

2017 INFORMATION KIT  
PART B: HPV SECONDARY

# 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



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# HUMAN POWERED VEHICLES (HPVS) - SECONDARY\*

## 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

**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.  
Teams may stay overnight on the Sunday after the event to encourage a safe journey home.

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

# TEAM NUMBERS

- Where possible, team numbers indicate pit numbers.
- Team numbers & pits 1 – 49 are located in Pit 1.
- Team numbers & pits 55 – 99 are located in Pit 2.
- Team numbers & pits 303 – 393 are located in Pit 3 (EEVs)
- 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.

No.	Team Name	School Name	Class
1	Team 2	Woodleigh School	B2
3	Parkie	Eaglehawk Secondary College	B1
4	Care Factor	Eaglehawk Secondary College	B2
5	Roadrunners	Bairnsdale Secondary College	B2
6	Toxic	Bairnsdale Secondary College	B2
7	Eclipse	Bacchus Marsh College	C
8	Bazinga	Bacchus Marsh College	B2
9	Eureka	Ballarat Specialist School	OPEN
10	Team 1	Heywood and District Secondary College	OPEN
11	MDHS Giovanni	Maryborough Education Centre	B1
12	Voltaic	Maryborough Education Centre	B2
13	High Flyer	Ballarat High School	B2
14	The Rodent	Ballarat High School	B2
15	Pegasus	St Margarets School and Berwick Grammar School	All Female
16	Chrysaor	St Margarets School and Berwick Grammar School	B1
17	Ceto	St Margarets School and Berwick Grammar School	B2
18	Zeus	St Margarets School and Berwick Grammar School	C
19	Pearcey's Punks	Catholic College Bendigo	B2
20	Sneaky Mum	Catholic College Bendigo	C
21	Too Fast	Marist College Bendigo	B1
22	Too Furious	Marist College Bendigo	B2
24	Emoji Go	Highview College	B1
25	Off The Grid	Highview College	B2
26	Outback Cadillac	Centralian Senior College	OPEN
27	Top Deck	Bendigo Senior Secondary College	C
28	Nothing Like a Bin Fire	Bendigo Senior Secondary College	OPEN
29	Mach 17	Killester College	All Female
30	Pedal To The Metal	Killester College	All Female
31	EVO	Kingswood College	OPEN
32	GC Racing	Galen Catholic College	C
33	Team 3	Woodleigh School	B1
34	Team 1	Woodleigh School	B1
35	Golden Ticket	Cobram Secondary College	B2

No.	Team Name	School Name	Class
36	Lilly's Rockets	Yarrawonga College P-12	OPEN
37	Team 1	Mount Ridley College	C
38	Cyclepath	Warracknabeal Secondary College	C
39	Red Right Hand	Warracknabeal Secondary College	C
40	Think Victory	Victory Christian College	B1
41	Outta Nowhere	Victory Christian College	OPEN
42	Eat Ya Greens	Weeroona College Bendigo	B1
43	Rice Burner	Weeroona College Bendigo	B2
44	In-Perfection	Girton Grammar School	All Female
45	Infusion	Girton Grammar School	B1
46	Just Roll With It	Terang College	B2
47	Just Cruisin	Terang College	C
48	Sneaky	Padua College Mornington	C
49	Nigel	Padua College Mornington	OPEN
60	Pearced	Caulfield Grammar School - Caulfield Campus	B2
61	Lett It Bern	Caulfield Grammar School - Caulfield Campus	B2
62	Bonnie	Donald High School	All Female
63	Ouyen HPV	Ouyen P12 College	B2
64	The Blackfish	Koo Wee Rup Secondary College	B1
65	White Line Fever	Creek Street Christian College	B2
66	Fearless	Numurkah Secondary College	B2
67	White Knight	Numurkah Secondary College	OPEN
68	Time Warp	Good Shepherd College	C
69	X-treme	Good News Lutheran College	C
70	X-press	Good News Lutheran College	B2
71	Wacky on Whizz Fizz	Lakeside College	B1
72	Wild on Whizz Fizz	Lakeside College	OPEN
73	Toe - Knee - Hand	St Arnaud Secondary College	B2
74	Send It	St Arnaud Secondary College	OPEN
75	ATLAS	Crusoe College	B2
76	LOKI	Crusoe College	OPEN
77	Senior Wizard	Wonthaggi S.C.	C
78	Genesis	St Joseph's College	B1
79	Team 2	Mornington Secondary College	B2
80	Team 1	Mornington Secondary College	C
81	HyperVenom	Kurnai College - Morwell Campus	B2
82	The Chief	Western Port Secondary College	C
83	Armageddon	Horsham College	B1
84	Apocalyse	Horsham College	C
85	Clyde	Donald High School	OPEN
86	Team 1	Ballarat Secondary College - Woodmans Hill Campus	B2
87	Team 2	Ballarat Secondary College - Woodmans Hill Campus	B2

