2015 REGULATIONS

18-25 OCT 2015

BRIDGESTONE WORLDSOLAR CHALLENGE

Document Control

Release version 1.2 issued 2 February 2015

Added the name “Bridgestone” where appropriate.

1.12 Schedule dates amended
1.9 Chief Scrutineer updated
1.27.1 Renumbered due to typographic error
1.28 Incorporated clauses 9/10/11 from Bulletin 1/2014 (as appended).
1.29.1 Dot point – Logistics Information added to Group C
2.11.1 Clarified that approval must be in accordance with 2.11.2
2.21.4 changed word ‘for’ to ‘while’
2.22.19/20 Renumber due to typographic error
2.22.20 Word ‘inbound’ changed to ‘impound’
3.2.1 Renumbered due to typographic error
3.3.1 Words ‘or exceed’ deleted, added footnote for clarity.
3.8.9 Footnote updated
3.37.5 Words ‘while charging’ added for clarity.
4.4 Date corrected

E&OE

Introduction & Welcome

The purpose of the World Solar Challenge is to stimulate research into, and development of, sustainable transport, meaning that the World Solar Challenge is primarily a design competition. The regulatory philosophy is to provide the parameters upon which to base the design, rather than specify exactly how each is to be achieved. Science and technology evolve and to encourage the most innovative ideas, so too do the event requirements. It is the established practice for the detailed requirements and dates of the competition to be announced on World Environment Day (June 5) in the year preceding the event.

Participation in the 2015 World Solar Challenge calls for the design and construction of a Solar Electric Vehicle within the given design parameters, and driving the Solar EV across the continent of Australia in accordance with these regulations.

The information contained herein is written for the purposes of conducting the 2015 World Solar Challenge and must not be regarded as constituting definitive instructions as to how a Solar EV should be constructed or operated.

Changes for 2015 include:

- The introduction of new media and Intellectual Property rules.
- Control Stop activities have been redefined. Teams may not do any work on their car during control stop time.
- Solar EV size limits will apply to charging as well as driving. Teams may not reconfigure solar collectors outside the dimensions of the car, or employ charging stands or cables carried by support vehicles.
- Cruiser Class scoring has been adjusted, and charging from the grid will be allowed only in Alice Springs.
- Document submission has been staggered to make compliance easier, and a new ‘General Specification’ document introduced to capture essential information in one place.
- The size of the frontal area signage requirement has been reduced, and its visibility criteria redefined, to make compliance easier.
- Electrical isolation requirements have been changed to make it easier to supply low voltage to the Solar EV when the high voltage system is isolated, and at the same time define a ‘safe state’ as the vehicle system default.
- A requirement to make provision for a data logging device has been introduced.

In addition, a number of operational changes will be made to make monitoring progress and publishing results more efficient and new procedures will be introduced to deal with penalties.

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

- Administration
- Innovation (technical and structural design parameters)
- Adventure (the On-Road protocols)
- Achievement and celebration.

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

Section 1 - Administration

1.1 Scope

1.1.1 These regulations apply to the 2015 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 Organiser as being part of the Event.

1.1.2 The Event will be conducted under the regulations described in this document (which supersede regulations for any previous World Solar Challenge) and any Further Regulations or Bulletins that may be issued.

1.2 Organisation

1.2.1 All correspondence shall be conducted in English, the Official Language of the Event.

1.2.2 Official correspondence will only be conducted between The Organiser and the Entrant's nominated representative, as detailed by the Entrant on the Entry Form. Written instruction to include others in team correspondence will be accepted.

1.2.3 The Event will be conducted in accordance with the published schedule of activities (see Regulation 1.12).

1.3 Time Zones

1.3.1 At the time of the Event, Darwin and the Northern Territory observe Australian Central Standard Time (ACST=UTC+9.5) while Adelaide and South Australia observe Australian Central Daylight Time (ACDT=UTC+10.5). The Event will observe ACST (Darwin time) throughout the journey to Adelaide.

1.3.2 After arrival at the Finish Line, all activities will be conducted in ACDT (Adelaide Time).

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—a distance of approximately 3000 km. This activity is conducted under all applicable traffic codes, laws and regulations.

1.4.2 Event related activities in Australia, including any conducted prior to the official commencement of the Event, are governed by the relevant statutory regulations, breaches of which may incur event penalties.

1.5 Eligibility

1.5.1 Applications for participation are invited from any team prepared to meet the standards and obligations of the competition. Eligible vehicles will be those who meet the design criteria described by these Regulations, and have been granted the Conditional Registration required by the civil authorities.

1.6 Entrant Obligation

1.6.1 Entrants are required to know and understand the Regulations of the Event and participation will constitute their full acceptance.

1.6.2 The Manager of each Team is responsible for the actions of Team Members, and other individuals associated with the Team.

1.6.3 Entrants are expected to 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 which could bring the Event into disrepute.

1.7 Event Organiser

The event is organised by the South Australian Motor Sport Board ('the Organiser').

The Registered Office is:
World Solar Challenge
South Australian Motor Sport Board
Level 1/164 Fullarton Road
Dulwich, South Australia, 5065

Postal address: PO Box 663,
Kent Town, South Australia, 5071

Telephone: +61 8 8212 8500
Facsimile: +61 8 8212 6700
E-mail: admin@worldsolarchallenge.org
Web: www.worldsolarchallenge.org

ABN: 43 976 679 496

The event is owned by the Government of South Australia.

1.8 Organising Committee

The Organising Committee is:

Chief Executive (SAMSB)	Mark Warren	
Event Director	Chris Selwood	
Event Manager	Kathryn Lee	
Faculty	Dr David Rand AM ScD FSTE	Prof. John Storey
	Paul Gwan	Dr David Snowdon
	Dr Peter Pudney	Dr John Ward
Faculty Support	Wendy Matthews	

1.9 Officials of the Event

The Officials of the Event are:

Event Director	Chris Selwood
Clerk of the Course	To be announced in Further Regulations
Assistant Clerks of the Course (Red Shirts)	To be announced in Further Regulations
Control Stop Managers	To be announced in Further Regulations
Paddock Manager (Hidden Valley)	To be announced in Further Regulations
Secretary of the Event	To be announced in Further Regulations
Chief Safety Officer	To be announced in Further Regulations
Chief Medical Officer	To be announced in Further Regulations
Chief Competitor Liaison Officer	To be announced in Further Regulations
Chief Energy Scientist	Dr David Rand AM FSTE
Chief Scrutineer	Paul Gwan
Chief Timekeeper	To be announced in Further Regulations
Chief Steward	Roger Brown
Technical Steward	Dr Peter Pudney
International Steward	To be appointed by the International Solarcar Federation
Cruiser Class manager	Dr David Snowdon (Dr Cruise)

1.10 Judges of Fact

1.10.1 Officials appointed by the Event are considered to be 'Judges of Fact' on all Event related activities.

1.10.2 Observers (see Regulation 3.14.1) appointed by the Event are considered to be 'Judges of Fact' on all Event related activities.

1.11 Stewards

1.11.1 The Stewards of the Event are the only authority empowered to make a decision concerning the interpretation of the Regulations of the Event.

1.12 Schedule

Action	Date	Comment
2015 Regulations published	5 June 2014	
Application for Entries Open	5 June 2014	On publication of the Regulations
Application for Entries Close	27 March 2015	Noon, Adelaide time
Entry list published	5 June 2015	
Draft Group A Documentation	30 April 2015	Online submission
Group B Documentation	30 June 2015	Online submission
Final Group A Documentation	31 July 2015	Online submission
Group C Documentation	31 August 2015	Online submission
Group D Documentation	12 October 2015	To be presented during scrutineering
Event Headquarters Open - Darwin	6 October 2015	
Official Event Period commences	6 October 2015	
Team Manager Briefing	12 October2015	
Static Scrutineering commences	13 October 2015	
Team Briefings commence	13 October 2015	
Official Team Function	16 October 2015	
Dynamic Scrutineering commences	17 October 2015	

Media Briefing	17 October 2015
Ceremonial Start in Darwin	18 October 2015
Ceremonial Finish opens in Adelaide	22 October 2015
Cruiser Class Public Judging	24 October 2015
Award Ceremony	25 October 2015
Pack down area closes	27 October 2015

1.13 Entering the Event

1.13.1 Application for participation must be made on the approved form, available on the World Solar Challenge website, and signed by an authorised person.

1.13.2 Applications may be made from the time these regulations are published, until noon on Friday 27 March 2015 (Adelaide time), or such other time as the Organiser may determine. The number of places is limited. Applications received after the limit is reached may be placed on a reserve list.

1.13.3 To encourage early application, places granted before 30 September 2014 will qualify for a discount and other benefits.

1.13.4 When the offer of a place is made, the Entrant will have 7 days to accept the offer.

1.13.5 Once an offer has been accepted, The South Australian Motor Sport Board will issue an invoice for payment of the Entry Fee, payment of which, by the due date, will confirm the entry.

1.13.6 Any invoice which has not been paid by the due date will void the entry.

1.13.7 The Organiser reserves the right to accept or reject any entry without explanation.

1.13.8 The Organiser reserves the right to accept late entries, and apply a late entry fee.

1.13.9 Entrants who do not satisfy the Chief Scrutineer that they will achieve compliance with the Regulations will fail to qualify for the Event and their place may be offered to a Team on the reserve list.

1.13.10 The Organiser is unable to take responsibility for any person born after 1 October 1997. If an Entrant wishes to have a person under the age of 18 in their team, written permission to participate in the Event, acknowledging that supervision is the responsibility of the Team Manager, must be given by the parent or legal guardian of any such proposed participant, and signed by both them and by the Team Manager.

1.14 Team Members

1.14.1 Each Team must include (but not be limited to):

- a Team Manager
- an interpreter if the Team Manager is not proficient in English
- at least two and at most four Solar EV drivers
- at most eight registered Solar EV passengers (for Cruiser Class)
- a Safety Officer
- a Battery Officer

- at least two drivers for each team support vehicle.

1.14.2 Each Team Member must register online, and be physically present at Team Registration in Darwin.

1.15 Solar EV drivers

1.15.1 Each Solar EV driver must hold an appropriate motor vehicle driver's licence recognised by Australian authorities valid for not less than the total period of the Event. Driving licences will be inspected and verified by the Australian Road Transport Authorities as part of the scrutineering process.

Acceptable driving licences will 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.

1.15.2 All Solar EV drivers must have a minimum experience of 12 hours driving the Solar EV, as demonstrated by the presentation of a logbook and a signed declaration by the Team Manager.

1.16 Team Identification

1.16.1 Team and Solar EV names will be taken from the Entry Form. Any change will be subject to the approval of the Organiser.

1.16.2 Each Team will be allocated a Team Number on acceptance of entry.

1.16.3 Early bird registrants may make a special request for the use of a particular Team Number. Requested numbers should contain two digits. '01' is the privilege of the current holder of the World Solar Cup.

1.16.4 Allocation of any number is at the sole discretion of the Organiser.

1.17 Entry Fee

The World Solar Challenge is not a commercial operation. The cost of staging an event over three weeks and 3000 km are significant and the Organiser, whilst cognisant of the cost of participation, recognises that the basic costs of the operation must be borne by the Entrant.

