



**USQ Queensland
Human Powered Vehicle
*Super Series***

2020

Vehicle Specifications

UNIVERSITY
OF SOUTHERN
QUEENSLAND



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1. Overview

When Human Powered Vehicle racing was introduced to Queensland 31 years ago, the concept was for high school students to research, design and then build a vehicle that was completely powered by human means. The students and vehicles were then challenged in a race of endurance. Over time, the development of both the vehicles and the sport has grown to a point of very high recognition across Australia and the world.

In recent years many companies have developed commercial racing vehicles that are purchased for both private and school race purposes. This document is written to convey a set of standard design and construction rules and regulations for all types of human powered vehicles taking part in all racing events within the QLD Human Powered Vehicle Racing calendar.

All Vehicles, school built or purchased, need to comply with these standards to be eligible to compete in Queensland based Human Powered Vehicle racing events.

1.1 Eligibility of Teams

HPV teams will vary between short courses and endurance courses.

- 1) **Short course**, team consist of a minimum of 4 and a maximum of 8 enrolled high school students as vehicle drivers. These teams may include up to 2 pit crew, (non-drivers).
- 2) **Endurance courses**, teams consist of a minimum of 6 and a maximum of 10 enrolled high school students as vehicle drivers. These teams may include up to 2 pit crew, (non-drivers).

- 1.1.1 Subject to the discretion of the Race Director, sick or injured drivers may be replaced during the race by pit crew. Incoming drivers will be issued with the appropriate wristband. The wristband of the retiring driver will be replaced with a support crew wristband. This is not an interchange system, replacements will remain for the duration of the race.
- 1.1.2 Any driver substitution must not alter the team's eligibility for the category in which that team is racing.
- 1.1.3 Team members may be excluded for inappropriate behaviour, such members cannot be replaced. Team managers may be asked to remove those excluded students from the venue.
- 1.1.4 Teams reduced to less than minimum number of drivers for the course, through exclusion for inappropriate behaviour, may be disqualified, and therefore unable to continue.
- 1.1.5 Gender Balance – For a Mixed team, at least half of the drivers will be female. In a Girls team, all drivers will be female. In a Boys team, gender is unrestricted.
- 1.1.6 Age of drivers – Junior teams shall consist of enrolled school students from Year 7 to Year 9, while Senior entries may contain any enrolled High School students, up to Year 12 to a maximum age of 18 years at start of event.
- 1.1.7 Composite teams from two or more schools are eligible to compete only where neither school can provide enough drivers to form its own team. This should be noted on your entry form. However, headhunting drivers to form an elite team is outside the spirit of this competition and will not be approved.

1.2 General - Human Powered Vehicle (HPV)

This type of vehicle must be a recumbent cycle with 3 or 4 load bearing wheels, completely driven by human power, with a single seat only and no alternative propulsion systems are allowed.

Racing categories includes:

- 1.2.1 **Junior** - Boys, Girls and Mixed consisting of students from grades 7 to 9. Any type of general HPV can be used for these categories, including school built, fully faired and shell design.
- 1.2.2 **Senior** - Boys, Girls and Mixed consisting of students from grades 7 through to grade 12. Any general type of HPV can be used for these categories, including school built, fully faired and shell design.
- 1.2.3 **Restricted** - Boys, Girls and Mixed consisting of students from grades 7 through to grade 12. These vehicles can be school built or professionally manufactured. They are to have less than 50% aerodynamic advantage, (coverings intended to REDUCE the effects of drag). **Vehicle photographs are to be provided with series registration, to the QLD HPV Super Series Coordinator for eligibility verification.**

1.3 Tandem – Human Powered Vehicle

A purpose built two seater vehicle with 3 or 4 load bearing wheels. **This type of vehicle is not supported within the QLD HPV Super Series.** Contact the individual race coordinator prior to registering this vehicle for acceptance, design and safety requirements.

1.4 Hybrid (two sources of power)

The Hybrid category encompasses vehicles that are driven by a combination of human and alternate power. **This type of vehicle is not supported within the QLD HPV Super Series.** Contact the individual race coordinator prior to registering this vehicle for acceptance, design and safety requirements.

1.5 School Built Vehicle

Use of commercially or professionally designed and built vehicles is not permitted. This Category is to encourage school-based design and constructed vehicles. Entrants are required to design and build the vehicle or make significant modifications to an existing school built vehicle, “in school”. Design decisions must be made collectively by the students. All construction, with the exception of welding, must be completed by student registered at the competing school.

1.5.1 Teams have to show proof of ownership that they have built the vehicle in school, this could be achieved by keeping a build portfolio containing drawings/sketches, photos of the build, parts list etc.

1.5.2 School Built categories vary between events in Queensland, check with the local race coordinator about race entry eligibility.

1.6 Multiclass

Athletes with disabilities - this category encourages inclusion of students with Education Queensland Low Incidence Disabilities. It is the team manager’s responsibility to ensure that each driver is eligible for this class and that they can safely negotiate the race track under race conditions with other competitors.

1.6.1 Commercially designed and constructed vehicles are permitted. Multiclass teams will register for 1 of the main team categories and also register as a multiclass team, this enables the team to challenge teams from other classes as well as Multiclass. They are also eligible for awarded wins in other categories as well.

1.6.2 Multiclass 1: is for **School SEP Unit** teams only, these teams may include up to 2 main stream students to fulfil maximum driver numbers.

