.

   g. Remove and clean up the absorbent materials. Put in a plastic bag (double bagged), tie it, and properly dispose of it.

h. It is the duty of the responsible party to contact appropriate agencies (DNR, Emergency Management, Wastewater Plant, etc.) when any spill threatens to leave an impervious surface or enter any drain or otherwise exit the property.

i. Replacement spill kit cleanup materials (absorbent towels, pads, booms, etc.) and personal protective equipment shall be replenished as soon as possible.

G. Drum/Barrel

I. Handling and Storage – Safety Guidelines

1. Drum Inspection - The appropriate procedures for handling drums depend on the drum contents. Prior to handling, the drum(s) condition should be determined. A visual inspection should focus on the following:

a. Symbols, words or other marks on the drum indicating that it contains flammable or combustible liquids.

b. Signs of deterioration such as corrosion, rust, and leaks.

c. Sharp edges or burrs.

d. Signs that the drum is under pressure such as warping, swelling and/or bulging.

e. Drum type (i.e. DOT Approved).

f. Chemical compatibility with other chemicals in the area.

g. Spillage on drums and the adjacent floors.

II. Moving and Storing Drums Safely - The following procedures can be used to maximize employee safety during drum handling and movement:

1. Ensure powered industrial trucks used in the movement of the materials have a rated load capacity high enough to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface.

2. Before moving anything, determine the most appropriate sequence in which the various drums and other containers should be moved. For example, small containers may have to be removed first to permit entry and movement of drums.

3. Ensure that operators have a clear view when carrying drums. Where necessary, have workers available to guide the operator's motion.

4. Wherever possible, do not move drums that may be under internal pressure, as evidenced by bulging or swelling.

5. If a drum containing a liquid cannot be moved without rupture, immediately contact a supervisor to report a potential spill condition.

6. Drip pans or a spill containment system (i.e. drum top pad) should be positioned below each drum faucet to catch spills or any possible drippings from a worn or damaged faucet.

7. Drum faucets will be of the self-closing type.

8. Drums of 55 gallons or more containing flammable or toxic liquids shall be surrounded by dikes or in a spill containment pallet system which can enclose a volume equal to at least 35% of the total volume of the containers.

9. Barriers or guards shall be used to protect drums and containers larger than 30 gallons if they can not be stored in an "out-of-the-way" location.

10. Drum containers shall not be stored or used where they are subject to open flame, hot metal or other sources of artificial heat.

III. Grounding and Bonding

Buildup of static electricity charges on containers and people is a dangerous source of sparks that can touch off flash fires wherever flammable liquids are being transferred or used.

1. Grounding. A readily accessible connection to an earth ground will be available in all storage and dispensing areas. (See Appendix B)

2. Bonding. A readily accessible connection from a grounded drum to a container being filled will be installed on all drums or bulk containers used to dispense flammable or combustible liquids. This procedure is not necessary when self-bonding containers are used. If it is unclear if the container is self-bonding, use a bonding strap in the dispensing process. (See Appendix B)

H. Spray Booths

I. Construction/Design Requirements (Refer to Appendix C)

1. Must be substantially constructed of steel, securely and rigidly supported.

2. May be concrete and aluminum or other substantial noncombustible material for intermittent or low-volume spraying.

3. Must be designed to sweep air currents toward the exhaust outlet.

4. If combustible, booth floors shall be covered with non-combustible material as to facilitate the safe cleaning and removal of residues.

5. Each spray booth having a frontal area larger than 9 square feet shall have a metal deflector or curtain not less than 2.5 inches deep installed at the upper outer edge of the booth over the opening.

6. Ventilation and exhaust systems shall be in accordance with Standard for Blower and Exhaust Systems for Vapor Removal - NFPA.

7. All spraying areas shall be provided with mechanical ventilation adequate to remove flammable vapors, mists or powders to a safe location.

8. Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow materials residue to be exhausted.

9. Each spray booth shall have an independent exhaust duct system discharging to the exterior of the building.

10. For multiple booths, all fans shall be so interconnected that one fan cannot operate without all fans being operated.

11. All bearings of the fan-rotating element shall be self-lubricating from outside the duct.

12. Electrical motors driving exhaust fans shall not be placed inside booths or ducts.

13. Belts shall not enter the duct or booth unless the belt and pulley within the duct or booth are thoroughly enclosed.

14. Exhaust ducts shall be constructed of steel and be substantially supported.

15. Each spray booth shall be separated from other operations by a minimum of three feet.

16. Air exhaust from spray operations shall not be directed so it will contaminate make-up air being introduced into the spraying area.