1.17.1 Entry fees are based on the class requested on the entry form. For example if a Challenger Class entrant fails to qualify and is offered a place in the Adventure Class, no refund is payable.

- Challenger Class AU$ 10,000
- Cruiser Class AU$ 10,000
- Adventure Class AU$ 8,000
- Evolution Class Contact Organiser

Figures include Australian tax. An official 'Tax Invoice' will be provided.

1.17.2 Fees invoiced before 30 September 2014 will qualify for a discount of 10%. In the event that the amount remains outstanding after the due date for payment, a supplementary invoice reversing this discount will be issued.

1.17.3 International banking charges are the responsibility of the Entrant. Minor adjustment (up to AU$150) can be settled at registration in Darwin.

1.17.4 Entry requests granted after the close of entries will attract a 10% late fee.

1.18 Other Fees

1.18.1 A Capitation Fee of AU$30 will be levied on each team member travelling from Darwin to Adelaide. The fee will include remote area air-ambulance emergency evacuation insurance, and is payable in Darwin.

1.18.2 A Fee (estimated at AU$50) may be payable to the Motor Accident Commission by the owner of each Solar EV in respect of compulsory third party bodily injury insurance required by operators of motor vehicles.

1.19 Refunds

1.19.1 Refund entitlement is based on date of withdrawal.

Date of Withdrawal	Entitlement
before 27 March 2015	full refund less bank charges
before 30 May 2015	refund less 15%
1 June – 31 August 2015	refund less 50%
after 1 September 2015	no refund
Cancellation or abandonment by Organiser	full refund

1.20 Cancellation of Event

1.20.1 The Organiser reserves the right to cancel or abandon the Event for any reason. The Organiser's liability for costs incurred by an entrant are limited to the amount of the Entry Fee received.

1.21 Insurance

1.21.1 Public Liability Insurance

The Organiser holds a $20,000,000 Public Liability policy which covers registered participants. The cost is part of the Entry Fee.

1.21.2 Compulsory Third Party Injury

The Organiser will arrange for Third Party Bodily Injury insurance required to operate the Solar EV on public roads, a fee for which may be payable by the owner of the vehicle. (see Regulation 1.18.2).

1.21.3 Third Party Property Damage

Cover has been arranged to cover any claims on the Organiser for damage done by your Solar EV during the event. The cost is part of the Entry Fee.

1.21.4 Comprehensive Insurance for personal effects, tools, equipment, Solar EVs 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 agreements covering limited subsidised health services for medical treatment with some countries through Medicare. For more detailed information can be found at www.medicareaustralia.gov.au*. The Organiser will ensure that the costs of remote area evacuation and emergency medical treatment are covered in the event of an accident. As this can be tens of thousands of dollars, the Capitation fee described in Regulation 1.18.1 will be levied on each individual team member travelling from Darwin to Adelaide as part of the event.*

1.22 Permits

1.22.1 Motor vehicles entering Australia require a federal import permit. The Organiser will make bulk application in respect of the Solar EV. Import permit arrangements for other vehicles (including road trailers) are the responsibility of the Entrant.

1.23 Freight

1.23.1 The Organiser will appoint a freight agent licensed by Australian Customs Service.

1.23.2 Freight deliveries to Hidden Valley Motorsport Complex outside the dates of the Event will not be accepted.

1.23.3 Details of all freight, Customs and Quarantine arrangements will be provided to registered teams.

1.24 Visas

1.24.1 Visas are required to enter Australia. Details of visa requirements can be found at www.immi.gov.au.

1.24.2 The Event is registered with the Australian Department of Immigration. Details of how the Organiser is able to support visa applications will be provided to registered teams.

1.25 Vehicle preparation

1.25.1 Preparation facilities will be available at Hidden Valley motorsport complex in accordance with the dates listed in the Schedule (see Regulation 1.12).

1.25.2 Responsibility for all operations at the Hidden Valley site is with the Organiser. Hidden Valley management is unable to assist with early arrivals, pit allocations or freight issues.

Details of all arrangements will be published in the Team Manager's Guide.

1.26 Copyright and Intellectual Property

1.26.1 It is a condition of participation that the Entrant acknowledges that the intellectual property of the Event is owned by the Organiser, and as such the Organiser holds the right to license any and all commercial depictions of the Event in any form, including but not limited to electronic, print or other media.

1.26.2 The Correct Title of the Event is the *Bridgestone* World Solar Challenge. The Correct Title is the *Word Mark* of the Event. Entrants and their sponsors must use the Correct Title in all references to the Event.

The Correct Logo of the Event will be published as an appendix to these Regulations. The Correct Logo will be supported by a Style Guide detailing its conditions of use.

1.26.3 The Word Mark and Official Logo are copyright and Trade Marks held by the Government of South Australia

1.26.4 Registered Entrants and their sponsors wishing to use the Word Mark and Logo in non-commercial publicity may do so in accordance with the requirements of the Style Guide.

1.26.5 Registered Entrants and their sponsors wishing to use the Word Mark and Logo in a commercial context (i.e. merchandise offered for sale) must seek the written permission of the Organiser.

1.27 Sponsorship Obligations

1.27.1 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.

1.28 Media and Promotional Obligations

1.28.1 A Promotional Schedule will form part of the Schedule of Activities. The Promotional Schedule will contain details of Official Media Calls and other promotional activities created for the benefit of Entrants and their sponsors.

1.28.2 Entrants must attend Official Media Calls with the Solar EV and any other Team personal vehicles and/or equipment requested.

Entrants may be requested to support other promotional activities, with the Solar EV, if required.

1.28.3 Registered Entrants must notify the Organiser of public and/or media promotional activities held for or on behalf of their attendance in the Event, not less than 7 days prior to the activity taking place.

Commercial confidence and media embargos will be honoured.

1.28.4 Media travelling with or in support of any Entrant must meet, and act, in accordance with the Event media accreditation requirements.

Entrants will be held accountable, through the application of Event penalties, for the actions of media representatives travelling with or in support of their Team, whether registered or not.

1.28.5 Registered Entrants who maintain an Internet presence are required to provide a link to the official Bridgestone World Solar Challenge website www.worldsolarchallenge.org

1.28.6 By entering the Event, Participants implicitly agree to the use, in perpetuity, of their names, images depictions and technical data of their vehicles, equipment and crew in any publicity material generated by the Event, its sponsors or licensees.

Technical data submitted as part of the qualifying process will be considered confidential before the Event.

1.28.7 The creation and use of any sound recording, still or moving image of the Event for commercial gain or public performance by the Entrant and/or their Sponsor/s is subject to the prior written approval of the Organiser, and the terms and conditions imposed as part of the approval process.

Teams are advised to contact the Organiser prior to entering into any commitment (for example as a condition of individual team sponsorship) for any such commercial arrangement, as failure to observe these conditions may lead to Breach of Copyright action by the State of South Australia.

1.28.8 Non-commercial media content generated by the Entrant must reference the Event in accordance with the provisions of Regulation 1.26.2

1.28.9 Teams or their sponsors shall not engage in any marketing or promotional activity that will materially detract from the value and standing of the sponsors of the event.

1.28.10 Activity by sponsors of teams shall not imply ownership of the event.

1.28.11 Team Managers are responsible for the activities of their sponsor.

1.29 Compulsory Documentation

1.29.1 Each Team must submit the following documentation using the templates provided, by the dates stated in the Schedule (1.12). Documents are divided into three groups. Group A will have both draft and final deadlines.

Group A:

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

Group B:

- Battery Incident Plan
- Team Safety Plan.

Group C:

- (draft) Roadworthiness Certificate
- Observer Arrangements
- Publication-quality information and photographs of the Team and Solar EV.
- Logistics information.

Group D:

- Two printed A4 copies of a diagram (plan view, front of the Solar EV at the top), clearly showing how emergency isolation is to be activated
- The (original) signed Roadworthiness Certificate.

1.29.2 Once the specification of the Solar EV has been lodged and accepted, requests to make changes to items described in the Compulsory Documentation must be sent to the Organiser in writing. If granted, any document submitted by a team will supersede all previous versions.

Section 2 - Technical Regulations for the Solar EV

2.1 Classes

2.1.1 Each regulation applies to all Solar EV Classes unless specified otherwise.

2.1.2 **Challenger Class** Solar EVs are designed for efficiency. They carry a driver only. The winner of the Challenger Class will be the first Challenger Class Solar EV to complete the course in accordance with the Regulations.

2.1.3 **Cruiser Class** Solar EVs are designed for practicality. They must be designed to carry two or more occupants. They will be judged on external energy use, the time taken to complete the course, payload carried, and practicality.

2.1.4 **Adventure Class** allows a team to run a Solar EV that has met the requirements of a previous recognised event, but does not comply with the requirements of the Challenger Class. Adventure Class vehicles must meet the safety requirements of this Event.

2.1.5 **Evolution Class** is a forum for demonstrating vehicles that have been designed, equipped or modified to demonstrate a significant reduction in the environmental impact of their operation. These may be practical or concept vehicles that meet road authority requirements for individually constructed vehicles but not the requirements of the Solar EV classes. The Organiser will determine the eligibility of any vehicle submitted for the Evolution Class.

2.1.6 Evolution Class vehicles must comply with the same regulations as Cruiser Class Solar EVs, with the following exceptions:

- energy sources are not restricted
- energy storage capacity is not restricted
- the energy storage system does not have to be removable from the vehicle.

2.1.7 Evolution Class Entrants may apply to the Organiser for further exemptions.

2.1.8 Solar EVs that do not meet all requirements for Challenger Class may be allowed to run in the Adventure Class.

2.1.9 Solar EVs that do not meet all requirements for Cruiser Class may be allowed to run in the Evolution Class.

2.1.10 The Organiser reserves the right to determine the Class of any vehicle.

The class names and concepts are the intellectual property of the World Solar Challenge. The names may only be used in other events with permission and suitable acknowledgement.

2.2 Solar EV Dimensions

2.2.1 Challenger Class and Cruiser Class Solar EVs must be no more than 4500 mm in length, no more than 1800 mm in width and no more than 2200 mm in height (above the ground) at any time while charging or driving.

2.2.2 Wheels and wheel spats may exceed this envelope while turning. Doors may exceed this envelope while occupants are getting in or out. The solar collector may exceed this envelope when being re-configured for charging or driving. (but not when charging or driving. See Regulation 2.2.1)

2.3 Configuration

2.3.1 Challenger Class and Cruiser Class Solar EVs must be supported by four wheels: two front wheels and two rear wheels. The points of contact between the tyres and the road must be symmetrical about the longitudinal centreline of the Solar EV.

2.3.2 For Challenger Class and Cruiser Class Solar EVs, the distance between the front tyre centres and the distance between the rear tyre centres must each be not less than half the width of the Solar EV while driving.

