

2017 INFORMATION KIT
PART B: EEVS

RACV



ENERGY BREAKTHROUGH

23-26 NOVEMBER 2017 | MARYBOROUGH, VICTORIA

POWERED BY IMAGINATION

THE PREMIER SCIENCE, TECHNOLOGY, ENGINEERING AND MATHS, ACTIVE LEARNING PROGRAM

A PARTNERSHIP BETWEEN



racveb.com

Energy Efficient Vehicles (EEVs)*

WEDNESDAY 22 NOVEMBER

4.00 pm – 5.00pm **Registration open**
Location: Administration Centre

THURSDAY 23 NOVEMBER

All Day **Teams arrive and set up camp**

11.00 am **Registration opens**
Location: Administration Centre

FRIDAY 24 NOVEMBER

All Day Teams arrive, register, set up camp, set up displays etc.

8.00 am – 6.00 pm **Scrutineering, Design and Construction**
Location: Display & Presentation Marquees

9.00 am – 6.00 pm **Display and Presentation**
Location: Display & Presentation marquees

5.30 pm **Spirit of Competition – Team Captain's Meeting**
Location: Hospitality Marquee, RACV front straight.

6.30 pm **Team Managers' Meeting**
Location: Hospitality Marquee, RACV front straight.

7.15 pm **Assembly for Night Practice**
Location: Pit Lane, RACV Track

7.30 pm – 9.30 pm **Night Practice**
Location: RACV Track

SATURDAY 25 NOVEMBER

10.00 am **Vehicle Fuel-Up**
Location: To be advised.

12.00 pm **Assembly of Starting Grid**
Location: Back straight, RACV Track

1.00 pm **Start of 24-hour Trial**
Location: RACV Track

SUNDAY 26 NOVEMBER

1.00 pm **Finish of Trial**
Location: RACV Track

1.45 pm **Presentation of Trophies (Secondary)**
Location: Stage in near Display & Presentation marquees

Afternoon Pack up and depart.

All teams should have arrived and registered by 12noon on Friday. Display & Presentation and Design & Construction schedules will be prepared with this in mind.

Note: Teams may stay overnight on the Sunday after the event to ensure that the team travels home safely.

TEAMS

No.	Team Name	School / Organisation	Class
207	Gandal	Ballarat Christian College	Hybrid 1 B/C (Pedal + 1 other source)
208	Legolas	Ballarat Christian College	Single Power Source (Electric Only)
209	Big Kahuna	Ballarat Grammar	Hybrid 1 OPEN (Pedal + 1 Other Source)
210	Maverick	Ballarat Grammar	Hybrid 1 OPEN (Pedal + 1 Other Source)
227	One Million Nuts	Bendigo Senior SC	Hybrid 1 OPEN (Pedal + 1 Other Source)
222	Energized	Chairo Christian School	Hybrid 1 OPEN (Pedal + 1 Other Source)
223	Ignition Point	Chairo Christian School	Hybrid 2 OPEN (2 Power Sources, Non-Pedal)
224	Radioactive	Chairo Christian School	Single Power Source (Electric Only)
216	Adimov Dreaming	Damascus College	Hybrid 1 OPEN (Pedal + 1 Other Source)
217	Sherlock Ohms	Damascus College	Single Power Source (Electric Only)
226	The flying flamingo	Drouin Secondary College	Hybrid 1 B/C (Pedal + 1 other source)
225	Xception	Girton Grammar School	Single Power Source (Electric Only)
221	Holmesglen	Holmesglen Institute of TAFE	Single Power Source (Electric Only)
211	Vortex	Holy Trinity Lutheran School	Hybrid 1 B/C (Pedal + 1 other source)
212	Tsunami	Holy Trinity Lutheran School	Hybrid 1 B/C (Pedal + 1 other source)
204	Marists Blitz2.0	Marist Sisters Coll. Woolwich	Hybrid 1 B/C (Pedal + 1 other source)
213	OACC 2	Overnewton Anglican CC	Hybrid 1 OPEN (Pedal + 1 Other Source)
214	OACC 3	Overnewton Anglican CC	Hybrid 1 OPEN (Pedal + 1 Other Source)
215	OACC 4	Overnewton Anglican CC	Hybrid 2 OPEN (2 Power Sources, Non-Pedal)
219	Too Fast	Trinity Grammar School	Hybrid 1 OPEN (Pedal + 1 Other Source)
220	Too Furious	Trinity Grammar School	Hybrid 1 OPEN (Pedal + 1 Other Source)

PIT AREAS

- Where possible, pit numbers are the same as the team number.
- All pit sites are numbered.
- Team numbers with a “3” or “4” prefix indicate where a school with three teams will use a total of two pit spaces. Eg. Team “310” shares pit space number 10 with team number 10.
- All pit sites must be set-up as per the direction of Event Officials and changes may be required at the Officials discretion.
- All pit sites are approximately 2.8 m – 3 m wide by 2 metres deep.
- All teams must leave approximately 1 m clearance area in front of their pit site for rider changeovers and for other teams to have line of sight of the track and pit lane.
- There is no existing shelter in the pit areas. Teams are encouraged to erect a small tent, or arrange to share a tent with another team.
- During the event there is restricted access to the pit area.
- No motor vehicles are allowed in the TRYathlon pit areas.
- If the surface of your pit area is hard, that is concrete and asphalt, securing tents will require water or sand filled weights rather than pegs.
- Pit areas should NOT be set up too early. 90 mins prior to your scheduled practice sessions should be adequate.

VEHICLE SPECIFICATIONS

Version 2017.01

Please note these Vehicle Specifications also cover the EEV and Try-athlon category.

EEV teams should also refer to the EEV Supplement at the end of these specifications.

Any significant specification changes have been highlighted in blue.

If changes are made to these specifications, the event committee will notify all team managers who have entered via their e-mail contact and changes will be published on the website.

All enquiries regarding Rules and Specifications should be emailed to:

Ernest Litera or Greg Hill of the RACV:

ernest.litera@racv.com.au or greg.hill@racv.com.au

1. SCOPE & CONFIGURATION

1.1 Intent

The Energy Breakthrough is intended as an experiment in personal mobility. The objective is to build an efficient and stable machine powered either entirely by human effort (Human Powered Vehicle) or a combination of power sources (Energy Efficient Vehicle).

Entrants must:

- **Participate in the design and construction of the vehicle whether it is from a clean sheet or the modification of an existing vehicle**
- **Understand the fundamental design and construction elements of the vehicle.**
- **Liaise with local industry or community groups to design and build a machine.**

Students will be judged on these aspects during the Design and Construction assessment.

The RACV 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.

Clarification of rules and specifications sought from Ernest Litera or Greg Hill of the RACV must be submitted by e-mail and a copy of responses presented at scrutineering.

1.2 Seating Capacity, Wheels

- The vehicle shall carry a rider alone, and shall have three or more load bearing wheels arranged in a stable configuration.

1.3 Riding Position

- The riding position shall not compromise machine controllability or safety, nor shall the riding position place the rider in a potentially hazardous position in the event of a collision.
- For these reasons a riding position (body angle) of less than 20 degrees from the horizontal is not allowed. *(See Section 4.2.1)*
- It is not advisable for the 'bottom bracket' or pedal crank to be higher than the rider's chest.

1.4 Power Source

- HPV - Motive power shall be entirely supplied by the rider.
- EEV - See EEV Supplement

1.5 Potential Maximum Speed

- The maximum speed of vehicles shall be 60 kph. The trial is a test of endurance and efficiency and therefore vehicles should not just be designed with achieving high speeds in mind.