17. Air exhausted from spray operations shall not be re-circulated.

18. Exhaust ducts shall be provided with a number of access doors when necessary to facilitation cleaning.

II. Maintenance and Operation Guidelines

1. The operation shall be designed, installed and maintained so the average air velocity over the open face of the booth (or booth cross section during spraying operation) shall not be less than 100 linear feet per minute.

2. All discarded filter pads and filter rolls shall be immediately removed to a safe, well-detached location or placed in water filled metal container and

disposed of at the close of the day's operation unless maintained completely in water.

3. Space within the spray booth on the downstream and upstream sides of filters shall be protected with approved automatic sprinklers.

4. Spray booth shall be installed so that all portions are readily accessible for cleaning. A clear space of not less than three feet on all sides shall be kept free from storage or combustible construction.

5. Spraying shall not be conducted outside of any predetermined spraying areas.

6. All spraying areas shall be kept free from accumulation of deposits.

7. Scrapers or other tools shall be of non-sparking material.

8. Approved metal waste cans shall be provided wherever rags or waste are impregnated with finishing material or residue.

9. Contents of waste cans shall be properly disposed of at least once daily or at the end of each shift.

10. Spray finishing employees' clothing shall not be left on the premises overnight unless kept in metal lockers.

11. "NO SMOKING" signs in large letters on contrasting color background shall be conspicuously posted at all spraying areas and paint storage rooms.

III. Protection and Prevention Guidelines

1. There shall be no open flame or spark producing equipment in any spraying area nor within 20 feet thereof, unless separated by a partition.

2. Space-heating appliances, steam pipes, or hot surfaces shall not be located in a spraying area where deposits of combustible residues may readily accumulate.

3. Electrical lamps outside of, but within 20 feet of any spraying area, and not separated by a partition, shall be totally enclosed to prevent the falling of hot particles and shall be protected from mechanical injury by suitable guards or by location.

4. Portable electrical lamps shall not be used in any spraying area during spraying operations.

5. All metal parts of spray booths, exhaust ducts, and piping conveying flammable or combustible liquids of aerated solids shall be electrically grounded in an effective and permanent manner.

6. In sprinklered buildings, the automatic sprinkler system in rooms containing spray finishing operations shall conform to the requirements of 29 CFR 1910.159.

7. Sprinkler heads shall be cleaned daily, if necessary (kept free from deposits).

8. An adequate supply of suitable portable fire extinguishers shall be installed near all spraying areas.

9. The quantity of flammable or combustible liquids kept in the vicinity of spraying operations shall be the minimum required for operations and should ordinarily not exceed a supply for one day or one shift.

10. Open or glass containers shall not be used.

11. Whenever flammable or combustible liquids are transferred from one container to another, both containers shall be bonded and grounded to prevent discharge sparks of static electricity.

I. Compressed and Liquefied Gas Cylinder Safety

1. Know the contents of the cylinder and be familiar with the properties of the gas. Reference the material safety data sheet (MSDS) on file for proper health, flammability and reactivity information.

2. When receiving gas cylinders, check for leaks; visually inspect the cylinder for damage; ensure the valve cover and shipping cap is on; and check for proper labeling.

3. Cylinders must be properly labeled, including the gas identity and appropriate health and physical hazards.

4. If a cylinder is damaged, in poor condition; leaking, or the contents are unknown, contact your supervisor and cylinder vendor. Have the cylinder vendor return the damaged cylinder to the manufacturer.

J. Cylinders

I. Safe Storage Guidelines

1. All cylinders should be stored in cool, dry, well-ventilated surroundings away from all potential flammable substances including oil, greases and gasoline. Do not subject any part of the cylinder to a temperature higher than 125° F.

2. Cylinders should not be located where objects may strike or fall on them.

3. Cylinders should not be stored in damp areas, or near salt, corrosive chemicals, fumes, heat or in direct sunlight. Store cylinders by gas type, separating oxidizing gases from flammable gases, corrosive gases from flammable gases, and full cylinders from empty cylinders.

