

# EVENT REGULATIONS

24-31 AUGUST 2025



# Document Control

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Minor grammatical corrections.

- 1.12 Removal of Cruiser Finish from Schedule
  - 1.29 Clarification of documents to be provided at scrutineering
  - 2.4.2 Clarification of PV cell area
  - 2.5.2 Clarification of how electrochemical cell energy will be calculated
  - 2.5.10 Clarification of which capacitors must be discharged in safe state
  - 2.11.7 Clarification of minimum test load
  - 2.11.8 Clarification of how load cases should be calculated
  - 2.28.2 Clarification of conductors considered to be outside the solar collector
  - 3.8.4 Satellite phone and UHF radios to be returned at the end of the event
  - 3.13 Cruiser judging details
  - 3.18.2 Cruiser starting positions
  - 3.21.6 Cruiser time advantage
  - 3.31 Correction of penalties
- Glossary          Reference for “apparent surface”

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# 2025 BRIDGESTONE WORLD SOLAR CHALLENGE

## REGULATIONS

### INTRODUCTION AND WELCOME

The biennial World Solar Challenge is owned by the Government of South Australia and managed by the South Australian Motor Sport Board. Since 2013, Bridgestone Corporation has been the naming rights sponsor of the event.

The aim of the Bridgestone World Solar Challenge is to stimulate research into, and development of, energy efficient vehicle designs and technologies to support the global challenge to decarbonise mobility. The Bridgestone World Solar Challenge is primarily a design competition with the philosophy to provide the parameters on which to base the design, rather than specify exactly how to build an energy efficient vehicle.

Revisions for the 18<sup>th</sup> edition retain the clear distinction between Challenger and Cruiser classes: Challenger vehicles will be optimised for converting solar irradiance to speed; Cruiser vehicles will be judged on practical design aspects as well as efficiency.

Significant changes from 2023 to 2025 include:

- shifting the date from October to August
- increased solar collector sizes and reduced energy storage allowances for Challenger and Cruiser vehicles
- Cruiser vehicles may have three wheels
- energy storage measured by energy rather than mass
- easier-to-follow Cruiser format—fixed energy allowance, two occupants, single stage, with incentives for sustainable, smart design features
- front and rear overhang restrictions, and new ground clearance requirements.

The information contained in this document is for the purposes of conducting the 2025 Bridgestone World Solar Challenge and must not be regarded as constituting definitive instructions as to how a Competition Vehicle should be constructed or operated.

This document is organised as far as practical into the following sections:

- Administration
- Competition Vehicle Regulations
- The Adventure (Darwin and on-road protocols)
- Achievement and Celebration.

Additional information or clarification of the intent of regulations is included in italics.

*The words WORLD SOLAR CHALLENGE and the SUN, FLAMES, RISING IN SEMI-CIRCLE image are registered trademarks owned by the Government of South Australia.*



# 1 ADMINISTRATION

## 1.1 SCOPE

- 1.1.1 These Regulations apply to the 2025 Bridgestone World Solar Challenge (hereinafter called 'the Event'), and comprise participants' eligibility, pre-event preparation, scrutineering, testing, on-road components, and any associated activities published by the Event Organiser as being part of the event.
- 1.1.2 The Event will be conducted under the Regulations described in this document which, along with any amendments or further regulations issued as Regulation Bulletins, supersede regulations for any previous edition of the Bridgestone World Solar Challenge.

## 1.2 LANGUAGE

- 1.2.1 The official language of the Event is English. All correspondence will be conducted in English.
- 1.2.2 Official correspondence must be conducted between the Event Organiser and the Entrant's nominated representative (the Team Manager) as detailed by the Entrant on the Entry Form. Specific written instruction to include others in team correspondence will be accepted.
- 1.2.3 In these Regulations, the word 'must' indicates an absolute requirement, the word 'should' indicates a recommendation, and the word 'may' indicates that something is possible or permitted.

## 1.3 TIME ZONE

- 1.3.1 The time zone for the event is Australian Central Standard Time (ACST = UTC + 9.5).

## 1.4 CONDUCT OF THE EVENT

- 1.4.1 The on-road component of the Event is conducted on public roads between Darwin and Adelaide, Australia – approximately 3000 km. In addition to these Regulations, and Regulation Bulletins that amend these Regulations, all activity is conducted under applicable traffic codes, civil laws, and regulations.
- 1.4.2 All activities undertaken by an Entrant, including activities conducted prior to the commencement of the official Event Period, are governed by statutory regulations, breaches of which may incur event penalties.

## 1.5 ELIGIBILITY

- 1.5.1 Eligible Competition Vehicles will be those that meet the design criteria described by these Regulations. Participating Competition Vehicles must not be used on any public

roads during the Event Period until permission has been granted by the civil authorities and the Event Organiser. Further information will be included in the Team Manager's Guide.

## **1.6 ENTRANT OBLIGATION**

- 1.6.1 By applying, Entrants declare that they know and understand the Terms and Conditions and Regulations of the Event and agree that participation will constitute their full acceptance to abide by and operate under the above mentioned for the duration of the Event.
- 1.6.2 Each Entrant must appoint an individual to act as the Team Manager. The Team Manager will be responsible for regulatory compliance, the actions of team members, and any other individuals associated with the Team. Entrants must not change their Team Manager without the approval of the Event Organiser.
- 1.6.3 Entrants must act fairly and in good faith in accordance with the Regulations.
- 1.6.4 Penalties (which may include exclusion) will be applied to any Team deemed to have departed from the spirit of the Event by deliberately acting to gain an unfair advantage over others, or by conduct that could bring the Event into disrepute.

## **1.7 EVENT ORGANISER**

- 1.7.1 The Event is owned and managed by the Government of South Australia and administered by the South Australian Motor Sport Board (ABN 43 976 679 496) ('the Event Organiser').

Head Office:	Level 5, 182 Victoria Square Adelaide SA 5000
Postal Address:	GPO Box 2343, Adelaide 5001
Head Office Telephone:	+61 (0)8 8429 2500
E-mail:	<a href="mailto:admin@worldsolarchallenge.org">admin@worldsolarchallenge.org</a>
Web:	<a href="http://www.worldsolarchallenge.org">www.worldsolarchallenge.org</a>

## **1.8 EVENT MANAGEMENT TEAM**

- 1.8.1 The Event Management Team is:
- Mark Warren, Chief Executive, SAMSB
  - Naomi Misiajlo, Event Manager, Bridgestone World Solar Challenge
  - Andrew Fotheringham, Head of Marketing & Communications
  - Rebecca Lawson, Head of Commercial
  - such other members the Event Organiser may appoint.
- 1.8.2 Scientific Faculty:
- Prof Peter Pudney
  - Dr David Rand AM FTSE

- Mr Paul Gwan
- Prof John Storey
- Dr David Snowdon
- Dr John Ward
- Mr Bart De Moitié
- Dr Glenn Platt
- Dr Fiona Leverone
- Dr Kirsty Veale
- Chris Selwood AM, Event Ambassador
- such other members the Event Organiser may appoint.

## **1.9 OFFICIALS OF THE EVENT**

- 1.9.1 The Event will appoint officials who will be responsible for the conduct of the Event.
- 1.9.2 During the Event, these officials will wear white or red event shirts.
- 1.9.3 A full list of all appointed officials will be published in a Regulation Bulletin before the start of the Event.

## **1.10 JURY**

- 1.10.1 The Event Organiser will appoint a team of independent Jurors to resolve disputes. Juror names will be published within the full list of officials noted in Regulation 1.9.
- 1.10.2 The team of appointed Jurors is the only authority empowered to determine the interpretation of these Regulations.

## **1.11 JUDGES OF FACT**

- 1.11.1 Each official appointed by the Event Organiser is a Judge of Fact on any event-related activity.
- 1.11.2 Observers appointed by the Event are Judges of Fact on all event-related activities.

## **1.12 SCHEDULE**

- 1.12.1 A detailed Event Schedule including all official functions, promotional activities and public engagement activations will be distributed to teams via a Team Notice.
- 1.12.2 All Teams **must** adhere to the Event Schedule, attend official functions, media calls, promotional activities and public engagement activations with their Competition Vehicle or other team vehicles or equipment as listed or requested.

Tuesday 7 May 2024	Event dates & key regulatory changes announced
Wednesday 5 June 2024 (World Environment Day)	2025 Event Regulations published.
Wednesday 5 June 2024 (World Environment Day)	Applications for Entry open Volunteer Registrations open
Friday 30 August 2024	Early Applications of Entry close
Friday 4 October 2024	Standard Applications for Entry close Volunteer Registrations close
Tuesday 22 April 2025 (Earth Day)	Official Entry list published
Friday 14 March 2025	Group A & B Documentation submission deadline
Friday 25 April 2025	Group C Documentation submission deadline
Friday 30 May 2025	Group D Documentation submission deadline
Saturday 9 August 2025	Event Headquarters open in Darwin
Saturday 9 August 2025	Official Event period commences
Monday 11 August 2025	Team Manager & Safety Officer briefing. Team Manager & Safety Officer must be in attendance.
Wednesday 13 August 2025	All Competition Vehicles must be based at Event Headquarters
Monday 18 August 2025	Static Scrutineering commences. All team members are required to be in Darwin.
Sunday 17 August 2025	Group E Documentation submission deadline
Thursday 21 August 2025	Official Team Welcome function
Friday 22 August 2025	Chief Minister's VIP Reception (TBC)
Saturday 23 August 2025	Dynamic Scrutineering commences
Saturday 23 August 2025	Team briefing
Saturday 23 August 2025	Media briefing
Sunday 24 August 2025	Official Start in Darwin
Wednesday 27 August 2025	Official Finish Line opens in Adelaide
Sunday 31 August 2025	Award Ceremony
Wednesday 3 September 2025	Pack-down area closes, official Event period closes

## 1.13 ENTERING THE EVENT

*Applications for entry are invited from any Entrant prepared to meet the standards and obligations of the competition.*

- 1.13.1 Applications for entry may be made from the time these Regulations are published until midday Friday 4 October 2024 (ACST), or such other time as the Event Organiser may determine.
- 1.13.2 Applications for entry must be made via the official online Entry Form, available on the Bridgestone World Solar Challenge website ([www.worldsolarchallenge.org](http://www.worldsolarchallenge.org)).
- 1.13.3 Accepted applications for entry will only be considered confirmed upon payment of the application fee.
- 1.13.4 The number of places is limited. Applications received after the limit is reached may be placed on a reserve list.
- 1.13.5 The granting of a place in the Event will become void if the entry fees have not been received by the due date.
- 1.13.6 Entrants who do not satisfy the Chief Scrutineer that they will achieve compliance with the Regulations (through documentary submission) may fail to qualify for the Event and their place may be offered to an Entrant on the reserve list.
- 1.13.7 The Event Organiser reserves the right to accept or reject any application without explanation.

## 1.14 ENTRY FEES

- 1.14.1 Entry fees include Australian Goods and Services Tax (GST) and are based on the class requested on the entry form. For example, if a Challenger team fails to qualify and is offered a place in the Explorer class, no refund of the difference is payable.
- 1.14.2 An application fee of \$2,000 Australian Dollars (AUD) is payable upon submission of the online entry form. Payment of this fee will be via credit card as part of the online Entry Form process. An official tax receipt will be provided via email.
- 1.14.3 The application fee, which forms part of the total entry fee, is non-refundable.

*Entrants will be provided with an invoice for the remaining entry fee within one month of receipt of their completed official Entry Form and application fee. Acceptable methods for payment of entry fees will be detailed in the invoice document.*

- 1.14.4 International banking charges are the responsibility of the Entrant. Minor adjustment (up to AUD\$150) can be settled at registration in Darwin.
- 1.14.5 Applications submitted before 17:00 (ACST) on Friday 30 August 2024 will be considered an Early Entry and qualify for the Early Entry fee.

*Early Entry fees must be paid in full by Tuesday 1 October 2024. Failure to pay by due date will void the qualification for Early Entry fees and a secondary invoice will be issued for the Standard Entry fee.*

1.14.6 The Standard Entry fee will apply to applications received after 17:00 (ACST) on Friday 30 August 2024 and before 17:00 (ACST) on Friday 4 October 2024.

1.14.7 All entry fees are payable in full by noon (ACST) Friday 13 December 2024; failure to pay by the due date will void the application. Any refund will be subject to the terms outlined under Regulation 1.16.

1.14.8 The entry fees are:

<b>Class</b>	<b>Early Entry fee</b>	<b>Standard Entry fee</b>
Challenger	AUD\$18,000	AUD\$20,000
Cruiser	AUD\$18,000	AUD\$20,000
Explorer	AUD\$15,000	AUD\$16,500

and includes

- Team Entry fee
- Team Member Registration fee of up to twenty (20) team members
- Twenty (20) Awards Ceremony tickets.

An entry fee of AUD\$110 will be levied for each additional Team member over and above the already included twenty (20). This fee covers Team member registration and an awards ceremony ticket.

1.14.9 The Event Organiser reserves the right to accept late entries. Entry requests granted after the close of entries will attract a 10% late fee.

*All enquiries regarding fees or payments should be directed to the Participant Liaison Officer via email [teams@worldsolarchallenge.org](mailto:teams@worldsolarchallenge.org) or phone +61 (0)8 8429 2500 during business hours, 09:00–16:30, Adelaide time, Monday-Friday.*

## **1.15 OTHER FEES**

1.15.1 A fee (estimated at AUD\$130) will be payable to the relevant authority by the owner of each Competition Vehicle in respect of compulsory third-party bodily injury insurance required by operators of motor vehicles in Australia.

## **1.16 REFUNDS**

1.16.1 Refund entitlement is based on date of withdrawal.

<b>Before 17:00 on Withdrawal Date</b>	<b>Refund</b>
4 October 2024	Full refund
Before 30 January 2025	75% refund
Before 22 April 2025	25% refund
From 22 April 2025	No refund

*The application fee and bank charges are not refundable.*

## **1.17 CANCELLATION OF THE EVENT**

- 1.17.1 The Event Organiser reserves the right to cancel or abandon the Event for reasons beyond its reasonable control, including but not limited to acts of God, natural disasters, fire, flood, earthquake, explosion, sabotage, acts of war, riots, and strikes outside its organisation, communicable disease crisis and quarantine restrictions.

## **1.18 INSURANCE**

- 1.18.1 A Regulation Bulletin will be issued in due course detailing the specific requirements for insurance cover that will be obtained by the Event Organiser and must be obtained by the Entrant.
- 1.18.2 The Event Organiser does not cover any claims arising from the participation of Entrants in the Event during the Event Period. Comprehensive insurance for personal effects, tools, equipment, Competition Vehicles and other vehicles is the responsibility of the entrant.

*Participants are advised that a personal travel insurance policy in respect of theft, loss, sickness, and accidents is highly recommended. The Australian Government has [reciprocal health care agreements](#) with some countries, covering limited subsidised health services for medical treatment.*

## **1.19 TEAM MEMBERS**

- 1.19.1 Each Team must include (but is not limited to):
- a Team Manager
  - a Safety Officer, responsible for the safety of the team
  - a Battery Officer, responsible for the Competition Vehicle battery
  - an interpreter if the Team Manager is not proficient in English
  - at least three (3) and at most six (6) Competition Vehicle drivers
  - at least two (2) drivers for each support vehicle (Competition Vehicle drivers should not drive support cars on the same day as driving the Competition Vehicle)
  - at least one (1) person with a recognised first aid certificate that is current for the duration of the Event Period, and who is not the Team Manager, Safety Officer or Battery Officer

- passengers for Cruiser teams.

1.19.2 Each team member will be required to register online and be physically present at team registration in Darwin. All team members must be in Darwin and registered by 15:00 on Friday 22 August 2025.

***Teams will not be allowed to proceed to Dynamic Scrutineering until all team members have been registered in Darwin.***

1.19.3 A person holding the position of Team Manager, Safety Officer or Battery Officer must not hold any other of these roles.

1.19.4 A person holding the position of Team Manager, Safety Officer or Battery Officer must be seated in the front escort vehicle, Competition Vehicle or rear escort vehicle during the on-road component of the Event while the Competition Vehicle is in motion on a public road.

