



Pannon Egyetem és Balatonalmádi

CoreComm

Solar Boat Challenge

SOLAR BOAT CHALLENGE TECHNICAL REGULATIONS

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2026

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University of Pannonia

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The Technical Regulations presented in this document serve as directives for the races. Situations that are not covered by the Rules will be decisively resolved at the solediscretion of the jury.

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1. GENERAL

1.1 Applicability

These Technical Regulations apply to all Solar Boat Challenge events. All participants, teams, and pilots must always comply with these regulations.

1.2 Obligation to Comply

Participation in the event is conditional upon full compliance with all Rules. The term “Rules” includes all documents defined in Section 3.

1.3 Responsibility

Each team is solely responsible for ensuring that its boat, systems, and equipment comply with these regulations.

Approval during inspection does not release the team from responsibility.

1.4 Authority of the Organizer

The Organizer (University of Pannonia) has full authority overrule interpretation, enforcement, safety decisions, and event execution. The Organizer may impose penalties, restrict participation, or disqualify teams.

1.5 Rule Modifications

The Organizer reserves the right to modify the Rules before or during the event for safety, operational, or fairness reasons.

1.6 Binding Instructions

All instructions issued by the Organizer or Officials are binding and must be followed immediately.

1.7 Interpretation

In case of ambiguity, the interpretation of the Organizer is final.

1.8 Participation Rights

The Organizer reserves the right to refuse or withdraw participation.

1.9 Force Majeure

The Organizer may cancel, suspend, or modify the event due to unforeseen circumstances.

2. TECHNICAL CONDITION AND SAFETY

2.1 General Responsibility

Each team is always fully responsible for the technical condition and safe operation of its boat.

2.2 Compliance

All boats must comply with these regulations and all applicable laws.

2.3 Technical Inspection

The Organizer may inspect boats at any time.

Only approved boats may participate.

2.4 Unsafe Conditions

Unsafe boats may be stopped, modified, or excluded. Decisions are final.

2.5 Operational Safety

Boats must remain controllable under all conditions.

2.6 Pilot Safety

Pilots must be physically and mentally capable. The Organizer may prohibit participation if safety is compromised.

2.7 Safety Equipment

All onboard systems must be properly installed and functional.

2.8 Environmental Protection

Pollution is strictly prohibited. Violations may result in disqualification.

2.9 Emergency Procedures

All participants must follow instructions immediately during emergencies.

2.10 Safety Priority

Safety always overrides competition.

2.11 Continuous Compliance

Boats must remain compliant throughout the event.

2.12 Responsibility After Approval

Approval does not transfer responsibility from the team.

3. DEFINITIONS

3.1 Rules

“Rules” include all official documents and communications issued by the Organizer: the provisions of the Notice of Race, the Technical Regulations, the Solar Racing - Race Elements Catalogue, the Race Instructions (all latest versions) and the local rules as issued by the national and or local authorities on the use of inland and offshore waters together constitute the Rules, as well as any subsequent additions and/or amendments implemented by the race organization.

3.2 Organizer

University of Pannonia is the Organizer and sole authority.

3.3 Officials

Persons appointed by the Organizer with binding authority. Members of the race committee, the technical committee, the race jury and the organization that will be mentioned in the Notice of Race and/or the General Team Briefing. All officials can be recognized as such. Instructions issued by an official must be followed promptly by the participants during the race.

3.4 Team

A registered group entering one boat.

3.5 Solar Boat

A boat that is exclusively powered by solar energy derived from solar panels mounted on board the vessel.

3.6 Solar Panel

Energy source for the propulsion of the solar boat.

3.7 Fully Loaded Condition

The condition of the vessel in which all systems have been mounted, all systems have been installed and all systems are operational, all the necessary ballast has been installed and the crew member(s) on board is/are equipped with the prescribed safety devices.

3.8 Pilot

The team member who has qualified in accordance with the rules to pilot the vessel during the race.

3.9 Steward Vessel

A vessel that is marked as such by means of a flag and that is used for the race-technical and safety supervision of the race.

