

Revision Responsibility: Vice President for Business Affairs  
Responsible Executive Officer: Vice President for Business Affairs

Source/Reference: Health & Safety Manual

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## PURPOSE

These steps are taken to both identify hazards present at our campuses while also identifying steps taken to minimize and eliminate exposure.

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## POLICY

### CHAPTER 24 HAZARDOUS MATERIALS

#### 24.01. GASES, VAPORS, FUMES, DUSTS, AND MISTS

##### 24.01.01. General Control Measures

Exposures by inhalation, ingestion, skin absorption, or contact to any material or substance will be avoided or protective equipment will be provided. Feasible administrative or engineering controls such as work rotation, time limitations, process or local exhaust ventilation and/or process isolation, must first be determined and implemented in all cases. In those situations where protective equipment or protective equipment in addition to other measures is used as the method of protecting the employee, such protection must be approved for each specific application by a competent industrial hygienist or other technically qualified source.

##### 24.01.02. Dangerous or Potentially Dangerous Atmospheres

Before employees are initially permitted to enter any confined work space (e.g., tank, underground structure, vat, etc.), the atmosphere within the space to be entered will be tested by a competent person to determine the concentrations of flammable vapors or gases, toxic atmospheric contaminants, and oxygen. If such tests indicate that the atmosphere in the space to be entered contains the following, appropriate control measures will be instituted.

1. A concentration of flammable vapor or gas greater than 10 percent of the lower explosive limit, and/or
2. A concentration of toxic contaminants above the threshold limit value, and/or
3. Less than 6.5 percent oxygen.

Control measures may consist of forced or natural ventilation, use of personal protective equipment, administrative controls, or a combination of these and other effective control techniques. In those circumstances where a man must enter an area before a safe level is achieved, such as setting up ventilation equipment, etc., approved personal protective equipment for the hazards involved will be provided and worn.

In all cases when an employee is stationed outside a compartment tank, or space as a tender for the individuals working inside, the employee will have immediately available for emergency use all necessary personal protective equipment equivalent to that required for the individuals inside. The employee will wear the personal protective equipment if he/she is exposed for prolonged periods which are hazardous to the employee's health. Employees entering a toxic or flammable atmosphere will be provided with and use an adequate, attended lifeline.

#### 24.02. COMBUSTIBLE DUST

Measures for the control of combustible dusts will be provided. Where combustible dust accumulates or is present in suspension in the air, electrical installations and equipment will be suitable for use in atmospheres containing the combustible dust. (i.e., See National Electrical Code - Article 502). Precautions will be taken to minimize the possibility of ignitions by static electrical sparks, through static grounding of machines or equipment, grounded metal comb for belts, humidification or other effective means. Equipment will be made dust tight with minimum interior volume and adequate pressure relief to the outside of the building.

#### 24.03. OXIDIZING AGENTS

Oxidizing agents will be stored only in rooms or buildings of fire resistive construction. They will be separated from supplies of fuels, flammable materials, and acids until the process requires their incorporation. Solutions of oxidizing agents will be placed only in non absorbent and non-combustible containers. Residue in discarded containers will be burned out in the open and the container will not be revised. Spills of oxidizing agents must be cleaned up immediately, and will not be salvaged.

Employees handling oxidizing agents should wear flameproof clothing as minimum protection. The college-provided clothing will be stored in metal containers when it becomes contaminated. College-provided clothing will be laundered frequently to minimize the hazard.

#### 24.04. FLAMMABLE AND COMBUSTIBLE LIQUIDS

##### 24.04.01. Definitions

Per N.F.P.A. 30, Flammable liquids are defined as any liquid having a flash point of below 100 F. and having a vapor pressure not exceeding 40 pounds per square inch (absolute) at 100° F. They are divided into two classes as follows: Class I liquids includes those having flash points below 100° F. and may be subdivided as follows:

1. Class IA includes those having flash points below 73° F. and having a boiling point below 100° F.,
2. Class IB includes those having flash points below 73° F. and having a boiling point at or above 100° F.,
3. Class IC includes those having flash points at or above 73° F and below 100° F., and
4. Class II includes those having flash points at or above 100° F. and below 140° F.
5. Class III includes those with flashpoints at or above 140 deg. F. (60 deg. C.) and below 200 deg. F. (93.3 deg. C).

**Note:** The volatility of liquids increase when artificially heated to temperatures equal to or higher than their flash points.

When so heated Class II and III liquids will be subject to applicable requirements for Class I or II liquids. This code may also be applied to high flash point liquids when so heated even though these same liquids when not heated are outside of their scope.