1.19.5 The person holding the position of Safety Officer must not be a Competition Vehicle driver.

1.19.6 Each Competition Vehicle driver must hold an appropriate motor vehicle driver's licence recognised by Australian authorities and valid for the total period of the Event.

*Driving licences will be inspected and verified by Australian road transport authorities as part of the scrutineering process. Acceptable driving licences must include a photograph of the holder, the class of vehicle for which the licence applies and the expiry date. If these details are not in English, either the licence must be accompanied by a certified translation, or a valid International Driving Licence is required.*

1.19.7 The Event Organiser is unable to take responsibility for any person under the age of 18.

*An Entrant may make a request for a minor to be included in their team provided such request is accompanied by a document giving permission and acknowledging that supervision of the person concerned is the responsibility of the Team Manager, not the Event Organiser. The document must be signed by both the parent or legal guardian of the proposed participant, and the Team Manager.*

## 1.20 TEAM IDENTIFICATION

1.20.1 All Team details including Team Name, Team Manager and Competition Vehicle details will be taken from the online Entry Form.

1.20.2 In accordance with the World Solar Challenge Terms and Conditions of Entry, available on the Event website [World Solar Challenge 2025](#), the Event recognises countries, economies and regions as per the Australian Government Department of Foreign Affairs and Trade (DFAT) nomenclature, publicly available at: [Countries, economies and regions | Australian Government Department of Foreign Affairs and Trade \(dfat.gov.au\)](#).

Any region not recognised as a country by DFAT will be referred to as a Region.

Flags will be included on Event signage for recognised countries only and will be consistent with DFAT protocols.

1.20.3 Requests to change entry details will only be considered when submitted, by the Team Manager, by email or through the team portal.



- 1.20.4 Once an entry has been accepted, any request to change entry details will be subject to the provisions of Regulation 1.29 and the approval of the Event Organiser.
- 1.20.5 Each Team will be allocated a 2-digit Team number on acceptance of entry.
- 1.20.6 Early Entry applications may make a special request for the use of a Team number. Requested numbers must contain exactly two digits.
- 1.20.7 Allocation of any number is at the sole discretion of the Event Organiser.

## **1.21 PERMITS**

- 1.21.1 Motor vehicles, including Competition Vehicles, entering Australia require a federal import permit. Strict conditions are in place for the import of motor vehicles, including Competition Vehicles, into Australia. The Event Organiser will apply for a permit to import the Competition Vehicle of each team that has met qualification requirements (including the payment of entry fees).
- 1.21.2 Import permit arrangements for other vehicles (including road trailers) are the responsibility of the Entrant.

## **1.22 FREIGHT**

- 1.22.1 The Entrant is responsible for all freight arrangements.
- 1.22.2 Freight deliveries to the Event Headquarters outside the dates of the Event's occupation of the facility will not be accepted.

*Details of all freight, customs and quarantine arrangements will be provided in the Team Manager's Guide and Freight Manual.*

## **1.23 VISAS**

- 1.23.1 Citizens of countries other than Australia or New Zealand need a visa to enter Australia.

*Visas are the responsibility of the individuals concerned. Visa requirements are detailed by the [Australian Department of Home Affairs](#). Information on how the Event Organiser is permitted to support visa applications will be provided in the Team Manager's Guide.*

## **1.24 VEHICLE PREPARATION**

- 1.24.1 Preparation facilities will be available at the Event Headquarters in accordance with the dates listed in the Event Schedule.

*The Event Organiser is responsible for all operations at the Event Headquarters. The Facilities Management of the venue is unable to assist with early arrivals, pit allocations or freight issues. Detailed arrangements will be published in the Team Manager's Guide, Regulation Bulletins and via Team Notices.*

## 1.25 STYLE GUIDE

- 1.25.1 The correct title of the Event is the *Bridgestone World Solar Challenge*. Entrants and their sponsors **must** use the correct title in all references to the Event.
- 1.25.2 The *Official Logo* of the Event will be published as Regulation Bulletin. The *Official Logo* will be supported by a style guide that details its conditions of use.
- 1.25.3 Entrants, Teams and their sponsors wishing to use the *Official Logo* in non-commercial publicity may do so in accordance with the requirements of the style guide.
- 1.25.4 Entrants, Teams and their sponsors wishing to use the *Official Logo* in a commercial context (i.e., merchandise offered for sale) must seek the written permission of the Event Organiser.

## 1.26 SPONSORSHIP OBLIGATIONS

- 1.26.1 It is a condition of participation that the Entrant acknowledges Event and category sponsors in their own publicity. Failure to do so may result in the team being delisted from Event publicity.

## 1.27 MEDIA AND PROMOTIONAL OBLIGATIONS

*A promotional schedule will form part of the Event Schedule. The promotional schedule will contain details of official media calls and other promotional activities created for the benefit of the Event, the Entrants, Teams and their sponsors.*

*Per Regulation 1.12.2, requests to attend media calls, promotional activities, public appearances etc are **obligatory** for all Teams.*

- 1.27.1 Notwithstanding the provisions of Regulation 1.27.6, the Event Organiser will respect the Intellectual Property of the respective owners. Technical details of Competition Vehicles will be kept confidential until the start of Static Scrutineering and commercial in confidence requests and media embargos will be honoured.
- 1.27.2 Teams must notify the Event Organiser of public, or media promotional activities held for or on behalf of their attendance in the Event, not less than seven (7) days prior to the activity taking place.
- 1.27.3 Media travelling with or in support of any Team must comply with the Event media accreditation requirements.
- 1.27.4 Teams will be held accountable, through the application of event penalties, for the unacceptable actions of media representatives travelling with or in support of their Team, whether registered as such or not.

*Standard operational procedure of Australian police is to first remove the cause of any problem. Police have advised that, where media vehicles following a team are creating a danger for other road users, they will take the Competition Vehicle off the road. Teams are advised to reinforce this point to their country's media in their own language.*

- 1.27.5 Teams who maintain an internet presence are required to provide a link to the official Bridgestone World Solar Challenge website: [www.worldsolarchallenge.org](http://www.worldsolarchallenge.org).
- 1.27.6 The creation and use of any sound recordings or still or moving images of the Event used for commercial gain or public performance by the entrant or their sponsors are subject to the prior written approval of the Event Organiser.
- 1.27.7 Non-commercial media content generated by the Team must reference the Event in accordance with the provisions of Regulation 1.25.
- 1.27.8 Teams and or their sponsors shall not engage in any marketing or promotional activity that will materially detract from the value and standing of the Event or its sponsors.
- 1.27.9 Activity by sponsors of Teams shall not imply ownership or sponsorship of the Event.
- 1.27.10 Teams are responsible for the activities of their sponsors.

## **1.28 REMOTELY PILOTED AIRCRAFT (DRONES)**

- 1.28.1 Remotely piloted aircraft (RPA) must not be operated without the approval of the Event Organiser.
- 1.28.2 RPA registration and pilot accreditation must be in accordance with [Civil Aviation Safety Authority \(CASA\) regulations](#).

*Further information will be provided in the Team Manager's Guide and any subsequent Team Notices or Regulation Bulletins.*

## **1.29 COMPULSORY DOCUMENTATION**

- 1.29.1 Each Team must submit documentation using online forms. All submissions must be made by the dates stated in the Event Schedule.

*The purpose of the documentation is to help Teams identify potential compliance issues before the Competition Vehicle is shipped to the Event.*

### Group A

- Team information
- Team promotional information
- Publication-quality information and photographs of the Team and Competition Vehicle.

### Group B

- Mechanical Specification
- Electrical System Specification
- Solar Collector Specification
- Energy Storage System Specification.

### Group C

- Energy Storage System Incident Plan
- Team Safety Plan

### Group D

- Logistics schedule
- Travel, arrival, and accommodation information

### Group E

- Roadworthiness Certificate

*A signed Roadworthiness Certificate must be submitted before a Team may apply for a permit for on-road testing.*

### Scrutineering

The following documentation must be presented at Static Scrutineering:

- Final technical documentation that describes the Competition Vehicle as built and highlights any changes since earlier submissions.
- Two printed A4 copies of a diagram of the Competition Vehicle in top view, with the front of the Competition Vehicle depicted at the top of the diagram, and clearly showing how emergency isolation is to be activated.
- The original signed Roadworthiness Certificate.
- A block diagram, printed on A4 paper, showing a plan view of the Competition Vehicle and where the high voltage functional blocks (PV array(s), energy storage pack(s), main fuses, motors, etc.) are located within the Competition Vehicle and the routing of the high voltage wiring between them.
- A simplified electrical diagram and accompanying description showing how safe state is implemented. This diagram must show the e-stop loop and how it controls the high-voltage contactors, the system that ensures the e-stop loop is deenergised in safe state, how the low-voltage bus external to the energy storage pack(s) is deenergised in safe state, and the battery fuses. The example Solar Wombat 25 electrical diagram, available on the Bridgestone World Solar Challenge team portal, indicates the level of detail required.

1.29.2 If the Team Manager wants to vary the documentation after the submission deadline, the Team Manager must make the request to the Event Organiser in writing setting out the proposed variations. If the Event Organiser accepts the Team Manager's request, the varied document will supersede all previous versions. The Competition Vehicle presented at scrutineering must be exactly as described in the latest version that has been accepted by the Event Organiser. Failure to disclose any changes may result in exclusion from the Event. The Event Organiser will not be responsible for failure to broadcast or publish any document for publicity because of variations proposed by the Team Manager.

## 1.30 CLARIFYING REGULATIONS

- 1.30.1 Team Managers must address any questions about the Regulations or the Event to [teams@worldsolarchallenge.org](mailto:teams@worldsolarchallenge.org)
- 1.30.2 If you ask for clarification of a Regulation and our answer restricts what you are allowed to do then we will publish the question and answer, without identifying which Team asked the question, so that every Team has the same information. If our answer does not restrict what you are allowed to do, then we will answer your question without publishing the question or the answer.

## 2 COMPETITION VEHICLE REGULATIONS

### 2.1 CLASSES

2.1.1 The Event will have three classes of Competition Vehicle:

- **Challenger class** is for single-seat Competition Vehicles optimised for converting solar irradiance to speed.
- **Cruiser class** is for Competition Vehicles with two or more seats that will be judged on practical design features as well as efficiency.
- **Explorer class** is for Competition Vehicles designed to participate in previous Events but not eligible for Challenger or Cruiser class, or other Competition Vehicles approved by the Event Organiser. Explorer class is non-competitive.

2.1.2 **Challenger** vehicles must be powered by solar irradiance collected by the Competition Vehicle. The only external energy input that may be used is the energy in the energy storage system at the start of the Event.

2.1.3 **Cruiser** vehicles must be designed to be powered by renewable energy.

*It is accepted that energy from regenerative braking, road gradients and wind incident on the Competition Vehicle while driving may also be used. Active aerodynamic features are permitted but must not reduce the stability of the vehicle. Cruiser Competition Vehicles must be designed to be powered by renewable energy but may be recharged from non-renewable sources if renewable sources are not available.*

### 2.2 DIMENSIONS

2.2.1 When driving in a straight line, the Competition Vehicle must fit inside a right rectangular prism 5800 mm long, 2300 mm wide and 1650 mm high, with the tyre contact points on the base of the prism.

*Standard 20' shipping containers have 5880 mm internal length and 2350 mm internal width.*

2.2.2 **Cruiser** vehicles must have a cargo compartment that can accommodate two items of luggage, each 560 mm × 360 mm × 230 mm. The cargo space must be separated from the Competition Vehicle mechanical or electrical systems.

### 2.3 WHEELS

2.3.1 Competition Vehicles must be supported by at least three wheels while driving.

2.3.2 The longitudinal distance between the frontmost part of the Competition Vehicle and the frontmost tyre contact point must be less than 60% of the wheelbase.

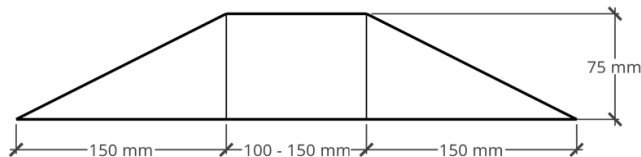
2.3.3 The longitudinal distance between the rearmost tyre contact point and the rearmost part of the Competition Vehicle must be less than 60% of the wheelbase.

- 2.3.4 The fully laden Competition Vehicle must be able to drive over a road apex formed by a 1:15 incline followed by a 1:15 decline without any part of the vehicle other than the tyres touching the road.



*The length of the road apex will be greater than the wheelbase of the Competition Vehicle.*

- 2.3.5 The fully laden Competition Vehicle must be able to drive over a speed hump with the dimensions shown in the following diagram without any part of the vehicle, other than the tyres, touching the speed hump.



- 2.3.6 The fully laden Competition Vehicle must have an approach angle of at least 10° and a departure angle of at least 10°.

*The Competition Vehicle must comply with all regulations in Section 2.3 whenever it is being driven.*

## 2.4 SOLAR COLLECTOR

- 2.4.1 Competition Vehicles may incorporate a solar collector that converts solar irradiation into energy that can be used to propel the vehicle. The most common type of solar collector for Competition Vehicles uses photovoltaic cells. Teams wishing to use other types of solar collector must send details of their proposed solar collector to the Event Organiser for approval.
- 2.4.2 A **Challenger** vehicle must not have more than 6.000 m<sup>2</sup> of solar collector area. Solar collector area includes:

- the *directly* exposed front surface area of all photovoltaic cells
- the *directly* exposed rear surface area of all bifacial photovoltaic cells
- the *directly* exposed surface area of energy conversion devices other than photovoltaic cells
- the *directly* exposed area of all surfaces that transmit, refract or reflect light onto devices that convert solar irradiation into energy that can be used to propel the vehicle.

A surface is *directly exposed* if light can travel in a straight line from any part of the sky, ground or road to the surface.

PV cell encapsulation within 10 mm of a minimum rectangle covering a PV cell will not be counted towards the solar collector area.

The solar collector area limit applies to all possible configurations of the solar collector, while driving and while solar charging.

Photovoltaic cell area includes active material, busbars, fingers, connection pads, and cell area covered by interconnection ribbon or tabs.

*If a bifacial photovoltaic array is tilted for solar charging so that the front and rear surfaces are both directly exposed then the front and rear surface areas are both counted.*

*It is accepted that light reflection from parts of the Competition Vehicle such as the canopy is unavoidable.*

*Example area calculation: The area of a SunPower cell with a width of 125 mm and a diagonal diameter of 166 mm is less than 0.0155063 m<sup>2</sup>, and so 386 cells will have a total area less than 6.000 m<sup>2</sup>.*

2.4.3 The solar collector area for **Cruiser** vehicles is unrestricted, but the solar collector must be within the allowable dimensions of the Competition Vehicle.

2.4.4 Materials with high environmental toxicity, including GaAs, CdTe and CuInSe<sub>2</sub>, must not be used for solar energy conversion.

2.4.5 All devices used for solar charging must be carried in the Competition Vehicle. This includes stands, supports, and cables.

*During solar charging, Competition Vehicles must not be tilted on jacks or stands that were not carried in the vehicle even if you are pretending to change a wheel.*

## 2.5 ENERGY STORAGE

2.5.1 A Competition Vehicle may store energy. The most common type of energy storage for Competition Vehicles is a rechargeable electrochemical battery. Teams wanting to use energy storage technologies other than rechargeable electrochemical batteries must send details of their proposed energy storage system to the Event Organiser for approval.

2.5.2 Energy storage capacity must be no more than:

- 11 MJ for Challenger vehicles
- 55 MJ for Cruiser vehicles.

The energy storage capacity of electrochemical cells will be based on specifications endorsed by the cell manufacturer. The nominal energy of a cell, in joules, will be calculated by

$$E = 3600 V q$$

where  $V$  is the nominal discharge voltage of the cell, in volts, specified by the manufacturer, and  $q$  is the maximum of the:

- rated discharge capacity
- minimum discharge capacity
- typical or nominal discharge capacity, in Ah, specified by the manufacturer.

The energy storage capacity for other forms of energy storage will be determined by the Chief Energy Scientist and will be based on energy that can be delivered from the 'tank'.