3.10 Paddock

Boat storage and preparation area.

3.11 Safety Gate

A controlled route section defined by the Organizer. Deviation from the shortest possible route that may be introduced by the race organization for safety reasons. The safety gate consists of one or more sets of 2 buoys that the vessels shall pass in between from the direction of the last start or last control point.

3.12 Outside Help

External assistance (except team members).

3.13 Maximum Voltage

The maximum voltage, measured in Volts, is measured with a voltmeter set between any two different points in the electrical system.

3.14 Nominal Battery Voltage

Standard operating battery voltage.

3.15 Dead Man's Switch

A device that is designed to cut the power supply to the engine as soon as the pilot loses control of the boat or when the pilot leaves the vessel, whether voluntarily or involuntarily.

3.16 Battery

The device that is used to store electrical energy. The following types of batteries for the storage of electrical energy are distinguished in the framework of the race: Lead-acid, Lead-gel, Nickel-Cadmium, Nickel-metal hydride, Nickel-Zinc, Silver-Zinc, Nickel-Iron Lithium-ion, Lithium-Iron-Phosphate and Lithium-polymer.

3.17 Energy Storage System

Any means, other than batteries, to store energy (e.g. super capacitors, heated water, etc.)

3.18 Freeboard

Distance between waterline and deck. Distance between the waterline in fully loaded condition and an imaginary parallel line tangent to the lowest edge of the deck or a line that connects openings in the side of the vessel, if applicable. The smallest distance is governing.

3.19 Openings

Feedthroughs on the main deck or the side of the vessel such as, bilge pump outlets, feedthroughs of overboard tubing, feedthroughs of cables, etc.

3.20 Added Buoyancy

Closed volume above the loaded waterline, which can take up loads on top of the static loading of the vessel.

3.21 Mains Switch

A switch that when switched to the 'on' position, electrically powers the boat. This switch is not the same as the emergency mains switch. The mains switch is not a mandatory switch.

3.22 Emergency Mains Switch

A switch that in case of emergency can be used to disconnect the electrical power between the solar panel(s) and the battery and between the battery and the electric motor.

4. TECHNICAL REQUIREMENTS OF THE BOATS

4.1 All boats must be single pilot boats.

4.2 The dimensions of boats are limited to

4.2.1 length: 8.00 m

4.2.2 width: 2.40 m

4.3. The length is the overall length from the front end of the boat, including the registration panel, up to and including the rear end of the boat, and including the propulsion system. Exceeding the maximum length by more than 0.5% of the allowed length will lead to disqualification.

4.4. No maximum draught or height is prescribed for the boats. Participants must however consider the fact that the depth of the water is limited in certain sections of the routes raced. The actual water depth and height clearance may vary from time to time. It is the responsibility of the participant to check this.

5. THE BOAT EQUIPMENTS

5.1 Energy Source

All solar boats must be fitted with solar panels, which will serve as the sole source of energy.

5.2 Materials

No general restrictions apply, except:

- materials acting as sails are prohibited
- Environmentally harmful materials are not allowed

5.3 Energy Storage

Energy storage systems other than batteries are allowed (e.g. supercapacitors).

Flywheels are not permitted for propulsion.

- The total onboard energy storage capacity for Open class boats is limited to 1.5 kWh (=5.400 MJ). This capacity includes the storage capacity of batteries for storing electrical energy.

5.4 Pilot Visibility

The pilot must always have unobstructed visibility and hearing.

5.5 Cabin Design

Fully closed cabins are not permitted. Spray skirts are allowed. The cockpit must minimize water ingress.

5.6 Emergency Evacuation

The pilot must be able to evacuate the boat within 5 seconds without assistance.

Requirements:

- inflatable life jacket must be deployed
- dead man's switch must activate
- No hatch opening required
- The minimum width of the cabin is 0.50 m.

5.7 Safety Belts

Allowed, but must not interfere with evacuation requirements.

