

## **115300 Laboratory Equipment**

### **Sections Included In This Standard:**

- 1.1 Fixed Laboratory Desks and Stations
- 1.2 Lab Sinks
- 1.3 Fume Hoods
- 1.4 Emergency Safety Showers and Eye Wash Stations
- 1.5 Flammable Storage Cabinets
- 1.6 Chemical Storage Cabinets
- 1.7 Compressed Gas Cylinder Storage

### **1.1 FIXED LABORATORY DESKS AND STATIONS**

When areas with fixed or built-in seating or tables are provided within laboratories, at least 5%, but not less than one, of the fixed or built-in seating or tables shall comply with the Florida Accessibility Code for Building Construction (Chapter 11, Florida Building Code.) It is preferred that all fixed desks, seating areas or tables within laboratories are compliant. Preferred designs for fixed lab desks and stations are shown on Drawings 11600-A and 11600-B at the end of this section. All other designs shall need to be approved by the University ADA Office prior to installation.

### **1.2 LAB SINKS**

For labs with lab sinks, at least one sink shall be accessible. Due to the nature of lab sinks, it may not be possible to have leg clearance under the sink. Instead, the sink should be installed in a base cabinet no higher than 34" tall. Controls shall be within side approach reach range. There should also be sufficient clear floor space in front of the sink to allow a minimum turning radius of 5 feet. Refer to Drawing 11600-E at the end of this section for an illustration of these requirements.

### **1.3 FUME HOODS**

#### **A. GENERAL**

B. UF Policy: All fume hood installations shall comply with UF Fume Hood Policy, available from Environmental Health and Safety, and be inspected by EH&S prior to final approval.

1. Codes: A minimum of one fume hood per lab shall meet Florida Accessibility Code for Building Construction (Chapter 11, Florida Building Code.) Drawing 11600-C, located at the end of this section, gives the applicable accessibility requirements for fume hoods.

C. HOOD PERFORMANCE: The following is the installation and continued maintenance performance requirements for fume hoods:

1. General Chemical Use: Hoods used for general teaching and research purposes shall maintain an average face velocity of 100 feet per minute (fpm) across a 16" sash height. The margin of error shall be  $\pm 10\%$ .
2. Radioisotope and Carcinogen Use: Hoods utilized for handling radioisotopes, acute toxins and chemical carcinogens shall maintain an average face velocity of 150 fpm across a 16" sash height ( $\pm 10\%$ ).
3. Perchloric Acid Use: Hoods utilized for perchloric acid shall be labeled as such by the manufacturer and maintain an average face velocity of 150 fpm across a 16" sash height ( $\pm 10\%$ ). Perchloric acid hoods shall be equipped with an integral wash down mechanism

and drain trough. This mechanism shall consist of water-spray nozzles that are capable of functioning either consecutively (from top of stack to bottom) or simultaneously upon user activation. The nozzles should be self-cleaning and mounted every five feet and inside of each duct elbow. These hoods shall be ducted individually and shall not be connected with any other hoods.

4. The performance monitoring system shall be capable of providing audible and visual indication of unsafe hood operation. This shall include:
  - a. Sash height above 16" (a sash stop may be installed provided it can be manually overridden).
  - b. Face velocities >110 fpm and <90 fpm for general chemical use.
  - c. Face velocities >165 fpm and <135 fpm for radioisotope and carcinogen use.