*The remaining regulations in this section are based on electrochemical energy storage. The Event Organiser will require that alternative energy storage systems meet equivalent levels of safety based on the organiser's assessment of the proposal submitted by the Team.*

- 2.5.3 Specifications from third party suppliers or found on the internet might not match those endorsed by manufacturers. If the Event Organiser receives conflicting or unclear specifications of electrochemical cell energy for a cell model, the Chief Energy Scientist will determine the nominal cell energy for cells of that model.
- 2.5.4 The energy storage system must be contained within at most two packs. Energy storage packs must be rigid, self-contained boxes that cannot be opened or disassembled without using tools and can be removed from the Competition Vehicle intact.
- 2.5.5 Electrochemical cells must not, at any time, be operated outside of the operating ranges for voltage, current and temperature specified by the manufacturer. Teams must provide manufacturer's specifications that include:
- minimum operating cell voltage
  - maximum operating cell voltage
  - maximum discharge current
  - maximum charge current
  - maximum temperature while discharging
  - minimum temperature while charging
  - maximum temperature while charging.
- 2.5.6 The Competition Vehicle must automatically prevent electrochemical cells from being operated outside the operating ranges for voltage, current and temperature specified by the manufacturer. Teams must provide endorsement by their certifying engineer that an adequate and effective automatic battery management system has been designed and implemented so that fault conditions will be managed safely.
- 2.5.7 Batteries used only to
- power a real-time clock when the Competition Vehicle is turned off; or
  - retain data when the Competition Vehicle is turned off; or
  - power wireless tyre pressure monitors
- are not considered to be part of the energy storage system, provided that the total energy capacity does not exceed 10 kJ.
- 2.5.8 Batteries or cells inside devices such as handheld radios, cameras, mobile telephones, or wristwatches that are carried by the driver or passengers are not considered to be part of the energy storage system if they are not electrically connected to the Competition Vehicle, its instrumentation or control systems.
- 2.5.9 If a commercial-off-the-shelf phone or tablet containing a battery is used as a driver display, it must be powered from the Competition Vehicle's electrical system. The electrical connection must be done in such a way that power cannot flow from the device back into the Competition Vehicle. The blocking diode or other system used to achieve

this must be mounted within 200 mm of the device. The device must not be charged from an external power source during the Event. The device's battery capacity will be counted as part of the energy storage capacity. The device will not be considered to be an energy storage pack.

*It is recognised that failure of the blocking device could result in 5 V being present throughout the Competition Vehicle even in safe state. This is acceptable as long as:*

*a) the team can demonstrate that such a failure is highly improbable and*

*b) that in the event of such a failure, no combination of additional failures can prevent the Competition Vehicle from entering safe state.*

- 2.5.10 Capacitors are not considered to be part of the energy storage system if their total energy storage capacity is less than 36 kJ. Any such capacitors that are outside the energy storage packs or solar collector must be automatically discharged to less than 60 V within five seconds of the Competition Vehicle being placed in safe state (see Regulation 2.28).
- 2.5.11 Energy storage packs must be mounted in the Competition Vehicle so that they will be restrained in a 20 g acceleration in any direction.
- 2.5.12 The Competition Vehicle must be designed so that no liquids or gases from energy storage packs can enter the occupant space.
- 2.5.13 Energy storage packs must be constructed so that each pack can be sealed using tamper-evident plastic seals, like 3 × 100 mm plastic cable ties. With seals fitted, it must not be possible to remove any cell without breaking the seal. Seals will be provided by, and fitted by, the Event Organiser at Scrutineering.
- 2.5.14 Energy storage packs for **Challenger** vehicles must have a means of being sealed so that no electrical connection can be made to the energy storage packs. The seals will be tamper-evident plastic seals, like 3 × 100 mm plastic cable ties. Seals will be provided by Observers.

*This regulation allows teams to have the energy storage system impounded inside the Competition Vehicle. Examples of acceptable sealing mechanisms include:*

- disconnecting each energy storage pack from the rest of the Competition Vehicle and sealing a cover over each pack that prevents access to all electrical connectors and to the inside of the pack*
- removing the energy storage packs from the Competition Vehicle and sealing them in a box provided by the team.*

- 2.5.15 Energy storage packs must be in 'safe state' while being removed from the Competition Vehicle and while being reinstalled into the Competition Vehicle.
- 2.5.16 Energy storage packs must be designed and constructed so that scrutineers can verify the cell models being used and the number of cells of each model.
- 2.5.17 Any external charging system that is used to recharge an electrical energy storage system must meet the following requirements:
- the charger must be used with a residual current device

- the charger must be either permanently connected to the energy storage system, or connect to the energy storage system using an appropriate connector
- the output of the charger must be electrically isolated from any ac input
- charging must stop automatically when the energy storage system is full or if a fault occurs.

*This regulation applies to all charging done in Australia, including in the pits at Event Headquarters.*

## 2.6 CRUISER RECHARGING

- 2.6.1 **Cruiser** vehicles may be recharged from an external energy source overnight, during the time intervals between when the team stops driving each day and when it starts driving the next day.
- 2.6.2 Each **Cruiser** Team is responsible for providing the equipment required to recharge their Competition Vehicle.

*Teams requiring electricity to recharge could hire a room or powered camp site if they have stopped in a town or at a roadhouse, or else recharge using an energy source supplied by the team.*

- 2.6.3 Battery swapping (or the equivalent for other types of energy storage) is not permitted.

## 2.7 VEHICLE IDENTIFICATION AND SIGNAGE

- 2.7.1 The Competition Vehicle must have a Vehicle Identification Number (VIN) permanently attached to a substantial part of the vehicle chassis or frame. Teams may apply for a VIN in their own country or else generate a 'surrogate' VIN with the format.

6ZZyssssssssssss

where y indicates the year of manufacture (N = 2022, P = 2023, R = 2024, S = 2025) and sssssssssss is 13 characters using digits 0–9 and uppercase letters A–Z but not the letters I, O or Q, that includes a manufacturer code and a vehicle serial number, e.g., 6ZZSW0MBATS0LAR01.

- 2.7.2 The Competition Vehicle must have a space at least 220 mm wide and at least 110 mm high for mounting a rear vehicle registration plate. Whenever the Competition Vehicle is being driven:
- the registration plate must be mounted in a vertical plane with its longest edge horizontal and perpendicular to the direction of travel
  - the letters must be upright
  - the registration plate must be within 50 mm of the rearmost part of the Competition Vehicle
  - no part of the Competition Vehicle may be in the region rearward of the registration plate in the range 15° up, 0° down, 45° left and 45° right from all parts of the registration plate.
- 2.7.3 You must not modify the registration plate.

*You must not enlarge the holes in the registration plate. You must not use the existing holes for rear vision.*

- 2.7.4 Competition Vehicles must incorporate Event signage in unbroken rectangular spaces 200 mm high and 500 mm wide on both the left and the right sides of the vehicle. Artwork will be available from the Event Team Portal.

*'Unbroken' means that the signage space must not overlap panel gaps or visible joints.*

*Stickers will be provided to teams requiring the signage. Incorrect use of artwork will result in a sticker of the correct size and with the correct artwork being applied.*

- 2.7.5 Teams must display their 2-digit team number on the left and the right sides of the Competition Vehicle, in digits that are more than 150 mm high and that are clearly visible against their background.

- 2.7.6 Event signage and Team numbers must be completely visible from 3 m perpendicular to the side of the Competition Vehicle and at a viewing height of 1.8 m above the ground.

- 2.7.7 Competition Vehicles must have an unbroken front signage area on the vehicle body, forward of the windscreen. The front signage area must contain:

- the name of the Competition Vehicle, or the name of the Team, or the number of the Competition Vehicle, readable at 3 m perpendicular to the centre of the name
- a 150 × 150 mm square Event logo.

The entire front signage area must be visible in top view and in front elevation view and must not overlap with the solar collector. Artwork or a sticker for the Event logo will be provided by the Event Organiser.

- 2.7.8 The national flag of the country of entry (as confirmed by the Event Organiser in line with Regulation 1.20.2) must be displayed on the Competition Vehicle, adjacent to the windscreen. Minimum height is 40 mm. The flag must not be broken.

Flags will be included on Event and vehicle signage for recognised countries only, as per DFAT protocols.

## 2.8 BALLAST

- 2.8.1 Each **Challenger** and **Cruiser** vehicle occupant will be assigned ballast so that the combined mass of the occupant and their ballast is at least 80 kg.

*Explorer class Team occupants need not carry ballast and will not be weighed.*

*Occupants will have their ballast checked by the Team's Observer outside the Competition Vehicle. All ballast must be removed from the Competition Vehicle at control stops.*

- 2.8.2 Ballast will be supplied by the Event Organiser.

*The approximate density of the ballast material is 5 kg per litre. Ballast provided by teams will not be accepted.*

- 2.8.3 Each occupant of **Challenger** and **Cruiser** vehicles must secure their ballast inside the Competition Vehicle within 300 mm of their hip point.

## 2.9 TRACKER AND TELEMETRY

- 2.9.1 The Competition Vehicle must have provision to carry a self-contained tracker provided by the Event Organiser.

*The tracker box will be 120 mm long, 120 mm wide and 70 mm high. The tracker will be self-powered. It will not require any electrical connection from the Competition Vehicle. The mass of the tracker will not exceed 2 kg. It will emit radio frequency energy with no more power than emitted by a mobile phone. The unit will be given to the Team for installation during Scrutineering.*

- 2.9.2 When the tracker box is installed in the Competition Vehicle, it must be possible to construct a right circular cone with its axis perpendicular to the top face of the box and an apex angle of  $120^\circ$ , and with the cone touching each edge of the top face of the box, so that no ray from the apex and within the cone passes through the ground or through any part of the Competition Vehicle that is not radio transparent at frequencies between 300 and 3000 MHz. The tracker box may be tilted within the Competition Vehicle.

*Fibreglass and aramid composites, vinyl stickers, paint, clear acrylic and clear polycarbonate are radio transparent if they do not include metal or carbon. Solar cells, carbon fibre composites and metal are not considered radio transparent.*



- 2.9.3 The tracker unit must be returned to the Event Organiser at the end of the Event.
- 2.9.4 **Cruiser** teams must upload telemetry data at each control stop and in Adelaide. **Challenger** teams may choose to upload telemetry data at each control stop and in Adelaide.
- 2.9.5 The telemetry data must include the following measurements taken at 10-second intervals while driving and while charging:
- distance travelled
  - longitude and latitude (if available)
  - cumulative energy generated from the solar collector
  - cumulative energy from the battery (increases when energy is taken from the battery, decreases when the battery is charged)
  - UTC time.

Details of data formats will be made available to registered teams.

- 2.9.6 Tracker and telemetry data will be published by the Event Organiser.

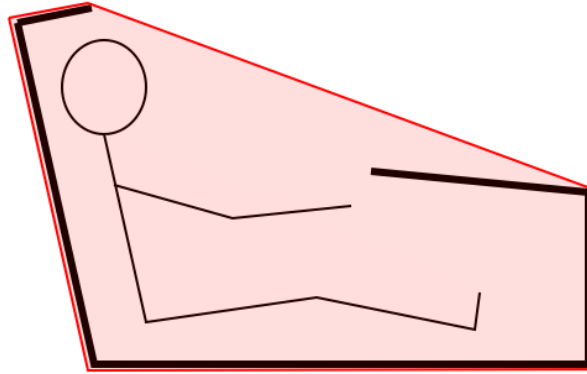
## 2.10 SAFETY

- 2.10.1 Teams are responsible for the safety and roadworthiness of their Competition Vehicles. Compliance with the Regulations and passing Scrutineering does not mean that a Competition Vehicle is safe, roadworthy, and fit for purpose.
- 2.10.2 Each Team must engage a professionally qualified certifying engineer to certify that the Competition Vehicle is designed and constructed using sound engineering practice, maintains stability while driving during testing, and is roadworthy and fit for being driven from Darwin to Adelaide on public roads. The certifying engineer must be qualified to report on the roadworthiness of vehicles for operation on public roads. They may consult with other engineers.
- In Australia, a certifying engineer must have a four-year bachelor's degree or higher in mechanical or automotive engineering, five years of postgraduate experience working in the automotive industry, and professional indemnity and public liability insurance. Other jurisdictions will have similar requirements.*
- 2.10.3 Any changes made after certification to items described in the roadworthiness certificate must be re-approved by the Team's certifying engineer.
- 2.10.4 All parts of the Competition Vehicle must be fixed so that they cannot detach while driving. Latched parts such as doors, canopies and top shells must be secured with two-stage latches where the first stage engages easily and is sufficient to hold the part if the second stage is not engaged properly.

## 2.11 OCCUPANT CELL

- 2.11.1 Competition Vehicle occupants must be enclosed in an occupant cell designed to protect them from injury.
- 2.11.2 Vehicle components within the occupant cell must be designed to minimise the risk of injury or entrapment in a crash.
- 2.11.3 Teams must provide documentation that specifies which parts of their Competition Vehicle constitute the occupant cell.
- 2.11.4 When occupants are seated normally, with safety-belts and helmets on, they must be completely inside the convex hull of the occupant cell.
- 2.11.5 There must be a gap of at least 50 mm between every point on every occupant's helmet and the convex hull of the occupant cell.

*Imagine stretching a rubber skin around the occupant cell; occupants must be completely inside the skin, and helmets must be more than 50 mm from the skin.*



2.11.6 Each Team must provide a description of how the occupant cell will protect the occupants from impacts including frontal impacts, side impacts, rollover impacts, bottom impacts and wheel impacts. This description must be endorsed by the Team's certifying engineer. For analysis of the occupant cell, the minimum test loads are:

- frontal impact: a 5 g load, opposing the direction of travel, applied to the front of the occupant cell in an area less than 250 mm high and less than 600 mm wide
- side impact: a 5 g load into the side of the occupant cell, applied adjacent to the driver's torso in an area less than 250 mm high and less than 600 mm wide
- top impact: a load with components 5 g down, 1.5 g sideways and 4 g backwards, applied at each possible area of contact between the occupant cell and the ground when the occupant cell is upside down; the contact area for each test load must have a diameter less than 150 mm

2.11.7 The occupant cell must be designed to protect each occupant's head, arms and upper torso by deflecting objects such as body panels and fencing wires away from the occupant. The structure used to achieve this must extend to the top of the occupant cell and be capable of resisting or deflecting loads of 5 g applied to it from any horizontal direction by a horizontal object 2.3 m wide and less than 250 mm high.

*It is permissible for the windscreen to break provided the occupants are protected.*

*Regulation 2.16.2 defines the maximum obscuration of the driver's vision by A-pillars.*

2.11.8 Loads in Regulations 2.11.6 and 2.11.7 are based on the fully laden mass of the Competition Vehicle. Teams must be able to show that the occupant cell structure will not fail with these test loads, that any deformations as a result of these loads will not impinge on the occupants, and that risks of impacts of the occupants with the interior of the Competition Vehicle are minimised.

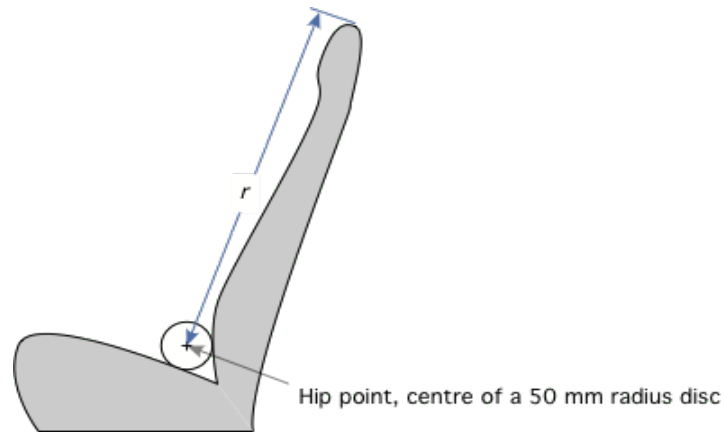
## 2.12 SEATS

2.12.1 **Challenger** vehicles must have one seat. **Cruiser** vehicles must have at least two seats.

*Cruiser vehicles must have two occupants while driving.*

2.12.2 Each Competition Vehicle occupant must have a seat that faces forwards. The driver's legs, viewed from above, must be within 10° of the forwards direction.

- 2.12.3 Each seat must have a back, and a head restraint that is behind the occupant's head. The distance from the hip point to the top of the head restraint at the lateral centreline of the seat must be at least 800 mm for front seats and at least 750 mm for **Cruiser** vehicle rear seats (UNECE Regulations 17 and 25). The hip point may be approximated as shown in the diagram below.



