



PPE for Hybrid Vehicles – What do we need?

By Daniel R. Wimer

As new technology in any discipline presents itself to the fire service we have always stepped up to the challenge and learned everything we could about every aspect of the topic.

Our newest challenge concerning Motor Vehicle Accidents is Hybrid Vehicles. Hybrid vehicles have been around for 10 years now and they are continuing to grow in popularity with consumers as gasoline prices bounce around \$3.00 per gallon.

Your department should have had some training on Hybrid Vehicle Safety by now. Manufacturers of hybrids make some very specific recommendations about hybrids involved in MVA's for Emergency Responders. They repeatedly tell us 'You can be harmed by the voltage on the vehicle' and further instruct us to properly 'Power Down' the vehicle and isolate the voltage.

Additionally manufacturers recommend the use of specific PPE for Hybrid vehicle incidents. One of the differences between our current PPE and the PPE recommended to be used around a hybrid involved in an MVA is that the fire service has had limited exposure to PPE for protection from electrical shock. Typically we rely on our local Power Company to kill the electricity at a fire in a building or at an MVA where electrical wires are down.

When it comes to a hybrid vehicle however, the fire service owns the responsibility of '**Powering Down**' a Hybrid whether we like it or not. We are going to be expected to be the most '**Qualified Persons**' on Hybrid vehicle Safety.

So what does the manufacturer of hybrids recommend for PPE? Here's a list of the items you should have to protect your firefighters:

- Full fire fighter protective gear with SCBA.
- Insulated RUBBER BOOTS! (not leather),
- Insulated Synthetic Lineman's Gloves,
- Insulated rubber mats,
- Non-Conductive pole at least 5 feet long,
- Alkali resistant apron, and
- Protective face shield or goggles.

Currently we have most of these items of PPE covered with the exception of the Insulated Lineman's Gloves, the Insulated rubber mat and possibly the protective apron. The apron would be a priority if we did not have our turn out gear. In the event that a Hybrid High Voltage battery was to split open and a firefighter got the fluid on their gear, you're going to throw the gear in the trash because the electrolyte has a pH of 13.5.

Let's look into the Lineman's Gloves as this is something new to us. We're reluctant to accept the liability of putting these on our rigs for a number of reasons. Whatever reason you have today may not be a good one on the day that you need the PPE at a Hybrid MVA scene. So we need to determine whether or not lineman's gloves are going to be introduced to our industry as another level of PPE.

As an industry we rely on NFPA and OSHA for guidelines on how we address safety issues. Both agencies address the use of PPE for use around electricity in fixed locations but they are not specific about PPE use around Hybrid vehicle incidents. From what both agencies state however we can gather enough information to come to an educated conclusion.

NFPA 70E and OSHA 1910 are the electrical standards we want to review. NFPA 70E is a standard for ALL electrical safety practices. OSHA 1910 is the Safety and Health Regulations for General Industry. Sometimes regulations can turn us upside down but an easy way to look at the relationship between the OSHA regulations and NFPA 70E is to view OSHA as the "shall" and NFPA 70E as the "how."

The NFPA standard addresses all three hazards, shock, flash and blast associated with working on energized electrical parts. We are particularly concerned with '**electric shock.**' Article 130 addresses 'Working On or Near Live Parts' which would apply at a Hybrid incident if we had not completed the 'Powered Down' procedures yet. Section 130.2 states that we need to protect 'Qualified Persons' who may be exposed to 'Live voltage' above 50 volts. (Hybrid battery voltage is on the average of 330 volts).

This standard also includes section 130.7 (A) (C), which addresses workers PPE needs, and includes specific requirements for both rubber insulating gloves and insulated **hand tools**. The standard specifically states:

130.7 Personal and Other Protective Equipment.

- (A) **General.** Employees working in areas where electrical hazards are present shall be provided with, and shall use, protective equipment that is designed and constructed for the part of the body to be protected and for the work to be performed.

Looking at rubber gloves, this standard outlines how to protect workers from shock due to direct contact with a live electrical part. The gloves greatly reduce the risk of injury for a worker when used within the proper voltage range. Rubber insulating gloves are rated for a maximum use voltage and assigned a class by ASTM (American Society of Testing Materials) standard D 120.

Hybrid vehicle manufacturers also recommend using Insulated Rubber Mats as part of the PPE envelope. The rubber mat allows you to approach the vehicle, lay the mat down and rest against it as you pull fuses, relays and HV Service Plugs.

Section 130.7 (D) addresses 'Insulated Hand Tools' for use around electricity. Insulated hand tools offer protection for someone working around electricity. Rubber insulating gloves and insulated hand tools together are vital components of a successful

PPE program for Hybrid vehicles and must be used in conjunction to provide the maximum protection for your firefighters.

OSHA mandates that all services to fixed electrical equipment (equipment fastened in place) be done in a de-energized state. Working live can only be done under special circumstances. Further it states that if working live (under 50 volts) the regulations outlined in NFPA 70E, Article 130 should be used as a tool to comply with the OSHA mandates.

OSHA 1910.137 outlines the design requirements for insulating blankets, matting, covers, line hose, gloves, and sleeves made of rubber. Subsections of 130 outline the maintenance and inspection of this PPE.

So now we're faced with making a decision about Lineman's gloves and insulated hand tools to be used at an incident involving a Hybrid Vehicles and this is a decision about safety for our firefighters so it makes sense to examine it thoroughly.

Our workplace in the fire service creates many hazards for our hands and we have more than one pair of gloves currently in use to protect them. It is important to assess the risk inherent with the electrical energy on a Hybrid vehicle and it looks like Lineman's gloves will be the next choice we make for gloves.

Electrically insulated hand tools that are rated for the voltage on a hybrid vehicle should be examined also. Don't rely on your current pair of channel locks or battery pliers in your toolbox because they're not rated for high voltage. And making the decision to purchase more hand tools in the fire service, you've got to be kidding!

For more information on Hybrid Vehicle Safety for Emergency Responders and on PPE such as lineman's gloves, insulated tools, NFPA and OSHA standards and a complete assessment of the standards for electrical safety visit:

<http://www.drwenterprises.org/purchase.html>.