1.6.3 Multiclass 2: is for Queensland **Registered Special School** entries only. This category will have restricted racing guidelines that all Multiclass 2 teams must follow to be eligible for competing in this class. Endurance races will stipulate a reduced racing timeline during the evenings and a different number of drivers per team. Refer to individual Event manual for specifications.

1.7 Entry Compliance

No vehicle will be allowed to take part in an event until it has passed **Scrutineering**. Vehicles must maintain compliance throughout each event. Vehicles may be inspected at any point throughout and after an event for continuing integrity and regulation checks.

1.7.1 Team managers have a responsibility and duty of care to their students. During construction and use of their vehicles, the Team Manager is required to monitor and assume responsibility for the following:

- 1) Driver protection structures are strong enough to meet their purpose.
- 2) No aspect of the vehicle compromises driver safety at any time.
- 3) Each driver in the team can fit safely within the vehicle, especially head clearances.

2. Safety

2.1 General

All vehicles are driven at the driver's own risk, and it is the responsibility of each school manager to ensure the safety of the schools vehicles throughout the entire race.

- 2.1.1 The Scrutineering process is to determine if the vehicle complies with the current specifications and is safe to race. No warranty whether expressed or implied is made in relation to safety or roadworthiness through the Scrutineering process.
- 2.1.2 **Composite Material:** Constructors using composite materials must comply with Safe Work requirements, particularly in regards to unbound fibres and complete curing of materials. Structures manufactured from such materials must be of suitably rigid design and construction to meet HPV Event requirements.
- 2.1.3 **Pedals:** Vehicles must be fitted with pedal toe straps, clips, or cleats (pedal to shoe locking devices) to help prevent feet from coming off the pedals while in use.
- 2.1.4 **Personal Protective Equipment:** A properly fitted bicycle helmet (AS approved), cycling gloves, covered shoes and shirts, (not singlets) must be worn when driving. Shatterproof sunglasses or safety glasses must be worn during the day and ONLY clear safety glasses must be worn at night.
- 2.1.5 Safety equipment must be displayed to the pit marshal as you exit the pits. If equipment is missing then the vehicle will be held in pit lane until the issue is corrected by a member of that team. Event coordinators/pit marshals may allow a "single lap return to pit" for rectification to occur. If the driver continues beyond the single lap black flag penalties will be issued.
- 2.1.6 All drivers with long hair must have their hair platted, held up or kept in a manner that their hair cannot be entangled with the vehicle's workings. Rear wheel enclosures are **NOT** required, but may be fitted if desired.

2.2 Vehicle

The vehicle design must provide substantial protection for drivers during any incident.

- 2.2.1 Vehicles must:
 - 1) Contain the driver in a strong and tough enclosure.
 - 2) Prevent contact between driver, the road, obstacles and other vehicles.
 - 3) Be formed from metal bar/tube work, composite, metal panels or combinations of materials.
 - 4) Have no internal items or structures that could injure the driver.
- 2.2.1 **Protrusions:** The exterior of the vehicle must not have protrusions capable of causing interference, injury or damage to personnel, vehicles or infrastructure. This includes features such as body or door handles, fins and roll bars.
- 2.2.2 Closed Canopy vehicles built or purchased from 2019 onwards must not have external roll bars that protrude higher than the silhouette of the vehicle when viewed from the side. Evidence of built or purchased date maybe required for Series registration.
- 2.2.3 Exposed axle ends must be recessed or flush in the hub, covered by bodywork, bar work, dome nuts or caps.

2.3 Driver

Canopies must be able to be opened independently from the inside by the driver, and, from the outside without the drivers help. The location of closure devices for canopies must be marked externally with an equilateral yellow triangle with sides of 50mm. **The triangle must stand out against the vehicles base colour or design patterns for ease of identification during an incident.**

- 2.3.1. The cockpit must be free of hazards that could injure the driver or pit crew. For example:
 - 1) Zip tie ends need to be cut flush, filed round, taped over or rotated away.
 - 2) Brake and gear cable ends should be covered
 - 3) **Nothing** will be within 250mm of the driver's face, especially centre steering controls.
- 2.3.2 Drivers observed to have their helmet contacting any surface within the vehicle will not be allowed to continue driving.
- 2.3.3 Helmet mounted cameras (or other devices) are not allowed.

- 2.3.4 Driver vision must not be impaired by enclosed bodywork, particularly during rainy or misty conditions. Provision must be made to prevent fogging at night or during inclement weather.
- 2.3.5 Windows are not to be tinted. See-through signage which impairs the range of vision is not permitted. The use of electronic visual enhancement devices is up to the individual race coordinator for approval.
- 2.3.6 Drivers seated in the normal operating position must be able to sight an object on the road 5 metres in front of the vehicle.
- 2.3.7 In combination with mirrors, drivers must have at least 210 degrees range of vision from inside any canopy or bodywork. The intent of this clause is that a driver is able to turn their head to visually check for other vehicles before changing their position on the track.

3. Vehicle Construction

Each vehicle must have three or four load bearing wheels, all of which must maintain contact with the road during normal operation.

