



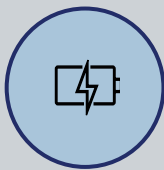


Electric Vehicle Safety Awareness

With the growth in environmental awareness and new regulations requiring that all new passenger vehicles sold in Canada after 2035 be electric zero-emission vehicles, an awareness of electric and hybrid vehicle hazards becomes imperative. New regulations will be phased in gradually starting with a 20% requirement in 2026.

You will start to hear common terms of these types of vehicles being referred to as Battery Electric Vehicles (BEV), Hybrid Electric Vehicles (HEV), and Plug-In Hybrid Electric Vehicles (PHEV) with each carrying its own set of hazards to be aware of. Each vehicle manufacturer will also have specific safety precautions to take based on the types of vehicles you are working with or around.

What's the Danger?


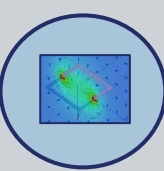
Ongoing daily safety awareness is required for working with or around Electric Vehicles (EVs) with some general hazards to be made aware of:

Main Electric Vehicle Hazards	
 Fire & Explosion	<p>A potential risk of explosion or fire exists with any vehicle but there is an increased risk with EVs during vehicle charging, battery storage, and with fully charged lithium batteries. Fires are usually caused by mechanical damage, external thermal stress, an external or internal short circuit, incorrect handling, overcharging, or deep discharging. Small sparks are sufficient to start a lithium battery fire. Once an electric vehicle fire starts it is extremely difficult to extinguish, requiring up to 10,000 L (2,500 gallons) of water.</p>
 Damaged & Repair	<p>Electric vehicles present the highest fire and electric shock risk when damaged or undergoing repair. Extra precautions should be taken if a vehicle shows signs of fire, thermal, or water damage or if there is a check engine warning light. A check engine light could indicate unexpected parts are electrically charged.</p>
 Electric Shock	<p>The highest risk working in the presence of EV & HEVs is the significantly higher voltage of up to 650 Volts (DC) compared to combustion engine vehicles with 12 to 24 Volts (DC). In dry conditions, accidental contact with live parts above 110 Volts DC can be fatal. Electric Vehicles contain orange high-voltage cables and components that can store electrical energy and dangerous voltage even when the vehicle is turned off and the battery is isolated.</p>
 Chemicals	<p>Battery systems contain chemicals that can be harmful if released and may include potassium hydroxide and alkaline electrolytes. Alkaline electrolytes are very harmful and can cause blindness if they get into your eyes and poisoning if they get into the bloodstream. A potential exists for the release of explosive gases and harmful liquids if batteries are damaged or incorrectly modified. During a fire, various harmful substances can be released.</p>
 Substantial Differences in EV & HEV Designs	<p>Each manufacturer will have specific safety precautions for their vehicles. Obtaining manufacturer-specific information for the vehicles being brought into your workplace is important. Guides for each vehicle are available through the National Fire Protection Association. NFPA - Emergency Response Guides for Alternative Fuel Vehicles</p>



SAFETY TALKS

Electric Vehicle Safety Awareness

 <p>Unexpected Movement & No Noise</p>	<p>When in operation, electric vehicles produce no noise which eliminates the warning combustion engine vehicles produce when approaching. Unexpected movement and no noise can cause not only a danger to those working on electric vehicles but others in the workplace including co-workers, customers, contractors, and visitors.</p>
 <p>Electro-magnetic Fields</p>	<p>Powerful magnet parts can create unexpected movement due to magnetic forces within the motors which can trap fingers. Where there are large voltages and currents in electric vehicles there will be corresponding electromagnetic fields. While it is still safe to drive and operate electric vehicles, if you have electronic devices such as a pacemaker in your body, it may not be safe to work on them.</p>

Safety Tips

- ✓ Only properly trained personnel with specialized PPE are to service or dismantle hybrid or electric vehicles.
- ✓ Special vehicle fire blankets and class D extinguishers can help suppress fires. Only attempt to extinguish very small fires with a fire extinguisher. **In the event of a vehicle fire Call 911 immediately!!!**
- ✓ Keep remote operation keys that need to be close to the vehicle for it to be powered up away from vehicles to prevent accidental movement or operation. Smart keys must be at least five metres away from the vehicle.
- ✓ Workers who move vehicles should be aware that others may not hear them approaching. Electric and hybrid vehicles may also move without warning.
- ✓ Keep your distance away from damaged vehicles or where any repair work is being undertaken. Warning signs and/or barriers are in place to warn everyone away from the work area.
- ✓ Damaged vehicle precautions should include placing vehicles in 15-meter isolation unless vehicles have sat without incident for more than 30 days. Where isolation areas are not available vehicles should be rejected.
- ✓ Electric vehicles should never be used to jump-start another vehicle. Only use a jump-pack to jump-start by connecting it to the 12v battery and follow the manufacturer's instructions to start the vehicle.
- ✓ Battery packs are susceptible to high temperatures. The vehicle will typically be labeled advising of its maximum and minimum temperature and this should be considered when carrying out operations such as painting in paint booths where temperatures may exceed the limit.
- ✓ When an electric vehicle is being recovered onto a recovery vehicle, the remote operation key must be removed to a suitable distance and the standard 12/24v battery disconnected to prevent the vehicle from being activated/started.
- ✓ Pressure washing has the potential to damage high-voltage electric components and cables. High voltage cables coloured orange are to be avoided in general and especially when pressure washing.
- ✓ Avoid towing unless it can be determined that it is safe to do so. Dangerous voltages can be generated by the movement of the drive wheels.
- ✓ In the event a technician is electrically shocked, don't touch them. Use a safety hook to push them off the electric vehicle source, call for a first aider, and 911. A safety hook is to be readily available with the location known by all staff.



SAFETY TALKS

Electric Vehicle Safety Awareness

- ✓ Significant amounts of stored energy can give rise to explosions if batteries are not stored and handled correctly. Store batteries with compatible batteries, in a dry, secure, designated area. Check with the manufacturer for further storage requirements.

Demonstrate

Demonstrate distance requirements, safety precautions, battery storage, charging stations, and workplace safety rules.

Discussion

Review the manufacturer information for the main types of vehicles working with or working around.

