

Laboratory safety equipment

Chemical fume hoods

Safety showers

Eyewash stations

Fire extinguishers

Fire blankets

Flammable liquid storage cabinets

Safety cans

Refrigeration equipment

First aid kits

Chemical spill kits

Portable safety shields

The availability and use of a number of types of safety equipment is essential to the practice of safe science. Safety equipment should be present in well-marked, highly visible, and easily accessible locations in or near all laboratories that use hazardous chemicals. For more information regarding safety equipment or specific regulatory requirements, please contact the EHS office.

Chemical fume hoods

Chemical fume hoods are one of the most important items of equipment used for the protection of workers in the laboratory. A standard fume hood is a chemical and fire-resistant enclosure with a movable window (sash) at the front to allow the user access to the interior. Chemical fume hoods capture, contain, and expel chemical emissions. In addition, chemical fume hoods (with the sash down) provide a protective barrier between laboratory personnel and chemicals or chemical processes.

Unless the hood is designed to draw a low-volume, a properly functioning standard hood draws air from the laboratory at a velocity of 100 feet per minute (± 10 to 20%) with the sash half open or at the designed operating height (at the stopper). The storage of large numbers of chemical bottles or other items within the hood can dramatically impair this functioning.

To ensure that fume hoods are operating properly, an off-site contractor conducts annual inspections. Off-site contractors service any hoods that are not functioning properly immediately.

Safety showers

Safety showers are required in areas where hazardous chemicals are used. Safety showers provide an effective means of initial treatment in the event of chemical contamination of the skin or clothing.

The shower area must be readily accessible, clear of obstructions, and clearly labeled.

Safety showers are tested annually by Facility Operations/Physical Plant ensure that the proper flow is provided according to the ANSI Standard, Z358.1. Safety showers should be activated weekly by laboratory personnel to ensure that they are working properly. It is recommended that weekly safety shower testing be documented by the laboratory.

Eyewash stations

Eyewash stations are required in areas where hazardous chemicals are used. Eyewashes must be easily accessible, unobstructed, and clearly labeled. The use of the hands must not be required to activate and maintain the water flow. Plumbed eyewash units are best and strongly recommended.

Eyewashes are tested annually by Facility Operations/Physical Plant to ensure that the proper flow is provided according to the ANSI Standard, Z358.1. Eyewashes should be activated weekly by laboratory personnel to ensure that they are working properly. It is recommended that weekly eyewash testing be documented by the laboratory.

In the event of chemical contamination of the eyes or face, immediately flush the eyes/face for 15 minutes and seek medical attention.

Fire extinguishers

Laboratory personnel should know the locations of all fire extinguishers in the laboratory, the type of fires for which they are appropriate, and be trained on how to operate them correctly. The Environmental Health and Safety Office (EHS) provides fire safety training to UNCP employees.

Fire extinguishers in the laboratory should be the appropriate type for the expected fire emergency. Extinguishers are classified according to a particular fire type.

Note: Classification of fires and extinguishers - Class A, ordinary combustibles; Class B, flammable liquids and gasses; Class C, live electrical equipment; Class D, combustible metals and metal alloys. Most laboratories are equipped with combination Class ABC fire extinguishers.

Fire extinguishers should be easily accessible, mounted properly on a wall, and unobstructed. The Environmental Health and Safety Office (EHS) is responsible for the inspection of fire extinguishers. Used fire extinguishers must be immediately serviced. Contact EHS for assistance.

Fire blankets

Fire blankets are recommended in all laboratories that use flammable liquids. Fire blankets should be easily accessible and unobstructed. In the event that a person's body or clothing catches fire, the person should immediately drop to the floor and roll to help extinguish the fire (STOP-DROP-and-ROLL method). A fire blanket should be used only as a last resort to help smother a body or clothing fire. Fire blankets can also be used to keep shock victims warm.

Flammable liquid storage cabinets

Flammable liquids in quantities exceeding a total of 10 gallons in a laboratory must be stored in flammable liquid storage cabinets or safety cans. Flammable storage cabinets shall be designed to meet NFPA (National Fire Protection Agency) and NC Fire Code guidelines. Cabinets are generally made from No. 18 gage sheet steel with double-walled construction or one-inch exterior grade plywood. Approved cabinets should be marked in conspicuous lettering "FLAMMABLE KEEP FIRE AWAY."

Flammable cabinets are not required to be vented (cabinets are generally vented only if the flammable liquids generate noxious fumes), but if venting is desired it shall meet NFPA and NC Fire Code requirements (contact EHS for details on venting requirements). Only flammable and combustible material should be stored in flammable storage cabinets.

