

Guidelines for Selection, Use, and Care of Laboratory Coats

Hazards exist in every University workplace and can take many different forms: sharp edges, falling objects, flying sparks, chemicals, noise, and a myriad of other potentially dangerous situations. Controlling a hazard at its source is the best way to protect students, employees and visitors. Substituting a non-hazardous or less hazardous material is always recommended and preferable to using personal protection equipment. If necessary to use the hazardous material, the preferred solution is the use of engineering or work practice (administrative) controls to manage or eliminate hazards to the greatest extent possible. When engineering or administrative (work practice) controls are not feasible or do not provide sufficient protection, personal protective equipment (PPE) must be used. University Policy requires a laboratory coat be worn for admittance into any laboratory area in which work with hazardous materials, flammable and corrosive materials, radioactive materials, and biological agents is conducted. Proper selection and use of PPE is critical to protection. This document provides guidance for selection, use and care of lab coats. Failure/refusal to wear required PPE by employees is a basis for disciplinary action. A student not wearing required PPE in a laboratory/technical area may not participate in lab activities until such PPE is worn. This policy may only be deviated from when a documented hazard assessment has been conducted and provides information that indicates that personal protective equipment is not necessary.

Lab coats are an important part of personal protective equipment that serve to:

- Provide protection of skin and personal clothing from incidental contact
- Prevent the spread of contamination outside the lab (provided they are not worn outside the lab)
- Provide a removable barrier in the event of an incident involving a spill or splash of hazardous substances

Each supervisor is responsible for ensuring that his/her workers (employees, students, and visitors) use the appropriate lab coat per this guideline. Individual departments, research centers, and other operating units must determine what type of lab coat is necessary and if the workers supply their own or if it is department provided. Under no circumstances should the employee work without the necessary lab coat. Students in teaching lab settings are required to provide a lab coat at their own cost. Lab coats are required in all undergraduate labs where chemical, biological, or radiological materials are used. This includes but is not limited to labs for Chemistry, Biology, Material Science Engineering, Chemical and Biomolecular Engineering, and Biomedical Engineering.

All **laboratory workers** are responsible for following the requirements for wearing and properly maintaining lab coats as outlined in this policy guideline and in laboratory-specific safety training.

Selection of Lab coats: Lab coats are available in a variety of materials and provide varying degrees of protection. Examples include: splash resistant coats, static free coats, chemical resistant coats and flame resistant coats. Please make sure that the coat you are selecting provides the type of protection that is appropriate for your needs. The first step in this selection process is to determine the types of hazards that exist in your lab and the reasons for the lab coats.

Here are some ideas to consider for conducting a hazard analysis:

- Does your lab conduct manipulations involving chemical, biological and radioactive materials?
- Do the lab store large quantities (>10gallons) of flammable liquids outside a flammable storage cabinet?

- Are there hot plates and open flames along with flammable liquids?
- Are there toxic chemicals in use or in store in the lab?
- What types of engineering controls are available in the lab (e.g.: fume hood, glove box)?

After conducting a lab hazard analysis it is time to select the appropriate lab coat. One coat may not provide protection against all the hazards present in one laboratory. A chart at the end of this document provides information about lab coats, materials, and protection offered.

Select lab coat/apron using the following recommendations:

- **Length** - At least knee length or longer is recommended for most effective coverage.
- **Wristband** - It is recommended that a lab coat with a fitted wristband/cuff be used to reduce the potential for splashes up the arm and fire hazards.
- **Top button** - It is best to use a lab coat that provides for a high top button at the neck to provide most effective protection.
- **Fire resistant** - Use only those constructed of a flame resistant material

Lab coats made of polyester-cotton blends (no less than 35% cotton) are acceptable in labs where no open flames are present. Lab coats must be made of 100% cotton or flame resistant material in labs where open flames are used (such as alcohol burners). Labs that store large quantities (>10gallons) of flammable liquids outside a flammable storage cabinet must use lab coats made of 100% Cotton treated with flame retardant material. Lab coats of flame resistant (FR) material are required in labs where pyrophoric materials are handled. Persons working with pyrophoric liquids are also required to wear 100% cotton clothing underneath the FR lab coat on days that they handle these materials in the lab.

Lab Coat Use – DO's and DON'Ts

- DO wear a lab coat when a Hazard Assessment of the laboratory determines hazards to the body are present or likely to be present. A good rule of thumb is to wear a lab coat at all times when working in a lab.
- DO wear a lab coat of appropriate size.
- DO chose a lab coat based on the types of work hazards. Lab coats can be disposable or reusable. Consider a disposable lab coat when using high hazard materials. Lab coats made of cotton fabric are recommended for general lab use. Flame resistant fabric (e.g., Nomex) or flame resistant cotton fabrics are a must if there is a significant fire potential.
- DO wear lab coats that cover the knees and have full-length sleeves, preferably tight sleeves than the loose one.
- DO keep lab coats completely “buttoned” up. Snap closures are preferred over buttons or zippers to keep the body covered and allow quick removal in an emergency.
- DO immediately remove a lab coat if on fire or there is obvious hazardous contamination.
- DO consider the addition of a rubber apron when there is a significant chance of exposure to corrosive materials.
- DON'T wear disposable lab coats more than eight hours or if it has become contaminated.
- DON'T wear lab coats made of synthetic fabrics if there is a potential for fire. Synthetic fabrics burn, melt, shrink and stick to the skin.
- DON'T wear lab coats unbuttoned. An open lab coat is an invitation for hazardous exposures.
- DON'T roll up the sleeves on lab coats for comfort or ventilation.
- DON'T wear lab coats outside the lab. Lab coats and other protective wear used in a lab should be kept in the work area to minimize the possibility of spreading chemicals to public places including eating or office areas. Do not use lab coats outside the room even when transporting chemicals, radioactive materials or biological hazards. The recommended method of transporting hazardous material within lab buildings is to utilize

secondary containment. Secondary containment must be plastic, securely sealed, Tupperware-type containers. This method allows your hands to be free from exposure to any hazardous material, thus eliminating your need to wear gloves or lab coat.

