

## Fire Prevention and Safety Plan and Fact Sheet

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#### Environmental Health and Safety

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## Purpose

The Arizona State University Fire Prevention and Safety Plan is a document that sets fire safety standards for practices, policies, and procedures to facilitate the university community's ability to conduct safe operations and to ensure regulatory compliance. The purpose of the Plan is to provide standards to safeguard life, health, property, and public welfare by monitoring and controlling the design, construction, quality of materials, occupancy use, location and maintenance of all buildings, and structures within the campus community.

The Plan includes methods designed to protect employees, students, and guests from fire and safety hazards presented by diverse operations conducted at the university and to promote safe practices. The Plan meets the fire prevention and safety requirements outlined in the Arizona Administrative Code, AAC and Occupational Safety and Health Act, OSHA, which encompass the uniform codes and nationally recognized codes and standards. The Plan is to simplify and address the most common fire and safety compliance issues in the above mentioned codes and standards.

## Scope and application

The objective of the Plan is to provide one comprehensive fire prevention and safety document for the campus community to reference in order to ensure safe practices are implemented in each university operation, as well as construction operations and special events conducted on university property or university-related functions on non-university property. The provisions of the Plan apply to construction, alteration, moving, demolition, repair, maintenance and use of any building or structure. The university is a complex environment and warrants a Plan to provide special and specific guidance for public assembly areas, classrooms, laboratories, restaurants, industrial operations, repair shops, and warehouses. University Services Capital Programs Management Group, or CPMG, and Environmental Health and Safety, or EHS, are responsible, along with any architect or engineer, to enforce and comply with all requirements of AAC and OSHA or ensure compliance with the intent of the code. The State Fire Marshal's Office/ASU Fire Marshal's Office is responsible for enforcing all requirements of the International Fire Code—2012 edition (IFC) and the National Fire Protection Association (NFPA).

The Plan applies to all university employees, functions, and affiliations. In addition, the university has the following plans, compliance guidelines, and programs established to protect the university community from health hazards:

- ASU Hazard Communication "Employee Right-To-Know" Program – applies to all employees.
- ASU Chemical Hygiene Plan – applies to employees engaged in the laboratory use of hazardous chemicals.

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- ASU Exposure Control Plan for Bloodborne Pathogens – applies to employees determined to have potential exposure to human blood and other potentially infectious materials as mandated by OSHA.
- ASU EHS Compliance Guidelines.

## Responsibilities

**Environmental Health and Safety** - is responsible for promoting regulatory compliance with AAC and OSHA standards for ASU. EHS will serve as the custodian of all documents required by the Plan, e.g., the 2012 edition and the latest edition/revision of the International Building Code (IBC), International Mechanical Code (IMC), IFC, and NFPA. An organizational chart defining the area of EHS responsibilities along with other EHS information can be obtained by contacting EHS or ASU Fire Marshal.

**University Fire Marshal and Management Staff** - The university fire marshal manages the fire inspection program, plans review program, fire safety training program, special events review, fire/accident investigation, general safety, monitoring the fire protection testing and maintenance programs, hazard mitigation program, Inter Governmental Agreements (IGA), correspondence/liaison with the regulators—State, Federal, and local, and provides consultations and technical support for the university community.

**University Fire/Safety Inspectors** - The university fire/safety inspectors are responsible for conducting regularly scheduled fire and safety audits of every university facility, conduct follow-up inspections, certify fire protection equipment, provide fire/safety training, assist in plans review, and conducts investigations.

**Deans, Directors, and Chairs** - Deans, directors, and chairs are responsible for ensuring that a fire and safety policy and evacuation plan is established for their organization. The fire and safety policy and evacuation plan must be specific to their operation to ensure compliance with the Plan and all applicable codes, as well as ensuring all staff receives adequate fire and safety training.

**Managers and Supervisors** - Managers and supervisors are responsible for ensuring all ASU and department fire and safety policies and evacuation plans are implemented, and all staff is aware and trained on the policies and evacuation plan. The policies and evacuation plan must be specific to their operation and comply with the Plan and all applicable codes.

**Employees** - Employees (any university-paid person, including students) are responsible for understanding the hazards involved with their occupation. They must be familiar with all safety precautions, location and use of fire protection and safety equipment, and know the emergency evacuation plan for their area and be able to demonstrate knowledge of evacuation plan.

## Inspections

Environmental Health and Safety's Fire/Safety Division conducts regularly scheduled inspections of all facilities on and off-campus, as well as special inspections for construction projects, child-care facilities, health-care facilities, and acceptance tests and inspections. Acceptance tests of fire protection systems are jointly inspected and tested by the ASU Fire Marshal's Office. EHS has a database program that maintains all fire safety documentation and reports (e.g., fire/safety inspection report, follow-up inspection reports and incident investigations). Every fire inspection, follow-up inspection, fire drill, test, or incident investigation conducted by EHS will be entered into the database, a report generated, then sent to the appropriate or requested department representative and a hard copy maintained in our building file. Facilities are inspected periodically by scheduling a predetermined number of buildings each month. Each month the buildings are prioritized by the type of occupancy (residential life safety, high occupancy, and high value high rise facilities are of the utmost priority). The occupants are responsible for ensuring that all code and safety issues are addressed appropriately and a response memorandum (providing a status of each line item written on the inspection report) is mailed back to the ASU Fire Marshal's Office prior to the follow-up inspection due date.