3.1 Dimensions:

- | | |
|------------------|--------|
| 1) Max Length | 2700mm |
| 2) Max Width | 1100mm |
| 3) Max Height | 1200mm |
| 4) Min Wheelbase | 1000mm |
| 5) Min Track | 600mm |

3.2 Design & Materials

The design shall provide protection for the driver in the event of a collision or rollover and shall be free of protrusions or other features capable of causing interference or injury to competitors or spectators.

- 3.2.1 The choice of design and construction materials is free, including bicycle chains, sprockets, brakes, wheels and other components. The use of Go-Kart frames, motorcycle frames and bicycle forks and frames is not permitted. However, bicycle centre brackets, head stems and wheel dropouts are permitted, provided the length of adjacent original frame tubing does not exceed 50mm.
- 3.2.2 Body work and canopies must be structurally sound and maintained in a safe condition at all times. Vehicles may be subjected to further safety inspections during the race if structural integrity is under question post a collision or roll over.
- 3.2.3 If a windscreen is removed then the opening/leading edge must be rendered safe. E.g. sharp edges protected by rubber/plastic tube.
- 3.2.4 Airflow for driver ventilation and provision to mitigate internal fogging must be evident.
- 3.2.5 Other equipment e.g. drink bottles, walkie talkies, shall be securely mounted, and should not impair driver control during use.
- 3.2.6 All batteries must be mounted securely so that they do not come loose. Liquid lead acid type batteries are not to be used.
- 3.2.7 All removable/replaceable body panels and seat padding inserts must be presented at Scrutineering with the vehicle they will be used on.

4. Driver Protection

4.1 Guarding of Moving Parts

When operating a vehicle under normal conditions a minimum of 50mm clearance between moving control parts and drivers hands/fingers must be demonstrated. If this is not achieved and the driver's hands are at risk of coming into contact with **moving wheel spokes**, guarding **MUST** be provided. See section 4.11.

- 4.1.1 Drivers must be protected from hair and clothing entanglement.
- 4.1.2 Chain ring teeth must be covered on the right hand sides using chain ring disc.

- 4.1.3 The drive system leading to the chain ring must be covered from the front of the seat to the chain ring with channel or tube.
- 4.1.4 This channel or tube must be mounted with a skimming clearance of 5mm max from the chain ring.
- 4.1.5 Any exposed pinch point on the return side of the chain must be guarded.

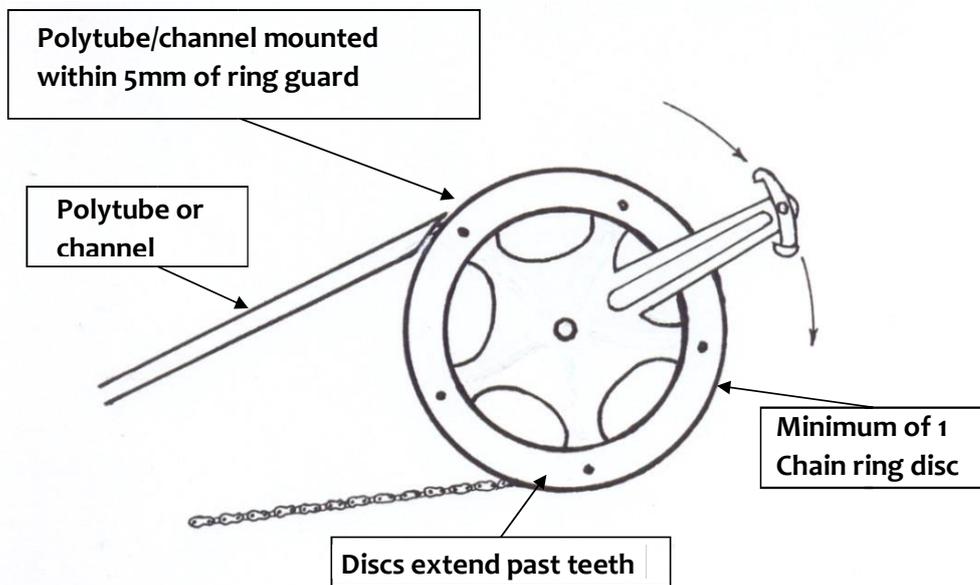


Figure 1. Guarding of chain drive system

4.2 Floor Protection

All vehicles must be fitted with an adequate floor pan that will protect the driver's feet, hands and arms from contacting the road surface when racing. The floor pan in conjunction with the seat and rollover protection bar system must protect the driver from collision impact through the underside of the vehicle.

- 4.2.1 Vehicles must have a white or very light-coloured underside to allow visibility of the vehicle when the vehicle has rolled. For vehicles with a dark underside, reflective tape is to be applied to the underside of the body to give indication to approaching vehicles of a roll over, especially for night racing.

4.3 General Vehicle Design Principles

All vehicles must include a Rollover Protection Structure (RPS) these include:

- 1) Rollbars that provide protection to the driver during a rollover or other track incident.
- 2) Cockpit Overhead Protection (COP) which protects the driver from oncoming traffic when their vehicle is stationary and on its side.

- 4.3.1 Vehicles fall into two main groups:

- 1) Open cockpit, or unfaired vehicles racing in "Restricted" categories.
- 2) Closed canopy, or shelled vehicles.

- 4.3.2 These may incorporate a:

- 1) hard shell (composites or metal) or
- 2) Soft-shell materials, like corflute.