2. DESIGN AND MATERIALS

2.1 Inherent Safety

- The design shall provide protection for the rider in the event of a collision or rollover. *(See Sections 2.3 and 4.0).*
- The design must be free of protrusions or other features capable of causing interference or injury to fellow competitors or spectators.
- Vehicle control and stability shall not be jeopardised by inappropriate design and construction methods.
- The onsite repairing, securing or joining of steering, brake or any other safety related components with glue or epoxy resins during the event is strictly forbidden.
- It is advisable for teams to carry spares of any critical components that may not be repairable during the race.
- Any electrical connections for lights or warning devices must be of an automotive or industrial standard with fully insulated connectors.

2.2 Exclusions

Choice of design and construction materials is free, except that:

- Designers and constructors are permitted to freely use any bicycle component except for complete frame sections.
- The use of Go-Kart frames or motorbike frames is not permitted.
- Maximum overall tyre width is 70mm.
- Rope or cable steering systems, tilt steering and flexible steering columns are prohibited.
- Our experience has shown Rear Wheel Steer (RWS) vehicles to be highly unstable. For this reason, RWS vehicles will not be accepted at the RACV event.

2.3 Bodywork

- There are three bodywork configurations, which impact the structure of the vehicle.
 - **Open bodywork** (or 'head out') vehicles requiring full roll bar protection
 - **Aerodynamically enclosed** vehicles with a soft shell or corflute panels requiring full roll bar protection
 - **Fully enclosed hard shell** bodywork built from a stiff composite material (carbon fibre / kevlar / fibreglass / etc.)
- The test for whether a vehicle will be accepted as a fully enclosed hard shell is if **the roof is able to support the weight equivalent to a rider in** between where the riders head would be located and their knees. If the roof is unable to support **this weight** it will be deemed 'aerodynamically enclosed' and must meet all roll bar requirements.
- If teams prepare multiple bodywork configurations for use, then all configurations must comply with all specifications and must be presented for approval during scrutineering.
- *Try-athlon competitors* – Bodywork must not be removed if doing so compromises occupant safety i.e. The roof in hard shell vehicles.

2.3.1 Clearances and Access for Enclosed Bodywork Vehicles

- There must be a forward clearance of at least 300 mm between the rider's face and the steering wheel or any bodywork.
- The rider shall be able to open and/or remove bodywork and exit the vehicle without external assistance.
- Bodywork shall be capable of being easily opened and or removed from outside the vehicle independently of the rider by someone who is unfamiliar with the vehicle. In an emergency marshals must be able to open the vehicle without explanation.
- The location of closure devices for opening body sections must be marked outside with a triangle of contrasting colour to the body **and side length of at least 10cm** making it clear for anyone unfamiliar with the vehicle.
- **The word "RELEASE" should be written near the triangle.**
- **If a hole has been cut in a window to enable access to an elastic strap then the hole must be at least 10cm wide to allow for an adult hand to easily reach into the vehicle.**

2.4 Vision and Ventilation

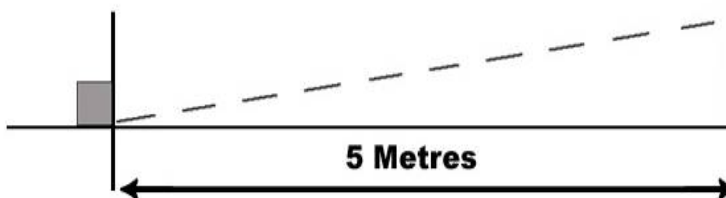
- Rider vision must not be impaired by excessively enclosed and restricting bodywork
- Side windows must be incorporated in the vehicle body design, which must extend from the shortest rider's shoulder line to above and behind the tallest rider's eye line. **Riders must have a clear view over their shoulders to see surrounding vehicles.**
- Windows must not be tinted or covered with any stickers, regardless of if they are intended to be see-through.
- **(It is a requirement that riders have a clear view of the vehicles around them, but also that officials can monitor designated riders and correct riding apparel.)**
- Rider and vehicle safety must not be impaired by restricted ventilation or visibility.
- Provision for rain and limiting window fogging must be demonstrated.

Vision Tests

The shortest rider and the tallest rider seated in their normal riding position are required to comply with the side and forward window requirements and have sufficient vision to comply with the following vision tests during scrutineering.

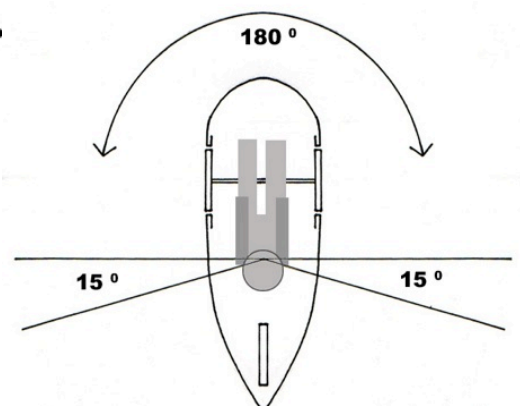
1. Sight an object on the road 5 metres in front of the vehicle.

FORWARD VISION



2. Sight 180 degrees ahead of the rider, and be able to turn their head sufficiently to see 15 degrees behind the rider on each side of the vehicle. The intent of this clause is that a rider is able to turn their head to visually check for other vehicles before changing their position on the road.

FORWARD AND SIDE VISION



3. Riders must be able to demonstrate that the vehicles mirrors provide effective rear vision.

3. VEHICLE DIMENSIONS

Length

2700 mm maximum

Width

1100 mm maximum

Height

1200 mm maximum

Wheelbase

1000 mm minimum wheelbase between the most forward and most rearward axles.

Track

600 mm minimum (width between centres of outermost tyre ground contact points)

Turning circle

10 metre maximum diameter (left and right).

Note: Due to the hairpins in Try-athlon Time Trial and Obstacle courses, Try-athlon teams are **strongly encouraged** to set up their vehicle with a **maximum** turning circle of 8 metres.

3.1 Vehicle Weight

HPV

50kg maximum

EEV

Single Power Source – 60kg maximum

Hybrid 1 – 60kg maximum

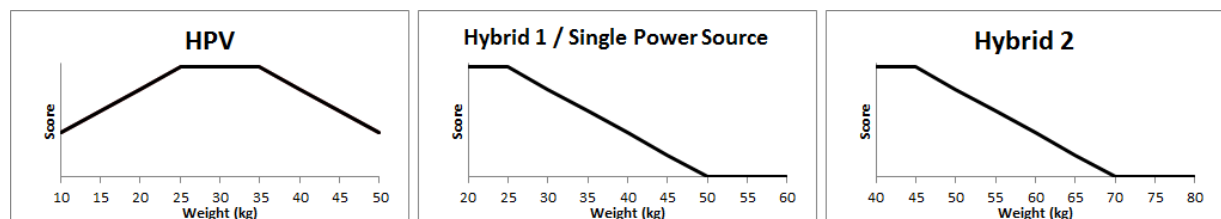
Hybrid 2 – 80kg maximum

The specified maximum weight includes batteries however EEV's will be scored on their weight without batteries.

Note: EEV teams should strive to make their vehicles as lightweight as possible **without compromising safety**.

