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A. Background

The purpose of this document is to provide guidance for selection, use and care of lab coats.

Lab coats are required at MIT when working with hazardous materials as stated in the Chemical Hygiene Plan (CHP) template (<https://ehs.mit.edu/site/chemical-safety/chemical-hygiene-program/plan-template>):

“A laboratory coat or equivalent protection is required when working with or when working nearby to hazardous chemicals, unsealed radioactive materials, and biological agents at BL2 or greater. A flame resistant lab coat is required when handling pyrophoric substances outside of a glove box. It is recommended that a flame resistant lab coat be worn when working with all flammable chemicals. Laboratory supervisors shall carry out a hazard assessment to identify situations (a task, experiment, or area) where alternative or more protective apparel must be worn.”

To aid users in complying with the lab coat guidelines, EHS, in collaboration with Procurement, has set up Lab Coat Preferred Vendors that can provide both lab coat supply and laundry services. Detailed information on options to obtain and launder coats, as well as links to further information on the Preferred Vendors, is found below.

A.1 Lab Coat Uses

When properly used, lab coats:

- Provide protection of skin and personal clothing from incidental contact and small splashes.
- 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.

A.2 Limitations of Lab Coats

In general, protective clothing, including lab coats, should not be used as a substitute for engineering controls such as a fume hood, a glove box, process enclosure, etc., or as a substitute for good work practices and personal hygiene. For significant chemical handling, it will be necessary to supplement lab coat use with additional protective clothing, for example, a rubber or vinyl apron for handling large quantities of corrosives or hydrofluoric acid, or it may be preferable to use chemical resistant coveralls for full body protection. Conversely, use of engineering controls such as fume hoods do not preclude the need for wearing the proper PPE, including lab coats.

Some known limitations of lab coats include:

- Lab coats are not designed to be the equivalent of chemical protection suits for major chemical handling or emergencies.

- With the exception of language in the OSHA bloodborne pathogen standard¹ pertaining to use of lab coats for protection of work clothes from blood or other potentially infectious material, there are no design or test criteria specified in regulations or guidelines specific to lab coats. What this means is that:
 - Lab coats are not tested for typical conditions that might be encountered in a research lab with respect to chemical use, or combined research activities.
 - 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 described as “flame resistant”, such as treated cotton, may not be chemical resistant or acid resistant.
 - A coat that is advertised as flame resistant has not been tested using criteria involving flammable chemicals on the coat. The term “flame resistant” refers to the characteristic of a fabric that causes it not to burn in air. The testing criteria involves applying an open flame to the bottom edge of a strip of fabric in a test chamber for 12 seconds and then looking at char length, after flame, and after glow, testing the self extinguishing properties of the fabric. The flame resistance test criteria were intended to simulate circumstances of a flash fire, or electric arc flash, not a chemical fire.

B. Selection

B.1 Hazard Assessment

With the limitations above in mind, lab coats are made of different materials, and it is important to select a coat or coats of appropriate material for the types of hazards in the lab. 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.

Some questions to consider are the following:

- Does your lab work primarily with chemicals, biological agents, radioisotopes, or a mix of things?
- Does your lab work involve animal handling?
- Are there large quantities of flammable materials (>4 liters) used in a process or experiment?
- Are there water reactive or pyrophoric materials used in the open air, e.g. in a fume hood instead of a glove box?
- Are there open flames or hot processes along with a significant amount of flammables?
- How are hazardous chemicals used and what engineering controls are available, e.g. a fume hood or glove box?
- Is there a significant risk of spill, splash or splatter for the tasks being done?
- What is the toxicity of chemicals used and is there concern about inadvertent spread of contamination?

The CHP Template contains a lab specific SOP form that can be used for assessing the hazards. Another assessment tool is the “PPE Hazard Assessment Form” linked from: <https://ehs.mit.edu/site/workplace-safety/personal-protective-equipment-ppe>.