4.4 Rollover Protection

Rollover protection must be integral with the vehicle frame and must be rigidly and robustly constructed to retain its integrity during a rollover incident. The structure must include either longitudinal bracing to a main chassis member or reinforced layers of composite to help prevent breakage or deformation during a roll-over. Roll over protection may be integral with hinged driver access panels which must include adequate locking or restraining points.

4.4.1 Vehicles must have four sets of protection bars or reinforced composite layers for the:

- 1) 'Head bar' or 'Main bar' (for metal tube structures, this includes bracing).
- 2) 'Knee bar' (for metal tube structures, this includes bracing),
- 3) 'Side impact protection' and
- 4) 'Overhead protection', either of strengthened composite or metal tube or rod.

4.4.2 With **unfaired bikes** and drivers in the normal operating position, the roll over protection shall conform to the following:

- 1) Head bar located not more than 150mm forward or rearward of the centre point on top of the drivers helmet.
- 2) Height from top of helmet of the tallest driver to the underside of the Head bar: 100mm min.
- 3) A minimum inside width of 300mm, 150mm below the bottom of the overhead protection head bar.
- 4) Minimum width of chassis, fairing or roll protection, (whichever is closer) measured at driver shoulders must be 500mm.
- 5) Knee bar positioned to ensure the rider's knees cannot make contact with any road surface during a rollover.
- 6) Overhead protection. The structure over the driver's head must provide enough strength to prevent the driver from being struck by another vehicle when on its side after a rollover. Two longitudinal bars must be symmetrical along the vehicles centreline and be 100mm to 250mm apart. These bars may be detachable or hinged to enable easier access for the drivers, but must lock in place, (refer to 4.5) and be strong enough to ensure the structure remains attached during a rollover and be able to withstand an impact without breakage.
- 7) All overhead protection must be able to withstand a static weight of 60kg to demonstrate structural strength and integrity.
- 8) Must be capable of protecting the driver against a collision with an oncoming vehicle.

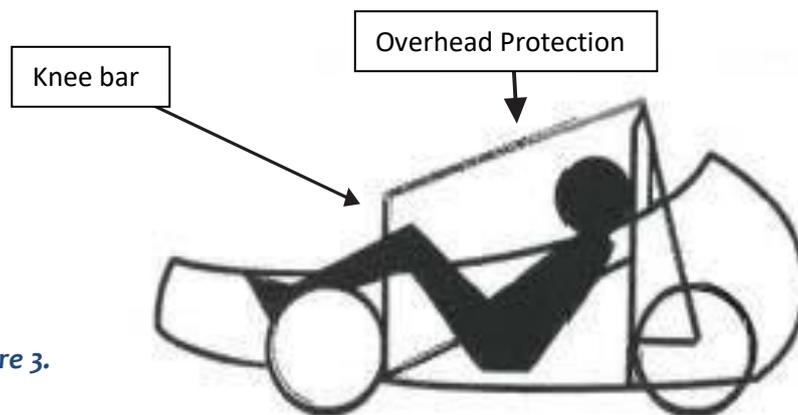


Figure 3.

4.4.3 For fully faired with flexible cover:

- 1) A ridged frame or composite equivalent is to be installed to enable meeting the Overhead protection requirements.
- 2) All overhead protection must be able to withstand a static weight of 60kg to demonstrate structural strength and integrity.
- 3) Structures may be detachable for driver entry or transport purposes, provided that appropriately robust attachment methods are used e.g. bolts with locknuts or positive lock metal latches. R clips, straps or Velcro are not permitted.

4.4.4. For fully faired with rigid structures.

Where the cover has a rigid structure with sufficient strengthening to protect the driver, the rollover protection shall conform to the following:

- 1) All overhead protection must be able to withstand a static weight of 60kg to demonstrate structural strength and integrity.

- 2) The structure of the hard cover must be sufficiently robust to protect the driver for all four of the protection requirements.
- 3) There must be sufficient head room to allow the driver to turn their helmeted head.
- 4) An air gap must exist between the driver's helmet and all internal structures of the vehicle. Drivers observed to have their helmet touching on any part of the internal structure, or padding if it is used will not be permitted to continue racing.
- 5) Vehicle padding is **NOT** required internally around the driver's head if no hazard is present.
- 6) Where a vehicles internal structure, including door hinges presents a possible hazard to the driver's safety, appropriate padding must be added. The air gap between the driver's helmet and the padding must be maintained

4.5 Rollover Protection Structure Requirements

- 1) Be structurally integrated with the chassis/frame/shell and be constructed to meet their purpose.
- 2) RRPS including bracing, can be formed from metal tubing, composite materials or other suitable materials.
- 3) Must entirely encompass the driver viewed from all directions. (Front, rear side and top).
- 4) The structures and bracing may be removable, providing that appropriate attachment methods are used i.e. nuts and bolts, not pins or clips.
- 5) The driver's legs, knees and feet must be protected from injury by the vehicle's structures/panels when the vehicle is upside down or on its side.
- 6) Opening parts of the RRPS must be secured to not open involuntarily.

4.6 Open Cockpit Vehicles Additional

At the driver's head the structure must:

- 1) Head bar protection be braced longitudinally from its highest point to a substantial chassis/body member see (**figure 3**) or be sufficiently braced within the structure's functional region requiring two braces.
- 2) Form a minimum angle of 10 degrees to the brace and this angle must include the vertical line through the highest point (**figure 4**).