4. Keep oxygen cylinders a minimum of twenty feet from flammable gas cylinders or combustible gas materials. If a twenty-foot separation cannot be maintained, a non-combustible barrier at least 5 feet in height having a fire resistant rating of at least one-half hour is required.

5. All gas cylinders shall be stored in an upright position away from sources of heat.

6. DO NOT smoke in an area where there are compressed gases being used or stored.

7. All gas cylinders and compressed gases (full or empty) should be properly fastened and supported at a point 2/3 of its height (from the upper most point) by straps belts, buckles, or chains to prevent them from falling and causing bodily harm. A maximum of two cylinders per restraint is recommended. Cylinders maybe attached to a bench top, individually to a wall, placed in a holding cage, or have a non-tip base attached.

8. Keep valve protective caps in place when the cylinder is not in use. This includes cylinders in welding carts that are not in use.

9. Keep valves closed on empty cylinders.

10. As with any hazardous material, storage in public areas is prohibited.

11. Cylinders that are empty shall be marked or tagged as “empty” or “MT”.

12. Cylinders must be kept away from electrical wiring where the cylinder could become part of the circuit.

13. Portable gas cylinders, containers or tanks shall be handled with extreme care and shall be stored in a suitable holding cage or flammable storage cabinet. The portable gas cylinder shall be stored upright with the valve cap in place.

II. Cylinders Safety Guidelines

1. To protect the valve during transportation, the cover cap (bonnet) shall be screwed on hand tight and remain on until the cylinder is in place and ready for use.

2. Cylinders SHALL NEVER be rolled or dragged.

3. When moving large cylinders, they should be strapped to a properly designed wheeled cart to ensure stability.

4. Only one cylinder should be handled (moved) at a time.

5. Compressed gas cylinders shall not be lifted by their valves or protective caps.

6. Unless cylinders are secured on a special cart, regulators shall be removed, valves closed and protective valve caps in place before cylinders are moved.

7. Don't attempt to drop a cylinder or permit them to strike each other violently or be handled roughly. A mishandled cylinder(s) may rupture violently, release its hazardous contents and/or become dangerous projectiles.

8. Compressed gas cylinders shall be inspected visually for damage prior to use. Do not repair damaged cylinders or attempt to reuse them. All damaged cylinders must be taken out of use immediately and properly tagged as out-of-service. Supervisor or appropriate personnel must be notified of the defective cylinders immediately.

9. Make sure the cylinder is equipped with the correct regulator. Always use the regulator designed for the material in use. Regulators are gas specific and not necessarily interchangeable.

10. NEVER use oil or grease on the regulator of a cylinder valve.

11. The cylinder valve should be opened to indicate pressure on the regulator gage. All connections can be checked with a soap solution for leaks. Be sure all connections are tight.

12. When opening the valve on a cylinder, the valve shall be opened slowly. The user shall position the cylinder with the valve pointing away from the user and warn those working nearby.

13. The cylinder should be placed so the valve handle at the top of the cylinder is easily accessible.

14. Open the valve SLOWLY and only with the proper regulator in place. The valve should be opened all the way for oxygen and ¾ to 1 turn for acetylene.

15. The valve should never be left open when the cylinder is not in use, even when empty. Air and moisture may diffuse through an open valve, causing contamination and corrosion within the cylinder.

16. No attempt shall be made to repair a cylinder that leaks. Such cylinders shall be removed from service and placed in an open, well-ventilated area away from any possible ignition source(s). Out-of-service cylinders will be marked or tagged and reported to the designated supervisor.

17. When a special wrench is required to open a cylinder or manifold valve, the wrench shall be left in place on the valve stem when in use; this precaution is taken so the gas supply can be shut off quickly in case of an emergency.

18. Regulators shall be removed when moving cylinders, when work is completed, or when cylinders are empty.

19. Use flashback arrestors and reverse-flow check valves to prevent flashback when using oxygen fuel systems.

20. Never completely empty the cylinder, always leave a residual gas pressure of approximately 30 p.s.i.

21. Fire extinguishing equipment should be readily accessible when combustible materials can be exposed to welding or cutting operations, using compressed cylinder gases.

22. NEVER heat a cylinder to raise the pressure of the gas.

23. NEVER refill a cylinder. Mixing of residual gases may result in a serious and devastating reaction.

24. DON'T use oxygen in place of compressed air.

25. NEVER rely on the color-coding to identify a gas. Different manufacturers may use different coding systems.

NEVER USE COPPER FITTINGS OR TUBING ON ACETYLENE CYLINDERS, AN EXPLOSION MAY OCCUR.