No.	Team Name	School Name	Class
88	Goldrush 1	James Sheahan Catholic High School	B2
89	Goldrush 2	James Sheahan Catholic High School	C
90	Wheel N' Deal	Maffra Secondary College	B2
91	Gallium	Maffra Secondary College	C
92	Dinky Dots	Mount Eliza Secondary College	All Female
93	Xpected	Mount Eliza Secondary College	C
96	Typhoon	North Geelong Secondary College	C
97	Tsunami	North Geelong Secondary College	OPEN
303	Sub Zero	Eaglehawk Secondary College	B2
305	Blitz	Bairnsdale Secondary College	OPEN
311	Stampede	Maryborough Education Centre	C
313	southern spirit	Ballarat High School	C
315	PerZeus	St Margarets School and Berwick Grammar School	OPEN
319	Hogan's Heroes	Catholic College Bendigo	OPEN
324	Aziz	Highview College	C
329	Not Fast But Furious	Killester College	All Female
342	Sugar Rush	Weeroona College Bendigo	B2
344	Introuble	Girton Grammar School	OPEN
360	The Big Cheese	Caulfield Grammar School - Wheelers Hill Campus	OPEN
369	X-cite	Good News Lutheran College	B1
379	Now you see me	Mornington Secondary College	OPEN
393	Speed Demons	Mount Eliza Secondary College	OPEN
405	Marist RIDINGTeam	Marist Sisters College Woolwich	All Female
414	Team 1	Overnewton Anglican Community College	C
418	Speedy Gonzales	Damascus College	B1

# 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.

Display and Presentation												
TIME	Panel 1			Panel 2			Panel 3			Panel 4		
9.30 am	1A	92	Mount Eliza Secondary College	2A	369	Good News Lutheran College	3A	13	Ballarat High School	4A	88	James Sheahan Catholic High School
10.00 am	1B	29	Killester College	2B	24	Highview College	3B	5	Bairnsdale Secondary College	4B	19	Catholic College Bendigo
11.00 am	1A	30	Killester College	2A	3	Eaglehawk Secondary College	3A	11	Maryborough Education Centre	4A	6	Bairnsdale Secondary College
11.30 am	1B	405	Marist Sisters College Woolwich	2B	33	Woodleigh School	3B	21	Marist College Bendigo	4B	60	Caulfield Grammar School - Caulfield Campus
12 noon	1A	329	Killester College	2A	45	Girton Grammar School	3A	78	St Joseph's College	4A	4	Eaglehawk Secondary College
1.30 pm	1B	15	St Margarets School and Berwick Grammar School	2B	40	Victory Christian College	3B	34	Woodleigh School	4B	86	Ballarat Secondary College - Woodmans Hill Campus
2.00 pm	1A	64	Koo Wee Rup Secondary College	2A	418	Damascus College	3A	35	Cobram Secondary College	4B	73	St Arnaud Secondary College
2.30 pm	1B	83	Horsham College	2B	16	St Margarets School and Berwick Grammar School	3B	8	Bacchus Marsh College	4B	81	Kurnai College - Morwell Campus
3.30 pm	1A	44	Girton Grammar School	2A	42	Weeroona College Bendigo	3A	90	Maffra Secondary College	4A	70	Good News Lutheran College
4.00 pm	1B	62	Donald High School	2B	71	Lakeside College	3B	65	Creek Street Christian College	4B	63	Ouyen P12 College
4.30 pm	1A	#N/A	#N/A	2A	###	#N/A	3A	#N/A	#N/A	4A	#N/A	#N/A