5.8 Stability

The stability of the boats must be such that a prescribed rolling moment of 150 Nm applied to the boat with the boat loaded with a load equal to the minimum required mass of the pilot, at the location of the seat of the pilot, will not result in lean over exceeding 12.5 degrees averaged over a measurement period of 5 seconds.

- In that case none of the openings in the hull, such as the outlet opening of the bilge-pump(s) or the edge of the deck or any of the solar panels may be submerged below the waterline.
- In case (additional) floats are being used, the floats on either side must have an additional volume of at least 0.050 m³ (=50 liter).
- It is allowed to use more than one (additional) float on either side of the boat.
- In that case the total displacement of the combined floats on either side must be 0.050 m³ or more.
- A boat having floats or multiple hulls must be designed such that the highest floater touches the water surface before reaching a roll-angle of 5 degrees.

- The use of flywheels is allowed for stability reasons.
 - The flywheels must be adequately protected against failure.
 - The flywheels may only be spun up with the help of solar energy or energy from the onboard storage system.
 - The flywheel and its control system must be designed such that it cannot deliver energy to the boat and its systems

5.10 Dead Man's Switch

Mandatory system that immediately stops propulsion when released.

5.11 Ballast

Must be securely fixed and accessible for inspection.

5.12 Bilge Pumps

Automatic electric pump required:

- minimum 1500 L/h capacity

Manual pump required:

- minimum 0.4 L per stroke
- operable from seated position

5.13 Rotating Parts

Must be shielded. Propellers exempt.

5.14 Fastening Systems

All fasteners must be mechanically secured.

Minimum 2 threads must extend beyond nuts.

5.15 Freeboard

All boats must be designed with a minimum freeboard of 0.25 m over the first 2.0 m measured from the front end of the boat and a freeboard of at least 0.20 m over the rest of the boat.

- Both freeboards must be determined in fully loaded condition.
- The connection between the hull and the deck must be watertight.

5.16 Buoyancy

Minimum 100% reserve buoyancy required.

Boat must remain afloat when flooded.

5.17 Tow System

All boats must be fitted with a fastening point for a towline in front of the hull (catamarans must have a fastening point on each hull).

- The fastening point(s) and its supporting structure must be capable of holding a minimum load of at least the boat's own weight.
- The minimum internal diameter of the fastening point(s) must be 20 mm.
- All boats must be provided with a floating towline with a length of 5 m or less if there is a chance the towline will hit the propeller. The minimum diameter of the towline must be 8 mm.
- The towline must be easy to cut in case of emergency.
- Catamarans must be fitted with two floating towlines, with a length of 5 m and a minimum diameter of 8 mm, one attached to each of the two hulls. These lines must be easy to cut in case of emergency.

- The towline(s) must be carried on the bow of the boat and easily accessible from a rescue boat for emergency towing

5.18 Signaling

All boats must be fitted with a minimum of two types of signaling systems.

- A uniformly colored orange or red warning flag with a minimum size of 30 x 30 cm attached to a stick or similar structure with a minimum length of 100 cm.
- The warning flag may not be combined with the required boat hook or paddle.
- An audible warning system, such as a ship's horn audible at reasonable distance, e.g.
 - An orally operated horn
 - A horn operated by a compressed air bottle
 - An electrically operated horn
- All boats must be fitted with a clearly visible yellow

5.19 Marker Buoy

All boats must be fitted with a clearly visible yellow or orange marker buoy with a diameter of at least 0.12 m.

- The buoy must be permanently connected to the boat by a buoyant rope with a minimum length of 5.0 m.
- The connection and storage of this buoy must be such that when the boat disappears under the water surface the buoy starts floating on the water surface and thereby indicates the position of the boat.

5.20 Paddle

All boats must be fitted with at least one paddle.

- The paddle must be functional such that it is possible for the pilot to paddle the boat, preferably from the normal seating position in the cockpit.
- The paddle(s) must have a minimum overall length of 0.60 m, a minimum blade length of 0.30 m and a minimum blade width of 0.13 m.
- The paddle(s) must be fastened in an easily accessible location on board the boat.
- The paddle may not be used as a means of propulsion during the race.
- The paddle must have a single function. It may not be combined with any other (emergency) device on board the boat.