K. Dip Tanks

1. Construction/Design Requirements

   a. Shall be constructed of non-combustible material and their supports shall be heavy metal, reinforced concrete, or masonry.

   b. Dip tanks in excess of 150 gallons in capacity or 10 square feet in liquid surface shall be equipped with a properly trapped overflow pipe leading to a safe location outside building.

   c. Ventilation shall comply with standards for Blowers and Exhaust Systems Criteria.

2. Liquid Storage and Handling Safety Guidelines

   a. The storage of flammable and combustible liquids in connection with dipping operation(s) shall conform to the requirements of 29 CFR 1910.106.

   b. There shall not be open flames, sparks, and spark producing devices or heated surfaces having a temperature sufficient to ignite vapors in a vapor area.

3. Safe Operation and Maintenance Guidelines

a. Areas in the vicinity of dip tanks shall be kept clear of combustible stock and shall be kept entirely free of combustible debris.

b. When waste or rags are used in connection with dipping operations, approved metal waste cans shall be provided and all impregnated rags or waste shall be deposited therein immediately after use.

c. The contents of waste cans shall be properly disposed of at least daily at the end of each shift.

d. "NO SMOKING" signs in large letters on contrasting color background shall be conspicuously posted in the vicinity of dip tanks.

e. Areas in the vicinity of dip tanks shall be provided with manual fire extinguishers suitable for flammable and combustible liquids, conforming to 29 CFR 1910.157.

f. Dip tanks covers shall be kept closed when tanks are not in use.

g. Dip tanks covers shall be of substantial non-combustible material or of tin-clad type with enclosing metal applied with locked joints.

Appendix A

STORAGE GUIDE FOR FLAMMABLE & COMBUSTIBLE LIQUIDS

(NOTE: This guide is not intended to be all-inclusive)

STORAGE GROUPING by Flash Point	**NFPA Fire Diamond Number**	**NFPA 30 Classifications**	***FIRE AREA STORAGE LIMITS***	
			Maximum Storage Outside Fire Cabinet	**Maximum Storage Inside Fire Cabinet***
GROUP I (Flammable or Combustible liquids with a flash point of <140°F)	**4** **3** **2** with F.P. <140°F	IA IB IC II	10 Gallons in containers or 25 gallons in safety cans	60 Gallons
GROUP II (Combustible liquid with a flash point of ≥ 140° F and < 200°F)	**2** with F.P. ≥ 140°F And < 200°F	IIIA	60 Gallons	120 Gallons minus the # of gallons of Group I liquids in Cabinet
Group III (Combustible liquid with a flash point of ≥ 200° F)	1	IIIB	No Limit	No Limit
***** *Maximum of three fire storage cabinets per fire area.*				

NOTES:

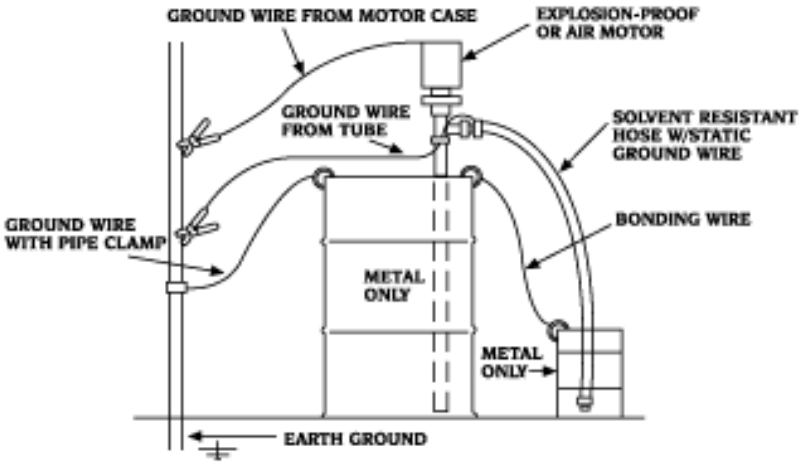
- A maximum of 180 gallons of flammable and combustible liquids with a flash point of < 140°F can be stored in a fire area (room with one-hour fire rated walls and self closing 20-minute fire rated door). This amount must be stored in the following manner:
  - Not more than 10 gallons located outside a flammable storage cabinet.
  - Not more than 60 gallons in a flammable storage cabinet.
  - Not more than 3 flammable storage cabinets per fire area.