2.3.3 When seated in a normal driving position, the driver's eyes must be not less than 700 mm above the road.

2.4 Construction

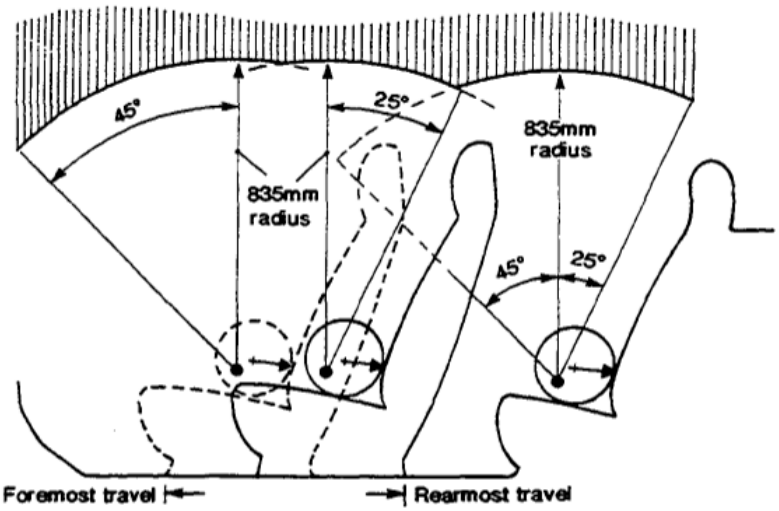
2.4.1 Solar EVs must be constructed or adapted to protect, as far as is reasonably possible, the occupants in the event of collision or roll-over. Steps should be taken to ensure that the structure (such as the solar collector), components or accessories will not impinge on the occupant space in a crash.

2.4.2 Occupants of Solar EVs, whilst seated in a normal driving position, must be enclosed in a safety cage capable of protecting them from a (hypothetical) drop of 1 metre onto a concrete floor, from every orientation.

Forces due to impact are typically calculated by F = E/s, where E is the kinetic energy of the object prior to the collision and s is the distance travelled after impact. Previously we specified a force of 5 m g, where g = 9.8 ms^{-2}. For a 250 kg Challenger Class Solar EV (with driver), this is equivalent to stopping in 0.2 m from a 1 m drop onto concrete or stopping in 4.1 m from speed 20 ms^{-1}.

2.4.3 The Entrant must describe, in the General Specification, how the Solar EV will meet the requirements of Regulation 2.4, and provide details of the steps that have been taken to ensure occupant safety in the event of a collision with a hard surface, a post or pole and with animals.

2.4.4 For Challenger and Cruiser Class Solar EVs, head space must comply with Section LK of the 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 Solar EV structure, including the windscreen, must lie wholly outside the head space. The steering wheel, mirrors, seat backs and head restraints may be in the head space zone.


45°
25°
835mm
radius
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radius
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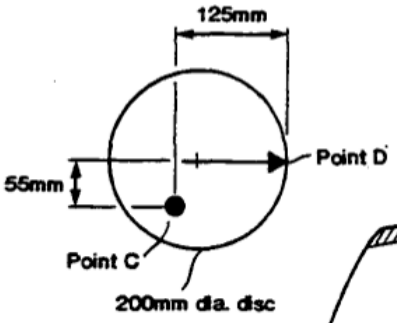
Foremost travel
Rearmost travel


125mm
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Point C
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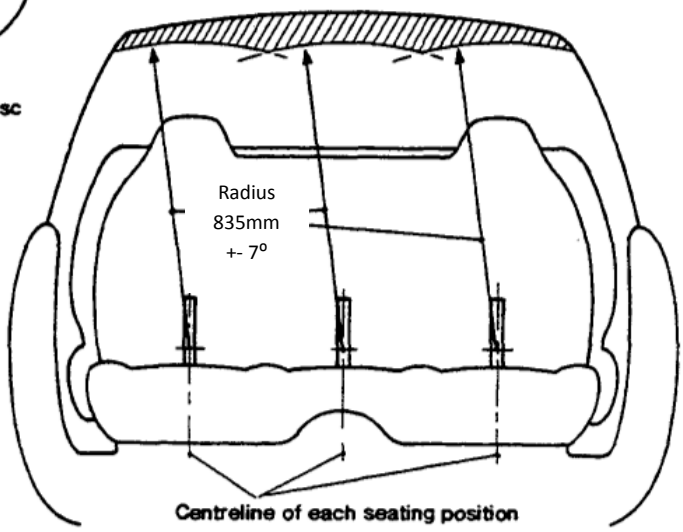

Radius
835mm
+- 7°
Centreline of each seating position

2.5 Occupant Ventilation and Hydration

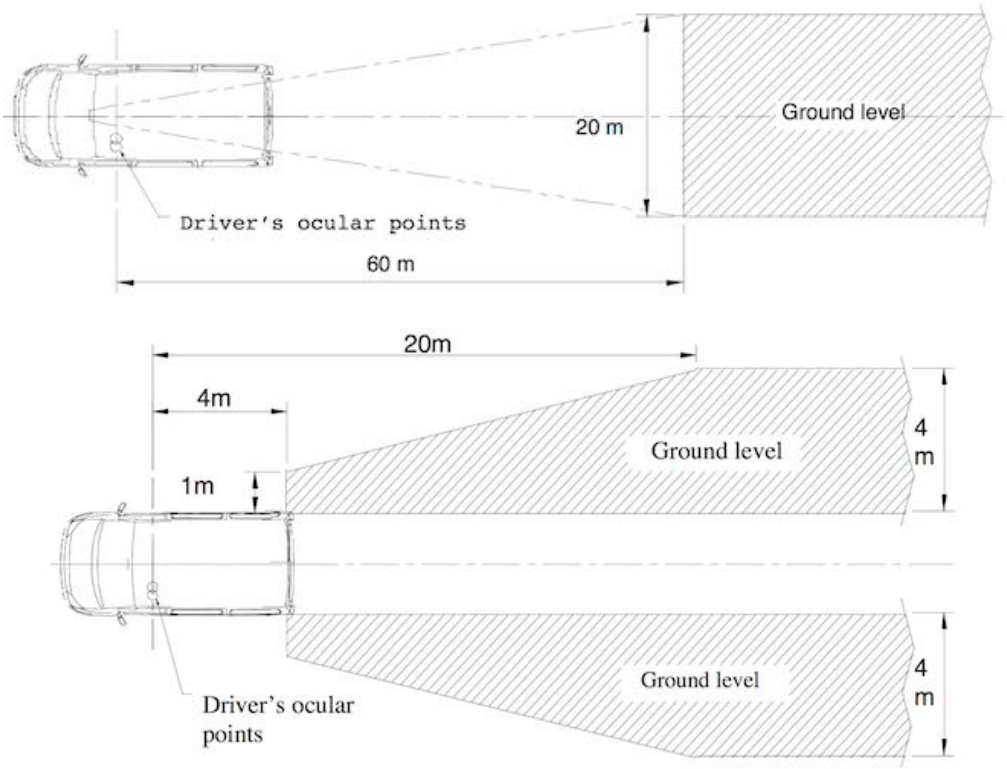
2.5.1 Adequate ventilation and drinking water must be provided to all occupants. Details of the ventilation system must be described in the General Specification Document.

Ambient temperature during the World Solar Challenge can be over 45°C, and the interior of a Solar EV can be 10°C above the ambient temperature. Ventilation, together with adequate hydration, is particularly important to allow Solar EV occupants to maintain a healthy body temperature.

2.6 Vision

2.6.1 The driver, when seated in the normal driving position with both seatbelt and helmet, must have clear forwards vision. For Challenger and Cruiser Class Solar EVs, the driver must be able to see every point between 0.40 m below eye level and 0.70 m above eye level at a distance of 4.0 m from the driver's eyes, at every forward angle.

2.6.2 The Solar EV must have rear vision systems that enable the driver to see the shaded areas shown from the normal driving position with the seatbelt fastened (UNECE Regulation 46, Section 15).



2.6.3 Rear vision systems may be electronic, mirrors, or both. Rear vision systems must operate whenever the Solar EV is in motion under its own power. Rear vision images must be oriented so that objects on the right of the Solar EV are on the right of the image.

2.6.4 All windows must be made of a material that is highly resistant to breakage or major damage. Windows that are necessary to ensure the driver's field of view must be made of transparent material that does not distort vision or colour.

2.6.5 Windows must have an optical transmittance not less than 75% (UNECE Regulation 43).

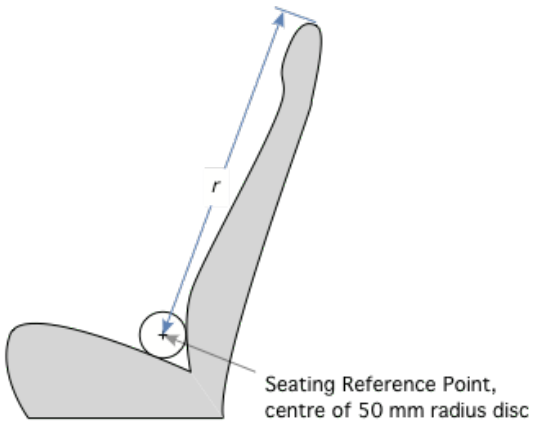
2.7 Seats

2.7.1 Each occupant must be provided with a forward facing seat that consists of a base (squab) and backrest.

2.7.2 Cruiser Class Solar EVs must have two or more seats.

2.7.3 For Challenger Class and Cruiser Class Solar EVs, each seat must have a head restraint. The distance from the Seating Reference Point to the top of the head restraint must be not less than 800 mm for front seats and not less than 750 mm for rear seats (UNECE Regulations 17 and 25).

2.7.4 For the purpose of the Event, the Seating Reference Point will be approximated as shown in the diagram below, and the top of the head restraint must be outside a radius *r* = 800 mm for front seats and outside a radius *r* = 750 mm for rear seats.



2.7.5 For Challenger Class and Cruiser Class Solar EVs, each occupant's heels must be below the seating reference point, and the angle between the shoulders, hips and knees must be not less than 90 degrees.

2.7.6 Seatbelts must be fitted for each seating position. Seatbelts must be compliant with UNECE Regulation 16 or US FMVSS 571.209 (or equivalent) and display the appropriate compliance marking.

2.7.7 Seatbelts must be fitted and used in according to the manufacturer's instructions.

2.7.8 For Challenger Class and Cruiser Class Solar EVs, seatbelt anchorages must meet the intent of UNECE Regulation 14.

Section LK of the Australian National Code of Practice for Light Vehicle Construction and Modification gives examples of how this can be met.

2.7.9 Provision must be made to secure driver and passenger ballast (provided by the Organiser during Static Scrutineering) within 300 mm of each seated occupant, and easily accessible by the Observer.

As a general guide, the density of the provided ballast is about 1.5 kg/L.

2.8 Doors and openings

2.8.1 Teams must demonstrate that all occupants (one per seat) can exit the Solar EV in less than 15 seconds without assistance.

2.8.2 Challenger and Cruiser Class Solar EVs must have doors or access points that can be secured and released from both inside and outside the Solar EV.

2.8.3 Emergency opening points, and the method of opening, must be clearly indicated on the exterior of the Solar EV.

2.8.4 Securing of any door, canopy or hatch canopy or hatch, required for occupant egress, with adhesive tape is not permitted.

2.9 Brakes

Braking requirements for Solar EVs are based on UNECE Regulation 13-H.

2.9.1 The Solar EV must be equipped with two independent mechanical braking systems, so that if one system fails the other can still bring the Solar EV to a halt.

A regenerative braking system does not contribute to the requirement of Regulation 2.9.1.

2.9.2 Independent braking systems may share components deemed 'not liable to failure' provided that they are amply dimensioned and readily accessible for maintenance.

2.9.3 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.