5.21 Fire Extinguisher

All boats must be fitted with an approved fire extinguisher with a minimum capacity of 1 kg (powder) or 1 liter (liquid) of extinguishing material suitable for extinguishing fires on board, preferably with a foam-based means of extinguishing

- Only fire extinguishers showing valid approval are allowed. The approval should show the date the fire extinguisher was tested last and the date when the next test is due. In case no valid approval is visible on the fire extinguisher(s), the fire extinguisher is usable for a period of two years after production. In that case, a production date must be clearly visible on the outside of the fire extinguisher.

- The fire extinguisher must be mounted in a position such that it can be reached easily by the pilot from the normal seating position in the cockpit and cannot drop into the water after taking it out of its attachment.
- In addition to the manually operated fire extinguisher an automated means of fire extinguishing may be installed.

5.22 Boat Hook

All boats must be equipped with a boat hook.

- The minimum length of the boat hook is 1 m.
- The boat hook must have a non-metallic hook.
- The boat hook may not be combined with the paddle or warning flag.

5.23 Repairs and Modifications

In the case of the occurrence of a (technical) failure on board, the participants are entitled to repair and/or replace the failed or flawed components with identical ones.

- Wherever possible repairs/replacements must be done under the supervision of a Technical Inspector.
- In the case of major repairs/replacements, e.g. in the case of the replacement of a battery, replacing a solar panel and likewise, without prior permission of the organization, the participant will be disqualified for the first upcoming race element.
- All repairs to the boats' electrical systems must be reported to the organization in advance.
- Repairs to other parts of the boats may be reported after the repair has been completed.
- Replacement or recharging of batteries must be reported to the organization and will lead to disqualification for the first upcoming race element. An equivalent rule applies for non-battery energy storage devices and power generating/conversion devices.
- Modifications to the boat during a racing season are allowed under the following conditions:
 - Modifying the boat during a race, after the boat has been technically approved by the organization, is not allowed.
 - Modifying the boat in between races is allowed.
 - All modifications must be reported to the organization before the start of the first race element after completion of the modification.
 - Failing to report a modification will lead to issuing a penalty.
 - A participant will only be allowed to participate in the race after the modification has been inspected and approved by the organization.
 - Modifications to the hull, the solar panel, the battery and the motor are not allowed
- Modifications demanded by the organization must be incorporated before the given deadline.

5.24 Minimum Speed

The average speed of the boats in the Open class must be at least 12 km/h. This may be tested during a Prologue to a race or at any other time the organization deems appropriate. During this test 10 km will have to be covered within 50 minutes for Open class boats.

5.25 General Safety

Sharp edges must be protected.

Steering must be reliable.

5.26 Steering gear

The steering gear of the boat must be sized for adequate controllability, must operate smoothly and must be free of play both in loaded and unloaded conditions.

5.27 Removable parts

Adding removable parts to the boat is allowed. These additional parts must meet all necessary requirements of these Technical Regulations

- The removable parts must either be installed or carried in the boat during the complete race.
- During the design process it must be clearly indicated that you want to apply this rule, and this must be approved
- The boat will have to pass the technical inspection both with and without the removable parts installed
- Marking parts as removable parts after having passed the design process is not allowed
- Propellers, hydrofoils and their support structure on the outside of the hull are considered removable parts but do not need to be specifically mentioned. They may always change and do not need to be carried on board the boat during the race.
- Certain parts may not be allowed to be classified as removable parts. These include at least:
 - parts necessary for achieving the required stability, for example floats.
 - solar panels
 - Physical removal/installation of removable parts may be done annually. In the case of removal this means taking them off and storing them in the hull of the boat before travelling further. Inside the hull it must be clearly marked where the removed parts will be stored such that they don't go "missing".
 - Using a system that makes it possible to take components (hydrofoils, etc. in and out of the water without removing them from the boat will have to be a system that is operated electrically from the main battery. This may be done in both a direct (e.g. an electrically operated actuator) and indirect way (e.g. the system requires forward speed of the boat to operate, and the required forward speed is achieved via the propulsion system that is powered electrically). Rule