3.1.1 Scoring of vehicle weight

All vehicles will be weighed and this will contribute to D&C score. Scores will be allocated according to the following charts:



4. OCCUPANT PROTECTION

4.1 Protection Bars for Open and Aerodynamically Enclosed vehicles

Vehicles must have four sets of protection bars:

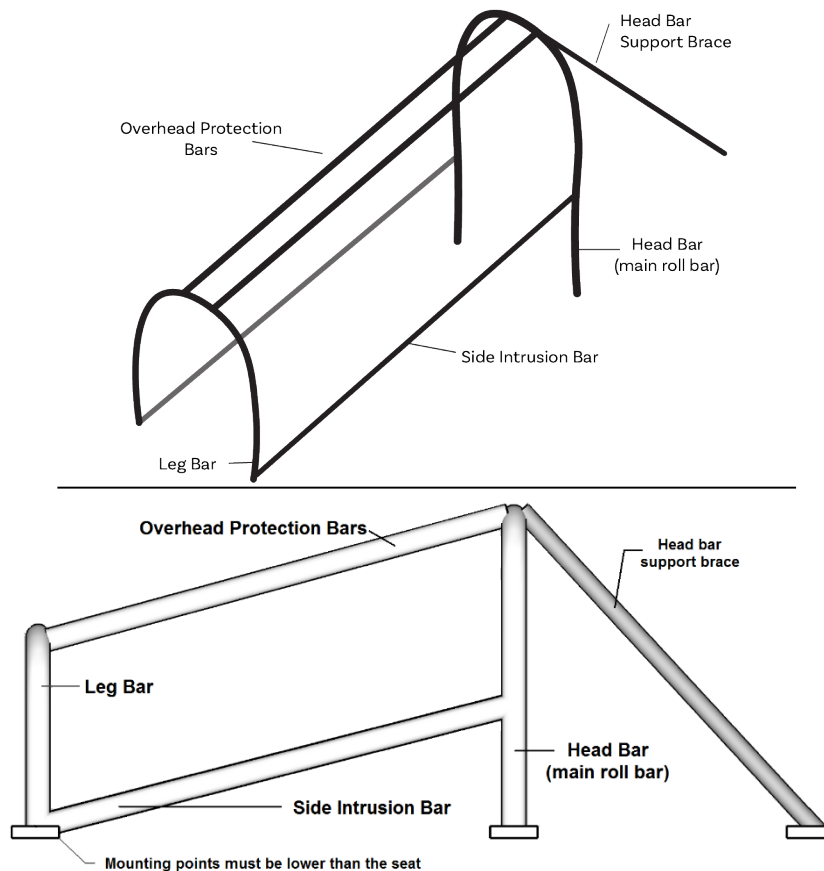
- “Head bar” (main bar) including brace,
- “forward leg bar” including brace,
- “side intrusion bars”, and
- “overhead protection”.

4.1.1 Construction

All protection bars, including bracing must be constructed from metal meeting the minimum outside diameter (O.D) specifications in the following table. All bars except the overhead protection bar must be joined either by welding or plate method (refer 4.1.4). The overhead protection bar may be hinged and locked to enable easier access for riders.

	HPV	EEV
Steel or Chromoly tubing	12.7mm O.D	16.0mm O.D
Aluminium tubing	16.0mm O.D	19.0mm O.D

Positioning of Roll Bars



(Please note: Drawings are not to scale)

4.1.2 Head Bar

The main head bar and brace together with the side intrusion bars must be one continuous welded frame, constructed according to the diagram above and must be solidly attached to the vehicle frame. (See Section 4.3: Plate Joints)

The “head bar” hoop must be braced from its highest point with one bar, preferably two, to a major structural member to form a tripod.

Note: The diagrams above show secure mounting plates; teams can use other mounting approaches but it must be solid, and able to support the weight of the vehicle and rider in a rollover.

4.1.3 Leg Bar

The “leg bar” (forward bar) must protect the riders legs, knees and feet from contacting the ground in a rollover or side slide situation and must be mounted across the vehicle above the riders knee area.

The “leg bar” must be braced to prevent the bar from folding over in a rollover or sliding situation.

The protection bars (head bar & leg bar) must be able to support the weight of the vehicle and rider in a rollover (a 40km/h impact is equivalent to dropping the vehicle on its roof from a first floor landing).

4.1.3 Side Protection

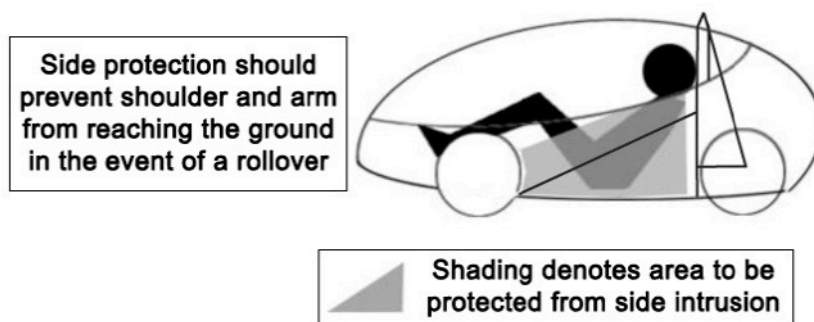
The vehicle must have side intrusion bars typically in line with the rider’s body (as described and illustrated in 4.1.1) that are an integral part of the continuous “head bar”.

In addition to the side intrusion bars, side protection bodywork or shielding is required to protect the area between the rider’s hip and shoulder from making contact with another vehicle and to prevent the rider’s shoulders and arms from reaching the ground in the event of a rollover.

This side protection bodywork should be constructed from suitably strong materials that will withstand sliding contact with the road.

No part of the rider is allowed to protrude outside the side protection during normal operation and there must be a clearance of 50mm between any part of the rider and the shielding.

SIDE IMPACT PROTECTION



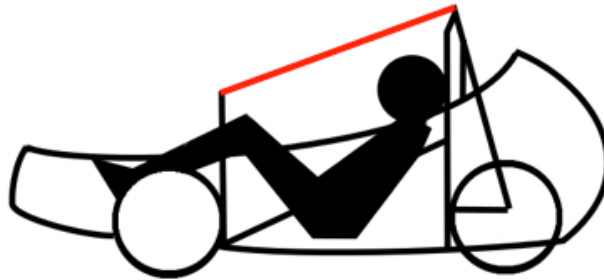
4.1.4 Overhead Protection

The structure over the head of the rider must provide enough strength to prevent the rider’s head from being struck by another vehicle when on its side after a roll over.

Open top and aerodynamically enclosed vehicles must have two longitudinal bars connecting the main head bar to the knee bar.

Bars must be symmetrical around the vehicle centreline and there must be 100mm to 200mm of separation between the bars.

These bars may be detachable or hinged to enable easier access for riders, but must lock in place and be strong enough to ensure the structure remains attached during a rollover.



4.1.5 Rider Protection Bar Clearances

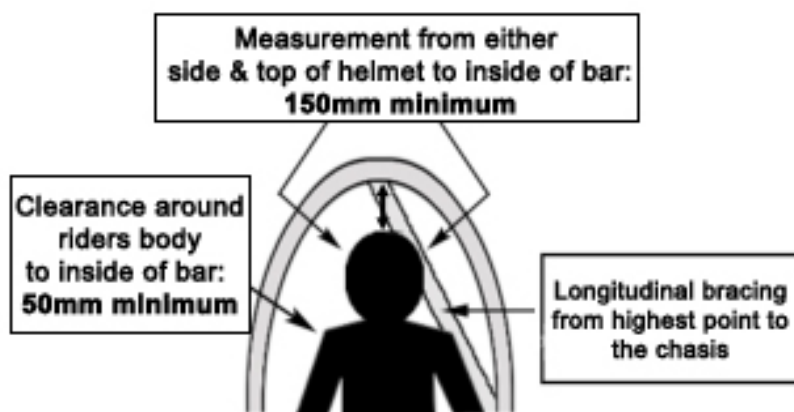
With the tallest of the competing riders in the normal riding position, the “head bar” must be fully visible outside the rider silhouette when viewed from the front or rear.

The overhead protection bars must have at least 50mm clearance above any part of the rider when viewed from the side.

The head bar must conform to the following dimensions:

- Measurement from helmet to inside of bar: 150mm minimum
- Measurement from either side of helmet to inside of bar: 150mm minimum
- Clearance around riders body to inside of bar: 50mm minimum
- Location forward or rearward of helmet: No more than 150mm

Diagram below: Open top or aerodynamically enclosed vehicles



4.2 Rider protection for fully enclosed hard shell vehicles

Fully enclosed bodies made from composites such as Carbon-Fibre, Fibreglass or Kevlar do not require metal protection bars provided they comply with the following requirements for strength and build quality tests.