Hydraulic brake hoses and lines are regarded as liable to failure. In general, bicycle brakes are not sufficiently dimensioned to be regarded as not liable to failure.

2.9.4 Mechanical braking effort must be applied to at least two wheels.

2.9.5 Braking must not cause the Solar EV to yaw.

2.9.6 For Solar EVs without anti-lock brakes, the front wheels must lock up before the rear wheels.

2.9.7 The Solar EV must be able to stop within distance $0.1\,v + 0.0060\,v^2$ metres from any speed v, in km/h, that the Solar EV can achieve, up to 100 km/h.

2.9.8 Braking performance will be tested at Dynamic Scrutineering. Each Team must demonstrate that they can stop their Solar EV in less than 20 m from 50 km/h.

2.9.9 Cruiser Class Solar EVs must be equipped with a park brake that is capable of holding the gross vehicle mass on a 20% gradient.

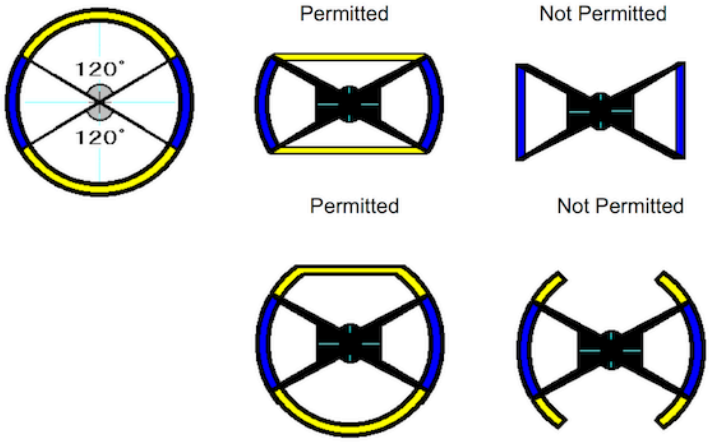
2.10 Steering

2.10.1 The steering system must have minimal backlash, and be designed with adequate strength and stiffness to assure good driving control in all circumstances.

2.10.2 The Solar EV must be able to make a U-turn in either direction within a 16 m lane, kerb to kerb.

2.10.3 Rear wheel steering (if fitted) must not compromise the control of the vehicle under any circumstances, including emergency manoeuvres or following failures such as tyre blowouts. Teams designing Solar EVs with rear wheel steering must describe, in the General Specification Document, how these requirements are met.

2.10.4 The steering system must be controlled by a steering wheel which conforms to one of the following permitted designs.



2.10.5 Failure of any non-mechanical component of the steering system must not prevent effective steering of the Solar EV.

2.10.6 Steering shafts must be designed so that they will not spear the driver in a crash.

A collapsible boss is an acceptable way to reduce steering wheel impacts.

2.11 Tyres

2.11.1 Solar EVs must be fitted with tyres that are:

- compliant with UNECE Regulation 30, UNECE Regulation 75 or US FMVSS 571.109, as indicated by DOT or E approval marking on the tyre; or
- otherwise approved by the Organiser. (see 2.11.2)

2.11.2 Teams wishing to use tyres that do not have appropriate approval markings must be approved by the Australian Road Traffic Authorities.

The Organiser will administer this process which requires the manufacturer to submit a sample tyre and written technical specifications to the Organiser's office not later than 30 April 2015. A positive outcome to the approval process, which may take up to three months, is not guaranteed.

2.11.3 Tyres must have a tread depth of at least 1.5 mm, and be free of any apparent defect

2.11.4 All front tyres must be of the same type. All rear tyres must be of the same type.

2.11.5 Tyres must be rated to withstand the loads and forces imposed by the Solar EV mass, speed, steering and braking, and must be used in accordance with their manufacturer's recommendations at all times.

2.12 Lights and indicators

Headlamps, retro-reflecting devices, illumination for rear registration plates, end outline lamps, fog lamps, reversing lamps and parking lamps are not required for the Event.

2.12.1 Rear stop lamps and front and rear direction indicators (turning indicators) are required.

2.12.2 Stop lamps must emit red light. Direction indicators must emit amber light.

2.12.3 For Challenger Class and Adventure Class Solar EVs, lamps must be clearly visible, in sunlight, at a distance of 30 m.

2.12.4 For Cruiser Class Solar EVs, lamps must be compliant with UNECE Regulations 6, 7 and 37 or the SAE/DOT equivalents, and must have UNECE or SAE/DOT compliance markings.

Cruiser Class Solar EVs that are registered for on-road use in their home country may apply for an exemption from this requirement.

2.12.5 For Challenger and Cruiser Class Solar EVs, lamps must comply with the following requirements (UNECE Regulation 48):

2.12.5.1 Direction indicator lamps must be within 400 mm of the extreme outer edge of the Solar EV on each side, at least 600 mm apart (400 mm apart if the Solar EV is less than 1300 mm wide), and not less than 350 mm above the ground. They must be visible 15° up, 5° down, 80° outward and 45° inward.

2.12.5.2 Brake lamps must be at the rear of the Solar EV, within 400 mm of the extreme outer edge of the Solar EV on each side, at least 600 mm apart (400 mm apart if the Solar EV is less than 1300 mm wide), and not less than 350 mm above the ground. They must be visible 15° up, 5° down and 45° to the left and right.

2.12.5.3 An eye-level brake lamp is required. Viewed from behind the Solar EV, the lateral position of the lamp must coincide with the visual centre of the Solar EV (typically the centreline of the canopy or rear windscreen). The lamp must be higher than a point 150 mm below the rear windscreen or canopy. The lamp must be visible 10° up, 5° down and 10° to the left and right.

2.12.6 Direction indicators must flash at 90±30 flashes per minute.

2.12.7 It must be possible to flash the left and right direction indicator lamps simultaneously, as a hazard warning signal.

2.13 Reversing mechanism

2.13.1 Cruiser Class Solar EVs must be able to be driven backwards under their own power with the driver seated in the normal position.

2.14 Horn

2.14.1 An audible warning device must be permanently fitted to the Solar EV. It must be capable of giving sufficient audible warning of the presence of the Solar EV, and have a constant amplitude and frequency (UNECE Regulation 28).

2.15 Instrumentation

2.15.1 Instrumentation must be provided to continuously inform the driver of the speed of the Solar EV and provide instant warning if the battery exceeds its operating parameters. (see Regulation 2.22.6)

2.16 Vehicle Control

2.16.1 Any cruise control function must automatically deactivate when the brake or accelerator pedal is operated, and when the main switch is turned off.

2.17 Identification

2.17.1 The Solar EV must have a unique Vehicle Identification Number (VIN), which must be permanently attached to a substantial part of the Solar EV chassis or frame.

For the purposes of the Event, this does not need to be a 17 digit VIN that meets ISO 3779

2.17.2 Solar EVs that pass scrutineering will be issued with a Northern Territory Government licence plate (aluminium, 215 × 97 mm, fees apply), which must be displayed on the Solar EV so that it can be read from behind the Solar EV.

2.17.3 For Challenger Class and Cruiser Class Solar EVs, the licence plate must be mounted without bending it and with its normal not more than 10 degrees from the direction of travel, with the baseline of the lettering horizontal.

2.18 Compulsory Signage

2.18.1 An unbroken rectangular space, 200 mm in height × 500 mm in width must be provided on each of the left and right sides of the Solar EV for Event signage. Each of these spaces must be clearly visible to a person standing 5 m to the corresponding side of the Solar EV. The Organiser will provide Event signage to qualifying Teams in Darwin.

2.18.2 Teams must display their Team Number on the left and right of the Solar EV, in digits that are not less than 150 mm high and clearly visible against their background to a person standing 5 m to the side of the Solar EV.

2.18.3 Challenger Class and Cruiser Class Solar EVs must have an unbroken front signage area, 600 × 150 mm, at the front of the Solar EV. The Event logo; name of the Entrant; name of the Team and the name of the car should be placed at the leading edge. The entire front signage area must be visible in both plan view and in front elevation view. The front signage area may be wrapped around the compound curvature of the Solar EV body, but the minimum distance along the surface between the left and right edges of the front signage area must be not less than 600 mm and the minimum distance along the surface between the upper and lower edges of the front signage area must be not less than 150 mm. The front signage area must not contain solar collectors.

2.18.4 A 150 × 150 mm Event Logo must be placed within the front signage area. Artwork will be available (From March 2015) for teams wishing to incorporate the Event Logo in vehicle coatings. Event Logo stickers will be provided to other Teams at scrutineering.

2.18.5 The national flag of the country of entry must be displayed on the Solar EV, fixed adjacent to the windscreen. Minimum size is 70 mm × 40 mm.

2.19 Electrical

- *Electrical 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.

2.19.1 All high-voltage parts must be protected by covers or protection grills that are reliably secured and marked with the approved high voltage symbol.

2.19.2 Covers that can be reached by Solar EV occupants while driving must be designed to exclude objects larger than 1 mm diameter (Ingress Protection rating IPXXD).

2.19.3 All high voltage covers must be designed to exclude fingers (Ingress Protection rating IPXXB).

2.19.4 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.

2.19.5 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.

2.19.6 Exposed carbon fibre is considered to be an exposed conductive part and so must be isolated from the energy storage system and from the solar collector.

Teams should regularly check that there is no electrical breakdown between either side of the energy storage system and any exposed conductive part, or between or any part of the solar collector and any exposed conductive part.

2.20 Electrical 'Safe State'

2.20.1 The Solar EV must have a Safe State which minimises the risk of electrical fire and electric shock to occupants, team members, emergency response personnel or bystanders.

2.20.2 When in the Safe State:

- All conductors emerging from the energy storage packs must be galvanically isolated from the energy storage devices inside those packs.
- No conductors emerging from the energy storage packs or solar collector may carry high voltage, even though galvanically isolated.
- All conductors emerging from the solar array must be isolated from all circuitry in the rest of the car by one or more a mechanical switches or contactors.

If the solar control electronics (such as MPPTs) are physically close to the solar cells, teams may request permission from the Chief Scrutineer to deem these components to be part of the solar collector. Requests for such approval (which must include electrical diagrams and fitment drawings) must be submitted no later than 30 March 2015 in order that the Draft Group A Documentation deadline may be met.

2.20.3 All wires, connectors and electronics modules (such as MPPTs) which remain at high voltage when in Safe State must be double insulated.

Double insulated components must meet the AS3001/IEEE 100 (UNECE100) definition of double insulation as comprising both basic insulation and supplementary insulation. A single layer of reinforced insulation is also acceptable. The surfaces of a photovoltaic cell are deemed to be double insulated if properly encapsulated. Unencapsulated surfaces of pv cells, interconnects and associated wiring must be double insulated.

2.20.4 All mechanisms for placing the Solar EV into Safe State and maintaining Safe State must employ mechanical switches or 'Normally Open' contactors designed to be fail-safe; if an electrical activation mechanism fails, the Solar EV must automatically place itself into Safe State immediately, and must remain in Safe State indefinitely

2.20.5 The driver must be able to place the Solar EV into Safe State while seated in the normal driving position and without releasing the seatbelt.

2.20.6 Contactors and switches must be rated to break dc fault currents.

2.20.7 For emergency use, an activation device that immediately places the Solar EV into Safe State must be provided on the exterior of the car. The activation device must be placed within a yellow disc with a minimum diameter of 180 mm. Also in the yellow disk must be a blue equilateral triangle (minimum side length 150 mm) containing 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).