5.28 Applies

- Trimming the setting of components (e.g. small adjustments of the pitch angle of the blades of a hydrofoil) whilst being installed and submerged in the water may be done mechanically, electrically and manually. Manual operation may be direct (manual operation of a control) or indirect (e.g. using a hydraulic or pneumatic system that is powered manually). The condition for manual operation is that there may be no significant propulsive force being generated from the manual operation of the system.
- More than one electric motor intended for propelling the boat may be installed. If a team decides to make use of more than one motor, all motors must be always installed in the boat. All means of connecting the motors to the rest of the

propulsion system (e.g. cables, connectors, chains, belts, etc.) must always be on board. The motors do not all have to be connected, electrically and/or mechanically, to the rest of the propulsion system. It is allowed to change the motor configuration in between race elements.

5.28 Boat Configuration and Adjustment Requirements

The configuration of the boat is not prescribed and may be adjusted throughout the race.

- Any means to adjust the configuration must be electrically operated from the main battery.
- It is not allowed to install a secondary power source for that purpose.
- The adjustment of the solar panels may only be done electrically.
- Furthermore, the boat must meet all requirements of these regulations in all possible configurations.

6. SOLAR PANEL

6.1 Energy Source

Propulsion energy must be derived exclusively from solar radiation captured by onboard solar panels.

Not allowed:

- wind propulsion
- human propulsion

Energy may be used:

- directly from solar panels
- from onboard storage charged by the panels

Batteries may be fully charged at the start unless otherwise specified by the Organizer.

6.2 Solar Cell Types and Maximum Area

Boats may have a total combined exposed solar cell area as is given in the table below.

PV cell chemistry	Allowable total cell area (m2)
Si	6.000
Thin film GaAs	5.328
Thin film CIGS	6.783
Multijunction	4.000

6.3 Solar Cell Area Calculation

Total area is the sum of all individual solar cells.

Reference values:

- $125 \times 160 \text{ mm} \rightarrow 153.33 \text{ cm}^2$
- $125 \times 166 \text{ mm} \rightarrow 155.06 \text{ cm}^2$

Busbars, connections, and spacing must NOT be excluded.

Any surface receiving solar radiation counts as active area.

6.4 Prohibited Technologies

Not allowed:

- concentrators (mirrors, lenses)
- bifacial cells

6.5 Panel Orientation

Panels must be mounted horizontally.

Maximum deviation: 10°

Curved panels are allowed within this limit.

Adjustable panels are allowed if powered by onboard systems.

6.6 Mechanical Mounting

Each applied solar panel must be mechanically secured to the boat, either in a frame or otherwise, and suitably protected against the influence of water.

- The design of the fastening system must be such that it will be wind- and water resistant in all directions, including turbulence, waves and gusts.
- All parts of the solar panel sticking out of the hull as well as the frames used to attach the solar panels must be provided with protection of sharp edges.
- Attaching flexible solar panels to the boat may also be done with the help of Velcro and/or double-sided tape.

6.7 Cooling and Cleaning

Cooling and/or cleaning of the solar panels during race elements is allowed

- Cooling and/or cleaning during a race element may only be done with the help of energy from the solar panels or the on-board battery
- Cooling and/or cleaning fluids used must be carried on board during the race element and/or may be pumped up from the waterway in which the race element is being raced

7. ELECTRONICS

7.1 Batteries

Participants are only allowed to use batteries that can be recharged electrically.

- The use of other types of batteries, such as mechanically charged batteries, is not allowed.
- Every team is responsible for its own batteries.
- All batteries cells used in the race must be commercially available or supplied by the organizer. In the latter case, all teams in the same class must be supplied with batteries of the same type and capacity.
- The batteries may under no circumstances be modified in any way whatsoever.
- The participants must disclose all data related to the batteries to the organization. The battery data provided must at least include a detailed description of the type of battery to be used and the so-called “materials safety data sheet” as supplied by the manufacturer thereby providing the organization with adequate information in case of an emergency.