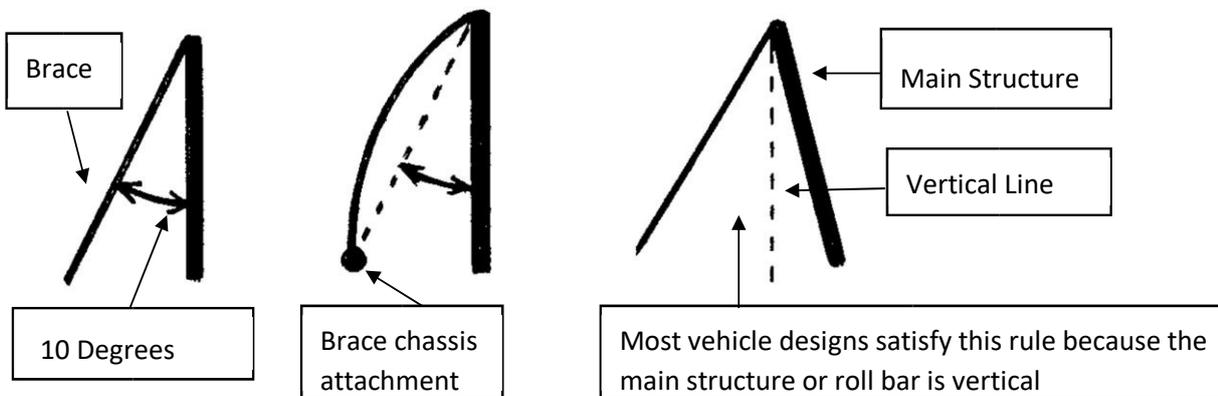


Figure 4, Rollover protection structure bracing

4.7 Locking Mechanisms

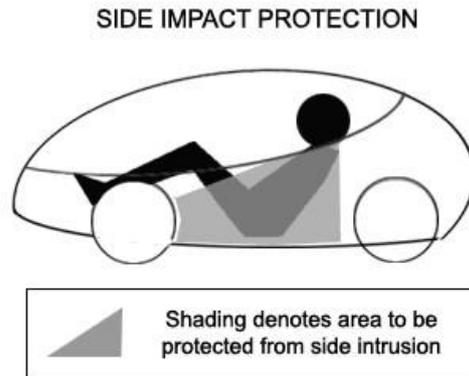
The locking mechanism must comply with the following:

- 1) Velcro is not sufficient by itself.
- 2) If elastic loops are used.
 - a. They must be under tension, with fixed hooks or large flanged buttons.
 - b. Must be fixed to structural members/bars/composites
 - c. Elastic cord must be a minimum diameter of 5mm

4.8 Side Impact Protection

Side impact protection must be afforded to the driver's body, from shoulders to hips to knees, **capable of protecting** the driver from entry by another vehicle during a "T-bone" style of collision and must protect drivers in all seated positions. It should consist of:

- 1) Tubing and/or rigid panelling on each side forming an enclosed cockpit.
- 2) The wheels may form part of this protection.
- 3) Side impact protection structures must be anchored not to move sideways.



4.9 Forward Protection

All vehicles must include substantial forward protection. This should be designed to prevent drive components such as chains, chain rings and drivers feet from coming into contact with other vehicles and to minimise the possibility of injury to other drivers who may be hit by your vehicle.

- 4.9.1 Bodywork or fairings with reinforcing shall be deemed to be sufficient protection. However, if such bodywork is damaged or removed during the race, the vehicle must still comply with rules 4.8 (side impact) and 4.9 (forward protection).
- 4.9.2 The shape of the vehicles nose section should be designed to minimise potential injury to other drivers, race officials and people in the pits if hit. The Forward Point of Impact (FPI) should be between ankle and knee height (100mm to 400mm). It should have a horizontal radius of greater than 40mm and a contact height greater than 30mm. Vehicles with a pointed internal steel frame nose section are to have a curved deflection plate fitted to the outside of the front of the vehicle to minimise the risk to everyone during a contact. Vehicles with a corflute only FPI are to implement a crumple zone capsule to the depth of 150mm using additional corflute to reduce the impact effect on their drivers during a head on collision. Square or flat FPI's of greater the 40mm by 40mm are acceptable **This change is recommended for 2020 and compulsory for 2021.**
- 4.9.3 Constructors must ensure that forward projecting struts will not become a hazard if surrounding bodywork is no longer intact (eg.by use of end plates or lateral tubing).

4.10 Rear Impact Protection

Rear wheels must be fitted with a bump bar or be fully enclosed to avoid contact with a trailing vehicle.

- 4.10.1 Rear impact protection must offer the driver protection in the case of a rear impact and ensure the driver's shoulders, neck and head are protected.
- 4.10.2 The vehicle must have a head restraint that prevents over-extension of the driver's head backward to help reduce injury to the driver's neck. The following are examples of acceptable versions of head rest.