- The body must have strengthened ribs moulded into the composite that are of at least equal strength to a metal roll bar. (eg: The roll bar area should not be able to flex when pressed by hand)

- All composite roll bar and side intrusion bar ribs must follow the same positioning as the metal protection bars outlined in section 4.1.
- All composite constructions must have finished edges. That is no protruding fibres or frayed edges.
- Metal roll bars can be used with composite bodies.
- Any joins must follow the plate mounting method as described in 4.3 Plate Joints.
- All teams constructing new hard shell composite vehicles with integral protection bars must send photos to the RACV technical contacts for review by the end of October.
- The onus is on schools to ensure that their vehicle is compliant with the required safety standards. The RACV Energy Breakthrough website includes some advice on composite construction in the '*Downloads*' section.

The test for whether a vehicle will be accepted as a fully enclosed hard shell is if the [roof is able to support the weight equivalent to a rider in](#) between where the riders head would be located and their knees. If the roof is unable to support the rider it will be deemed 'aerodynamically enclosed' and must meet all roll bar requirements.

4.2.1 Rider Protection Clearances for fully enclosed enclosed hard shell vehicles

With the tallest of the competing riders in the normal riding position, the following clearance must be met:

- Measurement from helmet to inside of shell: 50 mm minimum
- Measurement from either side of helmet to inside of shell: 50mm minimum
- Clearance around riders body to inside of shell: 50mm minimum

4.3 Plate Joints

- Where metal protection bars are to be joined without welding or attached to a composite body, plates should be used to distribute the loads into the body.
- These plates must be welded onto the metal protection bar and be no less than 60mm x 60 mm square in size and at least 3mm thick.
- A matching plate should be used on either side of the composite body and spacers must be used to prevent crushing of the composite structure.
- The plates must be joined using at least two 6 mm bolts with locking nuts (eg. Nylock Nuts).
- Corners and edges should be rounded and smoothed off.

4.4 Forward Protection & Nose Cone

All vehicles must have adequate forward protection to reduce the chance of injury in the event that the vehicle collides with a person or another vehicle.

The front of the vehicle must have a curved nose to prevent easy penetration of another vehicle. At 100mm from the front, the vehicle must have a cross section greater than 200mm.

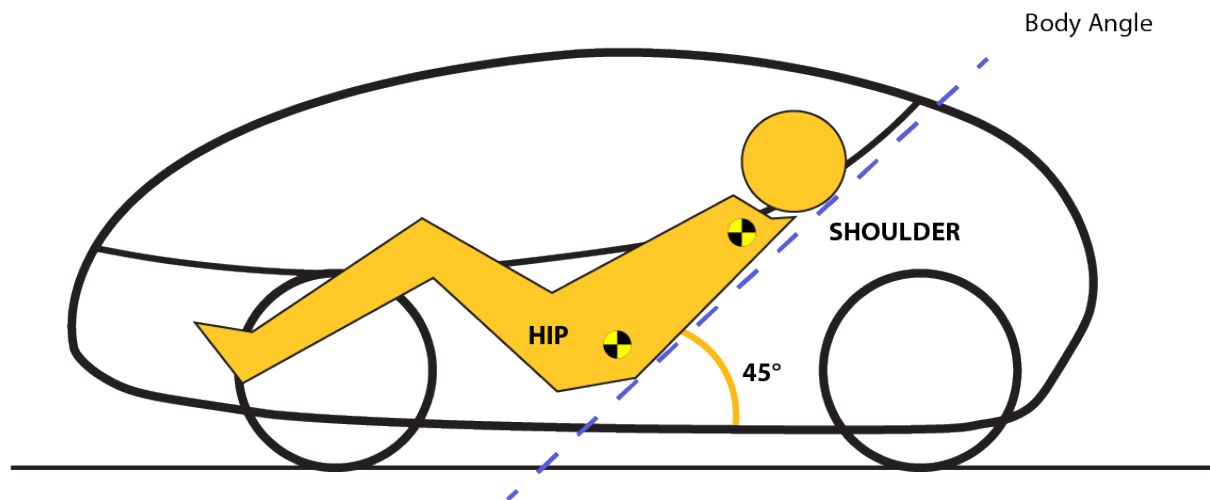
4.5 Seats

It is strongly advised that an "off the shelf" production seat from one of the major HPV component suppliers (such as Tri-Sled) be used, as seat angle and rider support are critical. These seats can also provide correct seat-belt positioning and head restraint fittings.



4.5.1 Position

- The seat must be fitted in a way that ensures that the riding position does not compromise machine controllability or safety, nor shall the riding position place the rider at risk of neck or back injury in the event of a collision.
- For these reasons a riding position (body angle) of less than 20 degrees from horizontal is not allowed. This riding position is measured from the hip and shoulder joints in relation to the road.
- The seat must be shaped and positioned to prevent the rider sliding under the seat belt.
- In vehicles with moveable seats, riders must remain protected by the side intrusion bars in all seat positions.



4.5.2 Locking of Seat Position

- The seat must be securely mounted.
- Adjustable seats must lock securely into position for each rider and must not move forward or backward.
- Seat belts cannot be used as part of the seat lock system

4.5.3 Additional Padding

- Any temporary or removable padding used for riders MUST be fixed into place using a positive attachment to a fixed part of the vehicle.
- This could be a strap and buckle, velco straps, dog clips, canvas zips, etc.

4.5.4 Head Restraint

- The vehicle must have a padded head restraint behind the rider's head that reduces the chance of over extension of the riders head backwards.

4.6 Seat Belt

4.6.1 Type

- The vehicle must be fitted with an Approved and Certified adult Four (4) point (minimum) seat belt for all riders.
- Seat belts must have certification label attached.
- The seat belt must be in good condition and completely standard, including buckle, stitching and mounting plates.
- Teams will be required to demonstrate adjustment of the seatbelt to suit each rider.

Suggested supplier:

Hemco Industries - <http://www.hemco.com.au/> or Ph: 1300 065 057

APV Safety Products: 4 point, 2 inch webbing available through most automotive parts stores.

4.6.2 Mounting

The seat belt must be mounted to a major, non-moving, structural member of the vehicle.

Seat belts are not permitted to be mounted to the seat under any circumstances.

Upper belts mounted behind the rider's shoulders are required to be horizontal or no more than 40 degrees from horizontal and mounted no more than **120mm apart** so as not to allow the belt webbing to fall from the shoulders when riding.

4.6.3 Positioning

Correct and safe positioning of the belts and catches can be found in the Australian Design Rules (ADRs) for motor vehicles.

This means seat belts must:

- Be worn over the shoulders and down the chest, to a low lap belt across the pelvis.
- Be adjusted to be as firm as possible on each rider and fitted to ensure that the seat belt remains properly adjusted on each rider at all times.
- The lap belt should be tightened before the shoulder belts so that the lap belt remains in the correct position.

4.7 Shielding

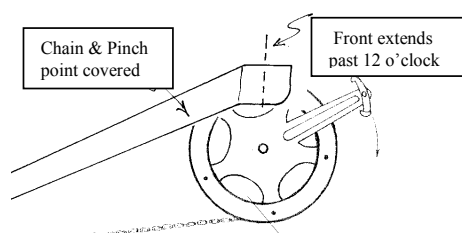
4.7.1 Rider Protection

The rider must be shielded from any rotating mechanical part in the vehicle. This includes Chains, Ring Gears and teeth, as well as wheels and tyres.

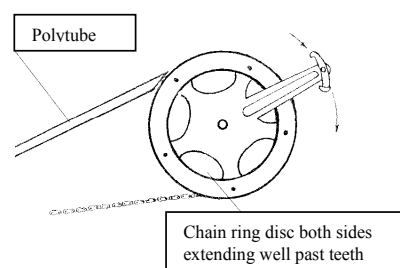
Wheels.

