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ELECTRIC VEHICLES

IDENTIFYING APPROPRIATE PPE FOR MAINTENANCE, REPAIR, MODIFICATION, DISPOSAL AND ACCIDENT RECOVERY OF ELECTRIC VEHICLES

Sales of electric vehicles (EVs), including cars and bicycles, are rising rapidly thanks to an increased interest in minimisation of fossil fuel use by environmentally conscious consumers. In using energy storage systems such as lithium-ion batteries, these vehicles present a set of safety risks that necessitate the use of personal protective equipment (PPE) designed to perform against chemical, electrical, and thermal hazards.

EVs are available in a range of formats:

1. Battery electric vehicles (BEVs) are powered only by electricity. They are also referred to as 'plug-in' EVs as they require access to an external outlet to charge the battery. They lack an internal combustion engine, fuel tank and exhaust system.
2. Plug-in hybrid electric vehicles (PHEVs) are powered by a combination of fuel and electricity. They contain an internal combustion engine that uses liquid fuel and a plug for use with external outlets to charge the battery.
3. Non plug-in hybrid electric vehicles (HEVs) are like PHEVs but rely on electricity generated by the car's braking system to recharge the battery, rather than plugging in to an outlet.

4. Fuel cell electric vehicles (FCEVs) are the least common format, utilising a fuel cell rather than a battery (or in combination with a battery or supercapacitor) to power electric motors. They are typically fuelled by hydrogen. Global sales of hydrogen powered cars are low compared with other EV types.

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THE RISKS

Many occupations are at risk of harm and injury when working with EVs. These include fire, rescue and first responders, clean-up crews, waste and recycling facility workers, tow truck operators, car mechanics and other auto trade workers such as panel beaters of spray painters, or installers of aftermarket auto equipment.

Electrical hazard – EVs store electrical energy which presents a risk of injury where workers contact the electrical system or its components. A compromised vehicle (including those involved in an accident) may not be sufficiently isolated, causing additional risk of electrical injury. Some EVs also generate electricity when the wheels are rotated, presenting shock or



arcing risk if the vehicle is being pushed or otherwise moved in the event of an accident.

A vital part of the maintenance and operation of EVs, the use of charging stations can also present risk in terms of electrical hazard exposure. While charging cables generally de-energise once charging is complete, the charging station itself still remains fully energised. Adequate safeguards against unwanted contact must be in place, particularly in residential charging station environments.

Thermal hazard – The high voltage batteries used in EVs comprise multiple lithium ion (Li-ion) cells which contain highly flammable electrolytes. As a result, it is not uncommon for an EV collision to result in a fire that can be extremely difficult to extinguish.

Chemical hazard – In addition to thermal injury risk, workers should take care to mitigate the risk of chemical injury from unwanted contact with battery electrolytes. Care should be taken, particularly post-collision, to avoid skin and eye contact, ingestion and inhalation of vapours.

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BE PARTICULAR ABOUT PPE

Care should be taken when working with EVs in any capacity, including those working in accident recovery including first responders, clean-up crews and tow truck operators. The breadth of injury risk requires provision of a suitable spectrum of PPE types including clothing and hand protection.

It is recommended that PPE should include suits that offer type 3 or 4 protection against chemical risk, as well as flame retardant and arc flash-rated protection.

Hand protection should incorporate suitable insulation to guard against arc-flash and electrical injury and should also integrate suitable chemical protection to effectively combat any contact with chemical spills arising from compromised vehicle batteries. Eye protection should also be worn to minimise the likelihood of chemical contact. The identification and use of suitable PPE should form part of a safety assessment and the development of suitable work procedures designed to protect those working with hazardous materials. If in doubt about available types, consult your PPE vendor for expert advice.



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