*You may use different cushions for different drivers. The full set of cushions will be considered part of the Competition Vehicle and must be carried in the Competition Vehicle.*

- 2.12.4 An Event manikin ('PVC Pat') must fit into the driver's seat and any passenger seat that will be occupied during the Event. Dimensioned drawings of the manikin are available on the Event website.

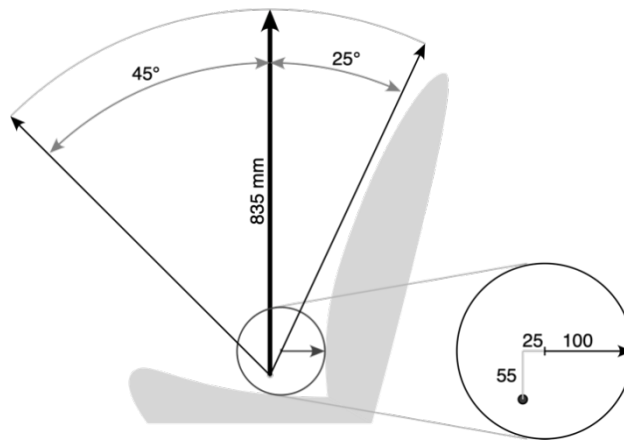
*PVC Pat's dimensions are based on 95th percentile international male and female dimensions from the [DINED anthropometric database](#).*

- 2.12.5 When seated in the normal seating position, PVC Pat must be protected by the occupant cell (Regulation 2.11), with the exception that PVC Pat does not have to wear a helmet (Regulation 2.11.4).
- 2.12.6 PVC Pat does not have to meet the vision requirements.
- 2.12.7 Each occupant's heels, including PVC Pat's heels, must be below their hip point.
- 2.12.8 The outer edges of PVC Pat's ankles must be 436 mm apart, as shown in the drawing. The outer edges of PVC Pat's wrists must be able to be placed 496 mm apart.
- 2.12.9 The angle between PVC Pat's shoulder, hip and knees must be more than 90°.
- 2.12.10 PVC Pat's head can tilt forwards, but no more than 30° from the line of the spine. PVC Pat's head does not yaw.
- 2.12.11 PVC Pat, or a person no smaller than PVC Pat, must be able to get in and out of the normal seating positions. You may remove PVC Pat's legs, temporarily, to help get the torso and head into position.
- 2.12.12 PVC Pat's hip point must be in the same position as the hips of an actual driver in the normal driving position, or an actual passenger in the normal seated position.



- 2.12.13 Head space for each seat must comply with Section LK of the Australian National Code of Practice for Light Vehicle Construction and Modification, as shown in the following diagram. The 835 mm radius arm must be able to move 45° forwards, 25° backwards and 7° either side of vertical. The steering wheel, mirrors, seat backs and head restraints may be inside the head space but must be designed to minimise the risk of injury in a crash. No other part of the Competition Vehicle structure, including the windscreen, may be inside the head space.

*This minimum head space requirement is based on a 50-percentile male and does not allow for a helmet. Taller team members may need more head space.*



## 2.13 SAFETY-BELTS

- 2.13.1 Safety-belts must be fitted for each seating position. Safety-belts must be compliant with at least one of the following standards: UNECE Regulation 16, US FMVSS 571.209, SFI 16.1, SFI 16.5, SFI 16.6, FIA 8853-2016, FIA 8854/98.

*The occupant cell will provide the greatest protection when occupants are secured into the cell with four-point or five-point harnesses.*

- 2.13.2 Safety-belts must be fitted and used according to the manufacturer's instructions, or as approved by the Team's certifying engineer.
- 2.13.3 Safety-belt anchorages must meet the intent of UNECE Regulation 14. In particular:
- upper anchorages for each seat must withstand a force of 13.5 kN applied to the upper safety-belt straps
  - lower anchorages for each seat must withstand a force of 13.5 kN applied to the lower safety-belt straps
  - the location of anchor points must comply with the instructions of the safety-belt manufacturer, or with UNECE Regulation 14 Annex 3.
- 2.13.4 Compliance must be confirmed by the Team's certifying engineer.

## 2.14 EGRESS

- 2.14.1 Teams must demonstrate that all occupants can exit the Competition Vehicle in less than 15 seconds, without assistance.
- 2.14.2 Doors and canopies used for egress must be capable of being secured and released from inside the Competition Vehicle and from outside the Competition Vehicle.
- 2.14.3 Emergency openings, and the methods of opening, must be clearly indicated on the exterior of the Competition Vehicle, and be visible and achievable by an emergency services first responder not familiar with the Competition Vehicle.

*Instructions may include diagrams.*

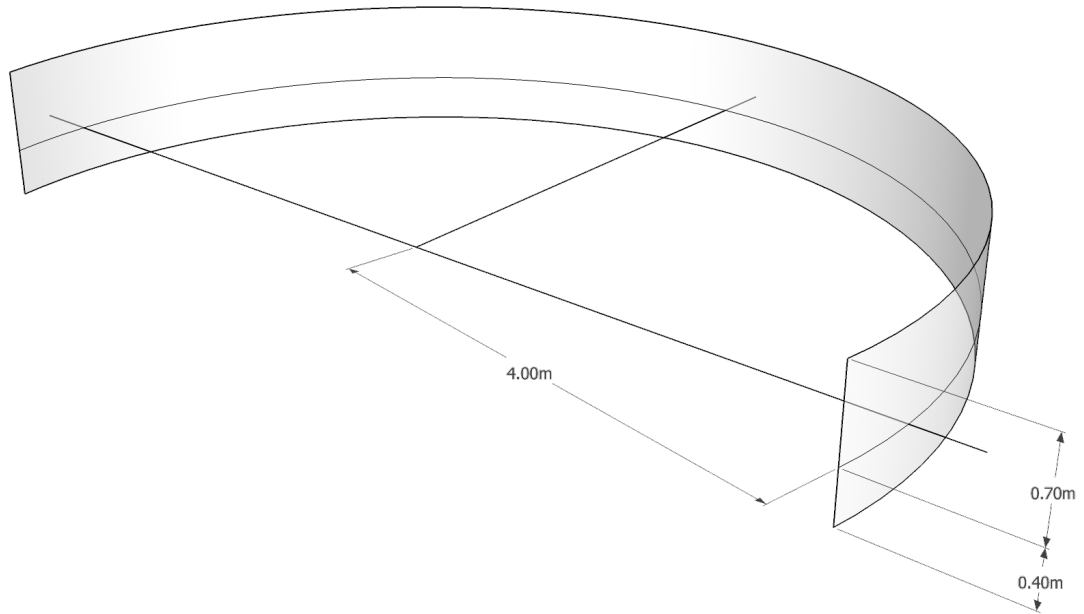
- 2.14.4 Occupants must be able to exit the Competition Vehicle without assistance at any time. Teams must not use adhesive tape to secure exits.

## 2.15 VENTILATION, COOLING, AND HYDRATION

- 2.15.1 The Competition Vehicle must have sufficient ventilation to prevent the build-up of CO<sub>2</sub> in the cabin. Occupants must have ventilation or cooling sufficient to ensure that they will not overheat. The Team must describe the ventilation and cooling systems and have them approved by their certifying engineer.
- 2.15.2 Each Competition Vehicle must have space for at least two litres of drinking water for each occupant (see Regulation 3.23.3).

## 2.16 FORWARD AND SIDEWARD VISION

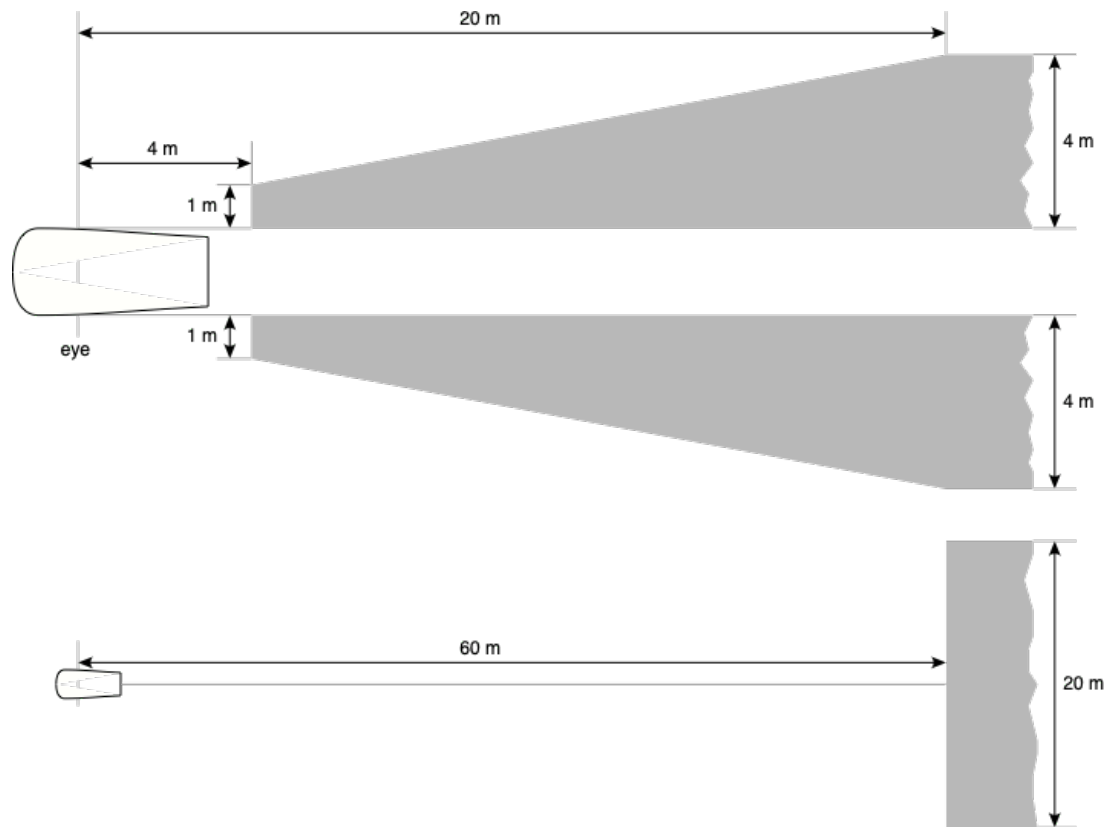
- 2.16.1 Each driver, when seated in the normal driving position with safety-belt and helmet on, must be able to identify 75 mm high letters at every point of forward travel that is:
  - 4 m from the driver's eyes, and
  - between 0.4 m below eye level and 0.7 m above eye level, and
  - between 100° left and 100° right of the direction of travel.



- 2.16.2 There must be no more than 2 pillars within the forward and sideward field of view. Each pillar must obscure less than 6° of the horizontal field of view.
- 2.16.3 Forward and sideward vision must be achieved without the aid of mirrors, lenses, or electronic vision systems.
- 2.16.4 The windscreen that is used for forward and sideward vision must have an optical transmittance more than 75%.
- 2.16.5 Traffic light colours must be discernible through the windscreen.

## 2.17 REAR VISION

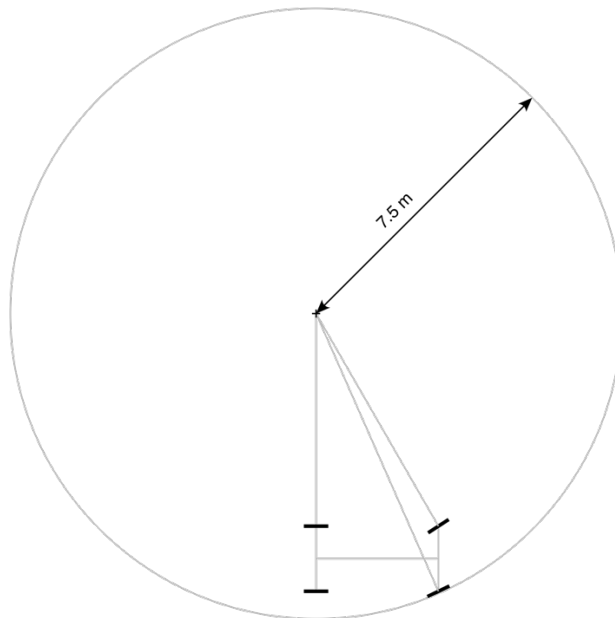
- 2.17.1 The Competition Vehicle must have rear vision systems that enable the driver, when seated in the normal driving position with the safety-belt fastened, to see the ground in the shaded areas shown in the diagrams below (UNECE Regulation 46, Section 15).



- 2.17.2 Rear vision systems may be electronic, mirrors, or both. Rear vision systems must operate whenever the Competition Vehicle is in motion under its own power or about to be driven. Rear vision images must be upright and oriented so that objects on the right of the Competition Vehicle are on the right of the image.

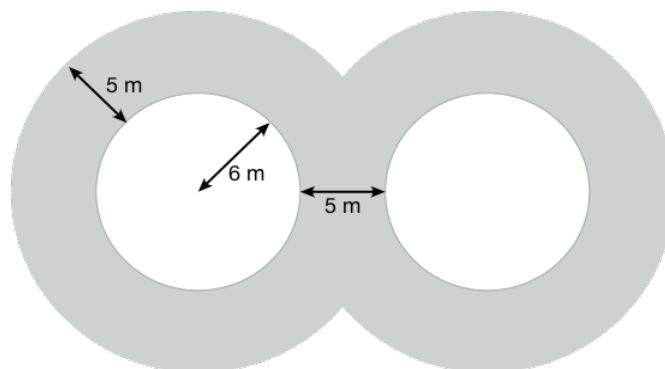
## 2.18 STEERING

- 2.18.1 Steering must be controlled by a steering wheel designed so that it cannot catch on clothing while driving or when the driver exits the Competition Vehicle.
- 2.18.2 Failure of any non-mechanical component of the steering system must not prevent effective steering of the Competition Vehicle.
- 2.18.3 Steering shafts must be designed to reduce the risk of injury to the driver in a crash.
- A collapsible boss is an acceptable method to reduce steering wheel impacts.*
- 2.18.4 Spherical joints used in steering and suspension rod ends must be designed so that the two joined parts cannot detach completely if the spherical joint fails.
- 2.18.5 Rear-wheel steering is not permitted. Specifically, no wheel that is rearward of the centre of mass of the Competition Vehicle may be steered, either by a mechanism that the driver operates or via a servo motor. This does not preclude suspension designs that are deliberately designed to have built-in bump steer or roll steer.
- 2.18.6 The Competition Vehicle must be able to turn in each direction within a circle with a radius of 7.5 metres, measured to the extreme outer edge of the tyre track at ground level.

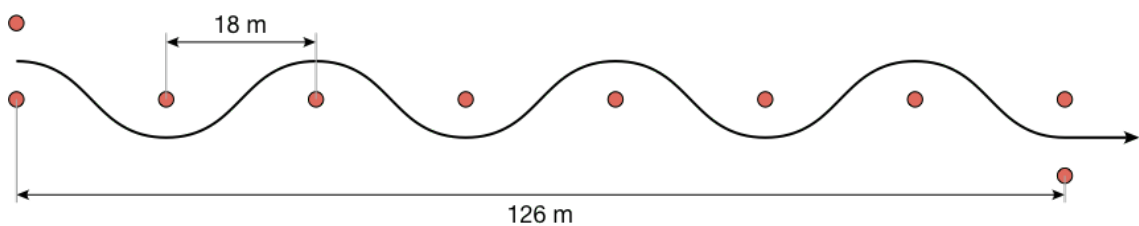


## 2.19 STABILITY

- 2.19.1 Competition Vehicles must be able to negotiate a Figure-8 course in less than 9 seconds per side and less than 18 seconds overall, in all driving configurations.



- 2.19.2 Competition Vehicles must be able to negotiate a slalom course in less than 11.5 seconds, in all driving configurations.



- 2.19.3 The Competition Vehicle must be stable at all achievable speeds and in crosswinds likely to be encountered, in all driving configurations. Teams must provide analysis or test results that show that the Competition Vehicle will be stable at high speeds and in crosswinds. This analysis must be approved by the Team's certifying engineer.