All vehicles must have an inner wall (which can be core-flute) that completely separates and shields the rider from the rotating wheels.

Rigid Chain Guard



Chain Tube and Sprocket Rings



- Chains, sprockets and gear wheels **MUST** be fully shielded to prevent accidental hazardous contact with rider or clothing.
- Chain ring teeth must be covered both sides using chain ring discs.
- A hair shield must be used to prevent long hair from falling anywhere near the rear wheel, chain or gear components.

There must be a clearance of 50mm between hand controls (including brake levers) and the frame or solid bodywork.

4.7.2 Protection of other Vehicles

- Chains, gear wheels and sprockets shall be suitably shielded to prevent their contact with other vehicles.
- Exposed axle ends have to be recessed or flush in the hub, covered by bodywork, bar work, dome nuts or hub caps.

4.7.3 Shielding from Road Surface

- Vehicles must be fitted with an under-tray or floor panel which prevents the rider's feet from contacting the ground when seated in the riding position.
- Pedal toe clips, elastic straps or pedal-to-shoe locking devices do not fulfil the requirements of this clause.

5. STEERING:

5.1 Type

The type of steering mechanism is free, except for:

- Tilt steering, flexible steering columns and rear wheel steer are prohibited.
- A minimum clearance of 300mm is required between the riders face and the steering wheel.
- The rider must have continuous positive control without the need for regular adjustment.

5.2 Freedom from Binding and Fouling

Steering linkages shall operate freely from full left to full right lock without binding or fouling.

5.3 Lock Stops

To prevent the rotating road wheels from coming into contact with any part of the vehicle or rider, there must be positive steering lock stops.

The steering mechanism or any solid component that moves with the steering mechanism must come up against a solid bracket or non-flexible part of the body or frame on full lock in either direction and stop any further steering travel.

In addition, at full lock there must be shielding or a clearance of 100mm between the occupant and any rotating part (such as wheels and controls) and in all steering positions there must be at least 50mm clearance between the hand controls (including brake levers) and the frame or solid bodywork.

6. BRAKES

6.1 Independent Systems

The vehicle shall be fitted with a minimum of two (2) separate effective and independent braking systems.

Two (2) separate brake levers must be used.

All wheels in contact with the road must have a braking capability.

6.2 Type

The front axle braking system shall operate directly on the wheel hubs or axles (i.e. not acting on the wheel rims) and may be either drum or disc type.

6.3 Directional Stability

Brakes on the same axle line (e.g. both front wheels) must operate via a single lever, so that independent operation of any braking system shall not have the potential to affect directional stability of the vehicle. That is, the braking power of each and every braking system shall be symmetrical about the vehicles longitudinal centre line.

6.4 Simultaneous Operation

The two braking systems shall be able to be operated by the rider simultaneously.

In a Hybrid 2 or single power source EEV a single lever may be used to operate both braking systems provided it is foot operated only.

6.5 Steering Control

Full steering control shall be maintained while braking systems are being operated.

6.6 Contact to the tyres

Brake systems must not apply friction contact to the tyres.

7. ANCILLARY DEVICES

7.1 Lighting

The vehicle shall be fitted with the following as a minimum requirement.

7.1.1 Headlight

Front lighting must be at least one white light, securely mounted between 250mm and 600mm above road level, at the front of the vehicle (forward of the rider's feet).

Lighting must be adequate to provide good visibility for the rider to see the track in the dark.

Additional lighting to improve the rider's vision is encouraged provided at least one light meets the designated requirement.

Headlights are not to be flashing.

Please note: Sections of the track are in darkness at night and sufficient lighting to see the road will be required.

7.1.2 Tail Light

Rear lighting must be at least one red bicycle type LED taillight. A steady, non-flashing light is required.

The light must be securely mounted:

- between 350mm and 600mm above road level
- within 150mm of the rear-most part of the vehicle, and
- on the vertical centre line of the vehicle.

7.1.3 Outline Lighting

The use of reflective material or strip lighting to indicate machine width and height (especially from the rear) is encouraged.

7.1.4 Mounting

All lights are required to be securely mounted for the duration of the event to maintain correct aim.

7.1.5 Helmet Mounted Lights

Helmet mounted lights are not to be used.

7.1.6 Batteries

Wet cell batteries must be housed in a sealed box (e.g. plastic) that will prevent spillage if the battery is inverted or damaged.

All connections must be of an appropriate industry standard as per section 2.1

7.2 Mirrors

At least two effective rear view mirrors must be fitted, one on each side of the vehicle, and having similar reflection (i.e. same size image) in order to clearly identify overtaking traffic and meet the rear vision test in 2.3.2.

Mirrors may be of the mildly convex type.

Mirrors shall be rigidly mounted to non-moving chassis or body members and steps should be taken to reduce vibration.

The smallest rider must be able to reach each mirror from the normal riding position, regardless of if they are adjustable.

7.3 Warning Device

An electric audible warning device shall be fitted (e.g. smoke alarm siren) and operate from the normal riding position.

The device must not run continuously and operate via a momentary switch.

The horn must emit a distinctly audible sound. This will be checked at scrutineering.

7.4 Other Devices

Any other equipment, e.g. drink bottle, shall be securely mounted and shall not impair rider control in its mounting or use.

The use of MP3's or similar music /entertainment devices by riders is NOT permitted.

Small video cameras (eg. GoPro) are allowed as long as they are not attached to the rider's helmet and are positioned so that they cannot pose any safety risk. Cameras should not be mounted outside the silhouette of the vehicle when viewed from the front.

7.5 Speedometer

All vehicles shall be equipped with a simple electronic speedometer (e.g. Cat-eye) to monitor speed during the event (pit area speed limit of 15 kph, track speed limit of 60kph). **This speedometer must be mounted on the vehicle in a position where the rider can see from normal riding position. A wristband-based speedometer worn by the rider is not acceptable.**

7.6 Transponder

Vehicle design should allow for a lap counting transponder to be mounted inside the vehicle, positioned within 200mm of the road surface, not above carbon fibre or metal; and not within 500mm of any RF source.

Transponders will be issued to Team Managers upon Check-in at the Administration Centre at the event.

8. MARKINGS

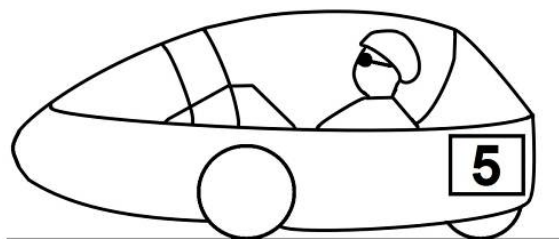
8.1 School Name

Each vehicle shall have their school name visibly displayed on either side of their vehicle.

8.2 Identification Panels

At registration, each vehicle will be provided with two adhesive identification panels (250mm x 300mm) with their competition number on it.

These identification panels must be attached to each side of the tail of the vehicle and as close to the rear as possible.



ENERGY EFFICIENT VEHICLES (EEVS) SUPPLEMENT

Version 2017.01

This supplement should be read in conjunction with the Energy Breakthrough Vehicle Specifications.

All specifications listed in the Energy Breakthrough Vehicle Specifications apply to Energy Efficient Vehicles with the following additional specifications.

Single power source Energy Efficient Vehicles operating on petrol will not be eligible to participate in the Energy Breakthrough in 2017.

All enquiries regarding Rules and Specifications should be to:

Ernest Litera and, or Greg Hill of the RACV:

ernest_litera@racv.com.au and/or greg_hill@racv.com.au

1. OCCUPANT PROTECTION BARS

Occupant 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 4.1.1 of the specifications.