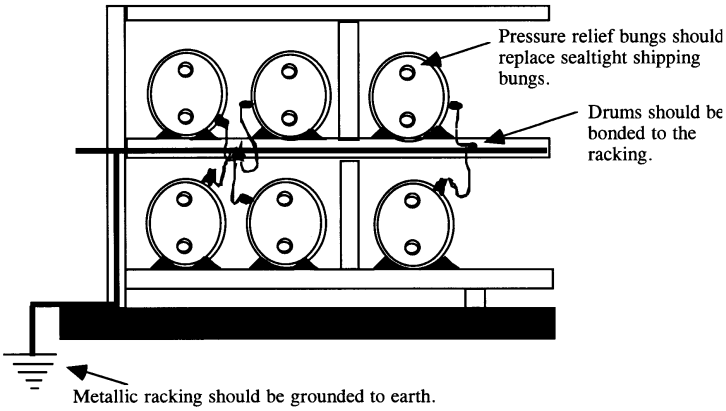
- In addition to the 180 gallons as stated above, a maximum of 60 gallons of combustible liquids with a flash point ≥ 140°F and <200°F can be stored outside of a flammable liquids cabinet.

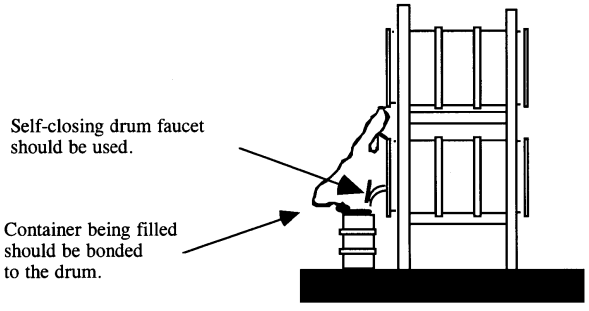
There is no gallon limit to combustible liquids with a flash point of ≥ 200°F in a fire area

Appendix B

GROUNDING DIAGRAMS







Appendix C

SPRAY BOOTHS
SELF-INSPECTION SAFETY CHECKLIST

SPRAYING OPERATIONS

- ❑ Is adequate ventilation assured before spray operations are started?
- ❑ Is mechanical ventilation provided when spraying operations are done in enclosed areas?
- ❑ When mechanical ventilation is provided during spraying operations, is it so arranged that it will not circulate the contaminated air?
- ❑ Is the spray area free of hot surfaces?
- ❑ Is the spray area at least twenty feet from flames, sparks, operating electrical motors and other ignition sources?
- ❑ Are portable lamps used to illuminate spray areas suitable for use in a hazardous location?
- ❑ Is approved respiratory equipment provided and used when appropriate during spraying operations?
- ❑ Do solvents used for cleaning have a flash point of 100 degrees F or more?
- ❑ Are the fire control sprinkler heads clean?
- ❑ Are "NO SMOKING" signs posted in spray areas, paint rooms, paint booths, and paint storage areas?
- ❑ Is the spray area clean of combustible residue?
- ❑ Are spray booths constructed of metal, masonry, or other substantial non-combustible material?
- ❑ Are spray booth floors non-combustible and easily cleaned?
- ❑ Is infrared drying apparatus kept out of the spray area during spraying operations?
- ❑ Is the spray booth completely ventilated before using the drying apparatus?
- ❑ Is the drying apparatus properly grounded?
- ❑ Are lighting fixtures for spray booths located outside the booth and the interior lighted through sealed clear panels?
- ❑ Are the electric motors for exhaust fans placed outside booths or ducts?
- ❑ Are belts and pulleys inside the booth fully enclosed?
- ❑ Do ducts have access doors to allow cleaning?
- ❑ Do all drying spaces have adequate ventilation?
- ❑ Is the average air velocity over the open face of the booth not less than 100 linear feet per minute?

- ❑ Is there a visible gauge, audible alarm, or pressure activated device installed to indicate or ensure that the required air velocity is maintained?
- ❑ Are at least three sides of the booth kept free from storage or combustible material?
- ❑ Is space within the spray booth on the downstream and upstream sides of filters protected with approved automatic sprinklers?
- ❑ Is the spray booth separated from other operations by not less than 3 feet?