Neck/shoulders Support Head Rest,
Adjustable



Adjustable Head Rest



Non-adjustable Head rest

4.11 Internal Front Wheel Protection

All internal front wheels are to provide protection from the driver's fingers being capable for entering the spoked section of the wheel during normal operation and during a collision or rollover incident. If the drivers extended finger tips can come within 50mm, (Australian standards for required shielding on machinery), of the exposed wheel spokes with the driver leaning as far forward as possible with a correctly fitted seat belt then at least one of the following methods, must be incorporated:

- 1) Inner spoke covers fitted to each wheel
- 2) A deflection panel fitted between the steering controls and the wheel
- 3) A fitted wheel cover, (only the rear 3rd of the wheel needs to be covered, not the entire front wheel provided it achieves the protection required as indicated above).
- 4) A complete wheel enclosure. (This may be removable for ease of tyre maintenance)

4.11.1 If the drivers finger tips cannot come within 50mm of the exposed wheel spokes, (not tyre) then no coverings are required.

5. Driver Seat and Equipment

5.1 Capacity

The vehicle shall carry only one driver.

5.2 Driving Position

The driver must not be placed in a potentially hazardous position in the event of a collision or rollover. The operating position must be recumbent.

5.3 Seat

Seat angle and driver support are major factors in seat design. It is recommended that an "off the shelf" production seat be used as these seats can also provide correct seatbelt positioning and head restraint fittings.

5.3.1 The seat must be shaped and positioned to avoid the driver sliding under the seat belt.

5.3.2 The seat must be fitted in a way that ensures that the driver's position does not compromise machine controllability or safety, nor shall the operating position place the driver at increased risk of neck or back injury in the event of a collision.

5.3.3 In vehicles with moveable seats, drivers must remain protected by the four protection systems; (head, knee, side and overhead) Moveable seats must lock securely into position for each driver and must not move once locked in place or when the vehicle is in operation. Seat belts or driver weight cannot be used as part of the seat position retention or locking system.

5.3.4 Seats must be adequately attached to structural components of the vehicle.

5.3.5 Any temporary or removable padding used by drivers **MUST** be fixed into place using a positive attachment to a fixed part of the vehicle. This could be a strap and buckle, Velcro straps, canvas zips, etc.

5.4 Seat Belts

The vehicle shall be fitted with a (minimum) four-point automotive type seat belt utilising a standard automotive type buckle. Damaged belting, inertia reel fittings, Velcro fastening and plastic buckles are not acceptable. All seat belts are to be free of visible damage, tears, fraying. Replacing seat belts every 5 years is highly encouraged.

5.4.1 A five point harness must be fitted to stop the driver from sliding forward in a collision if the seat position is of a lesser angle than 12 degrees. The extra strap is to be bolted to the leading edge of a reinforced seat or bar under the front of the seat and the strap utilised between the driver's legs. This must be made from seat belt material.

5.4.2 The seat belt shall be securely mounted to the frame or seat, such that the driver is restrained in the vehicle if rollover occurs.

5.4.3 Seat belts must be worn across the chest, shoulders and low across the front of the pelvis. Wearing the lap section of the belt across the abdominal area must be avoided.

5.4.4 Seat belts must be adjustable to fit all individual team members.

5.4.5 Seat belts should be adjusted as firmly as possible for each driver to minimise the risk of injury prior to leaving the pits.

5.5 Seat Belt Mounting

The seat belt must be mounted to comply with the following:

5.5.1 For **Professionally manufactured** vehicles,

- 1) Original unmodified belt mountings are acceptable.
- 2) If the mountings or seat has been modified, mountings are required to comply with the following requirements for school built vehicles.

5.5.2 For **School Built** Vehicles,

- 1) High Tensile bolts and matching nuts with a minimum diameter of 6mm, (8mm preferred)
- 2) At least 8mm bolts must be used where more than one belt mounting is retained by the same bolt.
- 3) Bolts are to have at least 2 threads showing through either a nut with spring washer, a Nylock nut or a captive nut.
- 4) The use of an appropriate grade of thread locker, such as Loctite 243 or similar) is highly recommended and compulsory on captive nuts.
- 5) Installation of seat belt mountings must not reduce the structural strength of the vehicle.
- 6) Welded mounting tabs are preferred where possible

5.5.3 Mounting points for shoulder straps must be:

- 1) Level with or higher than the driver's shoulders
 - a. Where mounting points cannot be raised, guiding brackets at shoulder height may be used to ensure the belt is effectively acting from shoulder height
- 2) A maximum of 250mm apart
- 3) Designed to ensure the seat belt does not slide off the shoulders of any driver when in use.

5.5.4 Where the seat belt is mounted to the seat frame/base

- 1) The seat anchorages must be securely anchored to structural members of the vehicle frame, and
- 2) Be strong enough to carry the load of the seat belt mountings plus any loads applied by the driver.

5.5.5 Where seat belts run through slots in metal or composite seats (or over seat edges), substantial protection is required to prevent damage to the seat belt (e.g. fraying and cutting). ***Tape alone is not sufficient.***

5.6 Driver Equipment

All drivers are required to wear either sunglasses or safety glasses at all times while inside the vehicle. These are to be fitted against the driver's face and not sitting on the end of the driver's nose. If visibility becomes an issue, drivers are to return to the pits on the next lap. **Safety Glasses with ventilation ports must be used during poor race conditions to minimise fogging. Any vehicle or driver observed to have poor visibility will be directed to the pits for rectification immediately.**

Drivers are encouraged to use a skate board style helmet with a smooth back edge to minimise possible neck strains or injuries. **Motor bike helmets or full face helmets are NOT to be used at all.** All helmets must meet Australian Safety standards.