Although the jurisdiction resides with the ASU Fire Marshal's Office and the State Fire Marshal's Office, the Local Fire Department may conduct pre-fire planning and familiarization inspections of university facilities. Any safety hazards discovered by the City Fire Department must be directed to the ASU Fire Marshal's Office or the State Fire Marshal's Office.

## Self-inspection program

A self-inspection program is a program designed for the employee to be actively involved in the safety of their area and facility. EHS encourages all departments to have a fire and safety self-inspection program to ensure the facility is safe and that any safety hazards can be identified and mitigated appropriately. If you are interested in starting a self-inspection program please contact the ASU Fire Marshal. If you start this program, it is highly recommended to conduct monthly inspections of your area of responsibility. A copy of the completed inspection form should be mailed to the University Fire Marshal, mail code 6412, scanned and send via email to [asufire@asu.edu](mailto:asufire@asu.edu), or faxed to 480-965-0736.

## Unsafe buildings or structures

Any building or structure or portion of a building or structure that is structurally unsafe, not provided with adequate egress, constitutes a fire hazard or identified as dangerous to human life is prohibited for use or occupancy and declared a public nuisance. Any building or area of a building that are declared to be a public nuisance must be abated by repair, rehabilitation, or removal in accordance with the procedures set forth in the International Code for the Abatement of Dangerous Buildings.

The definition of what may constitute as unsafe use is when a building or area of a building creates a hazard to safety, health, or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard, disaster, damage, or abandonment.

## Violations

It is unlawful for any person, department, unit, organization, or corporation to erect, construct, enlarge, alter, repair, move, improve, convert, demolish, equip, use, occupy, or maintain any building or structure or cause or permit a violation of any applicable codes or standards.

## Modifications

When there are practical difficulties involved in carrying out the provisions of this document or any other applicable codes or standards—EHS, CPMG, and the ASU Fire Marshal's Office may grant modifications for individual cases, as long as the intent and purpose of the code is maintained and stipulations are adhered to. Modifications cannot lessen any fire-protection requirements or structural integrity. Any variation to the code must be documented and maintained in the facility or project file of ASU EHS, and University Services. Variances to the IFC or IBC must be submitted and approved by the ASU Fire Marshal's Office prior to construction phase.

## Plans review process

The university must comply with applicable building and fire codes for temporary and permanent changes of a building, area of a building, or temporary structure. Capital Programs Management Policy, Application Building and Remodeling Permits and Inspections, and Floor Covering Permit Standards and Procedures ensures the appropriate departments review proposed remodel and construction projects and compliance issues. It is the responsibility of each department or unit to ensure this permit process is accomplished and approved prior to engaging in any remodel or construction project. However, it is important to know all code issues cannot be assured in plans review, thus the reason inspections are performed to help ensure remodels and construction projects are compliant with applicable codes as well as to ensure that the project is accomplished in a safe manner.

## Certificate of occupancy

No building or portion of a building will be used or occupied without being issued a Certificate of Occupancy by CPMG's Building Official or designated Inspectors – for construction/renovation facilities – or Fire/Safety Inspection Report from the ASU Fire Marshal's Office or by EHS – for any instances other than construction/ renovation related.

Changes in use of a building must be approved by EHS, ASU Fire Marshal's Office, CPMG and Facilities Management.

A temporary Certificate of Occupancy may be granted—provided all life safety systems required are certified operational by the Fire Marshal's Office and there are no substantial hazards that will result from occupancy of any building or portion thereof before the same project is completed.

## **Building and area use – type of occupancy**

Buildings and areas within buildings are specifically designed to meet the requirements of a certain type of occupancy. Requirements of a code or standard are implemented once an occupancy type has been established. Occupancy types are classified by a group and division. Refer to the IBC or IFC for division breakdown.

Each occupancy group has specific construction requirements and life safety system requirements that must be met and maintained. It is important that the occupancy use of an area or building maintains both the construction and life safety criteria and to submit for approval any occupancy changes to EHS and CPMG to ensure regulatory compliance and to ensure a safe environment is maintained for the university community.

## **Occupant load**

Occupant loads of a building, an area, or portion of a building are established and enforced to ensure accessibility, building security, and to accommodate safe egress from a building, an area, or portion of a building. An occupant load is determined after establishing the occupancy use and the contents of the building or area of the building.

Most assembly areas on campus have the occupant load posted at the entrance of the area or the occupant load is established by the number of fixed seats in the area. The occupant load is calculated by dividing the usable square footage floor space by an occupant load factor. The occupant load factor is determined by the occupancy use. It is important to ensure that the occupant load is established and enforced for accommodating safe egress of occupants. The IBC and IFC provide the minimum egress requirements and the maximum occupant load criteria/calculations; however, the IBC or IFC may have other requirements that are more restrictive.

