TEXAS A&M UNIVERSITY
Environmental
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LAB SAFETY AWARENESS WEEK

Engineering Controls

Lab safety starts with a safe attitude.

Identifying needs, getting familiar via training, and maintaining engineering control equipment is critical in protecting health and safety, especially in emergency situations.

- Examples include: fume hoods, biological safety cabinets, glove boxes, secondary containment for tanks and containers, neutralization systems for wastewater discharges, air cleaning systems, and others.
- Engineering controls are our first line of defense and protection. When the hazard assessment process indicates a potential impact, an evaluation should be conducted to determine if engineering controls are necessary to prevent or reduce workplace exposures or minimize compliance issues.
- Periodically check if appropriate engineering control equipment and supplies are maintained, serviced, and in good condition. Before using a fume hood, check to be sure the EHS sticker indicates an inspection within the last year.
- If your fume hood or other equipment monitor alarm sounds or you feel that the exhaust ventilation is not working correctly, take immediate action. Do NOT mute and continue working! Submit a work order for repair or contact labsafety@tamu.edu with questions.
- Having a regular training and maintenance program for your lab's engineering control equipment is imperative. Do not use broken or damaged equipment – notify lab members and schedule its service immediately.

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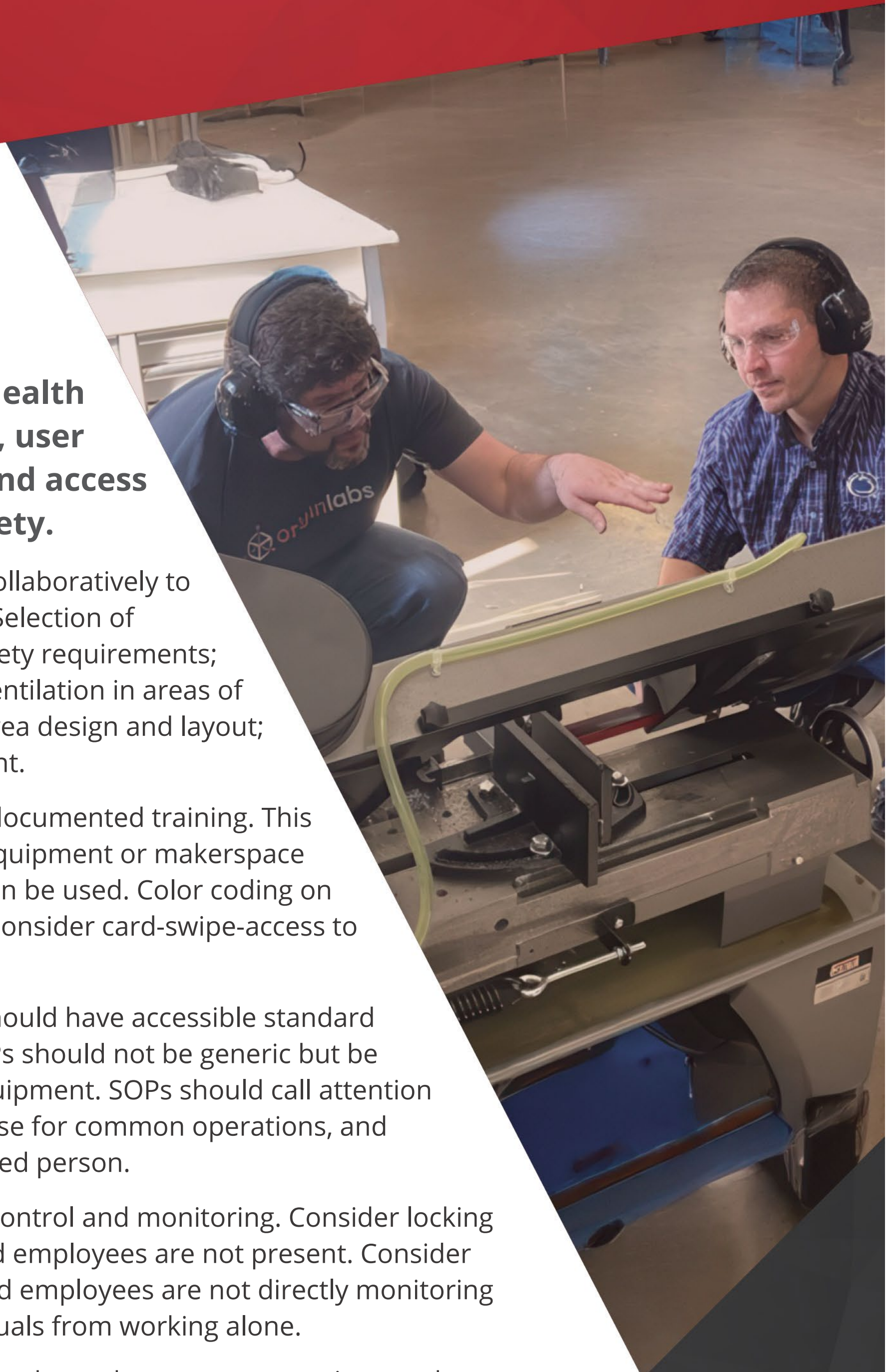
LAB SAFETY AWARENESS WEEK

Makerspaces



Makerspace safety is best achieved via a collaborative relationship between the responsible person and Environmental Health and Safety. Elements of safety-by-design, user training, and strategies for monitoring and access control are essential for makerspace safety.