Note: A Human Powered Vehicle that has been converted to an Energy Efficient Vehicle will satisfy the occupant protection specifications by duplicating the minimum specified bar dimensions for a HPV. (ie. another bar can be welded alongside the existing bar.)

2. FIRE EXTINGUISHER

A fire extinguisher must be fitted to all Energy Efficient Vehicles. An Australian Standard, dry powder minimum 5BE fire extinguisher of minimum capacity 0.9 kg shall be securely affixed to all hybrid vehicles in such manner and position 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. ENGINE IMMOBILISER

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 three types of vehicle allowed in the Energy Efficient Vehicle category:

- **Hybrid 1: Pedal power, plus one other power source.**
- **Hybrid 2 (Open): Two power sources, excluding pedal.**
- **Single Power Source: Petrol-only or electric-only vehicles**

4.2 Principle of Power Generation

The fuel allocation is only available to vehicles fitted with internal combustion engines as one of their driving sources and will only be commercially available pump fuel as supplied from normal retail outlets.

All fuel used for the trial will only be available from the RACV Scrutineers.

4.3 Minimum Duration of Power Generation

- The machine must be capable of sustained operation when powered separately by each propulsion system.
- 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.
- The test for whether a power source is compliant will be whether the vehicle is able to sustain it's speed while driving on either power source on flat road.

5. ELECTRICALLY POWERED VEHICLES

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.

Batteries and chargers must be labelled with the school name.

Batteries will be marked by RACV Scrutineers as per Trial Regulation 9.4.

5.3 Battery Casing

Batteries with deformed or damaged cases are not acceptable for use.

Any Lithium batteries with thin plastic wrapping must be held in a hard alloy carry case at all times (on and off the vehicle and when charging) to prevent puncture or damage in an accident.

Wet cell batteries must be housed in a sealed box (e.g. plastic) that will prevent spillage if the battery is inverted or damaged.

5.4 Total combined mass of propulsion batteries

The maximum total combined mass of propulsion batteries per vehicle is:

Battery type	Kg
Lead Acid	100
Ni Cd	65
Ni Zn	60
Li Ion	30
Ni MH	45

Note: Where Lithium Ion 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 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.

5.6 Power limitations for Pedal Electric EEV's or Hybrid One;

Electrical systems are restricted to a maximum of 36 Volts

* Teams are required to purchase and install the following designated electrical circuit breaker with an Amp rating in keeping with the battery Voltage they are using.

Designated circuit breakers, as per the following table, are available from;

“Retrolooms” 42 Renver Road Clayton Vic.

Contact Darren Halleren, Ph-03 8521 3021 or Darren@retrolooms.com.au

Amp	Voltage	Part-No
7-Amp	36-Volt	Prolec 1400-123-070
10-Amp	24-Volt	Prolec 1400-123-100
20-Amp	12-Volt	Prolec 1400-123-200

The circuit breaker must be mounted:

1. Out of reach of the rider.
2. Within 200mm of the battery pack.
3. In clear view to scrutineers during the trial.
4. Circuit breakers will be tagged and only replaced by scrutineers.

* Depending on the Voltage used in the vehicle, the circuit breaker, will limit the power output of the electric motor to approximately 250Watt. This output is in accordance with Victoria's legal limit for licenced road use.

5.7 Power limitations for Electric only EEV or Hybrid Two;

Electrical systems are restricted to a maximum of 36 Volts

Electric only vehicles are permitted to use the 20Amp circuit breaker for all voltages

Electric only teams are required to purchase the same 20Amp circuit breaker and mount it in the same position as the electric/pedal vehicles in Hybrid one.

6. VEHICLES POWERED BY INTERNAL COMBUSTION ENGINES

6.1 Engine Type

Choice of engine type or gearing is free.

6.2 Fuel types

Fuels for internal combustion engines will be commercially available pump fuels supplied by the organisers.

Any team using a fuel other than premium unleaded petrol must notify RACV prior to the end of October.

Notes: Fuels that must be stored under pressure such as LPG, CNG and hydrogen are not permitted.

6.3 Fuel tanks

Fuel tanks must be of sufficient capacity to contain the entire fuel allocation for the vehicle as indicated in Section 9.2 of the Trial Regulations. The fuel tank must be securely mounted using a fixed retaining bracket on a structural component of the vehicle.

The fuel tank must be shielded from the rider by the firewall (see section 6.5 Firewall, below).

The fuel tank refilling cap and any other tank closure shall be capable of having a mechanical seal (wire cable-tie) applied to prevent unauthorised opening.

Any plastic fuel tanks must be designated for petrol use and be compliant with AS/NZS 2906 Fuel Containers – Portable – Plastics and metal.

All fuel line connections must be secure and of an automotive standard.

6.4 Pressurised Fuel Systems

Pressurised fuel systems can be used, that is, diesel or petrol fuel injection, providing they comply with the following:

- all fuel lines are of a standard automotive type
- all fuel lines have crimped, or union type fittings at all ends
- all fuel lines must be securely mounted on the vehicle
- all fuel lines must be protected from heated sources and contact with any moving components
- any pressurised fuel tanks must have a relief valve that prevents pressure exceeding 10 psi and must be fitted with a metal, automotive tyre valve for testing.

6.5 Firewall

6.5.1 Description

Vehicle occupants must be separated and fully shielded (ie. no gaps) from any potential fire by a metal firewall.

This firewall must shield the rider from any direct flame occurring from:

- Engine and other high temperature heat sources.
- Fuel tank and lines
- Exhaust system

6.5.2 Firewall must extend:

- **In height** - above fuel tank, fuel lines, exhaust system, engine and other heat sources or potential heat sources – as well as above the shoulders of the tallest vehicle occupant in the normal driving or riding position.
- **Downward** - to the floor line

- **In width**– As wide as the rider's shoulders, in any case sufficiently to shield occupants from hot surfaces and potential fire sources.
- Body panels must be kept clear of hot surfaces and fuel lines.

6.6 Exhaust

Exhaust fumes, hot gases and vapours shall be routed to discharge clear of occupants and outside the bodywork, at the rear of the vehicle at a minimum angle to the horizontal of 45°, downward.

An effective silencer shall be fitted to reduce noise, and the pipe must not protrude beyond the frame of the vehicle.

The exhaust noise level must not exceed 90dB as measured behind the vehicle.

HPV, EEV AND TRYATHLON ENDURANCE TRIAL REGULATIONS:

1. SPIRIT OF COMPETITION

The RACV Energy Breakthrough Trial presents a unique opportunity for students to extend their learning experience beyond the boundaries of formal education. The following competition regulations have been framed so that the efforts and experiences of all participants are maximised, to be bound only by the constraints of safety and the spirit of healthy, but friendly competition.

2. ELIGIBILITY

2.1 Make-up of Teams

Teams will consist of the following numbers of competitors:

- Human Powered Vehicle Primary - 6 minimum – 10 maximum
- Human Powered Vehicle Secondary - 6 minimum – 8 maximum
- Energy Efficient Vehicle – 6 minimum - 8 maximum

2.1.1 Gender balance

- Except for Open Class teams and all female teams, a minimum of 50 per cent of the competitors in any one team shall be female.
- Gender ratio in Open Class teams is free.

2.2 Registered Riders

- Only registered team riders shall take part in the trial, however rider changes can be made up to the start of the endurance trial. (See Section 2.6).
- Emergency riders are encouraged to participate in the practice session to ensure they are familiar with the track and the vehicle.

2.3 Team Member Participation

- Team managers must ensure that every nominated team member participates as a driver.
- Managers are required to keep a log of rider track time, which can be checked by officials investigating incidents.

2.4 Age of Drivers

- Drivers of Energy Efficient Vehicles shall be at least 14 years of age, unless special prior approval is provided by organisers.

2.5 Identification

- All competitors must have official identification, which must be shown on request during the trial.