*In 2019, at least six Competition Vehicles left the road when hit by strong wind gusts. Wind gusts exceeding 100 km/h are possible. Some of the factors affecting Competition Vehicle stability are presented in the informal discussion paper by Prof John Storey, 'Stability Considerations' V 2.0, available on the World Solar Challenge website.*

- 2.19.4 The fully laden Competition Vehicle should not tip when tilted by 45° about each pair of adjacent tyre contact patches, in all driving configurations.

*The Team's certifying engineer must approve the stability and the rollover propensity of the Competition Vehicle.*

*A tilt test is one way of testing the static stability factor (SSF) of a Competition Vehicle, which is one indication of susceptibility to rollover. Notice that the Regulation says 'should' and not 'must'. It is permissible to have a Competition Vehicle that does not pass a static tilt test, provided that the Competition Vehicle has some other mechanism for handling the equivalent forces without tipping. If the Competition Vehicle cannot pass a tilt test in all suspension configurations it becomes particularly important that the certifying engineer be satisfied with the roll-over stability under all conditions. Their certification documentation should provide a summary of analysis and testing you have done.*

## 2.20 BRAKES

*Braking requirements are based on UNECE Regulation 13-H.*

- 2.20.1 The braking system must be approved by the Team's certifying engineer.
- 2.20.2 The Competition Vehicle must be equipped with a service braking system that enables the driver to control the Competition Vehicle and bring it to a halt without removing either hand from the steering control.
- 2.20.3 The Competition Vehicle must be equipped with a secondary braking system, operated by the same control as the service braking system, that the driver can use to control the Competition Vehicle to a halt if the service braking system suffers any single failure.

*The service braking system in a conventional vehicle is controlled by a brake pedal that operates two independent hydraulic brake circuits. One possible configuration has the front wheels on one circuit and the rear wheels on the other. An alternative configuration has a circuit for each diagonal pair of wheels. These arrangements meet the requirements for service and secondary braking systems—the service system operates both hydraulic circuits, and the secondary system operates whichever circuit has not failed.*

- 2.20.4 Service and secondary braking systems may share components deemed 'not liable to failure' if they are amply dimensioned and readily accessible for maintenance. Components 'not liable to failure' are:
- a brake pedal and its bearing
  - hydraulic cylinders and their pistons
  - hydraulic control valves
  - brake cylinders and their pistons
  - brake lever and cam assemblies.
- 2.20.5 Hydraulic brake hoses and lines are regarded as liable to failure.
- 2.20.6 The service braking system must apply braking effort to all road wheels.

- 2.20.7 Braking must not cause the Competition Vehicle to yaw. This requirement applies to both the service braking system and the secondary braking system.
- 2.20.8 For Competition Vehicles without anti-lock brakes, the front wheels must lock up before the rear wheels.
- 2.20.9 The service braking system must be able to stop the fully laden Competition Vehicle within distance

$$0.1 v + 0.0060 v^2$$

metres from any speed  $v$ , in km/h, that the vehicle can achieve, with minimum regenerative braking.

*If regenerative braking is disabled when the energy storage system is full then the service braking test must be done with no regenerative braking.*

- 2.20.10 If the service braking system has a failure, the secondary braking system must be able to stop the fully laden Competition Vehicle, with no regenerative braking, within distance

$$0.1 v + 0.0158 v^2$$

metres from any speed  $v$ , in km/h, that the vehicle can achieve.

*Braking the single rear wheel of trike, for example, might not provide sufficient braking force.*

- 2.20.11 Competition Vehicles must be equipped with a parking brake that can be operated by the driver from the normal driving position. The parking brake must hold the fully laden Competition Vehicle on a 20% incline or decline.

## 2.21 TYRES

- 2.21.1 Tyres must be suitable for highway use and used in accordance with their manufacturer's recommendations always.
- 2.21.2 Competition Vehicles must be fitted with tyres that are:
- compliant with UNECE Regulation 30, UNECE Regulation 75 or US FMVSS 571.109, as indicated by an E or DOT approval marking on the tyre; or
  - otherwise approved by the Event Organiser.

*Experimental or prototype tyres must be approved by the Australian road traffic authorities. The Event Organiser will administer this process, which requires the tyre manufacturer to submit a sample tyre and written technical specifications to the Event Organiser's office not later than 25 April 2025. A positive outcome to the approval process, which may take up to three months, is not guaranteed.*

- 2.21.3 The speed rating of the tyres must be more than the maximum speed of the Competition Vehicle. The load rating of each tyre must be more than the maximum static load imposed on it by the fully laden Competition Vehicle.
- 2.21.4 Tyres must be approved by the Team's certifying engineer.
- 2.21.5 Tyres must be free of any apparent defect.

## 2.22 DRIVING AND REVERSING

- 2.22.1 The fully laden Competition Vehicle must be able to start from rest on a 7% gradient.
- 2.22.2 The Competition Vehicle must be able to be driven backwards under its own power with the driver seated in the normal position.

## 2.23 LIGHTING

- 2.23.1 Competition Vehicles must be fitted with:

- two rear stop lamps
- one central stop lamp
- left and right front direction indicator lamps
- left and right-side direction indicator lamps
- left and right rear direction indicator lamps
- two daytime running lamps.

*Headlamps and tail lamps are not required, though would increase the practicality of **Cruiser** vehicles.*

- 2.23.2 Stop lamps must emit red light. Direction indicator lamps must emit amber light. Daytime running lamps must emit white light.

*If you are designing your own lamps, then you must show that your lamp colours conform to the chromaticity requirements described in UNECE Regulation 48.*

- 2.23.3 Lamps must be compliant with UNECE Regulation 148 or the SAE/DOT equivalents. Teams must demonstrate compliance by either:

- the presence of compliance markings on the lamps, or
- detailed documentation that demonstrates compliance with the photometric requirements of the UNECE or SAE/DOT regulations, confirmed by the Team's certifying engineer.

*Lamps approved for motorcycles and side marker lamps might not meet these requirements.*

*Photometric requirements for lamps are listed in Appendix 3 of UNECE Regulation 148. You may demonstrate compliance by testing or by calculations. If you are using calculations, be aware that most LEDs do not emit the same intensity at every angle, so the simple formula for converting luminous flux (lumens) to luminous intensity (candelas) does not apply.*

- 2.23.4 Competition Vehicles must have the correct type of lamp in each position. Lamps must be mounted with the correct orientation so that the photometric requirements of UNECE Regulation 148 or the SAE/DOT equivalents are met.

<u>Lamp</u>	<u>UNECE category</u>	<u>SAE/DOT type</u>
Front indicators	1, 1a, 1b	I3, I4, I5
Rear indicators	2a, 2b	I6



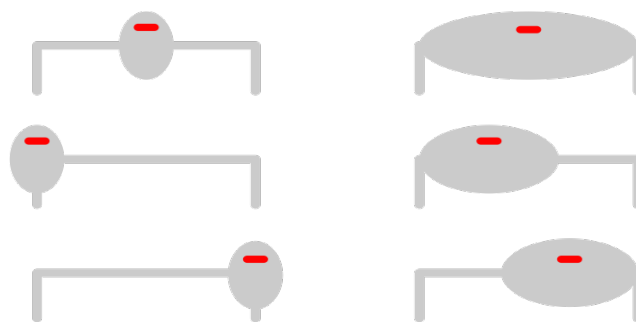
Side indicators	5, 6	E2
Stop lamps	S1, S2	S
Central stop lamp	S3	U3
Daytime running lamp	RL	Y2

Lamp position and visibility requirements are based on UNECE Regulation 48. 'Apparent surface' is defined in the glossary and in UNECE Regulation 48.

2.23.5 The rear stop lamps must meet the following position and visibility requirements:

- for each of the left and right stop lamps, the lateral distance between the outer edge of the apparent lamp surface and the corresponding outer edge of the Competition Vehicle must be not more than 400 mm
- the minimum lateral distance between the apparent surfaces of the two stop lamps must be at least 600 mm, or at least 400 mm if the Competition Vehicle is less than 1300 mm wide
- the lowest point on the apparent surface of each stop lamp must be at least 350 mm above the ground
- the entire apparent surface of each lamp must be visible from every point in the region between the planes 15° up, 5° down, and 45° to the left and right.

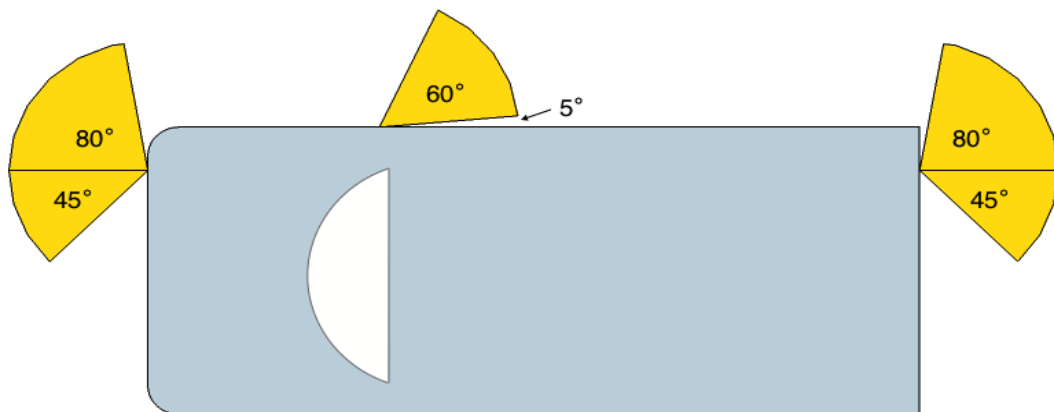
2.23.6 A central stop lamp is required. Viewed from behind the Competition Vehicle, the lateral position of the lamp must coincide with the visual centre of the Competition Vehicle (see the examples in the following diagram). The lowest point on the apparent surface must be higher than a point 150 mm below the rear windscreen if the Competition Vehicle has a rear windscreen, and the bottom of the apparent surface of the lamp must be higher than the top of the apparent surface of the rear stop lamps. The entire apparent surface must be visible from every point in the region between the planes 10° up, 5° down and 10° to the left and right.



2.23.7 The following position requirements apply to the left and right front indicator lamps and to the left and right rear indicator lamps:

- for each of the left and right indicator lamps, the lateral distance between the outer edge of the apparent lamp surface and the corresponding outer edge of the vehicle must be not more than 400 mm
- the minimum lateral distance between the inner edges of the apparent surfaces of the left and right indicator lamps must be at least 600 mm, or at least 400 mm if the Competition Vehicle is less than 1300 mm wide

- the lowest point on the apparent surface of each indicator lamp must be at least 350 mm above the ground.
- 2.23.8 Side direction indicator lamps must be less than 1800 mm behind the front most part of the Competition Vehicle, and the outer edge of each apparent surface must be within 400 mm of the extreme outer edge of the Competition Vehicle on each side.
- 2.23.9 The entire apparent surface of each front and rear direction indicator lamp must be visible from every point in the region between the planes 15° up, 5° down, 45° inboard and 80° outboard (see the diagram below, which shows the horizontal angles for the right indicators).
- 2.23.10 The entire apparent surface of each side indicator must be visible from every point in the region between the planes 15° up, 5° down, 5° outboard and 65° outboard (see the diagram below).



- 2.23.11 Direction indicators must flash at  $90 \pm 30$  flashes per minute.
- 2.23.12 It must be possible to flash the left and right direction indicator lamps simultaneously, as a hazard warning signal.
- 2.23.13 Daytime running lamps must be mounted at the front of the Competition Vehicle so that:
- the minimum lateral distance between the apparent surfaces of the lamps is at least 600 mm, or at least 400 mm if the Competition Vehicle is less than 1300 mm wide
  - the lowest point on each apparent surface is at least 250 mm above the ground
  - the entire apparent surface is visible from every point in the region between the planes 10° up, 10° down, 20° outwards and 20° inwards.
- 2.23.14 Headlamps (if fitted) must be at the front of the Competition Vehicle so that
- the lateral distance between outer edge of the apparent surface and the corresponding outer edge of the Competition Vehicle is not more than 400 mm
  - the minimum distance between the apparent surfaces is at least 600 mm, or at least 400 mm apart if the Competition Vehicle is less than 1300 mm wide
  - the lowest point on each apparent surface is at least 500 mm above the ground

- each entire apparent surface is visible from every point in the region between the planes 15° up, 10° down, 45° outwards and 10° inwards.

2.23.15 The stop lamps must operate whenever driving is possible, and the brakes are applied.

2.23.16 The daytime running lamps must operate whenever driving is possible.

## 2.24 AUDIBLE WARNING DEVICE

2.24.1 An audible warning device complying with the intent of UNECE Regulation 28 must be fitted to the Competition Vehicle.

2.24.2 Sound pressure level must be more than  $L_A = 105$  dB measured 2 m from the horn.

*The horn should be mounted so that Competition Vehicle occupants are not subjected to excessive sound pressure levels.*

*A standard car horn is unlikely to achieve 105 dB if it is sealed inside the Competition Vehicle and not open to the air outside the Competition Vehicle.*

2.24.3 The device must emit a continuous and uniform sound. The audible warning device must be capable of operating for 50,000 cycles of on for one second and off for four seconds.

## 2.25 INSTRUMENTATION

2.25.1 The following information must always be visible to the driver (i.e., not behind menus) while the Competition Vehicle is in motion:

- the speed of the Competition Vehicle
- whether the direction indicators are operating
- whether the hazard lights are operating
- energy storage system warnings
- electronic rear vision images (if fitted).

2.25.2 This instrumentation must be powered from the energy storage system, and not from separate batteries.

## 2.26 AUTOMATIC FUNCTIONS

2.26.1 Any cruise control function must automatically deactivate when the brake is operated, or the Competition Vehicle is turned off.

*Cruise control must not resume automatically following a brake operation.*

2.26.2 Any automatic driving function must immediately deactivate on manual input or when the Competition Vehicle is turned off.

*Automatic driving must not resume automatically.*

## 2.27 ELECTRICAL SAFETY

*Electrical safety requirements are based on Section 5 of UNECE Regulation 100. The term 'high voltage' means more than 60 V dc or more than 30 V rms ac.*

- 2.27.1 Protection against direct contact with high-voltage parts, including conductors, must be achieved using double insulation, enclosures, or barriers. It must not be possible to remove protection without the use of tools.
- 2.27.2 Protection against direct contact with high-voltage parts inside the driver, passenger and luggage compartments must be designed to exclude objects larger than 1 mm diameter (Ingress Protection rating IPXXD).
- 2.27.3 Protection against direct contact with high-voltage parts inside areas other than the driver, passenger and luggage compartments must be designed to exclude fingers (Ingress Protection rating IPXXB).
- 2.27.4 Double insulation must meet the AS 3001/IEEE 100 definition: comprising both basic insulation and independent supplementary insulation that provides protection equivalent to that of the basic insulation. A single layer of reinforced insulation is also acceptable if it provides protection equivalent to double insulation.

*Electrical tape and flimsy, easily displaced covers are unlikely to meet the requirements of supplementary insulation. The front surface of a photovoltaic cell is deemed to be double insulated if properly encapsulated. The rear surface is deemed to be 'live' unless the team can demonstrate otherwise.*

- 2.27.5 High-voltage energy storage packs must be marked with the high-voltage symbol shown in the following diagram.



- 2.27.6 The high-voltage symbol must also be visible on any enclosure or barrier that can be accessed without using tools, if removing the enclosure or barrier exposes high-voltage parts.

*Example: A motor controller contains high voltage parts, so these parts must be protected by an enclosure or barrier that requires tools to remove (Regulation 2.27.1). If it is possible to touch the motor controller enclosure without using tools (e.g., by opening the boot or tilting the solar collector) then the motor controller enclosure must have a high-voltage symbol on it.*

- 2.27.7 The resistance between any exposed conductive part and each terminal of the energy storage system must exceed 100 V ohms, where V is the nominal voltage of the energy storage system.

*This is equivalent to a maximum leakage current of 10 mA.*

- 2.27.8 The resistance between any exposed conductive part and each terminal of every solar cell must exceed 100 V ohms, where V is the maximum circuit voltage of the solar collector.