#### D. GENERAL INSTALLATION

1. Materials used in hood construction shall be compatible with the substances to be utilized in the hood. Common liner materials include stainless steel, porcelain, mineral board and epoxy. Common duct materials include stainless steel, fiberglass, and coated galvanized steel. The blower, housing and exhaust stack shall be compatible material. Asbestos-containing materials are not permitted for use in fume hood construction.
2. The fan motor, wiring and lighting shall be intrinsically safe. The fan motor shall be installed outside of the ductwork so as not to be exposed to contaminated air stream. The fan motor shall be installed remotely to insure negative pressure throughout the duct system. All utility controls shall be mounted outside of the hood.
3. All hood systems shall have dedicated ductwork and fans unless prior approval has been obtained from EH&S.
4. The hood shall be physically located away from high traffic areas, cross drafts, doors, windows that open and room ventilation equipment.
5. A bypass or constant-volume hood is preferred over the auxiliary air and conventional hood. Auxiliary air hoods shall only be used where it can be shown that room ventilation provides insufficient supply air.
6. Duct runs shall take the straightest and shortest path to the roof of the building as possible. Horizontal duct runs shall be minimized. When unavoidable, horizontal runs shall be sloped to allow condensate to drain into the hood or to a trapped drain line.
7. Fume hood exhaust stacks shall be located to minimize re-entrainment of hood emissions. The following considerations shall be included in stack design.
  - a. The use of rain caps or down turned stack heads is prohibited. Ductwork that is one inch larger in diameter and four times the diameter in length than the exhaust duct will be attached over the exhaust to act as a vertical discharge rain deflector.
  - b. The stack shall be placed to exhaust outside of the building recharge zone. This typically means a stack height of 8 - 10 feet above adjacent rooflines and 50 feet from nearest air intake.

- c. Provide a stack exit velocity at least 1.4X prevailing winds speed. This typically equates to velocities of 3,000 fpm.
  8. All laboratory fume hood exhaust fans shall be on emergency power and be driven by a Variable Frequency Drive.
  9. Following hood installation, the system shall be tested and balanced by a qualified firm hired by the UF Owner or Project A/E to ensure compliance with design criteria. The performance-monitoring device shall be calibrated following installation to provide indication of upper and lower operating limits. EH&S shall conduct face velocity profiles, post results at the hood and check monitor performance prior to final acceptance.
- E. REPAIRS AND RENOVATIONS
1. Prior to any repair or renovation work being conducted on any fume hood or ductwork, EH&S shall be contacted. Once the work and the hood have been investigated, a clearance protocol shall be issued for the work to commence. EH&S's investigation shall include determining if highly toxic materials have been used in the hood. The hood will be swipe tested for radioactive contamination as necessary.
  2. The protocol contains specific requirements for the wearing of the appropriate personal protective equipment (PPE) depending on the location of the repair. Repair/renovation crew staff shall be expected to wear the required PPE but will not be expected to remove or handle any chemicals left in the hood or clean the hood, as that responsibility will lie with the hood's users.
- F. TRAINING OF UNIVERSITY PERSONNEL: Provide 4 hours of training divided into 2 sessions to University personnel on the operation and maintenance of fume hoods and fume hood exhaust systems.

#### 1.4 **EMERGENCY SAFETY SHOWERS AND EYE WASH STATIONS**

A. GENERAL

1. Alternative equipment, such as self contained pressurized units; bottles or drench hoses are not to be considered UF or ANSI compliant, unless used in conjunction with an ANSI compliant shower or eye wash station. Self-contained units are acceptable for use in fieldwork areas where plumbed units are not possible.
2. Privacy or modesty curtains are not required for use with safety showers. Blankets or jumpsuits should be available for use as a cover-up, as a victim needs to remove all contaminated clothing.
3. To ensure complete accessibility to all laboratory staff, the shower and eyewash stations may be placed in the corridors of buildings. They shall be located to provide adequate coverage for all labs within the area. This corridor placement may not be suitable for all labs, workplaces and storage areas, and shall be considered for each situation.
4. These units may be equipped with flow alarms that would provide a visible and audible alarm when activated. This alarm would attract attention to a unit being used by someone who was splashed with a chemical and would also aid in identifying any unit that was activated in an act of vandalism.
5. In areas where stations shall be maintained outside of buildings, the unit shall be protected

against freeze damage. This could include having the unit heated or enclosed with insulation.

B. EMERGENCY SAFETY SHOWERS: Emergency safety showers are required to conform to the following:

1. ANSI Z358.1-1998 Standards.
2. Florida Accessibility Code for Building Construction (FACBC) (Chapter 11, Florida Building Code) compliance. Refer to Drawing 11600-D at the end of this section for required clearances and mounting height parameters.
3. Be located less than 100 feet from furthest point of chemical use in labs or hazardous areas. (May need to be closer in some cases, as required by EH&S).
4. Total travel time from hazard may not be more than 10 seconds.
5. Shall not be located behind doors or other obstacles.
6. Shall have a "stay open valve" capable of providing a minimum of fifteen minutes of continual flow that once activated cannot be turned off with out intentional action of the user.
7. Flow from showerhead cannot be less than thirty gallons of water per minute. This requires a minimal supply pipe size of 1".
8. Shower head shall be 84 inches from floor.
9. Minimum spray pattern shall be 20 inches in diameter at a height of sixty inches from the floor.
10. Locations shall be labeled with signs visible from all potential directions of travel to the unit.
11. Floor drains are not normally required. If required they shall be self priming.