Combustible liquid means any liquid having a flash point at or above 140° F., and will be known as Class III liquids. Class IIIA includes those having flash points at or above 140° F. and below 200° F. This code does not cover Class IIIB liquids. Where the terms combustible liquids or Class III liquids are used in this code, it means only Class IIIA liquids.

Note: The upper limit of 200° F. is given because the application of this code does not extend to liquids having flash points above 200° F. and should not be construed as indicating that liquids with high flash points are non-combustible.

##### 24.04.02. Sources of Ignition

In locations where flammable vapors may be present precautions will be taken to prevent ignition by eliminating or controlling sources of ignition. All electrical equipment and wiring will be of a type specified by, and will be installed in accordance with the National Electric Code, (i.e., N.F.P.A. 70). To prevent ignition from static electricity, flammable liquids will not be dispensed unless the nozzle and container are electrically interconnected. Smoking will be prohibited except in designated localities. "NO SMOKING" signs will be conspicuously posted where hazard from flammable liquid vapors is normally present. Heating will be by steam or hot water only. Open flames will not be permitted in flammable or combustible liquid storage areas. Hot work such as welding or cutting operations, use of spark-producing tools, and chipping operations will be permitted only under supervision of a responsible individual in charge. The individual in charge will make an inspection of the area to be sure that it is safe for the work to be done and that safety procedures will be followed for the work specified. Additional information on fire prevention and protection as well as specific supervisory responsibilities for safety of hot work is outlined in National Fire Protection Association, Section 51B. This information should be reviewed and applied as applicable.

#### 4.04.03. Storage

Flammable or combustible liquids will be stored in tanks or closed containers, approved for the specific purpose by class of liquid, volume, and location. Reference will be made to the basic code for situations not covered below.

1. Portable Containers - Safety cans will be used as containers for the storage and/or handling of flammable liquids in quantities of 5 gallons or less.
2. Drum Storage - Metal drums acceptable for the interstate shipment of flammable liquids will be used for the storage and/or handling of flammable liquids in quantities of more than 5 gallons but less than 60 gallons.
3. Storage Limitations Outside of Cabinets - Not more than 25 gallons of flammable liquids will be stored outside of a storage cabinet or inside storage rooms.
4. Storage Cabinets - Not more than 60 gallons of flammable liquid will be stored in a storage cabinet.
5. Inside Storage Rooms - Flammable liquids in excess of 60 gallons will be stored outside or in an inside storage room having a fire resistance of at least 1 hour, sills at all openings of at least 4 inches in height, liquid tight floors, electrical equipment, if any, suitable for hazardous locations, a gravity or mechanical exhaust ventilation system, and portable fire extinguishing equipment having a rating of at least 20 B:C.
6. Tank Storage - Storage tanks will be adequately vented to prevent the development of excessive vacuum or pressure as a result of filling, emptying, or atmospheric temperature changes. Emergency venting will be provided that will relieve excessive internal pressure caused by exposure to fires. Special extinguishing equipment will be provided as the need is indicated by the special hazards of operation, dispensing, or storage. Above ground tanks and containers will be protected by drainage, dikes, or walls to prevent accidental discharge of liquid from endangering property. Tank supports will be installed on firm foundations. Tank supports will be of concrete, masonry, or protected steel. Each connection to a tank inside of buildings through which liquid can normally flow will be provided with an internal or an external valve located as close as practical to the shell of the tank. Tanks will be provided with an automatic-closing heat-actuated valve on each withdrawal connection below the liquid level, except for connections used for emergency disposal, to prevent continued flow in the event of fire in the vicinity of the tank. Storage tanks inside of buildings will be permitted only in areas at or above grade which have adequate drainage and are separated from the processing area by construction having a fire resistance rating of at least 2 hours.
7. Container Storage - Storage buildings located less than 50 feet from another building will have the exposing wall blank and of a fire resistance rating of at least 2 hours. The arrangement of storage will comply with the Occupational Safety and Health Act Code of Federal Regulations, Part 1910.106(d). Containers in piles will be separated by pallets or dunnage where necessary to provide stability and to prevent excessive stress on container walls. No pile will be closer than 3 feet to the nearest beam, chord, girder, or other obstructions, fire protection equipment, or fire door. Aisles at least 3 feet in width will be provided where necessary for access to doors, windows, or fire protection equipment.

Storage outside buildings will be in accordance with Table H-16 or H-17, and subdivisions (ii) and (iv) of OSHA Part 1910.106(d) (6)(i) (See Appendix 24.04.03.A.). Storage areas will be protected against tampering or trespassers and will be kept free of weeds, debris, and other combustible materials not necessary to the storage.