It is the responsibility of each department, organization, or group to ensure that minimum egress requirements are established and enforced. EHS assists the university community in establishing occupant load limits to ensure egress of occupants are adequately accommodated.

## **Guardrails**

Guardrails are required for unenclosed floor and roof openings, open and glazed sides of stairways, landings and ramps, balconies or porches which are more than 30 inches above grade or floor below, and roofs used for other than service of the building. Some exceptions include the loading side of loading docks, the auditorium side of a stage, and along vehicle service pits not accessible to the public. Guardrails must not be less than 42 inches in height and have intermediate rails or an ornamental pattern such that a sphere 4 inches in diameter cannot pass through. For employee areas only, guardrails are required with a top and mid rail but the 4 inch rule does not apply. For more specific requirements and exceptions, see IBC Section 1024 and occupational safety and health standards.

## Exit

The term exit is defined in IBC as a continuous and unobstructed means of egress to a public way and will include intervening aisles, doors, doorways, gates, corridors, exterior exit balconies, ramps, stairways, pressurized enclosures, horizontal exits, exit passageways, exit courts and yards. Basically, the exit includes any occupied area of a building continuing on until the occupant safely exits the building.

Exits must be maintained as a safe system for egress. In addition, exits must be maintained as a safe area for rescue assistance for the physically challenged in above or below grade levels. The most common safety hazard is within the corridor. The fire code restricts the use, storage, or display of any combustible material within a corridor unless it is shielded with a transparent noncombustible material or fire retardant treated, and does not obstruct the required exit width. Contact EHS for information concerning ASU Fire Marshal's Office directives or exceptions.

It is the responsibility of each department, organization, or group to ensure that the "exit" is continuous and unobstructed, as well as ensuring compliance of fire code issues. Authorization of any type of storage or use of any "exit" can be temporarily approved by submitting a request to the ASU Fire Marshal's Office. Level of fire protection, construction type, occupancy type, and occupant loads are some factors that are assessed before any variation or authorization is granted.

The specifics on exit width and height, travel distances to an exit discharge, separation requirements, and aisle requirements are provided in IBC and IFC, Means of Egress. Determining the exit widths and fire protection requirements depend on the construction type, type of occupancy, occupant load, type of seating, type of fire detection and suppression that exists in the building, and the longevity of the occupancy type.

## Seating and aisle spacing

There are many variables in determining seating arrangements: the number of seats in a row, the number of rows in a section, spacing requirements between seating, spacing of aisles, and spacing of cross aisles. To ensure compliance of IBC and assist departments and organizations



with seating and aisle requirements, EHS is providing the following guidelines that will comply with most situations for public assembly areas.

- Accommodations for Americans with Disabilities Act (ADA) must be adequately addressed. Contact Affirmative Action for compliance information relating to ADA.
- All loose seating (e.g., folding chairs) must be braced together as one row, in a manner that will keep the row together during an emergency egress.
- Chair seating must be a minimum of 33 inches from back to back
- Dead-end vertical aisles for temporary seating must not exceed 26 rows.
- Minimum aisle space between rows will be between 4-8 feet, depending on the type of event, arrangement of seating, and occupant loads.
- The most protruding back part of a row must not be any closer than 22 inches from the most protruding front part of the row behind it.
- Travel distance to an exit must not exceed 150 feet for non-sprinkled buildings and 200 feet for sprinkled buildings (other conditions could increase the travel distance to a maximum of 300 feet).

If you are not able to comply with every item above, contact the University Fire Marshal's Office for further information and approval of alternate seating and aisle accommodations.

## **Fire alarm systems and suppression systems**

All university facilities are required to have, at minimum, a manual fire alarm system and all systems must be wired as a Class "A" system (exception: an approved variance by the ASU Fire Marshal). Determining the requirements of fire protection systems depends mostly on the occupancy type and type of construction. See the IBC and IFC for specific requirements for fire alarm systems and fire-extinguishing systems, and NFPA for specific installation requirements.

Halon Systems, Halon Alternative Systems, Carbon Dioxide Systems, and Dry or Wet Chemical Systems are special suppression systems and they must be maintained in accordance with NFPA Standards. All special systems are required to be tested semiannually by NAFED or other nationally recognized authorized and trained personnel (may require ASU Fire Marshal review and approval). It is the responsibility of the user group to ensure that all special systems are maintained and tested in accordance with NFPA. The user group must maintain the maintenance and testing documents for a minimum of five years and forward copies to ASU EHS.

## **Standpipes**

Standpipe systems may be required in facilities to accommodate fire department suppression activities (standpipes can be wet or dry systems). The following are the three classifications of standpipes which include the City of Tempe Fire Department's specification requirements for



standpipes (note: the City of Tempe and City of Phoenix have requirements that are different than national standard treat):

- Class I standpipe: A system with 2 ½ inch outlets.
- Class II standpipe: A system with 1 ½ inch outlets equipped with fire hose connected to a water supply.
- Class III standpipe: A system with a 2 ½ inch outlet or 1 ½ and 2 ½ inch outlets directly connected to a water supply and equipped with fire hose on the 1 ½ outlets.