- 2.27.9 A system must be implemented to monitor the isolation of the Competition Vehicle's chassis and body as per Regulations 2.27.7 and 2.27.8. This system may take the form of a permanently connected electronic device or a properly documented procedure of regular manual checks.
- 2.27.10 A fuse or circuit breaker, suitably rated to protect the wiring, must be mounted in or on each energy storage pack. Additionally, the dc interrupting current (i.e., dc breaking current) capacity of the device must be able to interrupt the maximum possible short-circuit current of the battery packs.

*A typical Competition Vehicle might use a 50 A fuse with a 15000 A dc interrupt rating. Fuses and circuit breakers intended for ac use might not meet this requirement. Teams must provide a manufacturer's data sheet clearly showing that the dc specifications of the device are adequate.*

## 2.28 SAFE STATE

*The Regulations in this section are for a Competition Vehicle with a photovoltaic solar collector and electrochemical energy storage. Teams using alternative solar collector or energy storage technologies must ensure that their Competition Vehicle can be made safe in an emergency. The systems used to achieve this must meet equivalent levels of safety based on the organiser's assessment of the proposal submitted by the entrant.*

- 2.28.1 The Competition Vehicle must have a 'safe state' which, in an emergency, minimises the risk of fire and electric shock to occupants, team members, emergency response personnel, and bystanders. When in the safe state:
- Every conductor emerging from each energy storage pack must be galvanically isolated from every energy storage cell. This means that there must be a contactor in series with the negative pole of the battery and a second contactor in series with the positive pole, in each energy storage pack.
  - No voltage may be present across any pair of conductors emerging from any energy storage pack.
  - No voltage may be present across any pair of conductors emerging from any solar collector. This isolation must be performed with a contactor, which must be mounted on the same structural component as the solar collector it is associated with.
  - All contactors described above must immediately and automatically open when safe state is invoked.
  - No current may be present through any conductor loop that is external to the energy storage packs or the solar collectors.

*MOSFETS and other semiconductor devices are not considered to offer galvanic isolation.*

*Safe state is for emergencies and for complete shutdown of the Competition Vehicle. In addition to safe state, a Competition Vehicle may have a 'standby' state that provides power to some subsystems outside of the energy storage packs.*

- 2.28.2 Any part of any conductor that is more than 200 mm from the nearest PV cell is considered to be outside of the solar collector.

*This Regulation applies regardless of the solar collector voltage. Emergency first responders are told that any wiring within 200 mm of a PV cell may be live when the Competition Vehicle is in safe state, and no wiring more than 200 mm from a PV cell will be live when the Competition Vehicle is in safe state.*

- 2.28.3 All mechanisms for placing the Competition Vehicle into safe state and maintaining safe state must be fail-safe; if an electrical activation mechanism fails, the Competition Vehicle must automatically and immediately place itself into safe state and must remain in safe state until there is a deliberate intervention by the Team.
- 2.28.4 The safe state circuit must be designed to be as simple and direct as possible. In particular, it must be designed in such a way that failure of a semiconductor device or devices, no matter how improbable, cannot:
- prevent the Competition Vehicle from entering safe state when the activation device is operated, or
  - bring the Competition Vehicle out of safe state without deliberate driver intervention.
- 2.28.5 The driver must be able to place the Competition Vehicle into safe state with a single simple action while seated in the normal driving position and without releasing the safety-belt. This activation device must be clearly labelled.
- 2.28.6 For emergency use, an activation device that operates with a single simple action that immediately places the Competition Vehicle into safe state must be provided on the exterior of the Competition Vehicle. Multiple activations must not bring the Competition Vehicle out of safe state. The activation device must be placed within a yellow disc with a diameter of 180 mm. Also, in the yellow disk must be a blue equilateral triangle (minimum side length 150 mm) that contains a red flash, with the legend Emergency Electrical Isolation. In addition, there must be a clear instruction on how to operate the device (e.g., PULL or PRESS). The yellow isolation disc and the activation mechanism must be clearly visible to an emergency services first responder approaching the driver and must be within 100 mm of the lower edge of the windscreen, adjacent to the driver egress opening. No part of the yellow disc may be behind the driver.



*Both activation mechanisms must be demonstrated at Static Scrutineering. The scrutineers may invite random members of the public to validate the ease of operation of the external emergency activation device.*

## **3 THE ADVENTURE**

### **3.1 SUPERVISION**

- 3.1.1 The Clerk of the Course is responsible for supervising on-road activities.
- 3.1.2 During on-road activities, communication with the Clerk of the Course must be made through Mission Control.

### **3.2 SAFETY**

- 3.2.1 The Team Safety Officer is responsible for the general safety of the Team.
- 3.2.2 The Team Battery Officer is responsible for the safe operation of the energy storage system and for supervising response to any energy storage system emergency.
- 3.2.3 Energy storage system incident response kits must be readily available to the Competition Vehicle and any other vehicle carrying Competition Vehicle energy storage systems.
- 3.2.4 A Team member with a recognised first-aid certificate, current for the duration of the Event, must travel in the front or rear escort vehicle.
- 3.2.5 It is the responsibility of each Team to ensure that the vehicles under its control are maintained in a safe, roadworthy condition and are operated safely and within the law always.
- 3.2.6 All Competition Vehicles and escort vehicles are operated and driven at the Team's own risk.
- 3.2.7 The Clerk of the Course may exclude any Team from the Event at any time if any Team member operates a Competition Vehicle or any other vehicle in an unsafe manner.
- 3.2.8 Teams must look after the health and safety of their team members and Observer.

*Fatigue and dehydration are serious hazards in this Event. This is especially relevant to drivers, particularly those of Competition Vehicles.*

- 3.2.9 Drivers, Team members, officials and Observers are to be drug free and maintain a blood alcohol level less than 0.01% whilst engaged in any duties associated with the Event.

### **3.3 SAFETY-BELTS**

- 3.3.1 The use of safety-belts is mandatory for all occupants of motor vehicles in Australia, including Competition Vehicles.

## 3.4 HELMETS

- 3.4.1 Each occupant of a Competition Vehicle must wear an approved motorcycle helmet securely fitted and fastened in accordance with the manufacturer's instructions.
- 3.4.2 Motorcycle helmets must have a mark certifying compliance with either:
- Australian/New Zealand Standard AS/NZS 1698:2006
  - United Nations Economic Commission for Europe Regulation No 22 (UNECE 22.05 or 22.06).
- 3.4.3 Helmets must not be modified, have unauthorised attachments, or be used in any way contrary to the manufacturer's instructions.

## 3.5 SAFETY EQUIPMENT

- 3.5.1 Suitable and appropriate safety equipment must be carried always. The minimum safety equipment that must be carried in the rear escort vehicle is:
- a first-aid kit
  - safety glasses and gloves for handling batteries
  - at least two (2) hazard warning cones
  - two (2) **yellow** warning flags, minimum size 300 mm x 300 mm
  - suitable fire extinguishers
  - fire blankets
  - sand (or similar material) for extinguishing fires
  - a spade
  - suitable containers for damaged electrochemical cells
  - safety vests
  - two (2) whistles
  - a back-pack fire extinguisher, filled with at least 16 litres of water, for fighting grass fires.

## 3.6 SUPPORT VEHICLES

- 3.6.1 Each Team must supply a front and a rear escort vehicle, a means of transporting the Competition Vehicle, and sufficient additional vehicles to transport and support the Team and its equipment during the Event.
- 3.6.2 The minimum requirement for transporting the Competition Vehicle is a suitable truck or trailer, which must accompany the Team throughout the journey.

*Many vehicle rental companies in Australia require the hirer and all drivers to be at least 23 years of age. One-way interstate rentals might not be possible through an airport rental desk and might require head office approval. Trailers should be booked early.*



- 3.6.3 Each Competition Vehicle must, at all times when in motion on the route, be accompanied by a front escort vehicle in front of the Competition Vehicle and a rear escort vehicle behind the Competition Vehicle. The space between the front escort vehicle and the Competition Vehicle should not be occupied by any other team vehicles except when those vehicles are overtaking, or being overtaking by, the Competition Vehicle. The space between the Competition Vehicle and the rear escort vehicle should not be occupied by any other vehicles.
- 3.6.4 A minimum of two (2) drivers must be available for every vehicle associated with the Team.
- 3.6.5 The rear escort vehicle must not be a bus, truck, or large campervan, or be towing a trailer.

*If traffic approaching from behind sees a large vehicle with a flashing light, the immediate perception is that that vehicle itself is the hazard, not the Competition Vehicle it is escorting. This may lead to a member of the public overtaking a large rear escort vehicle only to encounter an unexpected and previously unseen Competition Vehicle. Large rear escort vehicles make it difficult for vehicles approaching from the rear to see the Competition Vehicle.*

## 3.7 ESCORT VEHICLE SIGNAGE

- 3.7.1 All Team vehicles must carry a sign, visible from 30 m to the rear, stating the name and team number of the Team to which they belong.
- 3.7.2 All Team vehicles equipped with Citizen's Band (CB) radio must carry a sign, visible from 30 m to the rear, advising the CB channel number in use.
- 3.7.3 A warning sign larger than 900 mm x 300 mm with black lettering on a yellow background, clearly visible from 30 m, must be displayed on the rear of the rear escort vehicle, stating
- CAUTION: COMPETITION VEHICLE AHEAD**
- 3.7.4 No vehicle other than the rear escort vehicle may carry such a sign.
- 3.7.5 Front and rear escort vehicles must be fitted with amber flashing lights visible from all directions at a distance of at least 200 m in daylight. Flashing amber lights must not be obscured by signs or other equipment on the roof of an escort vehicle.

*Beacons designed as warning devices for industrial equipment are unlikely to meet the visibility requirement.*

## 3.8 COMMUNICATION

- 3.8.1 Every Competition Vehicle must have means of two-way voice radio communication with its rear escort vehicle. Communication must be possible whenever the driver is in the Competition Vehicle, including when the main energy storage contactors are open and when the Competition Vehicle is in safe state.
- 3.8.2 Each Team will be issued with a satellite telephone and external antenna. Further detail will be provided in the Team Manager's Guide.

- 3.8.3 Each Team will be issued with two 80-channel UHF CB radios, with antennas, to be fitted into the front and rear escort vehicles. External antennas must be used to ensure that the radio has sufficient range to communicate effectively with other road users. Teams must monitor the channel they have been allocated at all times while on the road, and respond promptly and courteously, in English, to reasonable communications with other road users, Teams and officials.
- 3.8.4 The satellite telephone and the two 80-channel UHF CB radios, with antennas, are hire items only and must be returned to the event. Details will be provided via Team Notice.

## 3.9 HEAVY VEHICLES

- 3.9.1 Any Team operating or contracting a vehicle over 4.5 tonnes GVM or a passenger vehicle with 12 or more seats must register the full details with the Event Organiser.
- 3.9.2 Compliance with Australian National Heavy Vehicle regulations concerning [driving hours, record keeping and fatigue management](#) is mandatory.

## 3.10 PREPARATION AND TESTING

- 3.10.1 The Event Organiser will provide facilities for team preparation and track testing of Competition Vehicles at the Event Headquarters in accordance with the dates listed in the Event Schedule.
- 3.10.2 All participating Teams must base themselves, and their Competition Vehicles, at the Event Headquarters from Monday 11 August 2025.
- 3.10.3 The Event Organiser will appoint a paddock manager to supervise the preparation and test facility. The directions of the paddock manager must be followed.
- 3.10.4 [Australian workplace standards](#) will apply to all event-related activities in Australia.
- 3.10.5 The Clerk of the Course may impose event penalties for breaches of speed limits or other rules at the Event Headquarters.
- 3.10.6 No test driving is to be conducted in the paddock, car park or access roads.
- 3.10.7 The track must not be accessed without clearance from the track controller.
- 3.10.8 The Event Organiser will work with the relevant authorities to provide on-road testing facilities. Detailed arrangements will be published in the Team Manager's Guide or via a Team Notice.  
*Teams who make direct contact with Australian road authorities delay this process.*
- 3.10.9 Any Team driving a Competition Vehicle on a public road without a permit is liable to civil penalties and exclusion from the Event.
- 3.10.10 The Event Organiser reserves the right to request a security deposit against damage, rubbish removal or cleaning beyond reasonable expectations.

## 3.11 TEAM REGISTRATION AND SCRUTINEERING

- 3.11.1 All participants are required to attend with their Team to complete the registration process and present their Competition Vehicle for the scrutineering process. The scrutineering process is divided into static and dynamic operations.
- 3.11.2 Team registration and Static Scrutineering will take place at such place as determined by the Event Organiser at the time and date described in the Event Schedule.
- 3.11.3 Teams must attend registration and Static Scrutineering with:
- the Team Manager, and an interpreter if required
  - all Competition Vehicle drivers, with their driving licences
  - any waiver documents required for participants under the age of 18
  - original signed copy of the indemnity form
  - all Competition Vehicle passengers
  - the Team Safety Officer
  - the Team Battery Officer
  - the Competition Vehicle, in road-ready condition
  - front and rear escort vehicles, including any trailer that may be attached to the front escort vehicle, in road-ready condition
  - the Competition Vehicle trailer or transport truck they intend to use in the Event
  - tools and personnel required to facilitate inspection of the Competition Vehicle
  - a list of all vehicles associated with the Team, including make, model, colour and registration number
  - compulsory documentation (see Regulation 1.29.1)
  - a spare Competition Vehicle tyre of each type
  - a sample energy storage cell (if cells inside the energy storage packs are not clearly visible)
  - the lockable box in which energy storage packs can be impounded where required.
- 3.11.4 Competition Vehicles must be transported to scrutineering on the trailer or truck that will be used during the Event.
- 3.11.5 The Team Manager must attend all registration and scrutineering stations. A Team Manager not proficient in English must provide an interpreter to accompany them always during this process.
- 3.11.6 All team members must complete their online registration by signing in at registration.

## 3.12 STATIC SCRUTINEERING

- 3.12.1 Static Scrutineering will check for compliance with the Regulations and will include a regulatory compliance and roadworthiness inspection by the Northern Territory Road Transport Authority.
- 3.12.2 Qualification must be achieved in road-ready condition. **Teams that do not present at the designated time in road-ready condition may fail to qualify.**
- 3.12.3 Up to seven (7) members of a team (including an interpreter and any Team media personnel) may accompany the Competition Vehicle on the scrutineering floor. Team members may be substituted between inspection stations.
- 3.12.4 Some dismantling (such as removal of the solar collector or top shell) may be required to facilitate inspection of the following components:
- mechanical systems (including seats, tyres, brakes, and steering)
  - electrical systems
  - energy storage system.
- 3.12.5 Dismantling and reassembly of the Competition Vehicle when required to facilitate inspection of the Competition Vehicle must be conducted (in the sole opinion of the Chief Scrutineer) in a reasonable time.
- 3.12.6 Checks and inspections with the Competition Vehicle in a road-ready configuration will include, but not be limited to:
- signage
  - dimensions
  - solar collector type and size
  - egress—all Competition Vehicle drivers and passengers are required
  - vision—all Competition Vehicle drivers are required
  - lights, indicators and horn
  - electrical compliance.
- 3.12.7 All energy storage devices must be declared at Static Scrutineering. Failure to declare any energy storage device may lead to disqualification.
- 3.12.8 The mass of each **Challenger** or **Cruiser** vehicle driver and passenger, with helmet, driving clothes and shoes, will be determined at Static Scrutineering. If the mass of a driver or passenger is less than 80 kg, ballast provided by the Event Organiser will be added to make up the difference. No credit will be given if a driver or passenger weighs more than 80 kg.

*Deliberate consumption of excessive food and drink prior to weigh-in is not in keeping with the spirit of the Event and may be hazardous to the health of the individual.*

*Competition Vehicle occupants must wear similar clothes (including shoes) while driving as when they weigh in.*

- 3.12.9 Drivers and passengers may be re-weighed at any time during the Event. Changes in weight considered unreasonable by the Chief Medical Officer will be referred to the Clerk of the Course.
- 3.12.10 Non-compliance penalties may be imposed at the absolute discretion of the Chief Scrutineer and may include failure to qualify. Penalties will be published.