At least one portable fire extinguisher having a rating of not less than 12-B units will be located not less than 10 feet, or more than 25 feet, from any flammable liquid storage area.

#### 24.04.04 Handling

Equipment will be designed and arranged to prevent the unintentional escape of liquids and vapors and to minimize the quantity escaping in the event of accidental release. Flammable or combustible liquids will be kept in closed containers when not in use, and transferred into vessels or containers within buildings only through a closed piping system, from safety cans or by means of a device drawing through an approved self-closing valve. Transferring by means of air pressure on the container will be prohibited. Areas in which flammable or combustible liquids are transferred from one tank or container to another will be separated from other operations by at least 25 feet or by construction having a fire resistance of at least 1-hour.

#### 24.04.05. Ventilation

Enclosed buildings will be ventilated at a rate of not less than one cubic foot per minute per square foot of solid floor area. Ventilation will be arranged to include all floor areas and pits where flammable vapors may collect.

#### 24.04.06. Piping Systems

Piping systems will be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibration, expansion, or contraction. Joints will be liquid tight. Piping systems will contain a sufficient number of valves to control properly the flow of liquid in normal operation and in the event of physical damage.

#### 24.04.07. Spillage and Drainage

Where flammable or combustible liquids are used or handled, means will be provided to dispose promptly and safely of leakage or spills. Emergency drainage systems, if connected to public sewer or discharged into public waterways, will be equipped with traps or separators. Portable fire extinguishment and control equipment will be provided in such quantities and types as are needed for the special hazards of operation and storage.

### 24.05. ACIDS, CAUSTICS, AND OTHER HARMFUL SUBSTANCES

#### 24.05.01. Carboys and Drums

Carboys will be provided with inclinators, or the acid will be withdrawn from the carboys by means of pumping without pressure in carboy, or by means of hand operating siphons. Carboys and drums will be stored in a cool, dry place away from the direct rays of the sun and from heat source. Empty carboys will be inverted and drained thoroughly. Carboys containing acids should be elevated from the floor to keep the bottom of the crates dry and prevent them from rotting. Carboys may be stored in tiers not over two high provided the bottoms of the upper row do not touch the glass neck or the wooden hoods of the lower carboys. At least one side of each carboy must be exposed to permit detection

of leakages. Generally, when carboy shipments are received, the stoppers will be loosened carefully and then retightened.

#### 24.05.02. Safety Measures

Face shields, aprons, and rubber gloves will be provided for workers handling acids or caustics. Suitable facilities for quick drenching or flushing of the eyes and body will be provided within 25 feet of the work area and kept accessible for immediate emergency use.

Acid handling buildings should be built of materials not affected by fumes and gases which are produced. Floors should be of acid-resisting material sloped to drains connected with catch basins. Wood and other carbonaceous materials should be limited to a minimum.

### 24.06. COMPRESSED AND/OR LIQUEFIED GASES

#### 24.06.01. Cylinder Storage

Storage rooms should be dry, cool, and well ventilated with enclosures having a fire resistance of at least 1 hour. Where flammable gases are stored, the storage room will have all electrical equipment and wiring installed and maintained in accordance with Article 501 of the National Electrical Code. Cylinders will be grouped by types of gas and the groups segregated as to compatibility. Charged and empty cylinders will not be stored at temperatures above 125° F. in direct sunlight, or subjected to artificially created low temperatures. Oxygen cylinders will be separated from fuel gas cylinders a minimum distance of 20 feet or by a non-combustible partition having a fire resistance of at least 1 hour. Cylinders will not be stored near combustible substances. Cylinders will be properly supported to prevent them from being knocked over. Cylinders should be protected against tampering and damage.

Where removable caps are provided for valve protection, such caps will be kept on cylinders at all times except when cylinders are in use. Cylinder valves will be kept closed except when the cylinder is in active use. Cylinders should be constructed and maintained in accordance with Department of Transportation requirements.

#### 24.06.02. Bulk Storage

Bulk storage containers will be constructed and tested in accordance with appropriate requirements of the American Society of Mechanical Engineers Code, sub-part H or the Federal Register, sub-part C (Department of Transportation) as applicable. Containers will be equipped with safety release devices where applicable (i.e., exception: poison gas, fluorine, etc.).

Bulk storage systems will be located above ground outdoors and at least 50 feet away from combustible structures, or at least 10 feet away from any opening in adjacent walls of fire resistive structures or will be installed in a building of non-combustible construction, adequately vented and used for that purpose exclusively. The location selected will be such that containers and associated equipment will not be exposed by electric power lines or adjacent combustibles. Small quantities of compressed gases may be stored in specially constructed storage areas, see specific gas for limitations.