2.6 Rider Substitution

- Sick or injured riders may be replaced prior to the start of the trial by a registered reserve rider of the same gender. Riders will not be substituted after the start of the trial.
- This substitution will require the identification wristband of the replaced rider to be handed to the Administration Centre and a new identification issued to the reserve rider.

3. RIDER ATTIRE

3.1 Fit and Adjustment

- All vehicle occupants shall wear the following safety attire correctly fitted and adjusted at all times the vehicle is on the track during practice and the trial.

3.1.1 Helmet

- For human powered vehicles and pedal/electric hybrid vehicles, minimum requirement is a bicycle helmet approved to AS 2063 or AS 1698.
- For petrol-powered or electric-only Energy Efficient Vehicles, requirement is a motor cycle helmet approved to AS 1698.

3.1.2 Eye Protection

- Shatterproof glasses, goggles or a helmet visor must be worn at all times.
- Provision must be made for the lights on period overnight.
- Full faced helmets must have the visor down at all times unless the rider is wearing other eye protection.

3.1.3 Gloves

- Strong material BMX or motor-cross type gloves preferred.

3.1.4 Shoes

- Full foot coverage, sandals not permitted.

3.1.5 MP3 players

- The use of MP3 players or similar music/entertainment devices by riders is NOT permitted during trial or practice sessions.

3.1.6 Video cameras

- Small video cameras (eg. GoPro) are allowed as long as they are not attached to the rider's helmet and do not pose any safety risk. Camera's must not be mounted to the outside of the vehicle silhouette when viewed from the front

3.1.7 Clothing

Human Powered Vehicles:

- Minimum coverage of shoulders, upper body and mid-thigh e.g.: shorts and T-shirt; or cycling knicks and jersey.
- **HPV Note:** Sleeveless triathlon skin suits, sleeveless cycling jerseys, sleeveless t-shirts, tank tops or singlets are not permissible.

Electric powered Energy Efficient Vehicles

- Riders of pedal/electric hybrid vehicles may choose to comply with the Human powered Vehicle clothing rules.
- Riders of electric-only vehicles must comply with the requirements for liquid fuelled vehicles below.
- Teams that have battery power must provide a pair of full cover gloves and a pair of protective goggles for anyone handling batteries.

Liquid fuelled Energy Efficient Vehicles

- All competitors shall wear overalls or clothes that cover and are neat fitting from ankle to wrist to neck.
- Fire retardant material is advised and light fabric/disposable overalls are not permitted
- It is not permissible for drivers of fuel powered vehicles to 'dress down' when their fuel is used up.

4. SCRUTINEERING

4.1 Compulsory

Scrutineering is compulsory for all vehicles and teams, to ensure compliance with vehicle specifications and safety attire requirements.

4.2 Before track

Before entering onto the track for practice, all vehicles must be scrutineered for safety.

RACV Scrutineers can refuse permission to enter the track for any safety reason.

4.3 Subsequent scrutineering

All vehicles will also be inspected at random during the trial for operation of safety items or when the vehicle is involved in a track incident. (See Section 7.11).

5. TRAFFIC LIGHTS AND SIGNALS

All competitors shall understand the meaning of the following traffic signals/flag signals:

Green Light or Flag

- The track is clear for competition.

Yellow Light or Flag

- **A sign of danger or track obstruction in the vicinity of the marshal point.**
- Riders are required to stop racing, slow and pass the point of danger at a significantly reduced speed (at or below 20 kph) using extreme caution.
- Riders must not resume competition until they are well clear of the danger **and until they reach the vicinity of the next marshal point displaying a Green Light or Flag.**

Red Light or Flag

- **An indication of extreme danger.**
- All vehicles shall come to an **immediate** stop.
- Racing has ceased.
- Riders must follow the directions of the Clerk of Course and flag marshals.

Blue Flag

- Is an indicator that a faster vehicle is positioned close to you. Competitors shown the blue flag must hold their line to allow overtaking.

6. START, FINISH AND BREAK

6.1 Pre-Race Briefing

All Team Managers must attend the pre-race briefing by the Clerk of Course and Trial Coordinator.

6.2 Lap Counters

It is the Team Manager's responsibility to ensure that:

- a transponder is picked up and correctly fitted to the vehicle
- the transponder is working at all times
- the transponder is returned to the Administration Centre at the end of the trial.

6.3 Grid Assembly

- The Clerk of Course, in conjunction with the event committee, will allocate and advertise starting grid positions following the practice session.
- Vehicles will be called to the starting grid assembly area at least 30 minutes prior to the official start.
- If a vehicle is not on the grid within 15 minutes of the scheduled start time, officials reserve the right to place the vehicle at the rear of the grid.
- Vehicles in the first 20 grid positions will be assembled according to the official grid positions. Thereafter teams will be assembled in groups of ten where exact starting position is less critical (ie. 20 – 30, 30 – 40, 40 – 50, 50 – 60, 60 – 70, etc).

6.4 Trial Start

The trial will be started with the drop of the National flag.

6.5 Trial Finish

All trials will conclude with the display of the black and white chequered flag,

- 24 hours after the start for the secondary HPV and Energy Efficient Vehicle teams.
- 14 hours of competition for the HPV Class A teams.

6.6 Class A Compulsory Break

6.6.1 Primary break

All HPV A vehicles will leave the track nominally from the specified time on Friday evening and resume their trial at the specified time on Saturday.

6.6.2 Rejoining the trial

All HPV A vehicles will be assembled on the track in their finishing positions for the restart.

7. TRACK CONDUCT

7.1 Speed Limit

Speedometers are mandatory and ALL competing vehicles shall observe a maximum speed of 60 kilometres per hour during practice and the trial, and 15 kph in pit lane.

Vehicles exceeding the speed limit (60 km per hour) will have a penalty applied (see Section 11.3).

7.2 Blue Line

A blue line has been painted on the track.

Vehicles must keep to the **left** of the track, on the inside of the BLUE line, unless overtaking another vehicle.

7.3 Seatbelts

All vehicle occupants shall wear a correctly adjusted seatbelt or harness when on the track during practice and the trial.

See section 4.6.3 of the Vehicle Specifications regarding correct adjustment of seat belts.

7.4 Injured Riders

Track marshals and RACV officials monitor the trial and where necessary will call for assistance from St John and the Rural Ambulance Service to attend to injured riders.

7.5 Right of Way

Competing vehicles have right of way over disabled vehicles that need to be recovered and returned to the pit area.

7.6 Direction of Travel

Under no circumstances is a vehicle to be driven or pushed on the track in the opposite direction to racing.

7.7 Overtaking

Vehicles should overtake on the outside, to the right of the vehicle being overtaken.

Riders must not change lanes without checking their mirrors to make sure it is safe to do so.

It is the responsibility of the overtaking (faster) vehicle to ensure that the overtaking move is carried out without endangering other competitors.

Cutting in, deliberate blocking or leaving insufficient clearance will be penalised.

7.8 Vehicle Recovery

If a vehicle breaks down, the corner marshals will report the incident and the team will be informed.

It is the responsibility of the team to recover their vehicle.

If a team is unable to safely recover their vehicle they can request assistance from the RACV.

7.9 Vehicle Lighting

Front and rear lights as required by vehicle specifications shall be illuminated during the hours of darkness as directed by the Clerk of Course.

Riders must stop in the pits as soon as possible to rectify any inoperable or insecure light.

Teams are encouraged to operate their lights for the entire duration of the trial if it is practical to do so.

7.10 Lighting Batteries

Batteries used solely for lighting may be charged and/or recharged and/or replaced as required.

7.11 Track Incidents

Vehicles involved in major on track collisions, crashes or rollovers must be tagged by officials and are required to proceed directly to the pits for inspection and if necessary, repair.

It is the responsibility of the rider and the team to ensure a crashed vehicle is tagged and any deliberate attempt to avoid tagging will incur a penalty.