Note: As per variance approval by the State Fire Marshal, fire hose may be removed once obsolete, replacement required, or testing required as long as stipulations in the variance are assured.

## **Fire extinguishers**

An accessible travel distance to an appropriate fire extinguisher is required for all areas of operation, while maximum travel distance depends on the nature of the occupancy. Hazardous occupancies must have an accessible fire extinguisher within 30 or 50 feet based on the occupancy/hazard. Non-hazardous areas must have an accessible fire extinguisher within 75 feet. Travel distance cannot include locked doors or changes in elevation.

The following are five classes of fires that any person should be aware of in order to select the proper fire extinguisher for capability of extinguishment.

- Class A: Wood, Paper, Plastic, or any other ordinary combustibles.
- Class B: Combustible and Flammable Liquids.
- Class C: Energized Electrical Equipment. Usually a Class A or B once electrical equipment is de-energized.
- Class D: Combustible and Flammable Metals.
- Class K: Kitchen Hood Suppression Systems and Fire Extinguishers Using K Products.

To minimize the confusion of selecting the appropriate fire extinguisher on campus, the university has installed multipurpose dry chemical (ABC rated) fire extinguishers in all areas requiring a fire extinguisher with the exception of the following areas:

- Equipment, Mechanical, and Electrical Rooms require Class BC rated dry chemical fire extinguishers.
- Kitchens with commercial hoods require Class BC rated dry chemical fire extinguishers or Class K, depending on the hood system.
- Special hazard areas requiring a Class D fire extinguisher. Quantity of hazard dictates the need of a class D fire extinguisher.

The university is required by OSHA to offer fire extinguisher training classes to all employees. Training classes are offered through Employee Development on a regular basis but special

department classes can be set up by calling the EHS Instructional Coordinator at 480-965-1823 or contact the ASU Fire Marshal at the same number.

Some department operations on campus are more likely to have a fire or incident occur. For this reason, EHS recommends that all employees that work within the following areas should attend a fire extinguisher training class which provides hand-on training:

- High risk areas, welding, use of open flames, hazardous chemicals, flammable and combustible liquids and gases, or have an increased probability of fire.

## Campus mall use

Campus malls are designed for pedestrian traffic but must accommodate authorized vehicle traffic. Authorized vehicles are ASU service vehicles, approved vendors, and emergency vehicles. Temporary approval may be granted for special events provided they do not obstruct emergency vehicle access per IFC specifications with Local Fire Department or LFD adjustments. All drivers using the malls must park their vehicles in a manner that will maintain a minimum mall access width of 24 feet, 26 feet if fire hydrants are on both sides of the mall or areas a ladder truck is needed for setup for emergencies, and a minimum height clearance of 14 feet per IFC and LFD requirements. All sides of university buildings must be accessible for emergency response vehicles/personnel within 150 feet or less.

All building exit doors, especially the main entry/exit, must be clear of any vehicles. Whenever possible, service vehicles should park in the service vehicle parking space, the nearest road, or nearest loading zone parking space.

## Evacuation procedures

There is an evacuation plan template that can be obtained through the Department of Risk Emergency Management. Each facility on campus should have an emergency evacuation plan and procedures in addition to business continuity plans. The evacuation plan and procedures should be developed and implemented with a collaborated effort by the department and building occupants. Some key items that must be in the evacuation plan are as follows:

### Address issues related to evacuation of physically challenged

- Clearly identify responsibilities of occupants to assist in evacuation procedures (activation of building fire alarm system, call 911, provide any information pertaining to the fire or emergency to the emergency responders).
- Designate safe area to reassemble.
- Establish accountability procedures and responsibility.
- Evacuation procedures (emergency notification protocol and evacuation plan).
- General Safety precautions (closing doors, understanding and use of life safety protection equipment—including fire extinguishers).
- Responsibilities of advising the on-scene emergency responder of vital information related to the emergency.

**Other issues to consider when developing an emergency evacuation plan are as follows:**

- Alternative reassemble areas for accountability.
- Coordination with all Occupants.
- Number of Exits.
- Occupant Load.
- Type of Construction and Height of Facility.
- Type of Fire Protection Systems.
- Types of Exits and Travel Distance to each Exit.

For assistance in developing and implementing an evacuation plan contact the Emergency Manager or designated assistant at 480-965-1914 or 8651.