C. EMERGENCY EYE WASH STATIONS: Emergency eye wash stations are required to conform to the following:

1. ANSI Z358.1-1998 Standards.
2. Florida Accessibility Code for Building Construction (FACBC) (Chapter 11, Florida Building Code) compliance. Refer to Drawing 11600-D at the end of this section for required clearances and mounting height parameters.
3. Be located less that 100 feet from chemical use areas of labs or hazardous areas. (May need to be closer in some cases as required by EH&S).
4. Total travel time from hazard may not be more than 10 seconds.
5. Shall not be located behind doors or other obstacles.
6. Shall have a "stay open valve". Once activated, this "hands off" valve shall not be turned off without intentional action of the user.

7. Flow from unit shall not be less than 0.4 gallons (1.5 liters) of water per minute.
8. Unit shall be capable of maintaining flow for a minimum of fifteen minutes.
9. Nozzles shall be protected from airborne contamination when not in use. These dust covers shall be self-removing once the unit is activated.
10. Locations shall be labeled with signs visible from all potential directions of travel to the unit.
11. Floor drains are not normally required. If required, they shall be self priming.

#### **1.5 FLAMMABLE STORAGE CABINETS**

- A. Flammable storage cabinets shall meet NFPA and OSHA requirements.
- B. Flammable storage cabinets need not be vented when installed. If vented, the vent system must meet the following criteria:
  1. Exhaust cannot be coupled to any other exhaust system.
  2. Exhaust piping must be made of metal (PVC piping will not meet regulations).
  3. The cabinet should be exhausted through both the upper and lower vents at a combined airflow of 25 cfm.
  4. Flammable cabinets may not be vented in series. Each cabinet shall be vented independently to eliminate possibilities of vapors combining and reacting with each other.
- C. No more than three flammable storage cabinets may be housed in any location, unless there is a minimum of 100 feet of separation.

#### **1.6 CHEMICAL STORAGE CABINETS**

- A. Cabinets used to store chemicals shall meet NFPA, OSHA and the following criteria:
  1. Must be constructed of materials that will be compatible with planned chemical storage.
  2. Cabinets shall be designed and be capable of withstanding weight of planned use.
  3. Shelves shall have one-inch lips on front edge to secure bottles.
- B. If cabinets are planned for chemical storage under fume hoods, and these cabinets are to be vented to the hood for exhausting of vapors, the cabinets shall have:
  1. Venting installed, and not have vent ports left open.
  2. Venting material used which is compatible with chemicals stored.
- C. Cabinets used to store flammable or corrosive materials shall be labeled with appropriate signage.

## 1.7 COMPRESSED GAS CYLINDER STORAGE

- A. Areas where compressed gas cylinders will be stored shall be equipped with racks and securing straps or chains. Securing straps or chains shall be installed so they are located within the upper 1/3 of the cylinder.
- B. Gas storage areas shall be planned so that incompatible gasses are separated by the regulated distances. Gasses shall be secured as close as possible to the use point to minimize excessive runs of piping or tubing.
- C. Extremely hazardous gasses shall be identified to ensure they are stored within compressed gas safety cabinets. This must be reviewed by EH&S during plan review and prior to construction. The gas safety cabinet shall be exhausted from the building by a dedicated ventilation system that will exhaust to the roof of the building. This dedicated exhaust shall run continually when a cylinder is located in the cabinet, be intrinsically safe and have emergency power back up.
- D. Some compressed gas cylinder storage cabinets may need to be sprinkled for fire protection as required by the gas to be housed in the unit. Consult with EH&S for requirements.
- E. Exhausted high hazard gasses may need to be routed through a scrubbing system. These will be considered on an "as-needed basis". Proposed plans shall be reviewed by EH&S.
- F. Highly flammable gasses, such as hydrogen, should be stored outside of the building and each instance shall be reviewed by EH&S on a case-by-case basis.

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