



ENERGY EFFICIENT VEHICLES (EEVS) SUPPLEMENT

[Version 2023.01](#)

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Introduction

- All specifications listed in the Human Powered Vehicle (HPV) And Energy Efficient Vehicles (EEV) Specifications apply to Energy Efficient Vehicles with the following additional specifications.
- This supplement should be read in conjunction with the HPV and EEV Specifications.
- Any significant specification changes from previous editions been highlighted and underlined in blue.
- **Key specifications that the Scrutineers wish to bring to the attention of Team Manager's have been highlighted in bold.**
- If changes are made to these specifications prior to the event, Team Managers will be notified via email and a new edition will be published on the website.
- The Energy Breakthrough (EB) Scrutineers have the final authority to decide if any vehicle or team participates in the event, based on safety and their interpretation of the following rules.
- All enquiries regarding HPV and / or EEV Specifications should be emailed to technical@eb.org.au
- **Please note that as of 2023 Internal combustion, fuel powered vehicles will not be eligible for the event. All EEV vehicles must use electrical propulsion.**

1. RIDER PROTECTION BARS

Rider protection for Energy Efficient Vehicles is the same as for Human Powered vehicles except that the metal protection bars are of greater diameter as per section 6.2 of the HPV & EEV vehicle specifications.

Note:

A Human Powered Vehicle that has been converted to an Energy Efficient Vehicle will satisfy the Rider protection specifications by duplicating the minimum specified bar dimensions for an HPV.

2. FIRE EXTINGUISHERS

- All Energy Efficient Vehicles must be fitted with an Australian Standard, dry powder minimum 5BE fire extinguisher of minimum capacity 0.5 kg.
- Fire extinguishers must be securely affixed to all Energy Efficient Vehicles. The use of weak or flimsy mounting brackets and/or securing straps is not permitted.
- Fire extinguishers must be positioned such that it can be readily reached and removed for use by either the rider from the normal riding position or external assistant in an emergency.
- The location of the fire extinguisher must be clearly indicated on the exterior of the vehicle.

3. CUT-OUT SWITCH

- All Energy Efficient vehicles are required to fit a cut-out switch that shuts down all propulsion sources and is accessible from outside the vehicle.
- The cut-out switch must be clearly visible, marked by a blue triangle and mounted on the left hand side of the vehicle and within 300 mm of the rider's left shoulder.

4. POWER SOURCES

4.1 Number of Power Sources

There are two types of vehicle allowed in the Energy Efficient Vehicle category:

1. **Hybrid 1:** Pedal power, plus one other power source.
2. **Single Power Source:** Electric-only vehicles

4.2 Minimum Duration of Power Generation

- Pedal assist type vehicles will be eligible to compete in the Hybrid 1
- While satisfying this requirement a power source may be used intermittently during the event to overcome particular loads, such as starting from rest or hill climbing.
- The spirit of this clause is that a sacrificial form of propulsion is not acceptable.

5. ELECTRICAL SUPPLY

5.1 Motor Type

Choice of motor type and gearing is free.

5.2 Total capacity and type of propulsion batteries

- Propulsion batteries shall be commercially available and not modified from their manufactured state.
- Battery packs can be placed in a casing providing that the cells are not removed from the manufacturers wrap or covering.
- Data sheets for batteries and chargers will need to be submitted to the scrutineering team prior to the event.
- Battery chargers must be commercially available and must not be modified from OEM standard.
- Batteries and chargers will be inspected and marked during Scrutineering.

5.3 Battery Casing

- Batteries with deformed or damaged cases are not acceptable for use.
- Any Lithium Ion (Li Ion) batteries with thin plastic wrapping must be housed within a protective case at all times (on and off the vehicle including when charging) to prevent puncture or damage in an accident.
- This protective case must be made of non-conductive material and preferably made of hard-plastic case with a foam padding and a lead lock.
- Wet cell batteries must be housed in a sealed box (e.g. plastic) that will prevent spillage if the battery is inverted or damaged.

Figure Ref 5.3: Battery Casing Examples



5.4 Total number of propulsion batteries

The maximum number of batteries per vehicle is:

Category	Max no. of batteries
<u>EEV 1 Open</u>	<u>4</u>
<u>EEV 1 B/C</u>	<u>4</u>
<u>EEV SPS</u>	<u>5</u>

Note: Where Lithium Ion or [Lithium Polymer](#) batteries are used a Battery Management System must be carried on board that is designed to provide adequate protection during charging and discharging.

5.5 Battery Charging Allowances

The amount of power available from the grid will be as follows:

Pedal/electric EEV	5.0 kilowatt hours
Electric SPS EEV	10.0 kilowatt hours

5.6 Mass of propulsion batteries on vehicle

- Vehicles are required to carry at least one battery pack at all times so that the electrical circuit is complete.
- Batteries must be securely mounted in vehicles.
- A battery pack is regarded as the normal quantity of batteries required for the electric motor to propel the vehicle.

5.7 Power limitations for EEV's:

- [Electrical systems are restricted to a maximum of 48 Volts.](#)
- [Hybrid 1 vehicles: it is recommended that these vehicles have a maximum motor output of 300-400 watts.](#)
- [SPS: it is recommended that these vehicles have a maximum motor output of 650-750 watts.](#)
- [A 20 amp maximum circuit breaker or fusible link must be installed. If a circuit breaker is fitted, it must be out of reach of the rider.](#)

All EEV vehicles will be required to have an energy meter fitted. This device will be fitted during scrutineering. specifications and wiring requirements will be supplied after entry is accepted.

6. VEHICLES POWERED BY INTERNAL COMBUSTION ENGINES

Please note that as of 2023 Internal combustion, fuel powered vehicles will not be eligible for the event. All EEV vehicles must use electrical propulsion.