B.2 Choosing the Right Lab Coat

While there are many different style features, from a protection standpoint the best coats have the following characteristics:

- Tight cuffs (knitted or elastic)
- Snap closures on the front for easy removal in case of contamination
- Coats with different properties are easy to tell apart (ex: FR coats should have outer markings clearly identifying them as FR coats and can be ordered in a different color than other coats present in the lab)
- Proper fit
- Appropriate material for hazards to be encountered

Once you determine hazards, you can review information on some typical lab coat materials, with guidance on use and limitations, in the Lab Coat Table at the end of this document to help determine the best materials for your lab. As noted above, there are limited specifications for lab coat materials with respect to typical lab use scenarios, and most of the information is

¹ 1 OSHA 29CFR 1910.1030(d)(3)(i) Provision. When there is occupational exposure, the employer shall provide, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices. Personal protective equipment will be considered “appropriate” only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee’s work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used.

anecdotal. As more information becomes available, this table will be updated.

One coat may not work for all lab operations. Some people may want to provide a basic poly/cotton blend coat for most operations, but have available lab coats of treated cotton or Nomex for work involving pyrophoric materials, extremely flammable chemicals, large quantities of flammable chemicals, or work around hot processes or operations. If chemical splash is also a concern, use of a rubber apron over the flame resistant lab coat is recommended. Lab coat materials may be made of materials for limited reuse, or disposable one time use.

B.3 Flame Resistant (FR) Lab Coats

Work with pyrophoric, spontaneously combustible, or extremely flammable chemicals presents an especially high potential for fire and burn risks to the skin. Per the CHP template, use of a fire retardant or fire resistant (FR) lab coat is required when handling pyrophoric chemicals outside of a glove box. An FR lab coat is recommended when working with any flammable materials. The primary materials used for FR lab coats are FR-treated cotton or Nomex. There is also a newer flame resistant and chemical resistant (FR/CP) lab coat that offers additional protection against many chemicals. Further information is available in the table at the end of this document, as well as from the EHS Office and the Preferred Vendors listed below.

C. Getting a Lab Coat

The Supervisor/PI is responsible for assuring that required PPE, including lab coats, is available, used, and maintained.

There are several methods in which a lab can obtain lab coats.

- 1) Rental coats -> Many laundry companies provide rental coats in a rental/laundry system. The benefits of this type of program are that it limits up-front costs for labs and can include free repairs or replacements for coats damaged through normal wear and tear. More information on this type of program can be found in the Lab Coat Cleaning section below and on the Procurement website.
- 2) Purchase reusable lab coats -> Lab coats can be purchased from many sources; the table at the end of this document includes ordering information for a variety of coat styles offered by the MIT Preferred Lab Coat Vendors.
- 3) Purchase disposable lab coats -> Disposable coats can be purchased from companies such as VWR. For environmental and cost reasons this is generally not the best solution. However, in cases where lab coats are rarely needed, or when a type of material not generally available in a reusable style is needed, this can be a viable option.

D. Lab Coat Use

When lab coats are in use, the following should be observed:

- Wear lab coats that fit properly. Lab coats are available in a variety of sizes. Some lab coat services also offer custom sizes (e.g., extra long sleeves, tall, or woman's fit). Lab coats should fasten close to the collar to provide optimal protection.
- Lab coats should be worn fully buttoned or snapped with sleeves down.
- Wear lab coats only when in the lab or work area. Remove lab coats when leaving the lab/work area to go home, to lunch, to the restroom, or meetings in conference rooms, etc.

D.1 Spill or Splash

Laundry services are not equipped to handle significant contamination of lab coats with hazardous materials. In the event of a significant spill of a hazardous material on the lab coat, remove the coat immediately. If skin or personal clothing is impacted, it will be necessary to proceed to an emergency shower. Remove any contaminated clothing, and shower. Generally, significantly contaminated coats and clothing will be considered a hazardous waste, and must be managed based on the type of contamination. If you have questions about significance of contamination from a specific incident, contact the EHS Office.