Display and Presentation												
TIME	Panel 5			Panel 6			Panel 7			Panel 8		
9.30 am	5A	<b>25</b>	Highview College	6A	<b>12</b>	Maryborough Education Centre	7A	<b>47</b>	Terang College	8A	<b>96</b>	North Geelong Secondary College
10.00 am	5B	<b>61</b>	Caulfield Grammar School - Caulfield Campus	6B	<b>46</b>	Terang College	7B	<b>84</b>	Horsham College	8B	<b>48</b>	Padua College Mornington
11.00 am	5A	<b>14</b>	Ballarat High School	6A	<b>22</b>	Marist College Bendigo	7A	<b>324</b>	Highview College	8A	<b>89</b>	James Sheahan Catholic High School
11.30 am	5B	<b>19</b>	Catholic College Bendigo	6B	<b>20</b>	Catholic College Bendigo	7B	<b>37</b>	Mount Ridley College	8B	<b>93</b>	Mount Eliza Secondary College
12 noon	5A	<b>87</b>	Ballarat Secondary College - Woodmans Hill Campus	6A	<b>7</b>	Bacchus Marsh College	7A	<b>69</b>	Good News Lutheran College	8A	<b>311</b>	Maryborough Education Centre
1.30 pm	5B	<b>303</b>	Eaglehawk Secondary College	6B	<b>342</b>	Weeroona College Bendigo	7B	<b>27</b>	Bendigo Senior Secondary College	8B	<b>77</b>	Wonthaggi S.C.
2.00 pm	5A	<b>75</b>	Crusoe College	6A	<b>17</b>	St Margarets School and Berwick Grammar School	7A	<b>32</b>	Galen Catholic College	8A	<b>80</b>	Mornington Secondary College
2.30 pm	5B	<b>43</b>	Weeroona College Bendigo	6B	<b>1</b>	Woodleigh School	7B	<b>38</b>	Warracknabeal Secondary College	8B	<b>91</b>	Maffra Secondary College
3.30 pm	5A	<b>66</b>	Numurkah Secondary College	6A	<b>313</b>	Ballarat High School	7A	<b>18</b>	St Margarets School and Berwick Grammar School	8A	<b>39</b>	Warracknabeal Secondary College
4.00 pm	5B	<b>79</b>	Mornington Secondary College	6B	<b>68</b>	Good Shepherd College	7B	<b>414</b>	Overnewton Anglican Community College	8B	<b>82</b>	Western Port Secondary College
4.30 pm	5A	<b>#N/A</b>	#N/A	6A	<b>###</b>	#N/A	7A	<b>#N/A</b>	#N/A	8A	<b>#N/A</b>	#N/A