Safety cans

A safety can is a container of not more than five-gallon capacity, having a spring-closed lid, spout cover, and flame arrestor and so designed that it will safely relieve internal pressure. Safety cans must be UL (Underwriters' Laboratories, Inc.) listed and must be compatible with the chemical that they are to contain. Safety cans with damaged parts such as corroded spark arrestor screens or insufficient springs must be taken out of service and replaced immediately.

Explosion-proof and laboratory-safe refrigeration equipment

The use of domestic refrigeration equipment for the storage of flammable liquids presents a significant hazard to the laboratory work area. Refrigerator temperatures are commonly higher than the flash points of the flammable liquids stored within them. In addition, domestic refrigerators contain exposed sources of ignition such as thermostats, lights, and heater strips that can ignite flammable vapors released inside the refrigerator and cause a fire or explosion. Domestic refrigerators can only be used to store non-flammable chemicals and samples.

Flammable liquids must only be stored in one of two types of laboratory refrigerators: laboratory-safe and explosion-proof refrigerators.

Laboratory-safe refrigeration equipment (also called flammable-safe or explosion-safe) is designed to eliminate sources of ignition on the inside of the storage compartment only, even though other safety design features like self-closing doors, magnetic door gaskets, and compressors and circuits located at the top of the refrigeration unit have been incorporated. They plug into a standard three-prong wall outlet in the laboratory.

Explosion-proof refrigeration equipment is designed to protect against ignition of flammable vapors both inside the storage compartment and outside the refrigerator. They are intended for use in high-hazard occupancies where an exterior source of ignition must be eliminated. Explosion-proof refrigerators are hardwired, using electrical conduit, into the buildings electrical service and do not have standard three-prong electrical plugs.

All flammable liquids that need to be stored in a cool environment should be stored in one of these two types of approved refrigerators. Containers must be tightly closed to minimize the amount of vapor released. Every laboratory refrigerator must be clearly marked to indicate what may (or may not) be stored in the refrigerator. Modification of domestic refrigerators to hold flammable liquids is not permitted.

First aid kits

First aid kits should be easily accessible to all laboratory personnel. If a first-aid kit is placed in a drawer or cabinet, the drawer or cabinet must be labeled "First-Aid Kit." First aid kits must be regularly inspected and restocked as necessary.

The University provides American Heart Association CPR and AED training to all UNCP employees. Contact EHS for more information.

Chemical spill kits

Every laboratory that uses hazardous chemicals should have access to a spill control kit. The keys to an effective spill kit are location and contents. Spill kits should be strategically located around work areas in fixed spots so they will be easily accessible. If a spill kit is placed in a drawer or cabinet, the drawer or cabinet must be labelled "Spill Kit."

In general, a spill kit should contain absorbent material, appropriate personal protective equipment, a container for spill residue, and a plastic dustpan and scoop. Laboratories that use mercury or mercury-filled thermometers and manometers should also have a mercury spill kit available. Once a spill kit has been used it should be immediately restocked.

Spill kits can be purchased through most vendors that sell chemicals or safety supplies. The following is a list of recommended items that should be contained in a chemical spill kit. However, it is important that spill kits be tailored to meet the specific spill control needs of each laboratory.

Absorbents:

- Universal Spill Absorbent Material - 1:1 mixture of sodium bicarbonate (baking soda): Flor-Dri (or unscented kitty litter) or alternatively, a 1:1:1 mixture of Flor-Dri (or unscented kitty litter): Sodium Bicarbonate: Sand. This all-purpose absorbent material is good for most chemical spills including solvents, acids, and bases;
- Acid Spill - Sodium Bicarbonate, Sodium Carbonate, or Calcium Carbonate;
- Alkali (Base) Spill - Sodium Bisulfate; and
- Solvents/Other Organic Liquids - Inert absorbents such as vermiculite, clay, sand, FlorDri, and Oil-Dri.

Personal Protective Equipment:

- Goggles and Face Shield;
- Plastic Vinyl Booties;

- Disposable Coveralls and Apron; and
- Disposable Vinyl Gloves and Heavy Neoprene Gloves.

Clean-Up Material:

- Plastic Dust Pan and Scoop;
- Plastic Bags (30 gallon, 3 mil thick); and
- One empty 5 gallon, plastic bucket with lid for spill and absorbent residues.

Other Examples:

- Hydrofluoric Acid Antidote Gel - Calcium Gluconate; and
- Mercury Spill Kit.

Portable safety shields

Portable safety shields can provide limited protection against explosions, fires, and chemical splash hazards. When a hood sash cannot provide proper shielding, portable safety shields should be used. It should be noted that portable safety shields do not provide protection on the sides and back of equipment and therefore work best if used in conjunction with a fume hood. Laboratory equipment/chemical apparatus should be shielded on all sides so that there is no line-of-sight exposure to laboratory personnel.