### 3.13 CRUISER DESIGN JUDGING

- 3.13.1 **Cruiser** judging, which will determine a design score for each **Cruiser** vehicle, will take place in Darwin at a time and location to be confirmed in due course via a Regulation Bulletin.
- 3.13.2 **Cruiser** Teams must prepare a 3-minute video and a brochure that describes their vehicle, how it will be used, and how it addresses sustainability, mobility and energy resilience. Each Team will present their video and their vehicle to a panel of Cruiser Judges appointed by the Event Organiser. Teams must allow Cruiser Judges to get into their vehicle to test the space and comfort.
- 3.13.3 The design score for each **Cruiser** vehicle will be determined by the Cruiser Judges. Each Cruiser Judge will allocate a single score, between 0 and 100%, to each Team. The final design score for a Team will be the arithmetic mean of the individual Cruiser Judge's scores. Cruiser Judges will be asked to consider:
- design innovation
  - ease of access and egress
  - occupant space and comfort
  - ease of operation (driving and charging)
  - versatility
  - style and desirability
  - suitability for the declared purpose
  - environmental impact
  - efficiency and convenience of the charging system.

Cruiser Judges will not be told how much weight to place on each of these criteria.

- 3.13.4 The design score for each **Cruiser** vehicle will provide a time advantage — see Regulation 3.21.6.

### 3.14 DYNAMIC SCRUTINEERING

- 3.14.1 Dynamic Scrutineering exercises will test the speed, stability, and braking capability of the Competition Vehicle, and will occur at the Event Headquarters or such other place as determined by the Event Organiser.
- 3.14.2 Competition Vehicles must pass Static Scrutineering before presenting for any part of Dynamic Scrutineering.

- 3.14.3 Figure-8 testing must be completed during Static Scrutineering week, prior to Saturday 23 August 2025.
- 3.14.4 The remaining Dynamic Scrutineering tests will be conducted on Saturday 23 August 2025. Attendance of Team Managers and drivers at a 07:00 roll call is mandatory.
- 3.14.5 Competition Vehicles must complete Dynamic Scrutineering in road-ready condition and with occupants and ballast in place.
- 3.14.6 **Cruiser** vehicles must complete Dynamic Scrutineering with two seats occupied.
- 3.14.7 No Competition Vehicle will be given permission to start the Event until it has passed Dynamic Scrutineering. Any vehicle failing Dynamic Scrutineering will only be permitted to re-present at the absolute discretion of the Chief Scrutineer. Dynamic Scrutineering will close at 12:30 on Saturday 23 August 2025.

### **3.15 MODIFICATIONS OR CHANGES AFTER SCRUTINEERING**

- 3.15.1 Once a Competition Vehicle and its drivers have passed Static Scrutineering, no changes to the design or configuration of the vehicle (that is, to any items described in the compulsory documentation) or changes to drivers will be permitted except under exceptional circumstances approved by the Chief Scrutineer.
- 3.15.2 Once a Competition Vehicle has passed Dynamic Scrutineering, and until released from the start line, component exchange, modification or repair of the vehicle is not permitted without the approval of the Chief Scrutineer.

### **3.16 BRIEFINGS**

- 3.16.1 A compulsory briefing for Team Managers and Team Safety Officers will be held in Darwin on Monday 11 August 2025 at a time and place to be advised. Team Managers not proficient in English must be accompanied by an interpreter.
- 3.16.2 A compulsory safety, procedural and media briefing will be held on Saturday 23 August 2025 at a time and place to be advised. All Team members must attend.

### **3.17 OBSERVERS**

- 3.17.1 The Clerk of the Course will appoint an Observer to travel with each Team. Observers may be changed between Teams at any time during the Event.
- 3.17.2 The Observer's responsibilities are:
- to record the locations and times that Teams start and stop
  - to record the locations and times of all activities and incidents that may affect the outcome of the Event
  - to check that ballast is correct for each driver or passenger change

- to be satisfied that Challenger energy storage systems cannot be charged between 19:00 and 06:30
  - to notify the Clerk of the Course as soon as possible if a Competition Vehicle leaves the road unexpectedly due to mechanical failure; the Team must not proceed until given permission by the Clerk of the Course
  - to notify the Clerk of the Course at the earliest opportunity if any breach of Regulation is suspected, energy storage cells or modules have been changed or an energy storage system seal broken, or if they have any concerns about the actions of the Team.
- 3.17.3 Observers are not permitted to interpret regulations or to give advice or directions to Teams. Advice or directions from Observers do not supersede the Regulations or directions from the Clerk of the Course. The only exception is if an Observer asks a team to stop because they feel unsafe—the Team must stop.
- 3.17.4 Each Team’s responsibilities to their Observer are:
- to assist the Observer in their duties always
  - to treat the Observer with courtesy and respect
  - to provide reasonable food for the Observer at least three times a day, and such drinking water as the Observer may require
  - if requested by the Observer, to send for assistance from the Event Organiser or transmit information to Mission Control
  - to provide a proper seat in the rear escort vehicle
  - to provide space for the Observer's luggage in the rear escort vehicle
  - to provide overnight accommodation for their Observer
  - to not make any demands of the Observer to assist team operations.
- 3.17.5 Each Team must allocate the front passenger seat of the rear escort vehicle to the Observer. This includes fair and reasonable space with, for example, the foot well not being filled with computer equipment such that the passenger space is restricted.

## 3.18 START LINE AND GRID

- 3.18.1 The official start of the Event will be held in State Square, Darwin, from 07:45 on Sunday 24 August 2025, or such other place and time as the Event Organiser may direct. Detailed procedural instructions will be issued in Darwin by Team Notice.
- 3.18.2 Starting position for **Challenger** teams will be by lap time recorded during Dynamic Scrutineering. Starting position for **Cruiser** teams will be by Cruiser design score.
- 3.18.3 All Competition Vehicles must be in their starting grid position by the appointed time for final inspections. Any vehicle not present will have their starting position amended.
- 3.18.4 Teams must not work on their Competition Vehicles on the start grid.
- 3.18.5 Two team members must stay with the Competition Vehicle on the start grid to assist officials with final inspections.

- 3.18.6 Front and rear escort vehicles must be in their designated places by 07:00.
- 3.18.7 Escort vehicles must be in position with the Competition Vehicle before entering public roads. Competition Vehicles that have left the start line and whose escort vehicles are not able or not ready to merge will be directed to return to the start area.

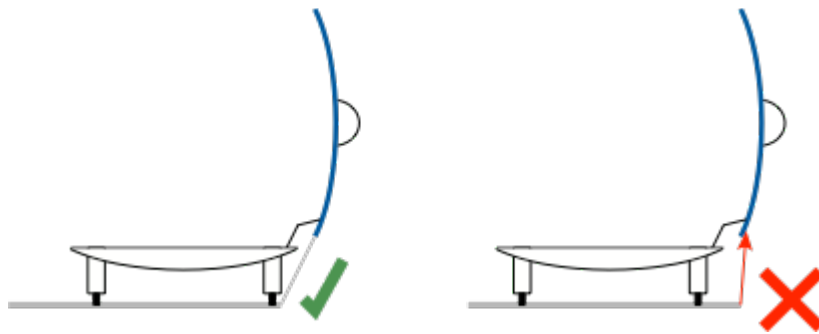
*Team Managers should recognise that it is not a realistic expectation for escort vehicle crew members to witness the start and re-join their vehicles to make a timely departure.*

## 3.19 ENERGY COLLECTION AND STORAGE

- 3.19.1 External devices intended to increase the irradiance on the solar collector or increase the efficiency of the solar collector must not be used at any time.

*Spraying of water from external sources is not allowed.*

*Ground sheets must not be placed in any position where it is possible to draw a straight line from any part of the ground sheet to any part of the solar collector.*



- 3.19.2 From the official start of the on-road component of the Event until the Team finishes, is no longer competing or withdraws, the energy storage system must never be removed from the Observer's control.
- 3.19.3 Damaged energy storage cells may be bypassed, but must not be removed from the energy storage system unless it would be unsafe to leave them in. Cells removed must be replaced by ballast with mass greater than the mass of the removed cells.
- 3.19.4 If a Competition Vehicle is unable to continue because too many energy storage cells have been damaged then the Team may replace cells and continue but will be considered no longer competing.
- 3.19.5 Each day, **Cruiser** teams may recharge their Competition Vehicles using their recharging system before commencing driving for the day and after finishing driving for the day. Once a **Cruiser** team has started driving on any day, they may not recharge until they have finished driving for the day.

## 3.20 ROUTE

- 3.20.1 The event course will be the major highways between Darwin, Northern Territory, and Adelaide, South Australia—approximately 3000 km.



- 3.20.2 One printed copy of the official route notes will be provided to each registered Team. Additional copies will be available for download from the Event website from June 2025.
- 3.20.3 Mandatory control stops will be established along the route. The locations of the control stops will be published in the official route notes.
- 3.20.4 Any detour signs erected by the civil authorities must be observed and the correct route re-joined at the first opportunity.
- 3.20.5 The Event Organiser may change the course at any time.

## 3.21 TIMING

- 3.21.1 The official start time on Day 1 will be deemed to be 08:00 for all teams.
- 3.21.2 The official start time each day after Day 1 is 08:00.
- 3.21.3 The official finish time each day is 17:00.
- 3.21.4 A time penalty of one minute will be imposed for each minute taken past the official daily finish time, up to and including 10 minutes past the official finish time. Beyond 10 minutes, each additional minute will attract a penalty of two minutes. Competition Vehicles must not be driven after sunset. Time penalties incurred in this manner will determine an adjustment of the official start time the following day.

*Example: If a team finishes at 17:07 on Day 2, the official start time for Day 3 will be adjusted to 08:07. If a team finishes at 17:13 on Day 2, the official start time for Day 3 will be adjusted by  $1 \times 10 + 2 \times 3$  minutes to 08:16.*

- 3.21.5 A Competition Vehicle starting before its official start time will be subject to a penalty of 2 minutes for each offending minute.
- 3.21.6 After completing the control stop at Katherine, each **Cruiser** team will be released from Katherine after a duration designed to give a time advantage to teams with high design scores. The holding duration for each Cruiser team, in minutes, will be calculated by the formula

$$d = 300(s^* - s)/s^*$$

where  $s$  is the team's design score and  $s^*$  is the maximum design score of any Cruiser team. Teams still at Katherine at the end of day 1 will be allowed to depart at 08:00 on day 2.

## 3.22 TRACKING

- 3.22.1 Each Competition Vehicle must carry a data logging and tracking device provided by the Event Organiser. The specifications of the tracking device are described in Regulation 2.9.
- 3.22.2 Information concerning progress and operation of Competition Vehicles may be published during the Event.

3.22.3 Satellite tracking data will not be accepted as basis for inter-team protests.

## **3.23 COMPETITION VEHICLE DRIVERS AND PASSENGERS**

3.23.1 Only registered Competition Vehicle drivers may drive the vehicle during Event hours.

3.23.2 When driving, ballast must be carried in accordance with the provisions of Regulation 2.8.

3.23.3 Each Competition Vehicle driver and passenger must have at least two litres of water accessible to them in the vehicle whenever they start their stint.

3.23.4 Compulsory Competition Vehicle driver changes will be required at specified locations on the route or between specified locations on the route. Driver change locations will be specified in a Regulation Bulletin. Vehicles must stop for 5 minutes at the specified driver change locations. These 5-minute stops must be separate from any overnight stop.

*These compulsory driver changes are in addition to driver changes that Teams organise to manage fatigue.*

3.23.5 Competition Vehicle drivers who will drive the vehicle for more than one hour in a day must not drive a support car within two hours of driving the vehicle.

## **3.24 DRIVING CONDUCT**

3.24.1 Each Team must ensure that all vehicles associated with their attendance at the Event are driven in a careful and courteous manner always.

3.24.2 Overtaking must be done in a safe manner and take into account prevailing conditions.

*A Team seeking to overtake another Team should communicate with the other Team via radio, and both Teams should maintain communication throughout the manoeuvre.*

3.24.3 The Event Organiser reserves the right to determine if any individual is acting de facto as a part of a Team.

3.24.4 The front and rear escort vehicles must have their amber flashing lights operating whenever they are escorting the Competition Vehicle. Support vehicles must not have amber flashing lights operating if they are not (directly) escorting the Competition Vehicle.

3.24.5 Except when pushing a disabled Competition Vehicle to a place of safety, Competition Vehicles must not be pushed along the road or into or out of a control stop. Push starting the Competition Vehicle is not allowed.

3.24.6 Whilst travelling on the open road, the front escort vehicle must be within 500 m of the Competition Vehicle. The Competition Vehicle must be allowed a safe stopping distance appropriate to the speed and conditions prevailing.

3.24.7 Whilst travelling on the open road, the rear escort vehicle must be within 5 seconds of the Competition Vehicle and must always maintain a safe stopping distance appropriate to the speed and conditions prevailing.

- 3.24.8 Competition Vehicles must not be driven on any public road between sunset and sunrise.
- 3.24.9 Teams must comply with all requirements imposed by road traffic authorities, police, or Event officials.
- 3.24.10 Competition Vehicles, escort vehicles and other team vehicles may be subject to scrutineering at any time during the Event to ensure compliance with the Regulations.

## 3.25 STOPPING

- 3.25.1 No Team vehicle may stop on the road except in an emergency or when required by traffic conditions.
- 3.25.2 Whenever stopped, all vehicles and all Team activity should be at least 2 m from the edge of the road. Teams who have vehicles or activity less than 2 m from the edge of the road when there is room to pull off further will be given demerit points and time penalties.
- 3.25.3 When stopping for an extended duration, vehicles should be parked, and all Team activity should occur, at least 10 m from the edge of the road.
- 3.25.4 Where it is necessary for any activity to take place less than 2 m from the road, two Team members wearing reflective vests must be positioned in a place of safety to warn approaching traffic using yellow flags, and to warn the Team of approaching traffic using a whistle.

*Do not use yellow flags if the Team is safely more than 2 m from the road—in this case the person waving the flag becomes the hazard.*

- 3.25.5 If a Competition Vehicle leaves the road unexpectedly because of a mechanical failure, the Team must get approval from the Clerk of the Course before resuming driving.
- 3.25.6 If a Competition Vehicle has suffered damage to any critical component, then the team may repair their Competition Vehicle but must not resume driving until:
- the Team's certifying engineer has recertified the repaired Competition Vehicle
  - the Team has submitted the new certification to the Clerk of the Course
  - the Clerk of the Course has approved the resumption of driving.

A document defining critical components and describing the recertification process will be available from the team portal.

- 3.25.7 If a Competition Vehicle rolls onto its side or roof then the Team must withdraw immediately.
- 3.25.8 Teams wanting to repair their Competition Vehicle or escort vehicles may, after obtaining approval from the Clerk of the Course, mark the road at the location where they stopped and transport their Competition Vehicle to a suitable place for making repairs, then return to the location where they stopped and continue driving.

## **3.26 OBSTRUCTING OTHER ROAD USERS**

- 3.26.1 Vehicles associated with a Team must not obstruct other road users, including other Teams. Infringement of this Regulation will incur a penalty for each incident.
- 3.26.2 To avoid obstructing other road users, each driver of a Team vehicle other than the Competition Vehicle and front and rear escort vehicles must leave at least 200 metres of space in front of their vehicle so that other road users can overtake and occupy the space in front of them. If it is safe to do so and will help clear traffic building up behind a vehicle, drivers of Team support vehicles should pull off the road to allow other road users to pass.

## **3.27 CONTROL STOPS**

- 3.27.1 Competition Vehicles must stop for 30 minutes at designated control stops along the route. The locations of the control stops will be specified in the official route notes provided by the Event Organiser.
- 3.27.2 All vehicles must obey control stop speed limits.
- 3.27.3 Teams must obey all directions given by the Control Stop Manager.
- 3.27.4 Teams must park in the spaces designated by Control Stop officials. Teams must not modify the parking space in any way. Ground sheets must not be used. Team members other than arriving occupants must not touch the arriving Competition Vehicle.
- 3.27.5 Occupants must get out of the Competition Vehicle without assistance from other Team members. Occupants must remove all ballast from the vehicle.
- 3.27.6 The arriving driver, alone, may reconfigure the vehicle for charging before control stop timing commences.
- 3.27.7 Control stop timing commences when the arriving driver activates the control stop timing system.
- 3.27.8 Timing will be paused at 17:00 and resume at 08:00 the next day.
- 3.27.9 Team members must not touch the Competition Vehicle for 25 minutes. The Competition Vehicle may reconfigure itself.
- 3.27.10 After 25 minutes, the departing driver, alone, may reconfigure the Competition Vehicle for driving. Ballast of all occupants will be checked outside of the Competition Vehicle. The driver and any passengers may get into the Competition Vehicle and prepare for departure. Other Team members must not touch the vehicle.
- 3.27.11 The Competition Vehicle must not depart until 30 minutes have elapsed. The Competition Vehicle must not depart until ballast and drinking water are in place, safety-belts are fastened, helmets are secured, and the Competition Vehicle is ready for the road.