If your coat becomes contaminated, please notify your EHS rep. If the coat must be discarded, document the loss of the coat, and if the coat is part of a laundry service, notify Jim Bagley at MIT Sourcing for tracking purposes (jbagley@mit.edu).

D.2 Emergency Fire Involving Lab Coat or Clothing

The action will depend on the circumstances of the fire. If only the lab coat is on fire, remove it, leave the area, and call 100 or activate a fire alarm. If both 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 the fire. If the area is also on fire, leave the area, closing doors as you leave, stop

drop and roll, or proceed to hallway safety shower, if available. Activate fire alarm or call the MIT Emergency numbers (100 from campus phone or 617-253-1212 from cell phone).

Seek follow-up medical attention.

E. Lab Coat Cleaning

Personnel are not allowed to launder lab coats at home. Clean non-disposable soiled lab coats routinely by use of a laundry service or work area washers and dryers. Frequency of cleaning will depend on the amount of use and contamination.

E.1 Laundry Services

A number of area laundry services provide routine laundering of reusable lab coats. Do not use a local dry cleaner that does not specialize in lab coats as they generally are not familiar with proper handling of potentially contaminated items.

A team comprised of EHS and Procurement personnel recently conducted an in-depth study of laundry options. Following extensive review, two laundry companies were selected to become MIT Preferred Vendors. The information below is based on the services offered by the two chosen vendors, North Star and Cintas. Labs that use services from one of these two companies have guaranteed MIT pricing and favorable contract terms. However, MIT labs are not limited to these vendors for lab coat supply or laundering.

Services available from lab coat preferred vendors include:

- Rent or buy lab coats in a variety of materials (100% cotton, poly/cotton blends, flame resistant cotton, Nomex, etc).
- Perform custom-tailoring of coats
- Repair minor damage (ex. lost buttons)
- Pick up coats on a weekly, biweekly, monthly, or on-demand schedule
- Provide storage options for clean and soiled coats
- Service individual labs or centralized service areas

In negotiating with a vendor, you should be sure they understand the possible contamination that may be on the lab coat. See the Spill or Splash section for more information on what to do in the event of contamination.

In addition to providing lab coats and laundering them, the lab coat companies listed below can also provide solutions to some of the most common problems encountered when setting up or managing a lab coat system. For example, in many areas at MIT space is limited. These companies have experience assessing available space and can provide multiple solutions on how to best store clean and soiled lab coats so they are conveniently located yet do not take up valuable lab space.