## **General safety**

Safety precautions and prohibitions are necessary to ensure a safe environment for employees, visitors, and for the occupants that live and work in residential facilities. EHS and the ASU Fire Marshal's Office prohibit the following items or practices on state property:

- Battery charging inside buildings. An exception: batteries that are completely sealed and do not emit any gases while recharging or when authorized by EHS and the ASU Fire Marshal's Office.
- Bicycles, skateboard, smart boards, scooters, and non-ADA nonpedestrian manual or motorized modes of transportation in public/ASU buildings.
- Candles or Open Burning – approvals through an ASU Fire Marshal's Office Special Event Permit Submittal will be required.
- Obstructing, tampering with, or misusing fire detection and fire suppression systems and their devices.
- Smoking is prohibited on ASU property by policy but fire code restricts any open flames or smoking due to hazardous chemicals or materials use, storage, handling, or dispensing, including perimeter of campus properties.
- Storage in corridors and stairways, within 18 inches of fire sprinkler heads or within 24 inches from ceiling on non-fire sprinkled buildings, within 24 inches of smoke or heat detectors, in mechanical rooms, electrical rooms, and exits. Only temporary authorization can be approved by the ASU Fire Marshal's Office.
- Storage of Class I Liquids in basements – Fire Marshal review and approval is required.
- Trees or any other vegetation that is no longer living.
- fronds—exceptions: flowers as long as maintained fresh per florist's recommendations)
- Use of extension cords. See electric safety section for authorized use and specifications of extension cords.
- Vehicles or any gas powered equipment used or stored inside buildings An exception: temporary approval may be granted by the ASU Fire Marshal's Office for special events.

- Any modification to a building or area of a building without a permit issued by Facilities Management or CPMG – permits must be reviewed by EHS.
- Storage of any items near any heat sources For example – lamps, transformers, heaters, generators, motors, etc.
- Fireworks or Pyrotechnics without the official approval of the ASU Fire Marshal.
- Unauthorized use of halogen lamps or other lamps/bulbs that generate extreme heat.

For general safety guidelines for vendors, holiday, or special occasion decorations or displays and special events, see the appropriate areas in this Plan, university policies, and compliance guidelines or request for related information from EHS or the Fire Marshal.

## **Electrical safety**

To ensure that electrical work in buildings is installed in accordance with the National Electric Code, or NEC, and to protect the university and the university community, only journeyman electricians and licensed/bonded contractors are authorized to perform electrical work on campus buildings and equipment.

Any electrical equipment or outlets that are near a water source or exposed to outside weather conditions must be on a Ground Fault Circuit Interrupter, or GFCI system to prevent shock and comply with NEC.

All electrical equipment and appliances must be tested and approved for use by a nationally recognized testing laboratory, i.e., Underwriters Laboratory or UL, Factory Mutual or FM. It is the user's responsibility to ensure that all electrical equipment and appliances are approved by a nationally recognized testing laboratory, inspected prior to use for any damage, repaired or discarded if damaged, and that equipment and appliances are used as recommended by the manufacturer.

The university has general safety requirements for use of electrical equipment or devices in university buildings and prohibits the use of any electrical equipment or devices that are not in compliance university policies, building/fire code and the national electric code.

- Extension or flexible cord specifications, temporary use only:
  - Minimum of 16 gauge with ground, which are three pronged male end.
  - The cord and both ends, male and female, must be intact with no damage--fraying or exposed wiring.
    - Devices or extension cords that increase outlet capacity – only surge protectors with individual circuit breakers are authorized.
    - Only use extension cords or electrical cords in the same room/area – prohibited for use through walls, doorways, ceilings, floors or running under carpets.
    - Use of extension cords for permanent wiring. Extension cords are for temporary use and must meet the specifications above; limit use to 90 days or less.

## Storage

Storage is a necessity for day-to-day operations; however, improper storage and unauthorized storage creates a fire hazard and may violate fire code. All building occupants must observe and comply with the following in regards to storage:

- A minimum of 18 inches clearance from the deflector of a fire sprinkler head is maintained and a minimum of 24 inches from the ceiling of non-fire sprinkled buildings.
- Bicycles, skateboard, smart boards, scooters, and non-ADA nonpedestrian manual or motorized modes of transportation are prohibited in public/ASU buildings or any place that obstructs egress from a building or area of a building.
- Ensure appropriate aisle width and head clearance is maintained.
- Excessive amounts of combustible materials, storage, or debris must not be permitted to accumulate in the building.
- Loose papers, magazines, books, or files must be either put into boxes, stored in filing cabinets, or stacked in an organized manner on shelves.
- Loose storage must be kept off floors.
- Storage must be maintained in an orderly manner.
- Storage of any chemicals, flammables, combustibles (liquids, solids, or gases) must be approved and permitted by EHS and ASU Fire Marshal.
- Storage of any material must not obstruct an exit (see exit definition under Exit section), obstruct any fire protection equipment or devices, or obstruct the view of exit signs.
- Storage of Class I Liquids or any other materials that create a toxic or flammable hazard where the material's vapor density is heavier than air is prohibited in basements.
- Storage under stairways is prohibited. Variances must be reviewed and approved by the ASU Fire Marshal.

Combustible materials must be segregated from flammable and oxidizing materials. Any chemical, flammable, or combustible material must be separated and stored, when required, in approved cabinets. (See safe handling and storage of peroxides below).

## Flammable and combustible liquids

Flammable and combustible liquids require special consideration for storage, handling, and dispensing. Some key issues important for compliance and protection to human health are as follows:

All areas must comply with the exempt amounts in the IBC and IFC tables or special conditions of a controlled area – variances must be approved by the ASU Fire Marshal's Office.