- Makerspace supervisors and EHS should work collaboratively to implement safety-by-design. Examples include: Selection of fabrication equipment to meet guarding and safety requirements; Effective general ventilation and local exhaust ventilation in areas of subtractive and additive manufacturing; Work area design and layout; Mechanical lifting device selection and equipment.
- Makerspace users and employees should have documented training. This training should be tied to authorization to use equipment or makerspace areas. Training matrices and tracking systems can be used. Color coding on badges can be used. Advanced facilities should consider card-swipe-access to machines or areas that is tied to training.
- Makerspaces used by the public and students should have accessible standard operating procedures for equipment. These SOPs should not be generic but be created from the user manual of the specific equipment. SOPs should call attention to primary hazards, controls, safe sequence of use for common operations, and operations that require assistance from a qualified person.
- Makerspaces should have some level of access control and monitoring. Consider locking and securing high risk equipment when qualified employees are not present. Consider preventing access to certain areas when qualified employees are not directly monitoring users. Implement protocols that prohibit individuals from working alone.
- Makerspaces should capture and properly process hazardous waste operations such as: Resin 3D printers and related cleaning solvents; Metalworking lubrication; Coating and paint residue.

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Chemical Storage

Best practices for chemical storage are critical to ensure campus community safety.

Maintain the safe and responsible use of chemicals, including waste, in line with state and federal regulations.

- Always consult your SDS for specific storage and segregation requirements for your chemicals and chemical hazardous waste.
- Store in groups based on their compatibility. Do not store your chemicals in alphabetical order, except within each hazard family.
- Store your flammable chemicals in flammable cabinets or fridges specifically designed for that storage purpose. Store in compatible containers that are in good condition.
- Label ALL chemicals with the full name of the chemical, date and its hazards. This includes any in-house mixtures, samples and waste. This is a regulatory requirement. Contact labsafety@tamu.edu with questions on proper labeling.
- Review SDS to ensure all chemical users have proper PPE and spill kits available before ordering a chemical or creating waste. This is critical to safely conduct experiments and address spills.
- See the EHS Laboratory Safety and Chemical Waste programs for more information.

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Hazard Identification & Risk Assessment

Risk assessments are crucial for conducting research projects safely.

1. Identify hazards
2. Determine the severity of potential risks
3. Establish suitable control measures

- Complete risk assessments **before** proceeding with research activities.
- EHS can help you perform risk assessments. Contact EHS at labsafety@tamu.edu to schedule a consultation.
- Risk assessments should be revised periodically, especially with any changes to the research experiment: adding new chemicals or equipment, changing the process, altering concentrations of already assessed chemicals, etc.
- EHS can help establish the hierarchy of controls, which includes elimination, substitution, engineering controls, administrative controls, and PPE.

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LAB SAFETY AWARENESS WEEK

Compressed Gas Cylinder Safety

- Inspect tanks, regulators, and hoses regularly for leaks, corrosion, cuts, bulges, and other defects.
- Separate oxygen and other oxidant gases from fuel-gas cylinders.
- Close valves and secure caps when not in use.
- Verify all cylinders are properly labeled.
- Transport only in carts designed for that purpose.
- Use the correct regulator for the gas and cylinder type.

Compressed gas cylinders must be . . .

- stored in an upright position.
- secured to permanent anchor points.
- in a well-ventilated area away from heat, electrical current and high traffic areas.

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Peroxide Forming Chemicals

Some common laboratory solvents fall into a category called peroxide forming chemicals. Under certain conditions such as oxidation or concentration, these chemicals may form shock-sensitive explosive peroxide crystals. Shocks as minimal as unscrewing a cap containing peroxide residues may be enough to trigger detonation, which highlights the importance of proper dating, disposal, and inspection of potential peroxide forming chemicals.

CLASS	CHARACTERISTICS	COMMON EXAMPLE
CLASS A	May autoxidize and form explosive levels even in unopened containers and without concentration.	Tetrafluoroethylene
CLASS B	Can form explosive levels of peroxides, but typically require concentration. Most of these are volatile enough that repeated opening of their container can allow for concentration via evaporation.	Diethyl ether and Tetrahydrofuran
CLASS C	Risk of peroxide formation is relatively low, but decomposition can initiate explosive polymerization of the bulk monomer.	Acrylonitrile

Essential habits for peroxide former safety:

- Label all containers of peroxide formers with date received and opened.
- Follow proper disposal procedures.
- Inspect chemical inventory regularly and dispose of old, expired, damaged or excess amounts of chemical.
- Maintain an accurate chemical inventory.
- Train personnel and ensure they know how to safely handle hazardous chemicals.

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