2.20.8 The yellow isolation disk containing the activation mechanism must be clearly visible to a person standing next to the car. If the windscreen is central or on the left of the Solar EV then the yellow disk must be on the left side of the windscreen and within 50 mm of the base of the windscreen; if the windscreen is on the right of the Solar EV then the yellow disk must be on the right side of the windscreen and within 50 mm of the base of the windscreen.

2.21 Energy sources

2.21.1 For Challenger Class and Adventure Class Solar EVs, solar irradiation received directly by the Solar EV is the only external energy source that may be used by the Solar EV.

2.21.2 For Cruiser Class, solar irradiation received directly by the Solar EV, or the electricity supplied at the designated charging location, are the only external energy sources that may be used by the Solar EV.

2.21.3 Devices used to concentrate solar irradiance may be used, provided that they are a permanent part of the Solar EV and the configuration of the car does not exceed the dimensions specified in Regulation 2.2.1

2.21.4 With the exception of a power cord required to connect a Cruiser Class Solar EV to an external power source, any items or equipment required while charging must either be part of, or carried by, the solar EV.

2.21.5 For Cruiser Class, the safety requirements for any device used to recharge the energy storage system are:

- the charger must be suitable for use with an Australian standard 10 A 230 V 50 Hz single phase power outlet
- a Residual Current Device must be used
- the charger output must be either permanently wired to the Solar EV high voltage system, or connect to the energy storage system using an appropriate connector
- the charger output must be electrically isolated from the ac input
- the charger must stop charging automatically when the energy storage system is fully charged
- the battery monitoring system must operate while charging.

Australian electricity supply is 230 Vac, 50 Hz. A domestic outlet can supply up to 10 A; 15 A outlets may be available at some caravan parks. 15 A plugs have a wider earth pin than 10 A plugs, and cannot be used in 10 A sockets. Residual Current Devices may not be present on older supply circuits in Australia.

2.21.6 For Challenger Class and Cruiser Class Solar EVs, if the solar collector uses photovoltaic cells then the allowable area of photovoltaic cells is:

- not more than 6.000 square metres for Solar EVs using only silicon photovoltaic cells
- not more than 3.000 square metres for Solar EVs using only GaAs photovoltaic cells.

Challenger Class and Cruiser Class Teams wishing to use other types of photovoltaic cells, a mix of photovoltaic cell types, or other types of solar collector, must contact the Organiser.

2.21.7 The area of photovoltaic cells will be determined by summing the exposed surface area of the component photovoltaic cells. Teams must supply sufficient information to enable the scrutineers to determine compliance with this regulation. The minimum requirement is:

- documentation showing the make, model, type, size and number of component cells
- calculations summing the total area, calculated to four significant figures
- a drawing, with dimensions, of the cells as fitted to the Solar EV
- a written declaration by a licensed professional in the country of origin (e.g. a professional licensed consulting engineer) that the solar collector complies with this regulation.

2.22 Energy storage

2.22.1 The configuration and characteristics of all energy storage devices must be declared, described in the compulsory documentation and approved by the Chief Energy Scientist.

2.22.2 Batteries used only to:

- power a real time clock when the Solar EV is turned off; or
- retain data when the Solar EV is turned off; or
- power wireless sensors such as tyre pressure monitors

are not considered to be part of the energy storage system.

2.22.3 The total energy capacity of cells allowed by Regulation 2.22.2 must not exceed 2.0 Wh.

2.22.4 Cells allowed by Regulation 2.22.2 may not be replaced or recharged from an external source, but they may be removed if it is unsafe to leave them in the Solar EV.

2.22.5 OEM batteries or cells inside devices such as handheld radios, cameras, mobile telephones or wristwatches that are carried by the driver are not considered to be part of the energy storage system provided that they are not electrically connected to the Solar EV, its instrumentation or control systems.

2.22.6 Instrumentation required to meet Regulation 2.15 must be powered from the Solar EV.

2.22.7 Capacitors are not considered to be part of the energy storage system if their total energy storage capacity is less than 10.0 Wh. Such capacitors must automatically discharge to less than 60 V within five seconds of the Solar EV being placed in the Safe State.

2.22.8 All other energy storage devices are considered part of the energy storage system.

Low voltage power for instrumentation and control may be provided from a dc–dc converter powered from the energy storage system.

2.22.9 For Challenger Class and Adventure Class Solar EVs, if the energy storage system is a secondary electrochemical battery then the sum of the nominal cell masses, as specified and endorsed by the cell manufacturer and approved by the Chief Energy Scientist, may not exceed the following limits:

- Li-ion 20.000 kg
- Li-Polymer 20.000 kg
- $LiFePO_4$ 40.000 kg
- Ni-MH 70.000 kg
- Pb-Acid 125.000 kg.

2.22.10 For Cruiser Class Solar EVs, if the energy storage system is a secondary electrochemical battery then the sum of the nominal cell masses, as specified and endorsed by the cell manufacturer and approved by the Chief Energy Scientist, may not exceed the following limits:

- Li-ion 60.000 kg
- Li-Polymer 60.000 kg
- $LiFePO_4$ 120.000 kg.

Entrants are advised to note that, when ordering cells, there is a requirement for a manufacturer's endorsement in the form of a signed statement confirming the mass of the cell to accompany the consignment. A generic data sheet downloaded from the internet is not acceptable. Further information will be provided to registered Entrants.

2.22.11 Teams wishing to use an energy storage system not covered by the Regulations above must contact the Organiser. The allowable configuration, mass, and any other requirements, will be determined by the Chief Energy Scientist.

2.22.12 If the energy storage system is an electrochemical battery, the Solar EV must be equipped with a battery monitoring system designed to detect any component cell becoming overcharged, undercharged, or too hot. The mechanisms for detecting and handling out-of-range voltages, currents and temperatures must be specified in detail in the Battery Incident Plan.

Other types of energy storage system must have equivalent safety systems designed to prevent uncontrolled release of energy.

2.22.13 Cells must not be removed from an energy storage pack unless it is to mitigate a hazardous situation. Cells may not be replaced or substituted with additional cells. With the exception of cells allowed by Regulation 2.22.2, any cells removed must be replaced by ballast of equal or greater mass. If a cell or module fails, it may be bypassed.

2.22.14 The energy storage system must not exceed two packs.

2.22.15 Energy storage packs must be designed so that they are in a Safe State when removed.

2.22.16 Energy storage packs must be constructed so that each pack can be sealed using tamper-evident plastic seals, similar to 3 mm × 100 mm plastic cable ties. With seals fitted, it must not be possible to remove any cell from a pack without breaking the seal. Seals will be provided and fitted by the Organiser at Static Scrutineering.

2.22.17 Energy storage packs must be securely fixed to the Solar EV, such that the battery will be restrained in a 20 G acceleration.

Cable ties will not meet this requirement.

2.22.18 Chemical spill-proof barriers must exist between the Solar EV occupants and any energy storage pack that could spill liquids if damaged.

2.22.20 Energy storage packs must be provided with a ventilation system that will vent any dangerous gases released from a damaged battery to the exterior of the Solar EV, to the rear of any occupant ventilation intake.

2.22.21 Challenger and Cruiser Class entrants must provide a lockable box suitable for energy storage pack impound.

2.23 Roadworthiness

2.23.1 Each Team is responsible for the roadworthiness of its Solar EV. By submitting an entry, the Entrant declares the Solar EV's integrity and suitability for the Event.

2.23.2 The Entrant acknowledges that the scrutineering process will determine only whether the Solar EV complies with the Regulations.

2.23.3 The Organiser makes no representation that compliance with the provisions of these regulations will mean that the structural, mechanical or systems integrity of the entrant vehicle is safe, roadworthy, or fit for the purpose of participating in the Event.

2.23.4 The Entrant must present a Roadworthiness Certificate, on the approved template and endorsed by a professional licensed consulting engineer in the home country of the Entrant, that the Solar EV has the structural integrity and roadworthiness characteristics suitable for the event.

2.23.5 The Roadworthiness Certificate must be presented to the Road Transport Authority at the time of scrutineering and in support of any application for pre-Event testing permits made to an Australian Road Transport Authority.

2.23.6 The Bridgestone World Solar Challenge is an extreme endurance event. To complete the event in the available timeframe an average minimum progress of 500 km per day is required. Solar EVs unable to keep up with this may be invited to either withdraw, or be carried forwards on a trailer.

Teams wishing to build Cruiser Class Solar EVs that can be registered for general on-road use should consult the road transport authority in their own country to determine any additional requirements.

Section 3 – The Adventure

3.1 Safety

3.1.1 The Team Manager must appoint a Safety Officer to be responsible for the general safety of the Team.

3.1.2 The Team Manager must appoint a Battery Officer to be responsible for the safe operation of the battery and supervising response to any battery emergency.

3.1.3 Battery incident response equipment (see Regulation 3.4.1) must be readily available to any vehicle carrying Solar EV batteries.

3.1.4 Each Team must have at least one member holding a recognised first-aid certificate, current for the duration of the Event.

3.1.5 It is the responsibility of each Team to ensure that the vehicles under their control are maintained in a safe, roadworthy condition and operated safely and within the law at all times.

3.1.6 All Solar EVs and Escort Vehicles are operated and driven at the Team's own risk.

3.1.7 A Team may be excluded from the Event at any time if, in the opinion of a Red-Shirt Official, it is or has been operating the Solar EV, Escort Vehicles, or any other vehicles in an unsafe manner.

3.1.8 Teams must look after the health and safety of their team members. Fatigue and dehydration are serious hazards in this Event. This is especially relevant to all drivers, particularly those of Solar EVs.

3.1.9 Drivers, Team Members, Officials and Observers are to be drug free and maintain a 0% blood alcohol level whilst engaged in any duties associated with the Event.

3.2 Seatbelts

3.2.1 The use of seatbelts is mandatory for all occupants of motor vehicles in Australia, including Solar EVs and support vehicles. The seatbelt requirements for the Solar EV are detailed in Regulation 2.7.

3.3 Helmets

3.3.1 Occupants of Solar EVs must wear helmets that meet DOT or ISO standards for motorcycle helmets. *(as demonstrated by displaying a recognised compliance/approval marking).*

3.3.2 Helmets may not be modified, have unauthorised attachments or be used in any manner contrary to the manufacturer's instructions.

3.4 Safety Equipment

3.4.1 Suitable and appropriate safety equipment must be carried at all times. The minimum safety equipment that must be carried in the Rear Escort Vehicle is:

- first-aid kit (see the Team Manager's Guide for suggested contents)

- safety glasses and gloves for handling batteries
- 2 (min) hazard warning cones
- yellow warning flag, minimum size 300 mm x 300 mm
- suitable fire extinguishers, fire blankets, sand (or similar material) and suitable containers for damaged electrochemical cells
- safety vests
- a whistle.

3.5 Support Vehicles

3.5.1 Each Team must supply a Front and a Rear Escort Vehicle, a means of transporting the Solar EV, and sufficient additional vehicles to transport and support their Team and equipment during the Event.

3.5.2 The minimum requirement for transporting the Solar EV 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 may not be possible. Trailers, in particular, should be booked early.