- All areas storing, handling, or dispensing Class I Liquids must comply with storage requirements set forth in IFC and comply with electrical requirements of the NEC.
- All Class I liquids must be stored in grade level or above locations. Not permitted

in basements or below grade level locations without ASU Fire Marshal review and approval.

- Spill control, drainage control, and secondary containment. All buildings, rooms, and areas must provide a means to control spillage and to contain or drain spillage and fire-protection water in accordance with IBC and IFC.

All Class I and II liquids require storage within an appropriate cabinet, flammable or combustible. Class III liquids may require storage within an appropriate cabinet, while the decision is based on the quantity, hazards within the area, type of occupancy, and factors involved with mixed occupancies. Exception: Groups A, B, E, F, I, M, R, and S Occupancies, the combined total quantities of flammable and combustible liquids used for demonstration, treatment and laboratory work not exceeding 10 gallons (37.85 L) may be authorized without cabinets but must be in approved locations.

Occupancy quantity limits of stored flammable or combustible liquids must not exceed the following:

- Quantities in Group A, B, E, F, I, M, and S Occupancies must not exceed amounts necessary for demonstration, treatment, laboratory work, maintenance purposes, and operation of equipment and must not exceed quantities set forth in IFC.
- Quantities in Group R Occupancies must not exceed amounts necessary for maintenance purposes and operation of equipment and must not exceed quantities set forth in IFC.

## Bonding and grounding

Static protection is necessary in order to prevent a fire or explosion from occurring. Bonding and grounding is a necessary precaution and required when dispensing any Class I, II, and III-A Liquids. The basic concept is ensuring that two or more items where a transfer of a liquid will occur must be connected to the ground and to each other. More specific requirements are in IFC or contact the University Fire Marshal.

## Special events

Special events are defined as any event that is not of normal occurrence and involves the public. All special events on university property or involving university personnel must have an ASU event coordinator submit a request to EHS to review, approve, and provide recommendations to address any code issues, safety issues, and insurance issue.

In every submitted request, EHS requires the following information at least 30 calendar days prior to the event, see [permit request form](#):

- A copy of the certificate of insurance identifying ASU, Arizona Board of Regents, and the State of Arizona as additionally insured. Minimum coverage is determined by the

Environmental Health and Safety Insurance Coordinator and any contracts that may be involved with the event.

- A layout plan of the event.
- Dates and times of the event.
- Location of the event.
- Name, title, and contact telephone numbers of the event coordinator/s – home, work, cellular telephone numbers and pager numbers.
- Number of people expected.
- Number of vehicles expected – a permit may be required to park vehicles on campus. Contact ASU Parking and Transit Services for more information.
- Special equipment to be used. For example, cooking and lighting equipment, powered or motorized equipment, etc.
- Special hazards For example – open flames, flammable and combustible liquids and gases, fireworks, pyrotechnics, etc. For minimum mortar separation distances see IFC.
- Type and purpose of the event.
- Type and size of any temporary structures – will require a certificate of fireproofing, see IFC for more details.

All requests will be reviewed for safety and fire code compliance and the event coordinator will be contacted with an approval, rejection, or special condition approval with stipulations to meet the intent of applicable codes.

## Permits

Permits are required by Environmental Health and Safety for the following:

- Any condition, operation, or use of materials considered being hazardous, dangerous, or unsafe.
- Fireworks or Pyrotechnics.
- Hot Work Operations in confined spaces requires a [confined space permit](#). Hot work must comply with [EHS102](#) and [Hot Work Compliance Guidelines](#).
- Laboratories, research, and other similar buildings or areas within buildings, must have permits to operate, store, and use hazardous chemicals—this is permitted through an Environmental Health and Safety certification program called Laboratory Management Information System.
- Open flames or open burning.
- Special Events.
- Storage of chemicals over the UBC/UFC exempt amounts or if considered a controlled area.



## Safe handling and storage of peroxides and peroxide forming chemicals

### Background

Peroxides are compounds containing O-O bonds with an oxidation state of  $-1$ . Hydrogen peroxide ( $H_2O_2$ ) and its organic peroxide derivatives are intrinsically unstable substances that spontaneously decompose under normal conditions. Special precautions must be taken when using peroxides due to their explosive nature and sensitivity to shock, friction, sparks, and heat.

Alkali (group IA) and alkaline (group IIA) metals combine with oxygen to produce metallic peroxides. They are primarily oxidizer hazards; however, metallic peroxides are also water reactive compounds. Metallic peroxides decompose when heated to form oxygen, which supports combustion.

### Hazard awareness and recognition

Common compounds known to form peroxides include, but are not limited to the following:

- Aldehydes.
- Alkali and alkaline metals.
- Compounds containing allylic hydrogens, including most alkenes, cyclohexene, cyclooctane.
- Compounds containing benzylic hydrogen atoms, particularly if the hydrogen is on a tertiary carbon such as isopropylbenzene.
- Ethers, especially cyclic ether and those containing primary and secondary alkyl groups, including dioxane, tetrahydrofuran, diisopropyl ether.
- Vinyl and vinylidene compounds, such as vinyl acetate.