Display and Presentation												
TIME	Panel 9			Panel 10			Panel 11			Panel 12		
9.30 am	9A	359	Caulfield Grammar School - Wheelers Hill Campus	10A	###	#N/A	11A	#N/A	#N/A	12A	#N/A	#N/A
10.00 am	9B	305	Bairnsdale Secondary College	10B	72	Lakeside College	11B	315	St Margarets School and Berwick Grammar School	12B	216	Damascus College
11.00 am	9A	319	Catholic College Bendigo	10A	31	Kingswood College	11A	49	Padua College Mornington	12A	222	Chairo Christian School
11.30 am	9B	10	Heywood and District Secondary College	10B	97	North Geelong Secondary College	11B	220	Trinity Grammar School	12B	227	Bendigo Senior Secondary College
12 noon	9A	26	Centralian Senior College	10A	67	Numurkah Secondary College	11A	224	Chairo Christian School	12A	210	Ballarat Grammar
1.30 pm	9B	85	Donald High School	10B	9	Ballarat Specialist School	11B	41	Victory Christian College	12B	214	Overnewton Anglican Community College
2.00 pm	9A	344	Girton Grammar School	10A	379	Mornington Secondary College	11A	76	Crusoe College	12A	209	Ballarat Grammar
2.30 pm	9B	28	Bendigo Senior Secondary College	10B	393	Mount Eliza Secondary College	11B	213	Overnewton Anglican Community College	12B	219	Trinity Grammar School
3.30 pm	9A	36	Yarrawonga College P-12	10A	74	St Arnaud Secondary College	11A	221	Holmesglen Institute of TAFE	12A	215	Overnewton Anglican Community College
4.00 pm	9B	#N/A	#N/A	10B	###	#N/A	11B	#N/A	#N/A	12B	#N/A	#N/A

Display and Presentation			
TIME	Panel 13		
9.30 am	13A	<b>207</b>	Ballarat Christian College
10.00 am	13B	<b>204</b>	Marist Sisters College Woolwich
11.00 am	13A	<b>211</b>	Holy Trinity Lutheran School
11.30 am	13B	<b>226</b>	Drouin Secondary College
12 noon	13A	<b>212</b>	Holy Trinity Lutheran School
1.30 pm	13B	<b>208</b>	Ballarat Christian College
2.00 pm	13A	<b>224</b>	Chairo Christian School
2.30 pm	13B	<b>225</b>	Girton Grammar School
3.30 pm	13A	<b>217</b>	Damascus College
4.00 pm	13B	<b>#N/A</b>	#N/A

Design and Construction								
TIME								
8:30 AM	214	Overnewton Anglican Community College	33	Woodleigh School	324	Highview College	#N/A	#N/A
	215	Overnewton Anglican Community College	34	Woodleigh School	311	Maryborough Education Centre	#N/A	#N/A
9:00 AM	211	Holy Trinity Lutheran School	64	Koo Wee Rup Secondary College	60	Caulfield Grammar School - Caulfield Campus	93	Mount Eliza Secondary College
	212	Holy Trinity Lutheran School	11	Maryborough Education Centre	14	Ballarat High School	10	Heywood and District Secondary College
9:30 AM	222	Chairo Christian School	223	Chairo Christian School	20	Catholic College Bendigo	393	Mount Eliza Secondary College
	210	Ballarat Grammar	78	St Joseph's College	37	Mount Ridley College	67	Numurkah Secondary College
10:00 AM	209	Ballarat Grammar	21	Marist College Bendigo	69	Good News Lutheran College	26	Centralian Senior College
	220	Trinity Grammar School	87	Ballarat Secondary College - Woodmans Hill Campus	32	Galen Catholic College	41	Victory Christian College
10:30 AM	219	Trinity Grammar School	369	Good News Lutheran College	88	James Sheahan Catholic High School	27	Bendigo Senior Secondary College
	92	Mount Eliza Secondary College	40	Victory Christian College	12	Maryborough Education Centre	344	Girton Grammar School