3.5.3 Each Solar EV must, at all times when in motion on the route, be accompanied by two Escort Vehicles—one immediately in front of the Solar EV and one immediately behind the Solar EV.

3.5.4 A minimum of two drivers must be available for every vehicle associated with the Team.

3.5.5 The Rear Escort Vehicle must not be a bus, truck or large campervan, or be towing a trailer.

The need for Regulation 3.5.5 is based on the identification of the perceived hazard. If traffic approaching from behind sees a large vehicle with a flashing light, and the immediate perception is that that vehicle itself is the hazard, not the Solar EV it is protecting. There is a high risk that such scenario may lead to a member of the public overtaking a large Rear Escort Vehicle only to encounter a previously unseen Solar EV.

3.6 Escort Vehicle Signage

3.6.1 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.

3.6.2 All Team Vehicles equipped with CB radio must carry a sign, visible from 30 m to the rear, advising the CB channel number in use.

3.6.3 A warning sign not less than 900 mm x 300 mm with black lettering on a yellow background, clearly visible from a distance of 30 m, must be displayed on the rear of the Rear Escort Vehicle, stating

CAUTION: SOLAR VEHICLE AHEAD

3.6.4 No vehicle other than the Rear Escort Vehicle may carry such a sign.

3.6.5 Front and Rear Escort Vehicles must be fitted with amber flashing lights visible from all directions from 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.

3.7 Communication

3.7.1 Every Solar EV must have means of two-way voice radio communication with its Rear Escort Vehicle when driving.

3.7.2 Each Team must carry a satellite telephone, and notify the Organiser of its number. This notification will be required at Registration. An external antenna is usually required when using a satellite telephone in a vehicle.

3.7.3 The Front and Rear Escort Vehicles (at least) for each Solar EV must have a UHF CB radio with a minimum of 40 channels, minimum power of 1 W, and compliant with Australian Standards. Teams must monitor the channel they have been assigned at all times while on the road, to facilitate communication with other teams and officials.

UHF CB refers to equipment operating in the 477 MHz band. 27 MHz AM devices or hand-held devices with fewer than 40 channels or devices with power less than 1 W are not compliant with this regulation. Enquiries concerning allowable frequencies for other equipment should be directed to the Australian Media and Communications Authority (www.acma.gov.au).

3.8 Preparation and Testing

3.8.1 The Organiser will provide facilities for team preparation and track testing of Solar EVs at the Hidden Valley Raceway in accordance with the dates listed in the Schedule.

Detailed arrangements will be published in the Team Manager's Guide.

3.8.2 Australian workplace standards will apply to all activities (see www.worksafe.nt.gov.au).

3.8.3 The Organiser will appoint a Paddock Manager and a Track Controller to supervise the facility, whose directions must be followed.

3.8.4 No test driving is to be conducted in the paddock, car park or access roads.

3.8.5 The track must not be accessed without clearance from the Track Controller.

3.8.6 Event penalties will apply for the inappropriate use of any motor vehicle.

3.8.7 The Organiser reserves the right to request a security deposit against damage, rubbish removal or cleaning beyond reasonable expectations.

3.8.8 Teams electing to prepare their vehicles in other locations will be provided with temporary pit facilities to assist their attendance at Dynamic Scrutineering.

3.8.9 Any Team driving a Solar EV on a public road without a permit is liable to civil penalties and exclusion from the Event.

We are working through changes to Northern Territory legislation with the relevant department of NT Government. Although there are some outstanding issues to be resolved there is a willingness to help and we are confident of a positive outcome. Once the requirements and procedures have been agreed, all registered teams will be notified.

3.9 Team Registration and Scrutineering

3.9.1 All participants are required to attend with their team to complete the registration process, and present their Solar EV for the scrutineering process. The scrutineering process is divided into Static and Dynamic operations.

3.9.2 Team Registration and Static Scrutineering will take place at the Royal Darwin Showground (Foskey Pavilion) or such other place as determined by the Organiser at the time and date described in the Schedule.

3.9.3 Teams must attend Registration and Static Scrutineering with:

- the Team Manager, and an interpreter if required
- all Solar EV drivers, with their driving licences and their driver training log books
- any waiver documents required by Regulation 1.13.10
- all Solar EV passengers
- the Safety Officer
- the Battery Officer
- the Solar EV, in a ready-to-start condition
- Front and Rear Escort Vehicles, including any trailer that may be attached to the Front Escort Vehicle, in a ready-to-start condition
- the Solar EV trailer or Solar EV transport truck they intend to use in the event
- The battery charger to be used during the Event (Cruiser Class only)
- tools and personnel required to facilitate inspection of the Solar EV
- a list of all vehicles associated with the team, including make, model, colour and registration number
- Group D compulsory documentation
- a spare Solar EV tyre of each type
- a sample battery 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.

3.9.4 Solar EVs must be transported to Scrutineering on the Solar EV trailer or truck that will be used during the Event.

3.9.5 The Team Manager must attend all Registration and Scrutineering stations. A Team Manager not proficient in English must provide an interpreter to accompany them at all times during this process.

3.9.6 All Team Members must complete their online registration by signing in at Registration.

3.10 Static Scrutineering

3.10.1 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.

3.10.2 Qualification must be achieved in road-ready configuration. Vehicles unable to present at the designated time, or which are not ready to start, may fail to qualify.

3.10.3 Up to seven members of a team (including an interpreter and any team media personnel) may accompany the Solar EV on the scrutineering floor. Team members may be substituted between inspection stations.

Some dismantling (i.e. removal of array or top shell) will be required to facilitate inspection of the following components:

- mechanical systems (including seats, tyres, brakes, steering)
- electrical systems
- energy storage system
- Road transport authority inspection (including presentation of roadworthiness certificate).

Checks and inspections with the Solar EV in a road-ready configuration will include:

- signage
- Solar EV size
- solar collector type and size
- egress—all Solar EV drivers and passengers are required
- vision—all Solar EV drivers are required
- lights, indicators and horn.
- Turning circle

3.10.4 Dismantling and reassembly of the Solar EV required to facilitate inspection of the Solar EV must be conducted (in the sole opinion of the Chief Scrutineer) in a reasonable time.

3.10.5 All energy storage devices must be declared at Static Scrutineering. Failure to declare any energy storage device will lead to disqualification.

3.10.6 The mass of each Solar EV driver or passenger, with helmet and driving clothes, will be determined at scrutineering. If the mass of a driver or passenger is less than 80 kg, ballast provided by the 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 competition and may be hazardous to the health of the individual.

3.10.7 Drivers and passengers may be 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.

3.10.8 Non-compliance penalties may be imposed at the absolute discretion of the Chief Scrutineer, and may include Failure to Qualify.

3.11 Dynamic Scrutineering

Dynamic Scrutineering exercises will be conducted involving speed, stability and braking capability of the Solar EV.

3.11.1 Dynamic Scrutineering will be held at the Hidden Valley Motorsport Complex, or such other place as determined by the Organiser.

3.11.2 No Solar EV may be submitted for Dynamic Scrutineering without having first passed Static Scrutineering.

3.11.3 No Solar EV will be given permission to start until it has passed Dynamic Scrutineering. Any Solar EV failing Dynamic Scrutineering will only be permitted to re-present at the absolute discretion of the Chief Scrutineer.

3.11.4 Dynamic Scrutineering will close at 13:00 Saturday 17th October.

3.12 Modifications or Changes after Scrutineering

3.12.1 Once a Solar EV and its drivers have passed Static Scrutineering, no changes to the design or configuration of the Solar EV (that is, to any items described in the compulsory documentation) or changes to drivers will be permitted.

3.12.2 Once a Solar EV has passed Dynamic Scrutineering, no component exchange, modification or repair of the Solar EV is permitted without the approval of the Chief Scrutineer until after the Official Start.

3.12.3 The Organiser reserves the right to impose 'Parc Ferme' conditions between scrutineering and the start line on any Solar EV.

3.13 Briefings

3.13.1 A compulsory Team Manager meeting will be held in Darwin on Monday, 12 October at a time and place to be advised.

This briefing is for Team Managers only. Team Managers not proficient in English may be accompanied by an interpreter.

3.13.2 A compulsory safety and procedural briefing will be held for the benefit of each team.

All team members must attend the specific briefing that will be held as the concluding activity of each Team's registration and static scrutineering process. It is essential that all members of the Team are present. Teams unable to meet this requirement may fail to qualify.

3.14 Observers

3.14.1 The Organiser will appoint an Observer to travel with each Team. (see Regulation 1.10.1)

3.14.2 Observers may be changed at any time throughout the Event.

3.14.3 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 the correct ballast (as described in Regulation 3.25.2) is in place following each driver or passenger change
- to be satisfied that the energy storage system cannot be charged or interfered with between sunset and sunrise, except as allowed for Cruiser Class Solar EVs

- to notify a Red-Shirt Official at the earliest opportunity if energy storage cells or modules have been changed or an energy storage system seal broken, if any breach of regulation has occurred, or if they have concerns about the actions of the Team.

3.14.4 Observers, as Judges of Fact, may not interpret regulations or give advice to Teams.

3.14.5 Each Team's responsibilities to the Observer are:

- to assist the Observer in their duties at all times
- to provide reasonable food for the Observer at least three times a day, and such drinking water as the Observer may require
- to never leave the Observer alone with the Solar EV
- if requested by the Observer, to send for assistance from the 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.

3.14.6 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.

3.15 Start Line and Grid

3.15.1 The Ceremonial Start of the Event will be held in State Square, Darwin, from 08:15 on Sunday 18 October 2015, or such other place and time as the Clerk of the Course may direct.

3.15.2 Starting position will be determined by Class and performance during Dynamic Scrutineering.

3.15.3 Compliance with the detailed procedural instructions (issued in Darwin), will be mandatory.

3.15.4 All Solar EVs must be in their starting grid position by the appointed time for final inspections.

3.15.5 Any Solar EV not present will have their start time amended.

3.15.6 Teams may not work on their Solar EVs on the start grid.

3.15.7 Two team members must stay with the Solar EV on the start grid to assist officials with final inspections.

3.15.8 Front and Rear Escort Vehicles must be in their designated places by 08:00.

3.15.9 Escort Vehicles must be in position with the Solar EV before entering public roads. Solar EVs which 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 the fact that it is not a realistic expectation for escort vehicle crew members to be able to witness the start and re-join their vehicle to make a timely departure.

3.16 Energy collection

3.16.1 Charging the energy storage system from an unauthorised source will lead to exclusion from the Event.

3.16.2 Cruiser Class Solar EVs may choose to recharge in Alice Springs. The recharge energy will be deemed to be equal to the capacity of the energy storage system.

The Organiser will use its best endeavours to ensure the provision of a dedicated 10 A (230 Vac 50 Hz single phase) power outlet for each Cruiser Class Team in Alice Springs. It is the responsibility of the Team to satisfy themselves that such arrangements are suitable for their needs. Cruiser Class Teams may make other arrangements for charging in Alice Springs.

3.16.3 External devices intended to increase the irradiance on the solar collector must not be used at any time.

3.16.4 From the official start of the on-road component of the Event until finish or withdrawal, the energy storage system may never be removed from the Observer's control.

3.17 Route

3.17.1 The event course will be the major highways between Darwin, Northern Territory, and Adelaide, South Australia—a distance of approximately 3000 km.