### Storage

Organo-peroxides should be isolated from all other compounds, especially flammables and combustibles. Ideally, they should be stored away from heat, ignition sources, and light in a temperature-regulated, ventilated cabinet. Due to their unstable nature, peroxides should never be stored in bulk unless extremely diluted. Polyethylene bottles are recommended for storing peroxides and superoxides, and should be capped to release oxygen gas. Metallic peroxides should always be protected from moisture.

Peroxides and peroxide forming compounds have a limited shelf life and should be purchased in small quantities. Each container should be labeled with the date of receipt and the date first opened; however, containers of ether should never be stored for more than twelve months, even if the bottle has never been opened.

### Handling

Containers of peroxide forming compounds should be handled with care or not handled at all if any of the following pertain: it is of uncertain age, has formed a precipitate, or its physical properties (color, appearance) differ from those of the pure substance.

Some of the most commonly available organic-peroxides are toxic by inhalation, ingestion, and skin absorption, and almost all are eye irritants. Always consult the accompanying material safety data sheet (MSDS) prior to handling any chemical.

## Testing and stabilizing

Once a sealed container of a peroxide forming compound is opened, the risk of peroxide formation is inevitable; however, some manufacturers add oxidation inhibitors, such as hydroquinone, to some peroxide forming chemicals. To prevent the decomposition of most forms of hydrogen peroxides, regardless of their concentration, a small amount of sodium pyrophosphate can be used as a stabilizer. This will only slow down the rate of decomposition but will not prevent it.

Several testing methods for the presence of peroxides are acceptable. For guidance, please contact EHS. Test strips for the detection of peroxides are also commercially available.

## Disposal

Please contact the EHS Hazardous Waste Unit for the disposal of all chemicals at 480-965-0647.

## Lamps and light bulb hazards

The United States Consumer Product Safety Commission has solicited an advisory concerning fires related to lamps, specifically halogen lamps. The NFPA provided EHS with information on fires, injuries and fatalities related to lamps and light bulbs. The leading cause of these fires was combustible material located too close to the heat source, which accounted for roughly one-third of the lamp and light bulb fires.

The following safety tips are recommended practices for the university community to ensure a safer community and help preserve life and property:

- Any damage, loose wiring, or any other potential safety hazard must be repaired by a qualified person or the appliance discarded.
- Check for loose connections.
- Do not place cloth over a light bulb to diffuse or soften the light. Buying low wattage or soft white or pastel light bulbs can help you achieve this effect without creating a fire hazard.
- Due to the higher heat emitting concerns of halogen lamps, EHS recommends if utilizing halogen lamps to have covered bulbs, or replace halogen lamps with 60 watt incandescent lamps. Exception: exterior security lighting or in open foyers of buildings where exposure to combustible material is not present.
- Keep combustible materials away from lamps and light bulbs, such as piling linens too near a bulb. Nothing should be stacked, rested against, or placed on top of a lamp.
- Make sure the lamp cord is protected by an insulated bushing or grommet where the power cord enters the lamp to prevent abrasion.
- Purchase lamps that have been listed by a recognized testing laboratory such as Underwriters Laboratory or UL.
- Read and follow the recommended use and safety precautions recommended by the manufacturer.
- Use only light bulbs equal to or less than that for which the light fixture is rated. (Using a higher rated bulb can cause overheating and deterioration of the conductor insulation as well as an ignition source to nearby combustibles). EHS recommends using 60 watt or less light bulbs but not to exceed the appliance capacity.
- Wall lamps should not be set too near curtains, furniture, or any other material including other walls.

Remember: Lamps and light bulbs themselves do not cause fires but improper use or unsafe practices do!

If you have any questions or need more information, please contact EHS ASU Fire Marshal.

## Fire prevention, protection and safety – fact sheet

### Introduction

There have been many studies related to injuries, deaths and property loss due to fire which has introduced many life safety improvements through advance technology and research. Although the United States is one of the most technologically advanced nations we continue to experience a higher life and property loss than most nations. The universities and colleges in the United States are no exception, especially the residential facilities – dormitories, sororities, fraternities, and individual housing units. Environmental Health and Safety, ASU Services Departments, State Fire Marshal's Office and Municipalities – Building and Fire Departments/Development Services – constantly collaborates, evaluates and plans life safety improvements for existing facilities and new construction.

Occupants should be aware of the fire protection features of their building and be careful not to undermine their purpose. Occupants should also practice fire safe behaviors by identifying hazards specific to their area and use the appropriate preventative measures. When a fire occurs, the campus fire emergency policy should be enacted. Life safety is the primary objective of all ASU fire protection programs.