7.2 Battery Housing

Batteries must be enclosed in protective housing.

Requirements:

- no contact with pilot
- no environmental contamination
- secured during capsizing

Housing must be:

- non-conductive
- fire-resistant
- chemical-resistant

Not allowed:

- metal housings
- carbon fiber housings

Must withstand 10g acceleration.

7.3 Battery Ventilation

Minimum ventilation: 0.3 m³/min

Must:

- prevent gas accumulation
- prevent water ingress
- operate continuously when active

Exceptions are allowed only by Organizer.

7.4 Battery Capacity Testing

For lithium-based batteries this capacity test will be a constant resistance, full discharge test or a constant current, full discharge test. In a constant resistance test the resistance applied during the test is determined by the nominal voltage of the battery and given by the following expression:

$$R_{test} = V_{2nom} / C_{nom} (\pm 15\%)$$

Where: R_{test} = resistor value used during the test in Ohm

V_{nom} = nominal voltage of the battery in V

C_{nom} = nominal capacity of the battery in Wh

In a constant current test, the current applied during the test is determined by the nominal voltage of the battery and given by the following expression:

$$I_{test} = C_{nom} / V_{nom}$$

Where: I_{test} = test current in A

C_{nom} = nominal capacity of the battery in Wh

V_{nom} = nominal voltage of the battery in V

7.5 Non-Lithium Battery Declaration Requirement

Teams using non-lithium-based batteries must indicate this during the design procedure. An appropriate means of testing these batteries will be provided.

7.6 Battery Capacity Test and Full Charge Definition

The starting point of the capacity test is a fully charged battery.

- Fully charged is defined as the point where the individual cells have reached their maximum voltage and the battery pack is balanced.
- The maximum cell voltages are:

Lithium-ion: 4.2 V \pm 0.05 V

Lithium-Polymer: 4.2 V \pm 0.05 V

Lithium-Iron-Phosphate: 3.6 V \pm 0.05 V

- A lead-based battery is considered fully charged when the voltage is 14.4 V for a 12 V nominal battery voltage and current through the battery has declined to less than 2% of the nominal capacity of the battery in Amp-hours (e.g. 2 Amps for a 100 Ah battery).

7.7 Battery Discharge Endpoint Definition

The end of the capacity test is when the battery is fully discharged.

- Fully discharged is defined as the point where the discharge is stopped by the Battery Management System. This must be the point where all individual cells have reached a voltage below the value given:

Lithium-ion: $2.7 \text{ V} \pm 0.3 \text{ V}$

Lithium-Polymer: $2.7 \text{ V} \pm 0.3 \text{ V}$

Lithium-Iron-Phosphate: $2.5 \text{ V} \pm 0.3 \text{ V}$

- A lead-based battery with a nominal voltage of 12 V is considered fully discharged when the voltage is 10.5 V. In order not to damage the battery during discharge the discharge will continue until the voltage reaches 11.7 V. At that time a discharge of 70% is considered to have been reached. The full capacity will be calculated based on that.

7.8 Battery Pack Testing Conditions and Liability Disclaimer

Only one battery pack per team can be offered for testing.

The battery pack offered must be balanced and have been fully cycled for at least 5 times.

The organization does not take responsibility for incorrectly functioning Battery Management Systems, unbalanced battery cells, and other kinds of failures of the battery pack that may appear during testing. These will also form no grounds for seeking redress.

7.9 Battery Management System Requirements

A dedicated, properly functioning Battery Management System is mandatory for all batteries other than lead-acid and lead-gel batteries.

- A solar controller is not allowed as a Battery Management System
- The system must monitor both the battery's voltage and temperature and must also be capable of shutting the system down when necessary.
- For Lithium-based batteries monitoring both charge and discharge currents is required. A means of controlling too high currents must be installed.
- The Battery Management System must be designed to monitor all individual battery cells. A means to monitor the individual battery cell voltages must be provided and demonstrated during the battery test.