<b>11:00 AM</b>	<b>216</b>	Damascus College	<b>29</b>	Killester College	<b>86</b>	Ballarat Secondary College - Woodmans Hill Campus	<b>47</b>	Terang College
	<b>217</b>	Damascus College	<b>24</b>	Highview College	<b>61</b>	Caulfield Grammar School - Caulfield Campus	<b>84</b>	Horsham College
<b>11:30 PM</b>	<b>207</b>	Ballarat Christian College	<b>44</b>	Girton Grammar School	<b>19</b>	Catholic College Bendigo	<b>359</b>	Caulfield Grammar School - Wheelers Hill Campus
	<b>226</b>	Drouin Secondary College	<b>418</b>	Damascus College	<b>25</b>	Highview College	<b>72</b>	Lakeside College
<b>12 noon</b>	<b>224</b>	Chairo Christian School	<b>3</b>	Eaglehawk Secondary College	<b>79</b>	Mornington Secondary College	<b>18</b>	St Margarets School and Berwick Grammar School
	<b>225</b>	Girton Grammar School	<b>16</b>	St Margarets School and Berwick Grammar School	<b>46</b>	Terang College	<b>28</b>	Bendigo Senior Secondary College
<b>12:30 PM</b>	<b>227</b>	Bendigo Senior Secondary College	<b>42</b>	Weeroona College Bendigo	<b>70</b>	Good News Lutheran College	<b>89</b>	James Sheahan Catholic High School
	<b>213</b>	Overnewton Anglican Community College	<b>81</b>	Kurnai College - Morwell Campus	<b>313</b>	Ballarat High School	<b>204</b>	Marist Sisters College Woolwich
<b>1:00 PM</b>	<b>405</b>	Marist Sisters College Woolwich	<b>13</b>	Ballarat High School	<b>6</b>	Bairnsdale Secondary College	<b>414</b>	Overnewton Anglican Community College
	<b>45</b>	Girton Grammar School	<b>5</b>	Bairnsdale Secondary College	<b>66</b>	Numurkah Secondary College	<b>96</b>	North Geelong Secondary College
<b>1:30 PM</b>	<b>221</b>	Holmesglen Institute of TAFE	<b>90</b>	Maffra Secondary College	<b>4</b>	Eaglehawk Secondary College	<b>305</b>	Bairnsdale Secondary College
	<b>62</b>	Donald High School	<b>65</b>	Creek Street Christian College	<b>68</b>	Good Shepherd College	<b>319</b>	Catholic College Bendigo

<b>2:00 PM</b>	<b>208</b>	Ballarat Christian College	<b>329</b>	Killester College	<b>7</b>	Bacchus Marsh College	<b>31</b>	Kingswood College
	<b>30</b>	Killester College	<b>71</b>	Lakeside College	<b>39</b>	Warracknabeal Secondary College	<b>97</b>	North Geelong Secondary College
<b>2:30 PM</b>	<b>63</b>	Ouyen P12 College	<b>22</b>	Marist College Bendigo	<b>82</b>	Western Port Secondary College	<b>9</b>	Ballarat Specialist School
	<b>226</b>	Drouin Secondary College	<b>43</b>	Weeroona College Bendigo	<b>85</b>	Donald High School	<b>49</b>	Padua College Mornington
<b>3:00 PM</b>	<b>83</b>	Horsham College	<b>35</b>	Cobram Secondary College	<b>80</b>	Mornington Secondary College	<b>76</b>	Crusoe College
	<b>1</b>	Woodleigh School	<b>17</b>	St Margarets School and Berwick Grammar School	<b>379</b>	Mornington Secondary College	<b>315</b>	St Margarets School and Berwick Grammar School
<b>3:30 PM</b>	<b>15</b>	St Margarets School and Berwick Grammar School	<b>8</b>	Bacchus Marsh College	<b>38</b>	Warracknabeal Secondary College	<b>77</b>	Wonthaggi S.C.
	<b>303</b>	Eaglehawk Secondary College	<b>75</b>	Crusoe College	<b>91</b>	Maffra Secondary College	<b>342</b>	Weeroona College Bendigo
<b>4:00 PM</b>	<b>74</b>	St Arnaud Secondary College	<b>36</b>	Yarrawonga College P-12	<b>#N/A</b>	<b>#N/A</b>	<b>#N/A</b>	<b>#N/A</b>
	<b>73</b>	St Arnaud Secondary College	<b>#N/A</b>	<b>#N/A</b>	<b>#N/A</b>	<b>#N/A</b>	<b>#N/A</b>	<b>#N/A</b>