Preferred



Not recommended



Banned

6. Vehicle Control

6.1 Steering

Steering mechanisms should provide continuous positive control without the need for regular adjustment. All steering systems, especially those employing wire or rope, must be demonstrated to be fail-safe. The vehicle must steer in a smooth and controlled manner while adhering to the following:

- 1) Steering systems shall operate freely from lock to lock without binding or fouling and must have a maximum lock limitation that prevents issues such as jamming, linkage damage and over centre travel.
- 2) The steering design must allow the wheels to be moved from full left lock to full right lock in an uninterrupted movement.
- 3) Steering controls must be designed and constructed so that they **will not injure** the driver in the event of an incident.
- 4) Tyres or wheels must not come in contact with a driver's hands under **NORMAL** operating conditions.

6.1.1 Steering controls which project towards the driver:

- 1) Must not be closer than 250 mm to the driver's face, and
- 2) Have rounded edges with suitable padding.

6.1.2 If the Chief Scrutineer suspects a vehicle may fail any of these specifications the vehicle must demonstrate that it can negotiate all corners on the track successfully at the event prior to being given approval to race.

6.2 Brakes

The vehicle shall be fitted with a minimum of two independent braking systems.

6.2.1 The braking system shall remain effective at all times during practice and racing.

6.2.2 Brake controls and cables must be positioned away from any moving parts and the road surface, to avoid injury to the driver or compromising the effectiveness of the braking system.

6.2.3 Brake systems must not apply friction contact to the tyres.

6.2.4 Vehicles displaying braking issues during practice or racing will be required to undergo further scrutineering inspections to prove serviceability of the braking system.

6.2.5 A dynamic braking test **MAY** be incorporated as part of the Scrutineering process.

6.3 Independent Front Braking System Trial:

- 1) **Senior teams only** are permitted to trial independent front braking systems with no rear brake.
- 2) Junior teams are not permitted to take part in this trial due to the high level of directional stability skills required
- 3) Any vehicle displaying poor handling under braking will be grounded for the duration of the event.
- 4) All members of teams taking part in this trial must be in year 10 or higher.

6.4 Mirrors

The vehicle shall be fitted with two, securely mounted, flat or mildly convex mirrors, positioned so that the driver is afforded a clear view to the rear.

- 1) Mirror diameter must be a minimum of 4cm,
- 2) Equivalent sized rectangular mirrors are allowed.
- 3) Glass mirrors are not permitted.

- 4) Two mirrors must be fitted to the vehicle at all times. Maintenance penalties may apply.
- 5) Mirrors must be mounted in a manner that prevents them moving during the race.
- 6) Mirrors must be contained within the silhouette of the vehicle to reduce the risk of damage in a rollover or collision.

6.4.1 When changing drivers, the replacement driver must adjust both mirrors to suit their driving position prior to being seat belted in.

6.5 Interstate Competitors

All interstate competitors are to check with the local race coordinators prior to event registration for entry eligibility as some interstate regulations vary from this document.

7. Vehicle Electronics

7.1 Lighting

Vehicles must have a front white light and a rear red light.

7.1.1 Head lights must operate continuously throughout any “declared lights on period”.

7.2 Front lighting must:

- 1) Be at least one white light, securely fitted between 200mm and 400mm above road level, at the front of the vehicle (forward of the driver’s feet).
- 2) Be of sufficient size and capacity to effectively illuminate the pathway of the vehicle, and to illuminate other vehicles being approached.
- 3) Headlights are to show a steady light, (not flashing).

7.3 Rear Lighting must be:

- 1) A red LED set to steady mode, (not flashing).
- 2) Fitted at all events and ready to be used for inclement weather.
- 3) Mounted within 150mm of the rear-most part of the vehicle.
- 4) Mounted on the vertical centre line of the vehicle.
- 5) Robustly mounted between 300mm and 600mm above road level.
- 6) Strip lighting or string LEDs must be confined or masked to 300mm – 600mm above road level.
- 7) A minimum of three LEDs.

7.3.1 Helmet mounted lights are not permitted.

7.3.2 Teams may fit additional lights anywhere on their vehicle but these lights cannot be flashing and are not a substitute for the mandatory lighting mentioned above.

7.4 Warning Device

A warning device must be fitted to each vehicle. It must comply with the following:

- 1) Mounted forward of the driver’s feet.
- 2) The warning device must be directed forwards and have direct contact with the outside airstream.
- 3) It must be an electronic device only.
- 4) The warning device must only be operated by using a momentary switch mounted on a steering handle.
- 5) The warning device should be waterproofed to reduce the possibility of failure during the race.
- 6) Warning devices must be serviceable for the duration of the event, this includes warning devices getting stuck on, (this is not allowed). Maintenance penalties will apply.

7.4.1 The device shall not impair driver control in its mounting or use and must be clearly audible at a distance of 10 metres. Such devices shall not emit inappropriate or offensive sounds.

7.4.2 Any secondary or back up horn fitted must be electronic.

7.5 Other Devices

The use of mobile phones, iPad, MP3's or similar music/entertainment devices are NOT permitted.

7.5.1 Small video cameras (e.g. Go pro) are allowed;

- 1) They are not to be attached to the driver's helmet
- 2) They must be positioned so that they cannot pose a safety risk.
- 3) They are not to be operated by the driver while on the track.
- 4) They must not be mounted outside the silhouette of the vehicle when viewed from the front.