7.10 System Voltage Limits and Electrical Safety Requirements

The maximum allowed system voltage is 60 VDC. However, a set-up of the solar panels where the open circuit voltage is higher is acceptable under the following conditions:

- When the electrical system is switched on (e.g. a maximum power point tracker or solar controller(s) being active) or off, the maximum voltage in the complete electrical system is 60 VDC or below.
- In that part of the system and under that specific condition the maximum voltage must be 100 VDC or less.
- The cabling and connectors used as well as the housing of the MPPTs will have to be insulation class IP65 or higher. Possible cables can be of the type Ölflex solar XLS with Epic solar 4 connectors.

7.11 The maximum allowed system voltage of the (composed) main battery is

limited to what has been given in rule 7.10 of these Technical Regulations.

- To be able to comply with this rule in combination with rule 7.8 also during charging, the number of batteries placed in series will be limited. The following limitations must be considered:

Type of battery	Nominal voltage used	Maximum charge voltage	Maximum Allowed number of batteries in series
Lead-acid and lead-gel batteries	12 V	14.4 V	V4
Nickel-Cadmium	1.2 V	1.5 V	40
Nickel-metal hydride	1.2 V	1.6 V	37
Standard Lithium-Ion	3.7 V	4.2 V	14
Lithium-Polymer	3.7 V	4.2 V	14
Lithium-Iron-Phosphate	3.4 V	3.6 V	16

- For the use of other types of batteries not mentioned in the overview the participant is required to contact the organization to have determined the maximum allowed number of batteries in series.

7.12 Battery Installation Restrictions and Exemptions

It is not allowed for a team to install additional batteries at any given time, in any location on the boat and for any purpose with the following exemptions:

- Handheld navigation and communication equipment powered by batteries is allowed if they are not electrically connected to the electrical system of the boat.
- (Laptop) computers powered by batteries are allowed as long as they are not electrically connected to the electrical system of the boat. The battery must be an integral part of the computer.
- Telemetry equipment is not connected to other system(s) of the boat or only connected to other system(s) of the boat via cables carrying data.

7.13 Insulation of Energy-Conducting Components

All energy conducting parts must be fully insulated such as to prevent the occurrence of hazardous situations in the case of contact and exposure to water (for instructions on how to do this, please refer to the NEN/DIN standards for example). Special care must be taken in case of boats made of conducting materials (e.g. aluminum, carbon fibre, etc.).

7.14 Electrical Wiring Color Coding and Strain Relief Requirements

The design of electrical wiring and circuitry must be based on standard color coding (NEN/DIN standards).

- A plus cable must be colored or marked red.
- A minus cable must be colored black or blue.
- All cables must be provided with suitable strain relief.

7.15 Electrical Cable Sizing Requirements

All electrical cables must be properly sized to expected system currents. As a guideline the following table may be used. The table is based on continuous currents in a hot environment. It is the sole discretion of the organization to approve the cables used. For this they may deviate from the values given in the table.

Cross-sectional area (mm ²)	Allowed current (A)
0.75	6
1	8
1.5	12
2.5	17
4	22
6	29
10	40
16	54
25	71
35	87
50	105
70	135
95	165
120	190
150	220

7.16 Emergency Main Switch Requirements

All boats must be fitted with an emergency mains switch that can simultaneously interrupt the power supply to the engine and the power between the solar panels and the Maximum PowerPoint Trackers / Solar Controllers or alternatively between the Maximum PowerPoint Trackers / Solar Controllers and the battery and engine. Thereby it isolates the power sources from the rest of the electrical system. This switch is not the same switch as the dead man's switch or the mains switch.

The switch must be capable of breaking the electrical power supply under full load.

The switch must be accessible for emergency personnel from outside of the cabin. Its position must be marked clearly on the outside of the boat such that the switch can be easily located.

The switch must be clearly marked as an emergency switch.

The switch must be operated via a red colored 'mushroom' type push button

The lettering must be of a minimum height of 20 mm.

It is allowed to use one or more relays in the switching system.

