Calendar

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**Electric Vehicle Protocols applicable to teams on site for a live event**

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| **Ensuring the safety of students, volunteers and other attendees of Formula Student is of paramount importance. The organisers reserve the right to disqualify a team for failure to follow these protocols or where they observe unsafe EV working procedures.** |

Following a number of known Formula Student Car battery incidents, the following protocol must be adhered to when operating any EV at Formula Student. The intention of this protocol is to reduce the risk of a battery fire and other hazards to team members and in the event of a fire reduce the exposure to risk.

A designated area is provided for working on and charging battery packs. This area will be supervised by the EV Safety Team and scrutineers who will manage the space and oversee any work being conducted. The team will have the right to stop you working on your battery pack etc if they feel you are not following good working practises for working on HV systems.

Ad hoc inspections of EV team pit areas will be carried out to ensure no electrical work is being carried out in contravention of these protocols. Penalties will be severe including disqualification from the competition for any contravention or failure to follow instructions from officials.

1. **Site Induction**

All EV teams will be invited to attend a site induction from the EV Safety Team on arrival at the live event. Your tabards for working in the EV charging and working areas will be issued following your induction. Your induction will include a tour of the EV charging and working areas, introductions to key personnel/officials and where they are located throughout the live event and how to contact officials in the event of an emergency e.g. fire

1. **Positioning during charging**

Accumulators / batteries **must** be removable from the vehicle for charging and accumulators **must** be charged or worked on outside of the vehicle at the event.

Once the battery pack is removed from the car, it must be placed on the accumulator container hand cart with the handle bar towards the door for immediate evacuation in case of any incidents.

1. **Team members**

A team member must always be present when the battery is in the charging area. When working on the battery, or the battery is charging, a designated Electrical Safety Officer (ESO) **must** be present – List of ESOs to be provided on this form. Teams must use the pink dynamics tabards to access the charging area thus limiting the maximum number of people in the charging area per team to 4 people.

1. **Working on the Battery / Accumulator or exposed HV wiring that is live**

There is a dedicated area for working on exposed HV such as when opening up the battery. You must use the dedicated area for any work on your accumulator / battery pack. You must notify the EV scrutineers before entering this this area to work on the battery and you must present to them a clear plan of what work you are going to undertake. Before leaving the area you must contact the scrutineers for a final check. Please note: Sitting on the floor to work on the battery pack is not permitted. Personal Protective Equipment (PPE) e.g.face shields and appropriate gloves EN60903 Class 00 must be used when working on the battery. If your accumulator cart is at a low level then trollies will be available so that you can work on any battery whilst standing.

**For the avoidance of doubt, work on an accumulator / battery pack includes working on cells, an assembly of cells, modules or anytime where a battery container is open. If in doubt you must consult the EV scrutineers.**

1. **Charging your Battery / Accumulator**

There is a dedicated area for charging your battery. You must only charge the battery in the dedicated area, you are **not** permitted to charge your battery in your allocated pit area. The dedicated area will be overseen by the EV scrutineers. You must notify the scrutineers when you enter the area and for a final check before leaving the area.

When charging the battery you must monitor the cell voltages and cell temperatures at all times to ensure that the normal limits are not exceeded. You must not leave the battery pack unattended when it is charging.

When you have finished charging your battery, you must check that the cell temperatures are starting to drop before you leave the charging area.

1. **Charging Times**

Charging times will be included in the Event Timetable and Team Handbook.

1. **Running your vehicle**

Whenever you run your vehicle, you may take it back to your pit area, but you must check that all cell temperatures are within normal working limits and before you leave your vehicle, you must ensure that all cell temperatures are reducing.

1. **Cell temperatures are not reducing.**

If the cell temperatures are above ambient after running the car or charging the battery and they do not reduce as expected or start to increase in temperature, then the car must be moved to the designated safe area. The ESO must notify the EV Safety Team immediately to alert them to the potential issue. In the designated safe area you must continue to monitor the cell temperatures to ensure that they start to drop. The EV Safety Team must be contacted for a final check before leaving the area.

1. **Battery fires in the charging / pit / garage area**

In the event of a battery fire or incident whilst in the pit / garage area immediately inform the attending Fire Marshal and EV Safety Team or **if there is not one present, please call the emergency number posted on the Garage wall**. The car should be moved to the designated safe area if it is safe to do so, for example if the battery is just starting to overheat. If the fire is established, then inform the fire marshal of the incident and the car will be towed to a safe area if this is possible. The objective is to ensure that all team members are safe, but also to ensure that fire cannot spread to other areas of the pits which could further endanger life.

If there is an overheating battery or a battery fire, the Fire Marshal will request assistance by radio message.

The safe area will be designated and marked with signage and barriers. Within the safe area will be provided a sandbox and sand suitable for dealing with EV battery fires.

Please ensure the above protocols are followed to ensure that the event is as safe as possible for everyone.

I, the Team Leader for **<INSERT TEAM NAME AND CAR NUMBER>** have read and understood the requirements for operating and charging an EV at the Formula Student 2022 live event and will ensure that my team complies with these requirements when charging the battery pack / accumulator or operating the vehicle.

The team **has/has not** completed the EV Safety Awareness Training delivered by Hypermotive Ltd on behalf of the IMechE.

**Signed Print Name Date**

**Contact number**

*One copy to be retained by the team. One copy to be signed and returned to the event organisers.*

Please complete for qualified ESOs (as many as you have), Battery Chemistry and Fire Extinguisher Type plus charging connection requirements\*:

**Battery Cell Chemistry**

**Fire Extinguisher Type**

**Charging connection required (a as appropriate):**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **3-pin UK mains plug** | **16A commando** | **32A commando** |
|  |  |  |  |
| **Single-phase** |  |  |  |
| **Three-phase** |  | **Not available this year** |  |

**\**The use of travel plug adaptors for the purpose of battery charging will not be permitted***

**Print Name ESO 1**

**Print Name ESO 2**

**Print Name ESO 3**

**Print Name ESO 4**