7.5.2 Radio communications;

- 1) Pits and vehicles communications may be permitted at the discretion of the Race Coordinator.
- 2) Where permitted for use, drivers are not to use ear plugs
- 3) Radios must be securely mounted to the vehicle and cannot be dislodge in the event of a rollover.

7.6 Speedometer

All teams are encouraged to fit a speedometer to the vehicle in a position where it can be clearly seen by each driver, to monitor speed in the pit areas. Pit speed limit is 10kph.

7.7 Transponders

These are used to record vehicle lap times at the events. Types of transponders used throughout the series will differ between events. They will be issued to you when you complete your administration and scrutineering process.

- 1) All transponder types need to be fitted in a vertical position within the vehicle, and as close to the track surface as possible.
- 2) Avoid placing them above anything metal or behind thick composite materials, as this weakens the signal.
- 3) It is the responsibility of the team managers to ensure that the issued transponder is working correctly throughout the entire race, and that the signal strength is adequate in its mounted position.

8. Race Ready

8.1 Vehicle Identification

Each vehicle shall have three race number decals (size A4 landscape), one at the front right side so it is clearly visible to the time keeper's box and one each side of the vehicle at the rear.

8.1.1 Each **SCHOOL MANAGER** is required to register their vehicles with the QLD HPV Super Series Admin to be allocated a racing number which will remain the same for the racing season. Race number decals will be mailed to your school after you have paid the registration fees. This is to be completed 6 weeks prior to attending your first event.

8.1.2 Category identifications will be distinguished by different coloured strips on the top section of the race decal.

8.1.3 Teams are encouraged to display their school name and or team name on the vehicles.

8.2 Team Identification

Drivers will be issued with a coloured wristband, pit crew members and team managers will be issued with a different coloured wrist band as well. Wrist bands are to be displayed for the duration of the event. Drivers seen without a wrist band whilst operating the vehicle will be stopped from leaving the pits exit until rectified.

8.2.1 Event officials, managers, drivers and support crew will be the only persons allowed in the pits area at all events.

8.3 Team Sponsorship

Teams are invited to display on their vehicles and uniforms any signs/logos that promote healthy school, industry and community links.

8.3.1 Team sponsorship must be consistent with the health and welfare of young people and the overall objectives of the QLD HPV Super Series.

8.3.2 Signs/logos/stickers representing cigarettes, drugs, alcohol or illegal substances or practices are unacceptable and vehicles displaying such images will not be passed at scrutineering. If you have any doubts about the suitability of a sponsor, please contact one of the race directors or Super Series admin personnel. The event organisers reserve the right to remove any offensive signage in the public interest.

8.4 Scrutineering

Prior to practice, all vehicles shall pass scrutineering.

8.4.1 Vehicle control and stability must be demonstrated during scrutineering.

8.4.2 At the discretion of the race director, a vehicle may receive a safety clearance to practice, prior to passing scrutineering.

8.4.3 Vehicles that fail scrutineering may, at the sole discretion of the Race Director, be allowed to compete in the event in a 'demonstration' capacity only. Such vehicles and teams will not be eligible for any of the event prizes or series points.

8.4.4 Vehicles that fail scrutineering due to safety issues will not be allowed to compete.

8.5 Future Advancements

This sport was developed to encourage design ingenuity and experimental outcomes in the field of human powered vehicles. This document is to give strong guidelines for the direction of the build and maintenance of a racing vehicle with driver and pedestrian safety as the main priority.

8.5.1 Vehicle design advancements are highly encouraged by school students and staff. Advancements that conflict with specifications set in this document may be appealed for inclusion by submitting a written report. You will need to include drawings, photographs, and a full explanation of the advantages of this new design to the QLD HPV Super Series Administration prior to attending any QLD event.

8.5.2 If the changes are deemed suitable to the advancement of the sport and there are no safety risks evident, a race worthy certificate will be issued from the QLD HPV Super Series Admin, to allow the vehicle to enter an event. The vehicle still needs to pass a standard pre-race scrutineering for all other aspects of the vehicle that have not been modified. Individual race coordinators always have the final say on whether a vehicle can race or not.

8.6 Acknowledgments

This document is a collaboration between QLD HPV Super Series Administration, the 8 Queensland HPV Race coordinators and RACQ Maryborough representative.

9. QLD HPV Racing Contacts

For more information regarding any of the series races or about the series itself, contact any one of the following race coordinators responsible for each event in order of race dates:

MAY

Toowoomba 16 Hour,

John Joyce

jjoyc13@eq.edu.au

JUNE

Yeppoon 8 hour,
Mackay 18 hour,

Peter Jensen
Michael Duggan

peter_jensen@emmaus.qld.edu.au
Michael.duggan@bigpond.com

JULY

Emerald 16 hour,
Willowbank 8 hour,

Gregory Pullen,
Andrew Newberry

Gregory_pullen@rok.catholic.edu.au
anewb9@eq.edu.au

AUGUST

Benaraby 8 hour,

Mark Boyd

mark@gladstonefleet.com.au

SEPTEMBER

Maryborough 24 hour,

Gavin Grantz

ggran10@eq.edu.au

OCTOBER

Bundaberg 8 Hour

Greg Smith

gcsmi1@eq.edu.au

QLD HPV Super Series

Series Coordinator,
Series Assistant,

Greg Smith
Rory Smith

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