1.0 PURPOSE:

To outline the policy and procedures which apply to the storage of flammable and combustible liquids.

2.0 ORGANIZATIONS AFFECTED:

This policy applies to all departments and employees of the City of West Allis.

3.0 POLICY:

Only certain specified amounts of flammable and combustible liquids are allowed to be in use, kept in certain containers within a workspace, and stored in approved flammable storage cabinets or storage area as outlined by the National Fire Protection Association (NFPA) codes and standards.

4.0 REFERENCES:

29 CFR 1910.106
Wisconsin Administrative Code Chapter 10
Wisconsin Administrative Code Chapter 32
NFPA 30 Flammable and Combustible Liquids Code (2002)

5.0 PROCEDURES:

5.1 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.

5.2 Approved: Approved or listed by a nationally recognized testing laboratory.

5.3 Boiling Point: The boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (psia). This pressure is equivalent to 760 millimeters of mercury (760 mm Hg).

At temperatures above the boiling point, the pressure of the atmosphere can no longer hold the liquid in the liquid state and bubbles begin to form. The lower the boiling point, the greater the vapor pressure at normal ambient temperatures and consequently the greater the fire risk.

5.4 Bonding: A provision of an electrical path from the grounded drum to the container being filled. Before a container is filled from a drum faucet, a bonding wire fastened to the drum must be attached to the container.

5.5 Closed Container: A container so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures.

5.6 Combustible Liquid: A liquid with a flashpoint at or above 100º F. Combustible liquids are subdivided into Class II or Class III liquids.

5.7 Container: Any can, barrel, or drum with a capacity of 60 U.S. gallons or less that is used for transporting or storing liquid.

5.8 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.

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

5.10 Flammable Range: The range between the lower flammable limit and upper flammable limit is the "flammable range." If a source of ignition such as a flame, spark, or static electricity is present, an explosion may occur. This may also be referred to as the "explosive range."

5.11 Flammable Storage Cabinet: A "flammable storage cabinet" is a listed storage cabinet designed in accordance with NFPA 30.

5.12 Flash Point: The lowest temperature at which a flammable liquid will give off enough vapors to form an ignitable mixture with the air above the surface of the liquid or within its container.

5.13 Grounding: A readily accessible connection to an earth ground is recommended. Grounding cables are attached to the container and left in place as long as the container is in storage facility.

5.14 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.

5.15 Lower Flammable Limit: The percentage of vapor in the air below which a fire can't occur because there isn't enough fuel: the mixture is said to be too lean.

5.16 Portable Tank: A closed container having a liquid capacity of 60 U.S. gallons and not intended for fixed installation.

5.17 Safety Can: Approved containers, of not more than 5 gallons capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.

5.18 Upper Flammable Limit: The percentage of vapor in the air above which there isn't enough air for a fire: the mixture is said to be too rich.

5.19 Vapor Area: Any area containing dangerous quantities of flammable vapors in the vicinity of dip tanks, their drainboards or associated other equipment during operation or shutdown periods.

5.20 Vapor Density: The weight of a flammable vapor compared to air. (Air-1). Vapors with a high density are more dangerous and require better ventilation because they tend to flow along the floor and collect in low spots.

5.21 Vapor Pressure: Measure of a liquid's propensity to evaporate. The higher the vapor pressure, the more volatile the liquid and, thus, the more readily the liquid gives off vapors.

5.22 Ventilation: As specified in this section is for the prevention of fire and explosion. 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.

6.0 FLAMMABLE AND COMBUSTIBLE LIQUID CLASSIFICATION:

The liquids are classified according to flashpoint and if applicable, boiling point.

6.1 Flammable Liquids: Any liquid having a flashpoint below 100 degrees F/37.8 degrees C.

- 6.1.1 Class IA: Flashpoint below 73 degrees F/22.8 degrees C.
  Boiling point below 100 degrees F/37.8 degrees C.
- 6.1.2 Class IB: Flashpoint below 73 degrees F/22.8 degrees C.
  Boiling point at or above 100 degrees F/37.8 degrees C.
- 6.1.3 Class IC: Flashpoint of 73 degrees F/22.8 degrees C to
  99 degrees F/37.8 degrees C.