### Applicable ASU policies

- EHS 201 - Electrical Safety
- EHS 202 - Decorations and Displays
- EHS 204 - Facility Safety and Occupancy Limits
- EHS 205 - Storage and Hazardous Chemicals

### Applicable ASU guidelines

- EHS Fire Prevention and Safety Plan

### Applicable regulations

- International Fire Code
- National Fire Protection Association (NFPA) Standards
- 29 CFR 1910.37 - Means of Egress
- 29 CFR 1910.38 - Employee Emergency and Fire Prevention Plans
- 29 CFR 1910.101 - Hazardous Materials
- 29 CFR 1910.106 - Flammable and Combustible Liquids
- 29 CFR 1910.157 - Portable Fire Extinguishers
- 29 CFR 1910.159 - Automatic Sprinkler Systems

### Summary of requirements

## Life safety features in campus buildings

Every building provides exits sufficient to permit the prompt escape of occupants in case of a fire or other emergency. Exits are marked by visible signs and illuminating EXIT signs where required. Keep exit doors and signs clear of obstructions and maintain the minimum required width of 44 inches for public access to exit doors. The required exit access may be more than 44 inches depending on the occupant load and the configuration of the space. Enclosed stairways provide safe passage to the outside in the event of an emergency. Keep stair doors closed to prevent the spread of fire and smoke and keep stairwells clear of storage. The exit system – corridors, passageways, stairways, and exit doors – must be free of any combustible or hazardous materials and must be maintained unobstructed.

Most campus buildings are equipped with a fire alarm that can be activated by manual pull stations, smoke detectors, heat detectors, beam detectors, duct detectors, and fire sprinklers. Keep all fire alarm devices free of obstructions. When activated, the alarm sounds throughout the building to initiate evacuation of building occupants and will also send a message to a dispatch center via telephone line or fiber optics – usually ASU Police Department Dispatch. In order to provide the designed fire protection, occupants must ensure a minimum of 18 inches of space beneath the fire sprinkler's deflector. Seek advice from EHS when erecting partitions in a fire sprinkler or fire detection protected space because the new wall may interfere with sprinkler and/or fire alarm coverage.

## Fire prevention measures

Electricity is the most common utility/energy source for heating, cooling, cooking, and generating electrical power distribution in most buildings today. As the most common energy source, electricity became the most commonly encountered hazard to life and one of the most common causes of fire. Make sure that the electrical equipment and appliances in your area are Underwriters Laboratory or UL listed and are used according to the manufacturers' recommendations as well as per fire code and electrical code. The use of makeshift electrical equipment is not permitted except in experimental laboratories when its use is crucial to the research or work being conducted; the lab employees are qualified and the laboratory is designed in a manner to prevent undo exposure or damage to life and property. All circuits should have over current protection. Whenever a damaged appliance or power cord is found, it must be immediately placed out of service and/or repaired by qualified electricians.

Flammable liquids create a severe fire and explosion hazard. Flammables must be kept in approved sealed containers and stored in flammable liquid storage cabinets or approved storage rooms. Refrigerators used for flammable storage must be manufactured for that purpose and labeled as such on the front of the door. Take out from storage only the amount needed for the day. Eliminate sources of ignition when using flammables; including, static electricity, friction and heat exposure.

Open flames must always be attended, whether in a laboratory, kitchen or shop area. Keep open flames away from combustible and flammable materials. Comply with EHS "Hot Works

Operation" guidelines when working with open flames outside of designated laboratories or shop areas.

Good housekeeping is always an important safety measure. Discard combustible waste as soon as possible. Accumulations of paper products and upholstered furnishings are attractive targets of malicious fire setting.

## **Emergency procedures**

A fire emergency exists when there is: uncontrolled fire, the presence or the odor of smoke, or an uncontrolled release of a toxic gas or a flammable liquid spill. When such an emergency is discovered, the following must be ensured by the occupants:

1. Pull the building fire alarm, unless the alarm is already sounding.
2. Shut off equipment in the immediate area and close each door exiting through if safe to do so.
3. Leave the building and assemble at a safe distance away from the building.
4. Call 911. Use any campus phone, pay phone or campus emergency phone to advise the ASU Police Department Dispatch of the fire emergency and any pertinent information you can provide or questions the dispatcher may ask you. Cell phones can be used but if the cell phone is a non-GPS phone you must advise upon 911 being answered your location is on ASU campus—specify the campus.

Be available to assist emergency responders and provide any information about operations in your area.

The use of fire extinguishers is not required by any building occupant or campus employee and is not recommended for those who have not received training.

## **Recordkeeping**

EHS maintains records of all life safety inspections, building evacuation drills, and training conducted by EHS as well as request for our files any documentation related to life safety inspections, building evacuation drills, and training performed by other organizations, vendors, or consultants.

## **Reporting**

Call 911 to report all fires, even fires found extinguished.

Call the Department of Facilities Management Service Center at 480–965–3633 or call EHS at 480–965–1823 to report life safety equipment that needs service. This includes missing or burned out EXIT signs, missing or discharged fire extinguishers, fire doors that do not completely self-close and latch and any damaged or malfunctioning fire alarm or sprinkler system.

### **Training**

EHS provides fire safety, evacuation, and emergency preparedness training to campus groups upon request. Call EHS at 480–965–1823 or review our website to request brochures, training or to borrow fire safety videos.