

**SUBJECT:** Storage or Use of Flammable and Combustible Liquids Inside of Industrial Plants or Similar Operations.

**Purpose:** To guide the enforcement of 1910.106 (d) and (e) and clarify the differences between the OSHA and NFPA requirements for storage of flammable and combustible liquids.

**References:** NFPA 30-2008, Flammable and Combustible Liquids Code  
NFPA 91-2010, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids

**Cancellation:** This directive supersedes **STD 1-5-7**, Storage or Use of Flammable and Combustible Liquids Inside of Industrial Plants or Similar Operations, dated Sept 26,2005.

**Background:**

Inside storage rooms are normally used: when the containers are opened for mixing, pouring, dispensing, or transfer of flammable and / or combustible liquids; if the quantity is too large to fit into an approved cabinet; if the quantity is excessive for any one fire area; and / or if the opened containers cannot be separated from potential sources of ignition. As defined by NFPA 30 paragraph 9.9- 2008 , inside storage "rooms" may be completely inside of the building; or inside with one common wall; or outside with one common wall of the building.

Storage and use of flammable and combustible liquids is generally permitted outside of a flammable liquid storage room or cabinet if the storage is considered to be warehousing only, or it is "Incidental storage and use of flammable and combustible liquids" in accordance with paragraph 1910.106(e)(2).

**Action:**

**A. CONSTRUCTION AND VENTILATION OF INSIDE FLAMMABLE LIQUID STORAGE ROOMS.**

1. 29 CFR 1910.106(d)(4) identifies the requirements for the design and construction of inside storage rooms, including the ventilation requirements in subparagraph (iv). NFPA 30-2008, paragraph 18.5, addresses the same subject with additional and differing requirements.
2. The requirement in 29 CFR 1910.106(d)(4)(iv) which states that "a gravity or mechanical exhaust ventilation system shall be provided" will be modified to be consistent with NFPA 30-2008, paragraph 18.5, which states that "a gravity or a continuous mechanical exhaust ventilation system shall be provided. Mechanical ventilation shall be used if Class I liquids are dispensed within the room".
3. The portions of 29 CFR 1910.106(d)(4)(iv) which apply when a mechanical ventilation system equipped with a control switch located outside of the door, which operates the lights and ventilation system, and requires a pilot light adjacent to the switch if Class I liquids are dispensed, will not be enforced if continuous mechanical ventilation is provided.
4. The portions of 29 CFR 1910.106(d)(4)(iv) which require a minimum of six air changes per hour will be enforced for gravity systems only. For gravity systems, the fresh air intake as well as the exhaust shall be to the exterior of the building (NFPA 30-2008, paragraph 18.5.3 and 18.5.4.2). Where Class I flammable liquids are dispensed, gravity systems are not permitted in rooms installed since 1977.
5. The following provisions of NFPA 30-2008, paragraph 18.5 will be enforced using General Duty for mechanical ventilation systems provided the system was installed since

1977 in rooms where flammable materials are dispensed. (recommended for older systems):

- a. A continuous mechanical system shall be used if Class I liquids are dispensed in the room (Para. 18.5).
- b. Exhaust air shall be taken from one side of the room, near a wall, within 12" (300 mm) of the floor (Para. 18.5.1).
- c. Make up air inlet(s) shall be on the opposite side of the room from the exhaust outlet, within 12" (300 mm) of the floor (Para. 18.5.1).
- d. Placement of air inlet(s) and outlet(s) shall enable the system to cause air movement across all portions of the floor (Para. 18.5.2).
- e. Exhaust shall be directed to the outside of the building without recirculation. (Exception: A fail-safe, continuous monitoring system with an alarm may be used to monitor recirculated air) (Para. 18.5.3).
- f. All ducts used for ventilation shall not be used for any other purposes (Para. 18.5.4).
- g. All ducts used shall comply with NFPA 91, 2010 (Para. 18.5.4).
- h. Inlet(s) located on a wall within the building shall be equipped with a fire door or damper with a fusible link or other approved thermal unit as required in NFPA 91, 2003. Installation shall be as required in NFPA 91, 2010 (Para. 18.5.4.1).
- i. Mechanical systems shall provide a minimum of one cubic foot of exhaust air per minute per square foot (0.3 cubic meters / minute per square meter) of area, but not less than 150 CFM (4 cubic meters / minute) (Para. 18.5.5).
- j. Mechanical ventilation systems shall be equipped with an air flow switch or other device, inter-locked to sound an audible alarm upon failure of the system (Para. 18.5.5.1).
6. Processing areas where flammable liquids are used should be ventilated to follow NFPA 30 -2008 paragraph 17.11 which says; "enclosed processing areas handling or using class I liquids or class II or III liquids heated to temperatures at or above their flash points where the room temperature is heated to a temperature higher than the flash point shall be ventilated at a rate sufficient to maintain the concentration in the area at or below 25 percent of the LFL."