6.2 Combustible Liquids: Any liquids having a flashpoint above 100 degrees F/37.8 degrees C.

- 6.2.1 Class II: Flashpoint of 100 degrees F/37.8 degrees C to
  140 degrees F/60 degrees C.
- 6.2.2 Class IIIA: Flashpoint of 140 degrees F/60 degrees C
  to 200 degrees F/93 degrees C.
- 6.2.3 Class IIIB: Flashpoint of 200 degrees F/93 degrees C and above.

7.0 FLAMMABLE STORAGE CABINETS:

7.1 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).

7.2 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.

7.3 Cabinets shall be marked in conspicuous lettering "FLAMMABLE – KEEP FIRE AWAY."

7.4 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.

7.5 Storage cabinets shall be constructed to meet the National Fire Protection Association (NFPA) criteria.

8.0 FLAMMABLE AND COMBUSTIBLE CONTAINERS:

8.1 According to their classification, flammable and combustible liquids are required to be stored in the following maximum – allowable size of containers.

Container Type:	**Flammable Liquid**			**Combustible Liquid**	
	IA	**IB**	**IC**	**II**	**III**
Glass	1pt	1qt	1gal	1gal	5gal
Approved Plastic	1gal	5gal	5gal	5gal	5gal
DOT Polyethylene	1gal	5gal	5gal	60gal	60gal
Safety Cans	5 gal	5gal	5gal	5gal	5gal
DOT Drum	60gal	60gal	60gal	60gal	60gal
Approved Metal Portable Tanks	660gal	660gal	660gal	660gal	660gal

8.2 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).

8.3 All portable tanks shall be approved by Underwriter Laboratory (UL) or other recognized listed agency. Portable tanks to have 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.

9.0 INSIDE STORAGE ROOM (S):

9.1 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. Openings shall be provided with approved self-closing fire doors. The room shall be liquid tight where the walls join the floor.

9.2 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, NFPA 251-1999.

9.3 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 five resistant rating, the maximum size of the room allowed is 500 feet with only 2,000 gallons of material being allowed. Please reference the chart below.

STORAGE LIMITATIONS FOR INSIDE ROOMS		
Total Floor Area (sq ft)	Automatic Fire Protective Provided?	Total Allowable Quantity (gal per sq ft of floor area)
≤ 150	No	2
	Yes	5
> 150 and ≤ 500	No	4
	Yes	10
NOTE 1: The fire protective system shall be automatic sprinklers, water spray, carbon dioxide, dry chemicals, or other approved system.		

9.4 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.

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

9.6 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).

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

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

9.9 Storage of flammable and/or combustible liquids shall not be stored to limit the use of exits, stairways, or other areas used for the safe egress of people.

9.10 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 can't 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.

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

10.0 STORAGE OUTSIDE BUILDING:

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.

11.0 DISPENSING AND TRANSFER OF LIQUIDS:

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

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

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

11.3.1 Through a closed piping system,
11.3.2 From safety cans,
11.3.3 By means of a device drawing through the top.

11.4 Grounding and bonding must be utilized when transferring Class I flammable liquids.

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

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

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

11.8 Transferring liquids by means of air pressure on the container or portable tanks is prohibited. This type of transfer may result in an overexposure that could exceed what the container or tank is designed to withstand. A flammable atmosphere could be created within the container or tank. This atmosphere could be sensitive to ignition due to increased pressure.

11.9 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's Hazard Communication Policy.

12.0 FIRE CONTROL:

12.1 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.

12.2 At least one portable ABC fire extinguisher having an Underwriter's Laboratories 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.

12.3 At least one portable fire extinguisher having an Underwriter's Laboratories 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.

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

12.5 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 or as needed based on usage.

12.6 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.

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

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

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

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