# 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](mailto:ernest.litera@racv.com.au) or [greg.hill@racv.com.au](mailto: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

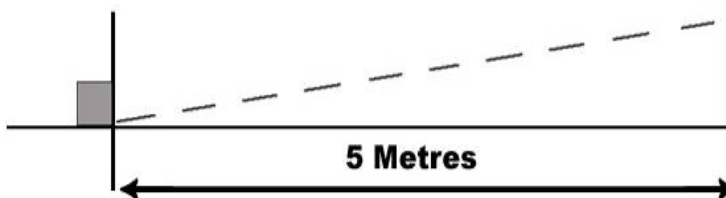
- Rider vision must not be impaired by excessively enclosed and restricting bodywork
- Side windows must be incorporated in the vehicle body design, which must extend from the shortest rider's shoulder line to above and behind the tallest rider's eye line. **Riders must have a clear view over their shoulders 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.**

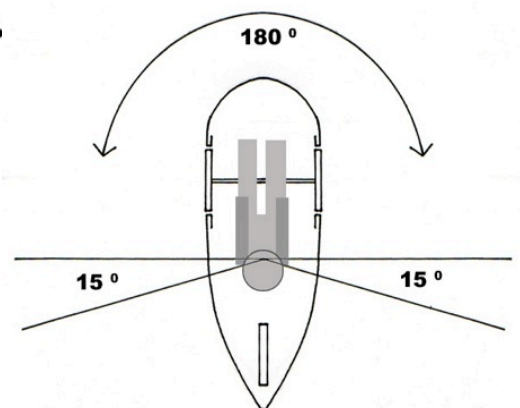
1. Sight an object on the road 5 metres in front of the vehicle.

#### 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

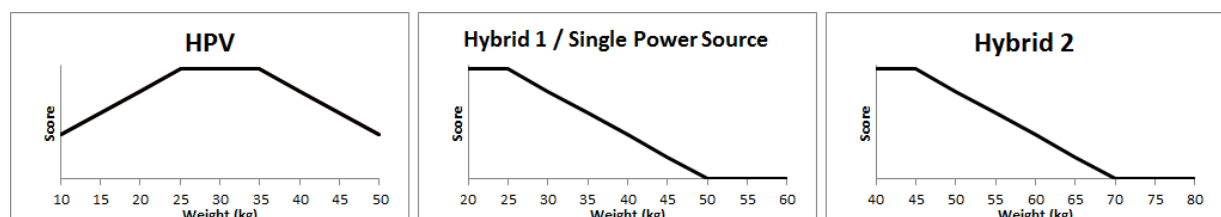
Hybrid 2 – 80kg maximum

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:

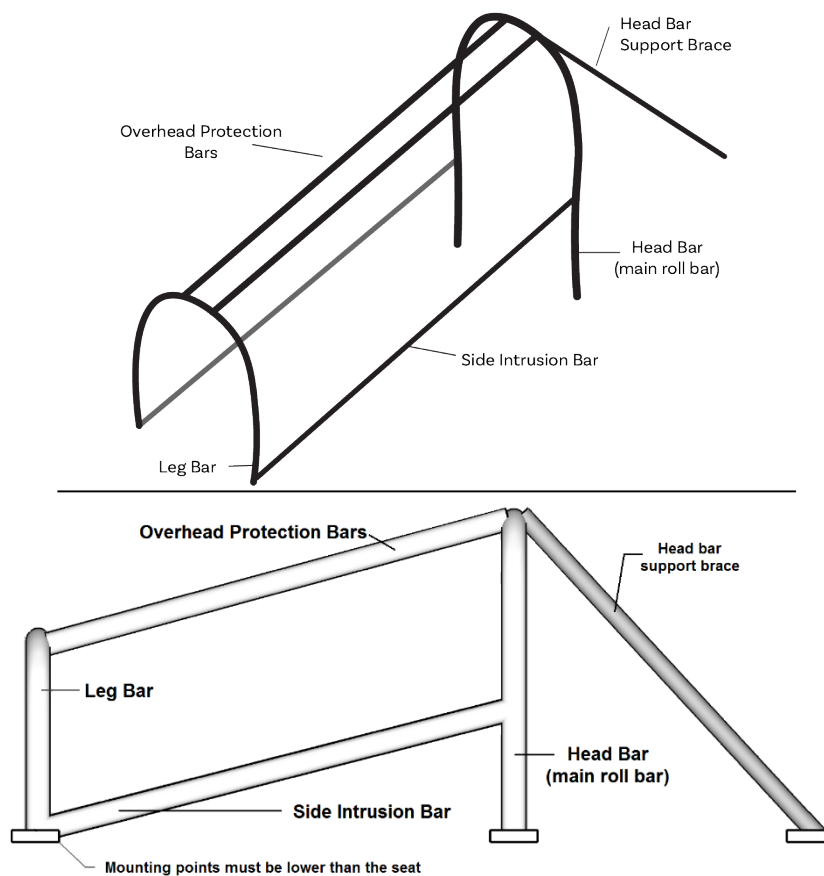
- “Head bar” (main bar) including brace,
- “forward leg bar” including brace,
- “side intrusion bars”, and
- “overhead protection”.

#### 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

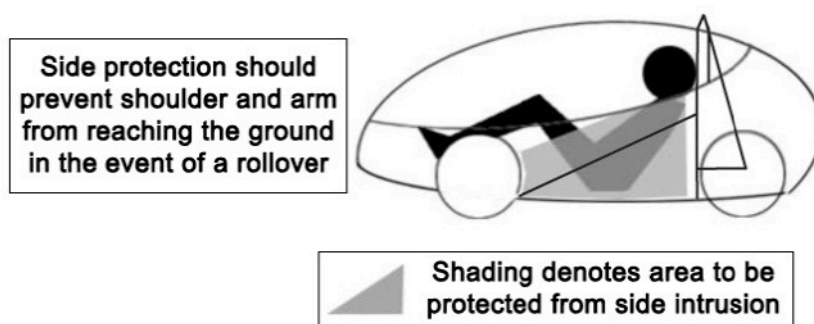
The vehicle must have side intrusion bars typically in line with the rider’s body (as described and illustrated in 4.1.1) that are an integral part of the continuous “head bar”.

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



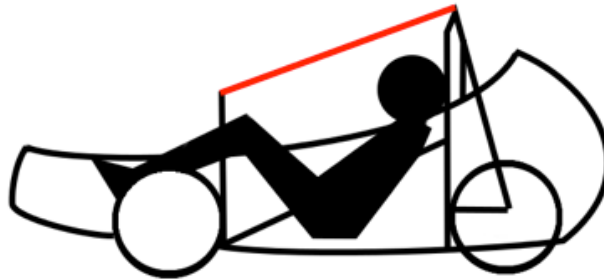
#### 4.1.4 Overhead Protection

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

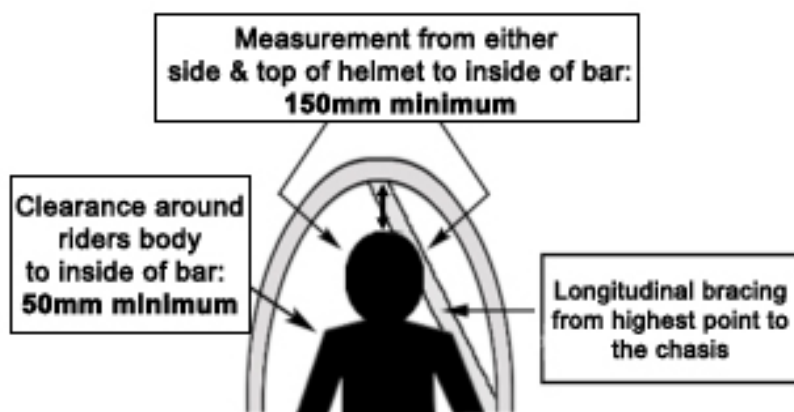
With the tallest of the competing riders in the normal riding position, the “head bar” must be fully visible outside the rider silhouette when viewed from the front or rear.