**B. INCIDENTAL STORAGE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS OUTSIDE OF A FLAMMABLE LIQUID STORAGE ROOM**

1. When the only operation involved is the storage of flammables in containers or tanks that are closed and remain closed throughout their storage, the storage area shall be considered, and referred to, as a warehouse as described in paragraph 1910.106(d)(5). In this instance, Tables H-14 and H-15 shall be used.
2. When procedures involve mixing, transferring, or other exposure of the liquid to vaporization through operational procedures in which the containers do not remain closed in the storage area, 1910.106(e)(2)(ii)(a) shall be considered to refer to a storage area and determine the permissible quantities as described in paragraph (d)(4). In this instance, Table H-13 shall be used to determine permissible quantities.

3. 1910.106(e)(2)(ii)(b) refers to the amount of flammable or combustible liquids that may be stored in any one fire area, outside of an approved storage room or cabinet in approved containers. OSHIs should use the chart in Appendix A as a quick guide to the classification of common flammable and combustible liquids.
4. 1910.106(e)(2)(iv)(d) is the section which shall be used to cite the employer for failing to use a safety can for transferring flammable and combustible liquids at the point of final use. 1910.106(e)(2)(iv)(d) also allows transfer by means of a device drawing through the top, from a container or portable tanks by gravity through an approved self-closing valve, or through a closed piping. NOTE: 1910.106(d)(2)(i) refers to the size of containers (reference Table H-12) and containers meeting D.O.T. requirements in storage. It does not necessarily require a "safety" can.

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Distribution: OSHA Compliance and WSC Director

Attachments: Appendix A - Classification of Common Flammable and Combustible Liquids

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**APPENDIX A - CLASSIFICATION OF COMMON FLAMMABLE AND COMBUSTIBLE LIQUIDS**

<u>Class 1A</u>	<u>Class 1B</u>	<u>Class 1C</u>	<u>Class II</u>
Acetaldehyde	Acetone	*Amyl Acetate	Diesel Fuel
Amylene (Pentene)	Allyl Alcohol	Banana Oil (Isoamyl Acetate)	Fuel Oils
2-Butyne	Benzene (Benzol)	Butyl Alcohol	Kerosene
1-Chloropropylene	*Butyl Acetate	Isobutyl Alcohol	Stoddard Solvent
2-Chloropropylene	Denatured Alcohol	Methallyl Alcohol	Anchor Type Car Wash
Collodion	*Ethyl Acetate	Methyl Butyl Ketone	Mineral Spirits
Ethylamine	Ethyl Alcohol	Methyl Isobutyl Ketone	Fremont #3042
Ethyl Chloride	Ethyl Butyl Ether	Propyl Alcohol	Jet Fuel
Ethylene Oxide	Gasoline (all)	Styrene	Acetic Acid
Ethyl Ether	Gin (Ethyl Alcohol and water)	Turpentine	
Ethyl Nitride	Heptane	O-Xylene	
Furan	Hexane	Xylol (O-Xylene)	
Isopentane	Isobutyl Acetate		
Isoprene	Isopropyl Alcohol		
Isopropeynl Acetylene	Isopropyl Ether		
Isopropylamine	Methyl Acetate		
Isopropyl Chloride	Methyl Alcohol		
2-Methyl-1-Butene	Methylcyclohexane		
3-Methyl-1-Butene	Methyl Ethyl Ketone (MEK)		
Methyl Ethyl Ether	Methyl Propyl Ketone		
Methyl Formate	Methyl Vinyl Ketone.		
Pentane	Naphtha V. M. & P		
1-Pentene (Amylene)	Octane		
Petroleum Ether	Toluene (Toluol)		
Propylene Oxide	*Toluol		
Vinyl Ethyl Ether			
Vinylidene Chloride			

\*Lacquer thinner is usually made up of various percentages of these liquids.