3.17.2 One printed copy of Official Route Notes will be provided to each registered Team. Additional copies will be available for download at www.worldsolarchallenge.org from September 2015.

3.17.3 Mandatory control stops will be established along the route.

3.17.4 Any detour signs erected by the civil authorities must be observed and the correct route rejoined at the first opportunity.

3.17.5 The Organiser may change the course at any time.

3.18 Stages

3.18.1 The Challenger Class will be timed in a single stage between Darwin and Adelaide.

3.18.2 Cruiser Class and Adventure Class will be timed in two stages: Darwin to Alice Springs, and Alice Springs to Adelaide.

3.19 Timing

3.19.1 Timing is under the control of the Chief Timekeeper assisted by Officials and Observers.

3.19.2 The Official Start Time on Day 1 for each Class is the time that the first Solar EV in the Class departs the Start Line.

3.19.3 The Official Start Time each day after Day 1 is 08:00.

3.19.4 The Official Finish Time each day is 17:00.

3.19.5 Cruiser Class may have daily start/finish times amended by operational conditions, or advised by the Cruiser Class Manager.

3.19.6 A penalty of one minute will be imposed for each minute taken past Official Finish Time, up to and including 10 minutes past the Official Finish Time. Beyond 10 minutes, each additional minute will attract a two minute penalty. Time penalties incurred in this manner will determine an adjustment of the Official Start Time the following day.

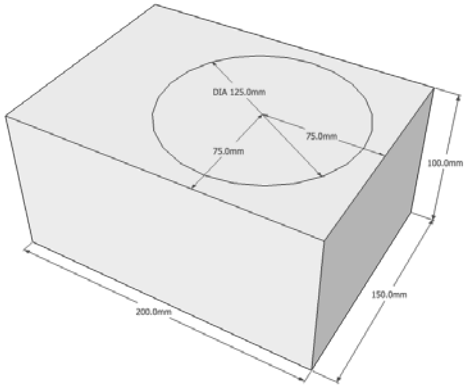
Example: If a team finishes at 17:07 on Day 2, the Official Start Time for Day 3 will be adjusted to 08:07. If a team finishes at 17:13 on Day 2, the Official Start Time for Day 3 will be adjusted by 1 × 10 + 2 × 3 minutes to 08:16.

3.19.7 A Solar EV starting before its Official Start Time will be subject to a penalty of 2 minutes for each offending minute.

3.20 Tracking

3.20.1 Each Solar EV will be required to carry a data logging and tracking device provided by the Organiser.

Provision must be made for a box, maximum dimensions l= 200mm x w=150mm x h=100mm, to be fitted in the Solar EV. The upper face of the box will require a minimum 1.6π steradian view of the sky through a minimum 125mm diameter circular window made of a radio-transparent material. The mass of the unit will not exceed 5kg.



3.20.2 Information concerning progress and operation of the Solar EV may be publicised during the Event.

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

The data logger will be self-powered. It will not require any electrical connection from the Solar EV. The unit will be installed during scrutineering, however to ensure adequate space has been provided, it is strongly advised that a mock data logger box is manufactured to the dimensions shown in the diagram, and model the radio transparency of antennae window in the chosen location. This may be further proved on a completed vehicle by observing the correct operation of any commercially available GPS receiver.

3.21 Driving Conduct

3.21.1 Each Team must ensure that all vehicles associated with their attendance at the Event are driven in a careful and courteous manner at all times. The Organiser reserves the right to determine if any individual is acting de facto as a part of a Team.

3.21.2 The Front and Rear Escort Vehicles must have their amber flashing lights operating whenever they are escorting the Solar EV. Support vehicles must not have amber flashing lights operating if they are not (directly) escorting the Solar EV.

3.21.3 Push starting the Solar EV during competition time is not allowed. A Solar EV considered to be in a hazardous situation may be pushed to a place of safety, providing the activity is recorded by the Observer.

3.21.4 The Front Escort Vehicle must, whilst travelling on the open road, maintain a distance not greater than 500 m, and not less than 2 seconds in front of the Solar EV. The Solar EV must be allowed a safe stopping distance appropriate to the speed and conditions prevailing.

3.21.5 Whilst travelling on the open road, the Rear Escort Vehicle must be not less than 2 seconds and not more than 5 seconds behind the Solar EV, and must at all times maintain a safe stopping distance appropriate to the speed and conditions prevailing.

3.21.6 Solar EVs may not travel between sunset and sunrise.

3.21.7 The Solar EV may not, during Event hours, be pushed, or towed, or carried forward on another vehicle, unless in compliance with the provisions of Regulation 3.22, or abnormal circumstances prevail.

It is the responsibility of each Team to operate the Solar EV safely at all times. Teams may take whatever action they consider appropriate to any given situation, including pushing or towing the Solar EV to safety. It is the duty of the Observer to record the details of such matters, and bring them to the attention of a Red-Shirt Official.

3.21.8 Regenerative power systems must not be on when pushing or towing the Solar EV, under circumstances where pushing or towing is allowed outside of competition hours.

3.21.9 Teams must comply with any requirements imposed by Road Traffic Authorities, Police, or Event Officials.

3.21.10 Solar EVs, Escort vehicles and other team vehicles may be subject to scrutineering at any time during the Event to ensure compliance with the Regulations.

3.22 Trailering

Rather than withdraw or face exclusion, 'trailering' allows teams whose Solar EV is unable to make reasonable progress to maximise their World Solar Challenge experience. The term 'trailer' applies to any means of transport used to carry the Solar EV.

3.22.1 A Team electing to trailer must carry their Solar EV forward to the next Control Stop.

3.22.2 Trailering may occur only between sunrise and sunset.

3.22.3 The Control Stop departure time of any Team who has trailered will be determined by the Clerk of the Course. (A Team who has trailered to a control stop may be held to allow any Team who has not trailered to pass).

3.22.4 Teams who have trailered their Solar EV will be credited with the length of the course driven in the Solar EV.

3.22.5 The Clerk of the Course may impose any other arrangements appropriate to particular circumstances.

3.23 Stopping

3.23.1 No Team vehicle may stop on the road unless required by traffic conditions.

3.23.2 When stopped adjacent to a road, all wheels of all vehicles must be clear of the road.

3.23.3 Wherever possible, vehicles must be parked, and all team activity must occur, at least 10 m from the edge of the road.

3.23.4 Where any activity takes place less than 2 m from the road a Team Member must be placed, in a place of safety, to warn approaching traffic using a yellow flag, and to warn the Team of approaching traffic using a whistle.

3.24 Obstructing other road users

3.24.1 Vehicles associated with a Team must not obstruct other road users. Infringement of this regulation will incur an automatic time penalty of 10 minutes per incident. Repeated infringement (>3) will lead to exclusion from the Event.

3.24.2 All vehicles associated with a Team, with the exception of the Front and Rear Escort Vehicles, must keep a minimum of 500 m from the Solar EV and each other whilst travelling on the open road, so that vehicles can be safely overtaken one at a time.

3.24.3 Where two or more Solar EVs are travelling less than 500 m apart, all Team vehicles with the exception of the Front and Rear Escort Vehicles, must move to allow the competing vehicles and their escorts to proceed unhindered.

3.25 Solar EV drivers and passengers

3.25.1 Only registered Solar EV drivers may drive the Solar EV during Event hours.

3.25.2 When driving, the correct driver and passenger ballast must be carried in the Solar EV and be placed within 300 mm of the corresponding seating position.

3.26 Control Stops

3.26.1 **Control Stop Officials:**

- At each Control Stop, a **Control Stop Manager** will be responsible for all traffic management, recording of arrival and departure times, and ensuring that the control stop regulations are followed.

- A **Competitor Relations Officer** will ensure that the documentation presented by the arriving Observer is complete, and has been signed by the Team Manager. The Competitor Relations Officer will provide any updated information and is delegated by the Clerk of the Course to advise the imposition of any penalties, accept any appeals or protests, and advise on the outcome of any appeal or protest lodged at a previous Control Stop.

The Competitor Relations Officer is the only Control Stop Official empowered to liaise with the Team Manager concerning the competition. Beyond acknowledging receipt of any protest and administering any penalty imposed by the Clerk of the Course, they are not delegated to enter into any discussion on such matters.

- A **Volunteer Relations Officer** will be responsible to the Event Manager for the welfare and deployment of Official Observers and other volunteers engaged by the Event.

3.27 Control Stop activities

3.27.1 Control Stop Time commences from the time the Solar EV enters the site.

3.27.2 All site speed restrictions must be obeyed.

3.27.3 Teams must obey all directions of the Control Stop Manager. When at a Control Stop, the Solar EV must at all times be able to be moved immediately if directed to do so by the Control Stop Manager.

3.27.4 When at a Control Stop no repair or maintenance tasks of any kind are permitted.

3.27.5 Solar EVs may not be reconfigured such that the allowable dimensions are exceeded while charging.

3.27.6 Solar collectors may be cooled, but only by use of a hand operated spray containing ambient temperature water

3.28 Withdrawal

3.28.1 Any team may withdraw by handing a withdrawal form, signed by the Team Manager, to a Red-Shirt Official or Competitor Relations Officer. Once the withdrawal has been accepted, the Solar EV may be transported to Adelaide to take part in the displays and the Awards Ceremony.

3.29 Overnight stops

3.29.1 The selection (and any cost) of overnight stops is the responsibility of each Team.

3.31.2 At overnight stops, the Solar EV 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.

3.29.3 If a Team's overnight camp is not immediately adjacent to the road, a marker cone must be placed on the roadside adjacent to point the Team exited the official route.

3.29.4 The Observer, with the Team Manager, must place a mark on the road to indicate the position at which the Solar EV stopped. The mark will be the starting line for the following morning.

3.29.5 Except for Cruiser Class Solar EVs recharging at Alice Springs, removable energy storage packs must be impounded between sunset and sunrise by placing them in the lockable container supplied by the Team.

3.29.6 The energy storage pack container must be placed under the control of, and in a position acceptable to, the Observer.

3.29.7 With the exception of a Cruiser Class Solar EV recharging at Alice Springs, if a Cruiser or Adventure Class Solar EV Team does not remove the energy storage packs, the whole Solar EV must be impounded by the Observer between sunset and sunrise. No work of any kind may be performed on the Solar EV during the impound time.

3.30 Penalties

3.30.1 **Time Penalties**

At any time during the Event, a Red-Shirt Official may issue a Fixed Penalty Notice requiring a 10 minute penalty to be taken.

Log books are reviewed by the Competitor Relations Officer at each Control Stop. Observer reports are regarded as fact. Subsequent or serious contraventions will be referred to the Clerk of the Course for determination.

Fixed penalty notices may be issued for:

- obstructing an overtaking vehicle
- team vehicles travelling too close together
- failing to get off the highway when stopped

- overnight activities too close to the road
- repairs (including wheel or tyre changing) during a Control Stop
- driving without Escort Vehicles
- Escort Vehicles driving without visible flashing lights
- driving without effective rear vision.

The 10 minute time penalty will be taken at the control stop nominated by the Red-Shirt Official.

Under the fixed penalty system no appeals will be accepted. However, Teams may elect to have the matter referred to the Clerk of the Course for determination by lodging a notification with the Competitor Relations Officer at the next available control stop. The determination will be communicated by the Competitor Relations Officer at the next open Control Stop.