E.2 MIT Preferred Lab Coat Vendors

Cintas Corporation

See the [Procurement website](#) for pricing and contract information

URL: www.cintas.com

Pascual Laguerra, Strategic Markets - Education

Email: laguerrap@cintas.com

Phone (cell): 978-621-6026

Fax: 844-712-2203

Chris Angelo, Senior Sales Executive

Email: AngeloC@Cintas.com

Phone (office): 978-244-6729

Phone (cell): 203-901-3423

Fax: 855-805-5909

North Star Rentals

See the [Procurement website](#) at for pricing and contract information

URL: <http://www.uniforms-linens.com>

Peter Villari

Email: Peterv@uniforms-linens.com

Phone (office): 617-623-1200

Phone (cell): 617-828-7971

Fax: 617-623-5625

Lab Coat Information Table

HAZARDS: GENERAL CHEMICAL, BIOLOGICAL, OR RADIOISOTOPES		
Material	Vendor and Model Info	Characteristics
Polyester/Cotton Blend 80/20 most common (Recommend a minimum of 65% polyester for chemical research lab setting.)	Supplier/Manufacturer/Model: Cintas or Amazon; Red Kap; KP72WH Supplier/Manufacturer/Model: North Star; Fashion Seal, 439	Flame Resistance: Burns readily. Limited testing indicates fabric will burn readily upon contact with pyrophoric chemicals, so poly/cotton coats must not be worn for handling such chemicals. Splash/Chemical Resistance: May be fluid resistant. Check information from manufacturer. Unknown chemical resistance. Anecdotally, better for work with acids than cotton. Comfort: Lightweight breathable. The more cotton, the more breathable. Notes: Most common material for clinical settings (hospitals, clinical labs) and labs handling biological materials and small amounts of flammables.
HAZARDS: CORROSIVES, HIGHLY FLAMMABLE MATERIALS, PYROPHORICS, AND/OR OTHER CHEMICAL SPLASH		
Material	Vendor and Model Info	Characteristics
Shieldtec (FR/CP)	Suppliers/Manufacturer/Model: Cintas, North Star, Fisher; Workrite; FR/CP	Flame Resistance: Yes Splash/Chemical Resistance: Good chemical resistance to corrosives and polar solvents. Minimal splash protection against non-polar solvents. Comfort: Breathable
HAZARDS: HIGHLY FLAMMABLE MATERIALS, PYROPHORICS, WELDING, ARC FLASH		
Material	Vendor and Model Info	Characteristics
Nomex	Supplier/Manufacturer/Model: Cintas Supplier/Manufacturer/Model: North Star, Bulwark, KNL6RB Supplier/Manufacturer/Model: VWR, Workrite, FR Nomex Men's Knit Cuff Flame Resistant Lab Coat	Flame Resistance: Yes. Limited testing demonstrates Nomex does not burn readily on contact with pyrophoric materials so is a good material for such work. Splash/Chemical Resistance: Limited splash resistance. Comfort: Breathable. Notes: Flame resistance is an inherent quality of the fabric, maintained even with laundering provided bleach is not used.
FR treated cotton	Supplier/Manufacturer/Model: Cintas or VWR; White Knight; IN30 Supplier/Manufacturer/Model: North Star; Bulwark; KEL2LB	Flame Resistance: Somewhat. Better than poly/cotton for lab settings with fire hazard, with an understanding of the limitations of the testing criteria for flame resistance. Splash/Chemical Resistance: Not necessarily fluid resistant. Degraded by acids. More resistant to solvents. Not generally tested for chemical resistance. Supplement with an apron for acid handling. Comfort: No information. Notes: 100% cotton or cotton blend is treated with a flame-resistant material. Will not lose flame resistance with laundering over typical use life of coat provided bleach not used.
HAZARDS: HIGH CONTAMINATION RISK (BIOLOGICAL)		
Material	Vendor and Model Info	Characteristics
Reusable Fluid Resistant Coats	Supplier/Manufacturer/Model: Cintas or VWR; White Knight; BAR 01 Supplier/Manufacturer/Model: North Star, Fashion Seal; 6403	Flame Resistance: No Splash/Chemical Resistance: Front material reportedly fluid resistant; "breathable" back material is not. Comfort: Permeable material in back of coat to increase comfort.
OTHER MATERIALS		
Material	Vendor and Model Info	Characteristics
Polypropylene lab coat.	Supplier/Manufacturer/Model: VWR, VWR Basic Protection SPP Lab Coats	Flame Resistance: No, burns readily. Splash/Chemical Resistance: No Comfort: Breathable Notes: Intended for protection from dirt, grime, dry particulates in relatively non-hazardous environment such as animal handling and clean rooms.
100% Cotton	Supplier/Manufacturer/Model: Cintas, White Swan, 650 Supplier/Manufacturer/Model: North Star, Fashion Seal, 420	Flame Resistance: No; burns less readily than poly/cotton blends, but still burns Splash/Chemical Resistance: Not fluid resistant or fluid proof. Degraded by acids. Anecdotally, more resistant to solvents. Comfort: Lightweight breathable Notes: Good for labs where acid handling is limited and splash resistance is not a concern, and there is some work with flammables, heat and flame. Supplement with an apron for acid handling.