Permanently installed containers will be provided with substantial non-combustible supports on firm non-combustible foundations. Piping systems will comply with the related requirements outlined previously.

#### 24.06.03. Liquefied Petroleum Gases (Flammable)

Containers and first stage regulating equipment, if used, will be located outside of buildings (i.e., exceptions provided). Each individual container will be located with respect to the nearest important building or group of buildings in accordance with Table H-3 and H-4 OSHA Part 1910.103(c) (See

Appendix 24.04.03.A.). Filling of fuel containers for industrial trucks will be performed outdoors not less than 25 feet from a frame building or wall opening.

#### 24.06.04. Anhydrous Ammonia (Flammable)

Containers will be located outside of buildings or in buildings or sections thereof especially provided for this purpose.

#### 24.06.05. Acetylene (Flammable)

Acetylene will not be generated, piped, or utilized at a pressure in excess of 15 pounds per square inch gage (i.e., 30 pounds per square inch absolute). Acetylene cylinders should be stored and used in an upright position. Quantities of acetylene exceeding 2000 cubic feet will be stored in a special building or separate, specially constructed room, having a fire resistance of at least 1 hour. At least one wall will be an exterior wall.

#### 24.06.06. Hydrogen - Liquefied (Flammable)

The location of liquefied hydrogen storage will be in accordance with Table H-3 and H-4 OSHA Part 1910.103(c) (See Appendix 24.04.03.A.). Special storage rooms will have fire resistance of at least 2 hours. Openings into other parts of the buildings are prohibited. At least one wall will be an exterior wall with explosion venting.

#### 24.06.07. Oxygen - Non-Medical

Oxygen cylinders will be separated from fuel gas cylinders or combustible materials a minimum distance of 20 feet or by a non-combustible barrier at least 5 feet high and having a fire resistance rating of at least 1/2 hour.

#### 24.06.08. Chlorine

Chlorine gas is poisonous, corrosive, and destructive. If not properly handled, it can be both dangerous and extremely hazardous to human beings and property. It is the duty and obligation of every user of chlorine to make certain that all persons having anything to do with it are thoroughly familiar with safe handling procedures.

Cylinders should be stored upright in a separate room, which should be cool, dry, fireproof, and provided with an exhaust fan located near the floor level. Two means of exit, as remote from each other as possible, should be provided from each separate room or building in which chlorine is stored, handled, or used. The use or storage of chlorine below ground level should be avoided, is possible, but when such conditions cannot be avoided, it is essential to provide forced ventilation with the intake located at the floor level. Never store containers near combustible or flammable materials. Keep cylinders away from radiators or steam pipes and other sources of direct heat. Never store containers near turpentine, ether, anhydrous ammonia, finely divided metals, and hydrocarbons, and other flammable materials. Containers should not be stored where they are exposed to continuous dampness. Do not store containers in locations where heavy objects may fall and/or strike them. Never store containers or place leaking containers where the fumes can enter a ventilating system.

Chlorine containers must be handled carefully to guard against accidental discharge of their contents. Valve protection bonnets should always be kept in place except when containers are being emptied. Do not drop containers nor allow them to strike any other object with force. Full and empty chlorine containers should be segregated to avoid confusion in handling. Use containers in the order in which they are received. Never tamper with the safety devices on containers.

Open container valves slowly; using only the special wrench provided by the supplier. One to one-and-one quarter turns of the valve stem in a counter clockwise (i.e., left hand) direction will open the

valve sufficiently to permit maximum discharge. Alteration or repair of containers or valves should never be attempted by the consumer. As soon as containers are empty, close their valves, disconnect, and test for chlorine leakage at the valve outlets. If no leakage is indicated, promptly apply cap nuts to valve outlets and attach valve protection bonnets securely in their proper places. These fittings should always be kept in place except when the container is being emptied.

Canister gas masks of a type approved by the U.S. Bureau of Mines for chlorine service or self-contained oxygen breathing apparatus should always be readily available where chlorine is being stored, transported, or used. Gas masks and emergency kits should be located outside the probable area of contamination so that it will be possible to reach them in case of an emergency. In case of fire, remove chlorine containers from the fire zone immediately. If it is impossible to remove containers from the fire area, notify all firefighting personnel that chlorine containers are in the fire area. Prompt treatment of persons exposed to chlorine is of the utmost importance. **OBTAIN MEDICAL ASSISTANCE AS SOON POSSIBLE.**

#### 24.06.09. Fittings and Connections

Special attention will be directed to special restrictions for certain gases which prohibit the interchange of fittings and hoses. Special threads and connections are designed for specific gases and equipment. Never force connections that do not fit. Threads on regulator connections must be the same as those on the cylinder valve outlet.