*The Clerk of the Course may ask the Control Stop Manager to reset the remaining time to 30 minutes if Team members interfere with the Competition Vehicle during the 30-minute control stop period.*

## 3.28 OVERNIGHT STOPS

- 3.28.1 An overnight stop commences when the Team stops driving for the day and finishes when the Team starts driving the next day.
- 3.28.2 The selection (and any cost) of overnight stop locations is the responsibility of each Team.
- 3.28.3 At overnight stops, the Competition Vehicle and all other vehicles must be parked in such a manner that they, and all Team activities, are conducted at least 10 metres from the edge of any road.
- 3.28.4 If a Team's overnight camp is not immediately adjacent to the road, a marker cone must be placed on the roadside adjacent to the point the Team exited the official route.
- 3.28.5 The Observer, with the Team Manager, must place a mark on the road to indicate the position at which the Competition Vehicle stopped. The mark will be the starting line for the following morning.
- 3.28.6 The Competition Vehicle must be driven, pushed by hand, or carried by hand between the stopping location and its solar charging location.
- 3.28.7 There are no restrictions on the number of Team members used to reconfigure the solar collector for charging at overnight stops.
- 3.28.8 The energy storage packs of **Challenger** vehicles must be disconnected and sealed before 19:15 each day.
- 3.28.9 Energy storage packs of **Challenger** vehicles must not be unsealed before 06:15 each day.

## 3.29 'NO LONGER COMPETING'

- 3.29.1 A Team will be regarded as 'no longer competing' if any of the following occur:
  - the Team is unable to maintain a minimum speed of 60 km/h on the open road
  - the Team is unable to drive to the next control stop before it closes
  - the Team arrives at a control stop after it has closed
  - a Challenger Team recharges their energy storage system from an external source
  - a Cruiser Team recharges their energy storage system from an external source during the time interval between when they started driving on a day and when they finished driving on that day.
- 3.29.2 Teams no longer competing must contact the Clerk of the Course for instructions. Teams may be allowed to continue driving their Competition Vehicle if they can maintain a speed of 60 km/h on the open road and reach the next control stop before it closes; otherwise,

the Team must transport their Competition Vehicle forwards to the next open control stop.

3.29.3 The Competition Vehicle must be in safe state whenever it is being transported.

3.29.4 Teams no longer competing must still accommodate an Observer.

### **3.30 WITHDRAWAL**

3.30.1 A Team may withdraw by forwarding a completed withdrawal form (available from the Observer) to the Clerk of the Course. The Competition Vehicle must not be driven on public roads after withdrawing but may be transported to Adelaide to take part in the displays and the awards ceremony.

### **3.31 PENALTIES**

3.31.1 The Clerk of the Course may impose demerit points on any Team that breaches a regulation. Demerit points will be published.

3.31.2 Each demerit point given to a Team will incur a time penalty of 30 minutes, to be served at a control stop nominated by the Clerk of the Course. All time penalties must be served before arriving at the finish line.

3.31.3 A Team accruing 3 or more demerit points will be excluded from the remainder of the Event.

3.31.4 The Clerk of the Course may impose operational restrictions (such as speed restrictions) on any Team.

3.31.5 At any time during the Event, the Clerk of the Course may issue a penalty of one demerit point in response to any of the following behaviours noted by an Observer or reported by an official:

- obstructing other road users
- stopping on the road (other than when required by traffic conditions)
- poor safety protocols (e.g., safety flags, whistles etc.)
- overnight activities too close to the road
- driving without both front and rear escort vehicles
- escort vehicles driving without visible flashing lights
- driving without effective rear vision.

3.31.6 The Clerk of the Course will determine penalties for offences including:

- slipstreaming or pressure wave pushing
- failure to follow the route instructions
- failure to observe a request by police or Event officials
- wilful damage or interference to property

- failure to stop at a designated control stop
- exceeding any posted speed limit
- driving at less than 50 km/h in areas with a speed limit of 100 km/h or greater, when not constrained by traffic
- driving without adequate visibility, due to smoke, dust or rain.

3.31.7 The Clerk of the Course may exclude any Team from the Event for wilful disregard of any Regulation or of the spirit of the Event. These offences include but are not limited to:

- misrepresentation
- wilful obstruction, or aggressive or unsafe driving
- driving the Competition Vehicle without a rear escort vehicle
- accumulation of 3 or more demerit points.

## **3.32 PROTESTS AND APPEALS**

3.32.1 A Team Manager may appeal any decision of the Chief Scrutineer to the Jury by lodging a written Notice of Appeal with the Clerk of the Course within one hour of the notification of the decision. The Notice of Appeal must detail the grounds for the appeal. An appeal fee of AUD\$500 will apply.

3.32.2 A Team Manager may lodge a written protest with the Clerk of the Course. Protests must be lodged before 18:00 on the day of the incident giving rise thereto. Protests will not be accepted after 18:00 ACST on the final Saturday of the Event. The protest shall specify the details of the incident and a protest fee of AUD\$200 will apply.

3.32.3 A Team Manager may appeal any decision of the Clerk of the Course to the Jury by lodging a written Notice of Appeal with the Clerk of the Course within one hour of the notification of the decision. The Notice of Appeal must detail the grounds for the appeal. An appeal fee of AUD\$500 will apply.

3.32.4 Protest/appeal fees will be returned if a protest/appeal is upheld.

3.32.5 The Jury may take advice from any party about the incident giving rise to a decision being appealed.

3.32.6 A decision of the Jury is final and binding.

3.32.7 A decision of the Jury must be conveyed to the Team Manager lodging the appeal within one hour of reaching the decision and confirmed in writing within 12 hours to all parties to the appeal including the Clerk of Course.

## 4 ACHIEVEMENT AND CELEBRATION

### 4.1 EVENT RESULTS

- 4.1.1 Results published throughout the duration of the Event are provisional. Results will not be final until after the determination of any outstanding protests and appeals.

### 4.2 COMPLETING THE COURSE

- 4.2.1 To complete the course, the Competition Vehicle must be driven the entire designated route in accordance with the Regulations.
- 4.2.2 A marshalling point will be established a few kilometres before the finish line. The finish time for the journey will be determined at the marshalling point.
- 4.2.3 The Competition Vehicle must drive to the finish line, escorted by vehicles provided by the Event Organiser. Other Team vehicles will be directed to a long-term parking location.
- 4.2.4 The goal for all competing Teams is to be the first to complete the route.

*To complete the route, Teams must drive their Competition Vehicle all the way from the official start line in Darwin to the official finish line in Adelaide and must still be competing when they arrive in Adelaide.*

- 4.2.5 An urban area reference point will be established at the start of the Adelaide urban area. The location will be published in the official route notes. If Team A can keep up with traffic and is overtaken by Team B after the urban area reference point, the arrival time of Team B at the marshalling point will be adjusted to be one minute behind the arrival time of Team A. If Team A is overtaken by Team B and Team A is unable to keep up with traffic at any point after the urban area reference point, the arrival time of Team B will not be adjusted.
- 4.2.6 Any unserved time penalties must be served at the marshalling point.
- 4.2.7 The **Challenger Cup** will be awarded to the **Challenger** Team that completes the route with the earliest finish time (arrival time at the Adelaide marshalling point plus any unserved penalty time).
- 4.2.8 The **Cruiser Cup** will be awarded to the **Cruiser** Team that completes the route with the earliest finish time (arrival time at the Adelaide marshalling point plus any unserved penalty time).
- 4.2.9 Teams in each class that complete the route will be ranked by finish time (arrival time at the Adelaide marshalling point plus any unserved penalty time).
- 4.2.10 Teams that do not complete the route will be ranked behind Teams in their class that complete the route. They will be ranked by the number of control stops completed before no longer competing, and within these groups by arrival time at the last control stop completed before no longer competing plus unserved time penalties accrued at any time during the Event.



## 4.3 EXPLORER CLASS

4.3.1 **Explorer** class is non-competitive.

4.3.2 The progress of **Explorer** vehicles will be controlled by the Clerk of the Course.

*Explorer vehicles will be allowed to drive to the finish line only after the first four (4) competing Competition Vehicles have done so.*

4.3.3 Teams in **Explorer** class will not be ranked by performance.

## 4.4 FINISH-LINE ACTIVITIES

4.4.1 Competition Vehicles must be placed on display at the Official Finish Line until 15:00 Sunday 31 August 2025.

4.4.2 Teams must have a minimum of two (2) Team members always present with the Competition Vehicle whilst on display to engage with public.

4.4.3 Other promotional, public engagement and Event activities will be held at the finish line and as per Regulations 1.12.2 and 1.27, any requests to attend or participate are mandatory for all registered Teams. A detailed program will be provided once details are finalised via a Team Notice.

## 4.5 AWARDS

4.5.1 An awards ceremony will be held in Adelaide on the evening of Sunday 31 August 2025 (exact date, time, and location to be confirmed).

4.5.2 Entry to the awards ceremony is by ticket only.

*Tickets for registered team members are included in the team entry fee and pro-rata team member registration fee outlined in Regulation 1.14. Additional tickets (subject to the capacity of the venue) for friends, family, sponsors, and public may be purchased. Further details will be provided in the Team Manager's Guide or via a Team Notice.*

4.5.3 The winner of the **Challenger** class will receive the Challenger Cup; the winner of the **Cruiser** class will receive the Cruiser Cup.

4.5.4 Additional awards may be presented.

4.5.5 The Event Organiser reserves the right not to present an award in any given category.

4.5.6 Each Team will receive a participation award.

4.5.7 All winning Teams must make themselves available for an official media call if required.

## **4.6 PACK-DOWN FACILITIES**

- 4.6.1 Open-air facilities will be made available for repacking Competition Vehicles for shipment. All vehicles (competition or otherwise), containers and equipment must be removed by close of business Wednesday 3 September 2025. Any remaining items will be removed for storage at the Entrant's expense.

# GLOSSARY

<b>ACST</b>	Australian Central Standard Time (UTC + 9.5 hours).
<b>apparent surface</b>	The apparent surface of a lamp includes all parts of the lamp surface that emit light and are not obscured by other parts of the light-emitting surface. See UNECE Regulation 48 for examples.
<b>AS/NZS</b>	Australian Standard / New Zealand Standard.
<b>battery</b>	Electrochemical cells wired in series or parallel and housed in a single container.
<b>CB</b>	Citizen's Band radio.
<b>certifying engineer</b>	A professional engineer engaged by a team to report on compliance with regulations and roadworthiness requirements. The certifying engineer must be qualified to certify vehicles for operation on public roads.
<b>Clerk of the Course</b>	The person responsible for coordinating dynamic scrutineering and the on-road portion of the event.
<b>Competition Vehicle</b>	The vehicle designed, built, and registered by the Entrant, in line with these Regulations, specifically for competing in the Bridgestone World Solar Challenge.
<b>Cruiser Judge</b>	A person invited to make subjective assessment of <b>Cruiser</b> vehicle attributes.
<b>DOT</b>	United States Department of Transport.
<b>Dynamic Scrutineering</b>	The process of checking the Competition Vehicle dynamic attributes (steering, braking, stability etc) for compliance with the Regulations. Held on Saturday 23 August 2025.
<b>Early Entry</b>	A Teams whose Application for Entry was submitted before 17:00 (ACST) on Friday 30 August 2024.
<b>energy storage pack</b>	A rigid self-contained box containing energy storage components, such as electrochemical cells, and components for monitoring, control and isolation.
<b>energy storage system</b>	The Competition Vehicle subsystem used to store energy, comprising one or two energy storage packs and the electrical connections between them.
<b>Entrant</b>	The legal entity that completes the World Solar Challenge Application for Entry and requests a place in the event for one or more teams. An entrant is typically a registered institution, organisation or commercial entity.

<b>Entry Form</b>	The World Solar Challenge Application for Entry form, found on the event website, required to be completed by an entrant to request a place in the event.
<b>Event</b>	The 2025 Bridgestone World Solar Challenge.
<b>Event Organiser</b>	The South Australian Motor Sport Board, South Australian Motor Sport Board (ABN 43 976 679 496), a body corporate pursuant to the South Australian Motor Sport Act 1987 (SA) of Level 5 182 Victoria Square/Tarntanyangga, Adelaide SA 5000
<b>Event Period</b>	Saturday 9 August 2025 to Wednesday 3 September inclusive.
<b>Event Schedule</b>	A detailed list of all event activities. See Regulation 1.12.
<b>EVSE</b>	Electric Vehicle Supply Equipment.
<b>FMVSS</b>	United States Federal Motor Vehicle Safety Standards.
<b>Freight Manual</b>	Documentation providing advice on freighting items into and out of Australia.
<b>GST</b>	Australian Goods and Services Tax.
<b>high voltage</b>	More than 60 V dc or more than 30 V rms ac.
<b>Intellectual Property</b>	All industrial and intellectual property rights including all: (a) know how, trade secrets, copyright, trademarks (whether registered or unregistered), designs, patents, and any right to have confidential information kept confidential.
<b>Judge of Fact</b>	A person recognised by the organiser as able to determine whether an event occurred (e.g., whether a team obstructed traffic).
<b>Juror</b>	A person appointed by the event to resolve disputes.
<b>lateral</b>	In a horizontal plane and perpendicular to the direction of travel.
<b>longitudinal</b>	In a horizontal plane and parallel to the direction of travel.
<b>Mission Control</b>	The Event Organiser's operations centre.
<b>Observer</b>	A category of event volunteer, appointed by the Event as Judges of Fact that travel with the Teams. See Regulation 3.17.
<b>occupant</b>	A driver or passenger in the Competition Vehicle.
<b>participant</b>	A person who has registered to participate in the event as a member of a Team.
<b>PV</b>	Photovoltaic.
<b>Red-Shirt</b>	A senior event official (wearing a red shirt) responsible for overseeing the conduct of the Event.

<b>Regulations</b>	2025 Bridgestone World Solar Challenge Regulations.
<b>Regulation Bulletin</b>	A bulletin that clarifies or amends the Regulations.
<b>Route Notes</b>	Documentation providing directional information with regards to the event route from Darwin to Adelaide.
<b>road-ready</b>	Ready to drive on the road.
<b>Static Scrutineering</b>	The process of checking the Competition Vehicle and other team vehicles for compliance with the Regulations.
<b>Standard Entry</b>	A Team whose Application for Entry was submitted after 17:00 (ACST) on Friday 30 August 2024 but before 17:00 (ACST) on Friday 4 October 2024.
<b>SAE</b>	Society of Automotive Engineers.
<b>SFI</b>	The SFI Foundation issues standards for motor sports equipment.
<b>solar collector</b>	The Competition Vehicle subsystem used to collect solar energy. It is typically an array of photovoltaic cells, with or without concentrators or reflectors, but other types of solar collector are possible.
<b>Team</b>	A group of people registered by the entrant to participate in the event. An entrant may have more than one team participating in the event.
<b>Team Manager</b>	The person in charge of, and responsible for, the actions of a team.
<b>Team Manager's Guide</b>	Documentation providing additional information and advice relevant to participation in the Event.
<b>Team Notice</b>	A notice that provides event information to teams (but does not amend the regulations).
<b>track (overall)</b>	The lateral distance between the leftmost and rightmost tyre contact points.
<b>track (front or rear)</b>	The lateral distance between the two front (or two rear) tyre contact points
<b>tyre contact point</b>	The point at the centre of a tyre contact patch where a tyre touches the ground.
<b>UHF</b>	Ultra High Frequency. Commonly refers to Australian two-way radio operating on the Citizens Band.
<b>UNECE</b>	United Nations Economic Commission for Europe, responsible for regulations for motor vehicles.
<b>UTC</b>	Coordinated Universal Time.

**VIN**

Vehicle Identification Number.

**wheelbase**

The longitudinal distance between the frontmost tyre contact point and the rearmost tyre contact point.