3.30.2 **Penalties by Determination**

Teams committing the following offences may be subject to a penalty determined by the Clerk of the Course:

- slip streaming, hand pushing or pressure wave pushing
- obstructing an overtaking vehicle
- failure to follow the route instructions
- failure to observe a request by Police or Event Officials
- wilful damage or interference to property
- failing to get off the highway when stopped
- 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.

In normal circumstances, time penalties must be served on the day of issue by extending the time spent in a Control Stop. The Clerk of the Course may impose any other arrangements appropriate to particular circumstances.

3.30.3 All time penalties must be served prior to crossing the finish line.

3.30.4 **Exclusion**

Entrants committing the following offences are liable to be excluded from the event:

- wilful obstruction or aggressive driving
- replacement of energy storage cells
- removing the energy storage system from the Observer's care

- charging of the energy storage system from any source other than those approved at scrutineering
- wilful disregard of any regulations or the spirit of the Event
- Driving the Solar EV without a Rear Escort Vehicle
- misrepresentation
- continued inability to maintain minimum progress .

Teams who have been excluded for inability to maintain minimum progress may transport their Solar EV to the finish line, and take part in the display and closing ceremonies.

3.31 Protests and appeals

3.31.1 Any protest must be lodged with the Clerk of the Course (or any appointed delegate, normally a Red Shirt or Competitor Relations Officer), in writing, within 12 hours of the incident giving rise thereto. A protest fee of AU$200 will apply.

3.31.2 Any decision of a Red-Shirt Official may be appealed to the Clerk of the Course by lodgement with the Organiser via Competitor Relations Officer of a written Notice of Appeal that details the grounds for the appeal, within one hour of the handing down of the decision giving rise thereto. An appeal fee of $200 will apply.

3.31.2 Any decision by the Clerk of the Course may be appealed to the Stewards by lodgement with the Organiser via Competitor Relations Officer of a written Notice of Appeal that details the grounds for the appeal, within one hour of the handing down of the decision giving rise thereto. An appeal fee of $200 will apply.

3.31.3 The Chief Steward is empowered to convene a tribunal to consider any protest or appeal requiring final resolution. The tribunal may take advice from any party. The decision of the Tribunal is final and binding.

3.32 End of Timing

3.32.1 The Organiser will designate a location outside of the Adelaide urban area as an End of Timing waypoint.

The intent is to mitigate the risk that the winner could be determined by lane congestion or other traffic conditions.

3.32.2 To complete the course the Solar EV must reach the Finish Line by the designated route, under its own power.

Solar EVs are expected to make reasonable progress with regard to prevailing traffic conditions. The Metropolitan Traffic Control Centre will monitor and advise the Clerk of the Course of average travel times. In the circumstances that more than one Solar EV is traversing the urban area, The Clerk of the Course may provide an Official to observe progress. Where traffic conditions alone change the order of arrival in the city centre, the order of finish will be determined by End of Timing waypoint.

3.32.3 Where the order of arrival determined by Regulation 3.32.1 is affected by any circumstances other than traffic conditions (as advised by the Metropolitan Traffic Control Centre and/or the determination of an Event Official), the order of finish will be determined by the Clerk of the Course.

3.32.4 A marshalling point will be established adjacent to the Finish Line.

The purpose of the marshalling point is to separate the Solar EV from its escort vehicles, and provide the opportunity to serve any outstanding time penalties.

3.32.5 Where the Clerk of the Course determines that a Team was unable to make reasonable progress between the End of Timing and the marshalling point then that Team will have its Finishing Time adjusted to be 1 minute behind that of any other Team that arrives at the marshalling point before it.

3.32.6 Teams unable to drive from the marshalling point to the Finish Line will have their Finish Time adjusted as described in 3.32.4.

3.32.7 Teams that have not reached the Finish Line by 1700 (Event Time) must stop, mark their position, and continue at 0800 (Event Time) the following morning as per normal procedure.

Section 4 - Achievement

4.1 Finish Line

4.1.1 The Official Finish Line will be in the City of Adelaide.

4.1.2 To be classed as a Finisher, a Solar EV must have completed the entire course in accordance with the Regulations and cross the finish line.

4.1.3 Challenger Class and Adventure Class Teams that Finish will be ranked in increasing order of time taken (including penalties). Challenger Class and Adventure Class teams that do not finish will be ranked behind Finishing Teams in increasing order of distance travelled in the Solar EV.

4.1.4 Cruiser Class Teams will be ranked by Score (see Section 4.5). Finishing Cruiser Class Teams will be ranked above non-finishing Cruiser Class Teams.

4.1.5 Finishing Solar EVs must be made available for public exhibition up to the time of the prize giving ceremony, or such earlier time as the Organiser may determine.

4.2 Results

4.2.1 Results published throughout the duration of the event are considered ‘provisional’.

4.2.2 Results will only be considered final following the determination of any of outstanding protests and appeals.

4.2.3 The winner of the World Solar Cup will be the highest ranked Challenge Class Team.

4.2.4 The winner of the Cruiser Class will be determined by the highest Score.

4.2.5 The highest ranked Adventure Class Team will receive and award.

4.3 Cruiser Class Scoring

4.3.1 Cruiser Score will be the weighted sum of four scores, depending on external energy use, Darwin – Adelaide time, person-kilometres, and practicality.

4.3.2 The Cruiser Class score will be:

$$S = 15\ E^* / E + 70\ T^* / T + 5\ D / D^* + 10\ P / P^*$$

Where E is the external energy use, *T* is the time, *D* is the person-km distance, *P* is the practicality score, and where *E** is the minimum *E* of any Cruiser Class Finisher, *T** is the minimum *T* of any Cruiser Class Finisher, *D** is the maximum *D* of any Cruiser Class Finisher, and *P** is the maximum *P* of any Cruiser Class Finisher.

4.3.2.1 Nominal external energy use of a Cruiser Solar EV will be calculated as E = (n + 1) q, where n is the number of times the energy storage system is charged from external sources between the Start Line and the Finish Line, and q is the nominal capacity of the energy storage system. The nominal capacity of an electrochemical battery is the sum of the nominal cell masses divided by the allowable battery mass multiplied by 15 kWh; the nominal capacity of other types of energy storage system will be determined by the Chief Energy Scientist.

4.3.2.2 Time T is the time taken to drive from the Start Line to the End of Timing waypoint, including any penalty time but not including the time allocated for Control Stops.

4.3.2.3 Person-kilometre distance D is the sum of the distances travelled by drivers and passengers in the Solar EV between the Start Line and the Finish Line. Passenger-kilometres will be counted for each passenger seat that is occupied for a complete leg (between consecutive Control Stops).

4.3.2.4 Practicality *P* will be determined by a panel of judges, appointed by the Organiser.

The subjective nature of practicality judging intentionally brings an element of market analysis to the design process, and gives the design team the real-world experience of determining what the end user (in this case guest judges) may find attractive, and give the design a desirable point of difference.

Entrants will be invited to brief the judges on their design philosophy, which may include the desire to focus their design effort on a particular market segment. The judges will be asked to examine a number of features of the Solar EV, which may require demonstration of those features. Examples of features the judges might find desirable include:

- *ease of access and egress*
- *ease of operation*
- *reliability*
- *versatility*
- *style*
- *suitability for declared purpose.*

A Cruiser Class Solar EV that has been granted an unconditional Road Registration (street legal) in the team's home country will be highly regarded. Registration papers should be available for the judges scrutiny.

4.4 Awards

4.4.1 An awards ceremony will be held in Adelaide on Sunday 25 October 2015.

4.4.2 Each participating team will be provided with tickets commensurate with the number of registered individuals up to a maximum of 20 tickets. Additional tickets (subject to the capacity of the venue) may be purchased. Further details will be provided in the Team Manager's Guide.

4.4.3 Awards may be presented in the following categories:

- the achievements of Evolution Class entrants will be recognised
- the achievements of Adventure Class entrants will be recognised
- a Safety Award will be presented to the team exhibiting safety awareness in theory and practice
- the 'David Fewchuk Spirit of the Event' award will be presented to an individual exhibiting the qualities promoted by the World Solar Challenge
- an Innovation Award will be made to the team presenting a concept which, in the opinion of the judges, furthers the aims of the Event
- each Entrant will receive a Participation Award
- other achievements may be recognised through the presentation of an award.

4.4.4 The Organiser reserves the right not to present an award in any category.

4.4.5 All winning teams must make themselves available for an Official Media Call if so required.

4.5 Pack-Down Facilities

4.5.1 Open-air facilities will be made available for repacking Solar EVs for shipment. All containers and equipment must be removed by close of business Wednesday 27 October 2015. Any remaining items will be removed for storage at the Entrant's expense.

Glossary

ADRs Australian Design Rules (for motor vehicles).

Battery A multiple of electrochemical cells of the same chemistry, connected in series or in parallel, and housed in a single container.

Battery module A battery unit manufactured as the basic component of a battery pack.

Battery pack A number of batteries connected together to provide the required power and energy for a given application.

Cell (electrochemical) A device that converts chemical energy into electrical energy by passing a current (reverse flow of electrons) between a positive and a negative electrode.

Conditional Registration The authority to use public roads used by the Event, granted by the Northern Territory road traffic authority.

Entrant The legal entity that completes the Participation Agreement and requests a place in the Event for one or more Teams. An Entrant is typically a Registered Institution, Organisation or Commercial Entity.

Force Majeure Circumstances beyond the control of the Organiser or Entrant. *In the context of the World Solar Challenge this does not automatically suggest cancellation or abandonment of the Event*

ISO International Standards Organisation.

Normal Driving Position Means that the driver (and passengers) are in the car, dressed as they would be for the journey, including helmet(s), seat belts fastened and properly tensioned and doors closed

Parc Ferme Controlled impound of a competing vehicle. No work of any kind is permitted on a vehicle impounded under Parc Ferme conditions.

Participant A person who has registered to participate in the Event, as a member of a Team.

Primary battery An electrochemical battery (or cell) that contains a fixed amount of stored energy when manufactured, and that cannot be recharged after that energy is withdrawn.

Secondary battery An electrochemical (or cell) that is capable of repeated charging and discharging.

Team The group of people registered by the Entrant to work together on the common goal of operating the Solar EV.

Team Manager The person in charge of, and responsible for, the actions of a Team.

Road-ready configuration The Solar EV completely assembled with the components and equipment that will be presented at the Start Line.

UNECE United Nations Economic Commission for Europe, the body charged by the UN to work towards harmonised regulations for motor vehicles.

The design parameters for the 2015 Bridgestone World Solar Challenge are guided, in general terms, by the intent of the UNECE harmonised regulations for individually constructed vehicles.

Appendix 1 - Official Bulletins incorporated in this document

Regulation Bulletin 1/2014

Regulation 1.28 – Media and Promotional Obligations

The commercial imperatives of protecting the interests of the event require that potential risks associated with ambush marketing are identified and mitigated.

The following clauses have been added to Regulation 1.28

1.28.9 Teams or their sponsors shall not engage in any marketing or promotional activity that will materially detract from the value and standing of the sponsors of the event.

1.28.10 Activity by sponsors of teams shall not imply ownership of the event.

1.28.11 Team Managers are responsible for the activities of their sponsors.

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Chris Selwood

Event Director