### 24.07. SPRAY FINISHING USING FLAMMABLE OR COMBUSTIBLE LIQUIDS, COMBUSTIBLE POWDERS, OR OXIDIZING MATERIALS

#### 24.07.01 Facilities

Spray finishing operations should be separated from other areas by construction having a fire resistance of at least 2 hours and provided with automatic sprinkler protection. Spray finishing operations should be confined to properly constructed spray booths, rooms, or tunnels. Spray booths will be substantially constructed of steel, concrete, or masonry with interior surfaces smooth and continuous without edges and otherwise designed to prevent pocketing of residue and facilitate cleaning. Space within spray booth having a frontal area greater than 9 square feet should be protected with automatic sprinkler. A clear space of at least 3 feet around spray booths will be maintained.

There will be no electrical equipment in any spraying area subject to deposits of combustible residues. Electrical equipment located in spraying area or within 20 feet of a spraying area will be installed and maintained in accordance with Chapter 5 of the National Electrical Code.

All spraying areas will be kept from the accumulation of deposits of combustible residues. Sprinklers protecting spraying areas will be maintained free of deposits. If there are excessive accumulations of residue in booths, ducts, dust discharge points or other spraying areas, then all spraying operations should be discontinued until conditions are corrected.

All spraying areas will be provided with mechanical ventilation adequate to remove flammable vapors or mists to a safe location and to confine and control combustible residues so that life or property is not endangered.

#### 24.07.02 Flammable and Combustible Liquid Storage

The quantity of flammable or combustible liquids kept in the vicinity of spraying operations will not exceed the minimum required for a single shift. Original shipping containers will not be subjected to air pressure for supplying spray nozzles.

### 24.08. SURFACE PREPARATION AND PRESERVATION

#### 24.08.01. Steam Cleaning

All employees within range of the blast will be protected by suitable face shields. Metal parts of the steam gun will be insulated to protect the operator.

#### 24.08.02. Toxic and Flammable Cleaning Solvents

When toxic solvents are used, one or more of the following measures will be employed to safeguard the health of employees exposed to these solutions.

1. The cleaning operation will be completely enclosed to prevent the escape of vapor into the working space,
2. Either natural ventilation or mechanical exhaust ventilation will be used to remove the vapor at the source and to dilute the concentration of vapors in the working space to a concentration which is safe for the entire work period, and/or
3. Employees will be protected against toxic vapors by suitable respiratory protective equipment in accordance with previous requirements and, where necessary, against exposure of skin and eyes to contact with toxic solvents and their vapors by suitable clothing and equipment.

#### 24.08.03 Chemical Paint and Preservative Removers

Employees will be protected against skin contact during the handling and application of chemical paint and preservative removers and will be protected against eye injury by goggles or face shields. Precautions will be taken in accordance with the requirements previously outlined. When using chemical paint and preservative removers which contain volatile and toxic solvent, such as benzol, acetone, and amylacetate, appropriate face and eye protection will be used. When using paint and rust removers containing strong acids or alkalines, employees will be protected by suitable face shields to prevent chemical burns on the face and neck.

#### 24.09. MECHANICAL PAINT REMOVERS

Employees engaged in the removal of paints, preservatives, rusts, or other coatings by means of power tools will be protected against eye injury by goggles or face shields. All employees using portable rotating tools for the removal of paints, preservatives, rusts, or other coatings will be protected by respiratory protective equipment. Flame or heat will not be used to remove soft and greasy preservative coatings.

#### 24.10. DRYING EQUIPMENT

Industrial ovens and furnaces will be safely located and protected from exposure to dip tanks, spray booths, storage or handling of flammable liquids, gases or solids, or exposure to the diffusion of flammable air-vapor mixtures. The use of combined dipping and baking, or spraying and baking units is permissible when adequately ventilated and inter-locked. Ovens will not adjoin recreational areas, lockers, lunchrooms, etc., and will not obstruct means of egress.

Ovens which may contain flammable air-gas mixtures will be equipped with unobstructed relief vents for freely relieving internal explosion pressures. Explosion relief vents should be located so that employees will not be exposed to injury. Ovens in which flammable or toxic vapors are liberated will be mechanically ventilated to outdoor atmosphere regardless of the type of heating equipment involved. All ovens or dryers processing flammable materials, those involving flammable vapors, or heated with combustible fuels, as well as all auxiliary apparatus in close proximity to the oven dryers, will be protected with fuel safety devices, ventilation controls, oven-temperature controls, interlocks, etc., to

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properly safeguard the process. Ovens containing or processing combustible materials will be equipped  
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