Tagged vehicles will not be allowed to rejoin the trial until the tag is removed following an RACV inspection.

Vehicles will also be inspected at random during the trial for operation of safety items such as brakes or mirrors which will also require rectification before continuing.

7.12 RACV Vehicle

When the RACV Vehicle is on the track it displays flashing yellow lights which indicates extreme danger in the same manner as corner yellow lights/flags.

Riders must slow, use extreme caution, must not overtake other competitors and pass when directed by the RACV driver.

8. PIT PROCEDURE

8.1 The Pit Areas

- All pit sites must be set-up as per the direction of Event Officials.
- Each team in the HPV, EEV and Try-athlon endurance trials will be allocated a site in the pit area, except where schools with three entries in a category will be required to utilise two pits sites.

- All pit sites are numbered and are a minimum of 2.8 metres wide by 2.0 metres deep.
- Where possible, pit numbers are the same as the team number.
- All teams must leave approx 1 metre clearance area in front of their pit site for rider changeovers and for other teams to have line of sight of the track and pit lane.
- There is no existing shelter in the Pit areas.
Teams are encouraged to erect a small tent, or arrange to share a tent with another team. Teams are encouraged to erect a team or school banner in their designated pit area(s) including team numbers. A banner about two by one metres would be ideal.
- HPV A teams are required to share their pit spaces - but not tools and resources - with Try-athlon teams for their Friday night Try-athlon Practice session.
- No vehicles or trailers will be allowed in the Try-athlon pit areas.

8.2 Speed in Pits

Maximum speed in the pit area is 15 km/h.

8.3 Direction of Travel in Pits

Under no circumstances shall a vehicle enter the pit area via the pit exit lane.

8.4 Driver Change-Over

All driver and passenger changes shall occur in the designated area adjacent to each team's pit.

8.5 Stopping in Pits

8.5.1 Brakes only

Vehicles shall come to a halt in the driver change lane under the effect of the vehicle's own braking system.

Stopping with the assistance of others is not permitted.

8.5.2 Full stop

Vehicles shall be stationary prior to unfastening seatbelts or harness.

8.5.3 Riders/Drivers

Driver refreshments and adjustments to clothing etc. shall only be effected when the vehicle is stationary in the pit area.

8.5.4 Pit Crew

- A maximum of three students and one supervising adult, in addition to the incoming and outgoing riders, shall attend a vehicle in the pit lane at driver change-over.
- The four designated people from each team attending the vehicle in pit lane are encouraged to wear a green reflective vest.

8.6 Pit Lanes

Pit entry and exit lanes shall be kept clear at all times.

8.7 Pit Crew Communications

- The use of radio communication between rider and pit crew is permitted provided operating the unit does not interfere with the rider's control of the vehicle.
- The use of notice boards for communication between the rider and the pit crew are permitted.

However, such notice boards and their use shall comply with the following:

- they must be held and displayed by one person only at a time
- they must be held so they do not go beyond the line of pit lane barriers.

8.8 Major Repairs

- Major repairs including welding and grinding equipment must NOT be carried out in the pit lane. The pit lane includes a team's tent adjacent to the track.

- These repairs must be carried out in the vicinity of the repair container.

8.9 Stationary Vehicles

In pit or driver change lanes, stationary vehicles shall give way to vehicles proceeding along these lanes.

8.10 Removal of Components

Redundant, superfluous and/or damaged components of substantial mass i.e. greater than 0.5 kg, may not be removed from a vehicle except with the permission of the chief scrutineer or deputy. At the discretion of the Chief Scrutineer his/her deputy, the vehicle may be required to carry ballast. Teams may not substitute or replace power sources or strip the vehicle below its starting weight after the commencement of the event.

8.11 Vehicle Restarts

Vehicles that have been involved in a track incident and received a Return to Pits sticker cannot restart until a RACV Marshal has checked the vehicle is safe to continue and removed the sticker.

9. FUEL USE AND RECHARGING OF BATTERIES:

9.1 Fuel Burning Energy Efficient Vehicles

In accordance with Section 1.4.2 of the EEV specifications, fuel burning entries will receive a single allocation of fuel

9.2 Amounts of Fuel Allocated

- Hybrid vehicles – 3 litres
- Petrol single power source vehicles – 4 litres

9.3 Sealing of Fuel Tanks

Fuel tanks on vehicles will be sealed after the allocation of fuel prior to the start of the event.

9.4 Batteries

At scrutineering teams using batteries are required to present all of their battery allocation for identification marking.

All batteries must have manufacturers labels including details of battery type displayed.

Batteries must be labelled with the school name.

9.5 Battery Recharging – process and Procedure

The onus is on the teams to use safe and reliable battery chargers.

Teams will start with fully charged batteries as the charging area will not open until one hour after the trial start. After which, there is no limit placed on the amount of time that batteries can be charged. All recharging is to be conducted in a designated area provided by the event organisers, and under constant supervision, to ensure charging is carried out in a safe manner.

Any team found to be charging batteries not in the designated area will be penalised.

All battery chargers must be electrically tested and tagged. The chargers must also be presented at the battery check on Saturday for an extra Energy Breakthrough tag to be applied. Only approved tagged chargers can be used.

Battery chargers must be of a commercially available type. The physical dimensions of the charger must not exceed 30cm x 30cm x 30cm.

Bare connections and alligator clips are strictly forbidden. All connections must be made using a properly insulated electrical connector. Anderson plugs are the preferred type of connector.

Only one battery pack may be charged at a time. A battery pack is defined as the usual amount of batteries required to run the vehicle.

Teams will be provided with one power outlet in the charging area, which will be fitted with a digital readout. Outlets are restricted to 4 amps (fused) or 720W whichever is the lower and officials will disconnect chargers drawing higher amp readings and notify the team.

10. TRIAL POINT SCORING

- The vehicle completing the most number of laps in each class in the trial period scores the maximum 50 points.
- Other vehicles in each class score points for the number of laps completed in proportion to the number of laps.
- For example, say team AA in a particular class travels the greatest distance, 200 laps, and team BB in the same class travels 160 laps.
- Points scored are as follows:

Team AA:

200 laps = 50 points

Team BB:

160 laps $50 \times \frac{160}{200} = 40$ points

11. INFRINGEMENTS

11.1 Vehicle Design

Vehicles which are considered safe but DO NOT comply with key elements of vehicle specifications may be given permission to start the trial with a penalty.

This penalty can be up to 50 laps and will be applied by the RACV Scrutineers.

11.2 Reporting of Incidents

Teams may report track incidents or infringements of these competition rules to the RACV officials who will investigate and act accordingly.

If teams wish to proceed with an official complaint they will be provided the appropriate documentation.

11.3 Penalties

A team that breaches any trial regulation including the spirit of competition, will be notified that they are under investigation for an infringement of the competition rules.

A panel of officials will review the incident and apply a penalty, which they consider is consistent with the severity and intent of the infringement.

Incident reviews will be conducted as soon as practical, but in any case will be resolved before the end of the endurance trial.

Penalties may take the form of:

- A warning.
- A “stop and go” penalty.
- A time penalty.
- 50 lap penalty.
- Disqualification of a rider.
- Exclusion from trial results.
- Withdrawal from competition.



CIRCUIT LENGTHS

- RACV - 1.58 km
- CFA - 1.11 km

KEY

- Toilets
- Showers
- Camping Area
- First Aid
- Food & Refreshments
- Assembly Point
- Marshall Point & Number
- Track Direction
- Start/Finish
- Pushcart Changeover Point
- Wrist Banding Station
- RACV Stage
- CFA Stage
- Road Closure
- Repair Station
- Recharge Station
- Parking Area
- On-site Supermarket
- Hospitality Marquee

RACV ENERGY BREAKTHROUGH SITE