

Personal Protective Equipment (PPE)

When working with robotics, despite the field, safe attire must always be adhered to. For safety precautions, closed-toe shoes must be worn at all times and loose-fitting clothing will not be allowed. This means; no flip-flops, no slippers, no backless shoes, no loose dresses or shirts, no drawstrings. Loose jewelry is also not permitted, for it is considered a safety hazard. Long hair is to be tied back so that it does not interfere with vision or possibly get caught in tools or related objects. Protective hearing equipment is needed when working with loud tools. Gloves and goggles are generally required throughout the entirety of our work. Gloves are to be well-fitted to your hands. Chemical-splash goggles and hardware goggles are both accepted. All goggles that are worn are to be ANSI-approved, UL-listed, or CSA-rated. Tints of yellow, rose, blue, and amber are accepted and are FRC approved. **Glasses are NOT goggles.** Please wear goggles over your glasses or have approved side shields. All goggles must cover the side of your face. If you do not adhere to these basic safety rules, you may not participate.

When working with mechanics and hardware tools, safety goggles are **REQUIRED** at **all times**. Gloves are needed for heavy lifting, and are strongly recommended when working with hammers and mallets. **DO NOT wear gloves when operating the drill press.** Electricians and programmers must also wear safety goggles when in the presence of mechanical work. Electricians and mechanics are to wear gloves and safety goggles if testing motors, batteries, or wires. If testing a battery or handling a cracked and/or leaking battery, you **must wear CHEMICAL GLOVES** and **SAFETY GOGGLES**. It is required and expected of you to wear the proper attire when working with the robot.

If a fire emergency were to occur, follow **PASS** while using a fire extinguisher. PULL, AIM, SQUEEZE, SPRAY. If injury occurs, follow **RICE**. REST, ICE, COMPRESSION, ELEVATION.

Pit Safety & Competition Regulations

When attending a *FIRST* competition or off-season competition, always conduct yourself with excellence. **Never run and always treat officials and other teams with respect.** Have a buddy to travel with at the event. If you become lost, contact a team mentor or captain. If you cannot, find a *FIRST* official to help you; they are always distinguished with nametags.

Safety goggles are always required when in the pits or on the field. They must be ANSI-approved, UL-listed, or CSA-rated. Tints of yellow, rose, blue, and amber are accepted and are FRC approved, **but are not recommended for use in the pit. Glasses are NOT goggles.** Please wear goggles over your glasses or have approved side shields. All goggles must cover the side of your face. If you are transporting heavy crates or the robot, working gloves are required. They must be well-fitted to your hands to prevent hazards. When lifting, **lift with your knees.** Bend down before lifting and maintain a good grip of what it is you are lifting. **Never** lift the robot above your knees and **always** lift the robot with two or three other people. At competition, each team has their own pit measuring 10ftX10ft. The maximum height allowed is 10ft. You may only stay within your team's pit area. For safety concerns, and for efficiency, we do not allow more than ten people into the team's pit at once. People 12 years old and younger must be guardian-accompanied. **If you are not a legal guardian,** therefore you **may not** accompany a child. Please take part in keeping our pit clean, especially if you are in the pit. We have an organized system and keep all tools and materials organized. **Keep it that way.** Only use tools for their intended purposes! Wear closed-toe shoes and no loose-fitting clothing. Tie long hair back and remove all dangling jewelry.

Battery Safety

All batteries used for the robot are sent to us from *FIRST*. Each battery is measured to hold 12V and is partially powered by **Sulfuric Acid (H₂SO₄)**. This is a **STRONG ACID** and is **highly corrosive**. It is colorless and prone to leak from a battery when the battery is cracked, scratched, dented, or split. **DO NOT** use a visibly damaged battery; place it in our battery bin of batteries to be disposed of. If a battery is leaking, neutralize it with **Sodium Bicarbonate**. To see further information on chemicals and chemical contents, refer to the Material Safety Data Sheet. **DO NOT** touch a broken battery; if you happen to come into contact with a leaking battery, flush contacted skin with water for at least 15 minutes. Seek medical attention.

To neutralize a leaking battery;

1. Put on chemical gloves.
2. Pour sodium bicarbonate on all leaking surfaces.
3. Place battery in an enclosed container for disposal.
4. Record leak in Incident Log.
5. Neutralize acid that may have come in contact on gloves.

All batteries must be kept in a cool, well-ventilated area. This applies to batteries being charged or standing. Do not overcharge the battery and measure the voltage after each charge. Be careful to not short out battery terminals when working with them; if you are testing a battery, wear safety goggles and hold onto the covered part of the wire. Place ground down first and then positive. Each battery tested is to be tested with an appropriate motor. All batteries should be held with two hands (each weigh aprx. 10lbs), and never be held by the terminals!

Always check batteries for cracks, dents, bent terminals, cut wire, or leaks. Before each test drive, demo, and match; **CHECK YOUR BATTERIES**.

Electrical Safety

Remember, electrical currents are live and may even stay in the wires if they are not being used or plugged in to anything. Always check wires for snags, and cover them with electrical tape. **Never** plug another extension cord into another extension cord and **never** plug an extension cord into a power strip. It is okay to plug a power strip into an extension cord. Only use appropriate gauge sizes and never overfill a motor with too much energy.

When at competition, never overfill your given power strip in your pits, and do not daisy chain. Take care of the batteries and keep them charged to 12V. Do not overcharge them and handle them with care as to not crack or dent them.

Programming Safety

All programmers have their own personal area to work in, away from the robot and away from the heavy mechanical work. This area is meant specifically for updating, writing, and fixing code. Our coding is written in Robot C (C++). You may only use our laptops, property of the Pyrobots, to program. No other laptops should be used, and only those authorized to do so may program on our laptops. If you are working with the robot, testing the robot, or programming in the same room as the robot, you **must** wear appropriate **safety goggles**. If you do not, you are not permitted to work with the robot.

Pneumatic Safety

Pneumatics deals with air systems through the use of compressors, pistons, tubing systems, and solenoids. There are different color tubes for differentiation and these tubes connect compressors to pistons and solenoids. Solenoids help regulate the flow of the air in the system and be sure that pressure does not build up in such a high concentration. Only use appropriate piston sizes and never damage the pistons. All air compressors should be in a **well-ventilated area** and should never be overrun in order to prevent over-heating. The PSI reading should **never** exceed 120psi.

Mechanical Safety

When working with mechanics, always wear **safety goggles**. This is a requirement **EVERYWHERE**; pits, competitions, and build season. **Gloves** are also a necessity when mechanics testing motors, batteries, or wires. It is also strongly recommended to wear gloves when working with hammers and mallets and doing heavy lifting; the robot and heavy crates. **NEVER wear gloves when working with the drill press.** It is essential to follow general dress code; no loose clothing, no loose jewelry, and closed-toe shoes.

You are **NOT permitted** to use a tool for any other purpose besides what it is intended for. Ratchets and wrenches are meant for tightening and loosening bolts; **NOT FOR ICEPICKS OR MALLETS.**

Material Safety Data Sheets (MSDS)

Every *First* Robotics team is required to have a set of **material safety data sheets**, and these are necessary because they let each member make themselves privy to the chemicals contents of things they use every day in robotics. We have our own set of **MSDS** and each member is expected to know all of the material listed and what to do in case of an emergency involving one of these substances.