Emergency spill or splash: In the event of a significant spill of a hazardous material on the lab coat, it should be immediately removed. If skin or personal clothing is impacted, it will be necessary to proceed to an emergency shower. Any contaminated clothing should also be removed. Guidance should be sought from OEHS about whether the coat and clothing should be cleaned or discarded as hazardous waste.

Emergency fire: The action will depend on circumstances of the fire. If only the lab coat is on fire, remove it, leave area, and call 6911 or activate fire alarm. If lab coat and clothing are on fire, shout for help then stop, drop, and roll; or proceed to an emergency shower (if close by) to extinguish fire. If the area is on fire, leave area, closing doors as you leave. Activate fire alarm and or call 6911. Seek follow-up medical attention.

Below is a YouTube video developed by North Western University to demonstrate the importance of wearing a flame resistant lab coat in a chemical laboratory

<http://www.youtube.com/watch?v=quTegBMio6U>

The table below (www.ehs.columbia.edu) provides information on some typical lab coat materials available, with guidance on use and limitations. There is little or no information provided by manufacturers or distributors about the capability of a lab coat for a combination of hazards. A coat that is “flame resistant”, such as treated cotton, may not be chemical resistant or acid resistant. The term “flame resistant” refers to the characteristic of a fabric that causes it not to burn in air. There are limited criteria for testing lab coat materials with respect to typical lab use scenarios, and some of the information is anecdotal.

Material/Source	Features	Pros	Cons
Polyester/Cotton Blend 80% Polyester / 20% Cotton, 65/35, and 40/60 are common blends.	Liquid Resistance Splash resistant. No specific chemical resistance. Anecdotal evidence suggests polyester blends provide better protection against corrosive material than cotton. Flame Resistance No Polyester blends burn more readily than 100% cotton or flame-resistant materials. Comfort Lightweight and breathable. More cotton in the blend results in better breathability.	Appropriate for use in clinical settings and research laboratories where biological material is manipulated.	Polyester blends burn readily when ignited, and are not appropriate for use with flammable liquids, pyrophoric materials, or near open flame.
100% Cotton	Liquid Resistance Not splash resistant. No specific chemical resistance. Anecdotal evidence suggests cotton lab coats provide better protection from solvent contamination than corrosive contamination. Flame Resistance No Burns less readily than polyester blends. Comfort Lightweight and breathable.	Appropriate for use in clinical settings and research laboratories where there is light flammable liquid or open flame use.	Cotton lab coats should be supplemented with a chemical splash apron when corrosive material is handled.
100% Cotton treated with flame retardant.	Liquid Resistance Not splash resistant. No specific chemical resistance. Anecdotal evidence suggests cotton lab coats provide better protection from solvent contamination than corrosive contamination. Flame Resistance Yes Flame-resistant (FR) fabrics and garments are intended to resist ignition, prevent the spread of flames away from the immediate area of high heat impingement, and to self-extinguish almost immediately upon removal of the ignition source. Comfort Lightweight and breathable.	Appropriate for use in research laboratories where substantial fire risk exists from flammable material handling or open flame use. Laundering will not damage the flame resistant coating.	More costly than a traditional 100% cotton lab coat.
Nomex IIIA	Liquid Resistance Flame Resistance Yes When in contact with direct flame or extreme heat, fibers in the protective clothing enlarge, enabling greater distance between the user's skin and heat source. Comfort Breathable, but slightly bulkier than polyester blend or 100% cotton materials.	Appropriate for use in research laboratories where there is extreme fire danger from open flame, electrical arc flash, and pyrophoric material.	Expensive.
Polypropylene	Liquid Resistance Not splash resistant. Flame Resistance Not flame-resistant. Comfort Very lightweight and breathable.	Appropriate for use when protection from dirt and grime in nonhazardous environments is desired. Disposable. Low cost.	Offers no protection from hazardous materials.
Microbreathe	Liquid Resistance Barrier to particles, biological fluids, and chemicals. Flame Resistance Not flame-resistant. Comfort Lightweight, breathable, and stretches to allow ease of movement.	Appropriate for use in clinical settings and research laboratories where biological material and chemicals are handled. Low particle count fabric is ideal for clean room activities. Disposable.	Inappropriate for use in environments with a significant fire danger
DuPont Tyvek lab coats	Liquid Resistance Barrier to particles, biological fluids, and chemicals. Flame Resistance Not flame retardant and melts at 135°C (275°F)	Appropriate for use in clinical settings and research laboratories where biological material is manipulated Excellent protection against microscopic airborne particles	Inappropriate for use in environments with a significant fire danger.

NOTE: Contact the individual lab coat or chemical protective equipment manufacturers for specific chemical, fire and antistatic protection data and information. Do not exclusively rely on the information in this chart.