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.

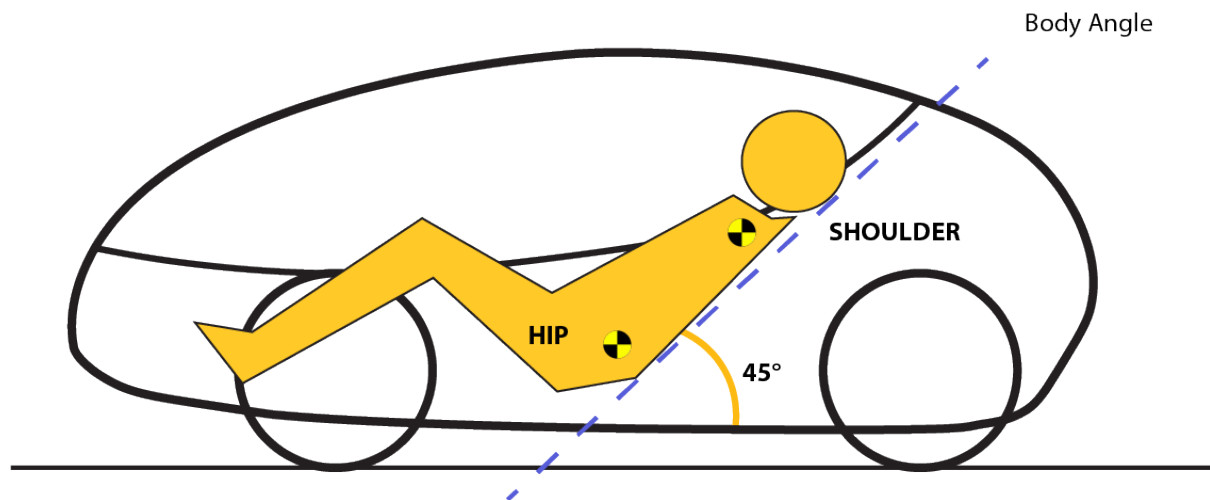
### 4.5 Seats

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.

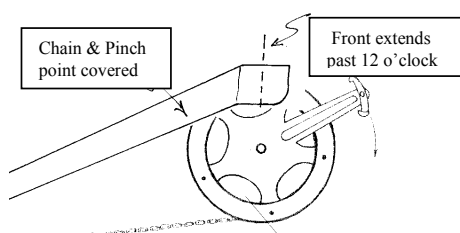
**4.7 Shielding****4.7.1 Rider Protection**

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.

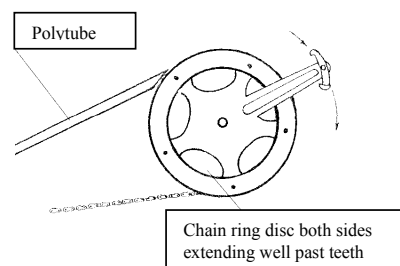
**Wheels.**

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

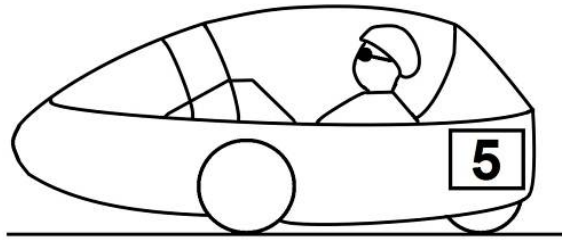
### 8.1 School Name

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.



# HPV, EEV AND TRY-ATHLON 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.