In the case of the use of a relay or contactor, this relay/contactor must be rated for the application.

A system that short circuits the solar panels will be allowed for interrupting the current to the MPPTs /solar controller.

7.17 Main Fuse Requirements and System-Level Protection

All electrical systems must be provided with a fuse in serial connection with the main battery (main fuse').

The main fuse may under no circumstances carry more than 200% of the expected power.

The main fuse must be mounted as close as possible to the main battery.

The rating of the main fuse may not be higher than the allowed current in the thinnest wire in the relevant part of the electrical system.

In addition to the main fuse, as a minimum, the following systems must be fused:

- Solar panel
- Motor controller
- Battery
- Battery Management System

7.18 Eye Protection Requirements for Battery Handling

Participants are bound to always use eye-protecting eye gear when assembling, mounting and / or relocating the batteries and/ or when performing any other types of activities related to the batteries.

7.19 Energy Storage Sealing Requirements

It must be possible to easily seal the energy storage system(s) (battery or any other type of energy storage).

The participating teams must make sure that the necessary means are made available such that the organization can apply the seal in a simple and fast way.

The organization will apply the seal on the battery after it has been technically approved.

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t must be possible to easily seal the battery housing. This must be designed in such a way that it is not possible to (re)charge the battery with any other source than solar energy and that it is not possible to replace the battery without breaking the seal.

If a participant needs to break the seal, he or she is bound to notify the organization as soon as possible.

The boat is prohibited from racing from the moment the seal has been broken.

The boat may only return to the race once it has been subjected to a technical re-inspection and a new seal has been installed.

7.20 Electrical Circuit Diagram Availability Requirement

During the technical inspections and/or at any moment on request, the teams are obliged to show the electrical circuitry schemes.

8. APPEARANCE OF THE BOATS

8.1 Boat Registration Number and Panel Requirements

All participating boats must show the registration number provided by the organization.

- The registration number must be positioned on the registration panel mounted to the boat
- The registration panel must be no less than 300 mm in height by 300 mm in length.
- The participating team is responsible for acquiring and mounting the registration panel that must be rigid and permanently fixed to the boat. It must be constructed such that a radar reflector for speed measurements can be mounted to it.
- The registration panel must be positioned above deck no further than 2 meters from the bow.
- The bottom of the registration panel may not be placed lower than the top of the solar panels.
- The registration number must always be visible and from all angles.
- The placement of the registration panel may not hinder the accessibility of the towing eye in the prow.

8.2 Boat Aesthetics and Sponsor Display Regulations

Participants are allowed to finish the boat design with aesthetic embellishments of their own choice considering the rules given in the Notice of Race.

- Participants are also allowed to display their sponsors.
- These displays may not conflict with sound moral standards whatsoever. Furthermore, they must follow the local legislation.
- All subjects to the sole discretion of the organization.

8.3 Transponder Installation Requirement

A transponder for tracking and tracing during the race may be provided by the organization and must be positioned on the boat as instructed by the organizations.

9. INSPECTIONS

9.1 General

The organization is entitled to conduct inspections of the boats at any time of its own choosing. The participants are bound to cooperate with such inspections.

9.2 Pre-Race Inspection

The organization will inspect all boats for full compliance with the requirements prior to the start of the race.

- All participants will be notified in advance of the time and location of the inspections,
- The organization will invite the participants for an inspection,
- During the inspection the participants are required to present their boat in a race-ready condition,
- Boats that fail to comply with the applicable requirements will not be allowed to enter the race until the time they come into full compliance, and this has been confirmed by means of a re-inspection,

- All modifications or repairs to the boat, made after the inspection, will be subject to re-inspection.

9.3 Participant Responsibility for Boat Safety and Condition

Participants are always responsible for the technical condition and safety of the boat during the race. Approval during the inspections will under no circumstance exempt participants from their due responsibilities.

9.4 Inspection Preparation and Procedure Requirements

The inspection set-up will be announced to all participants in advance by means of an inspection form that will be used during the inspection. Participants are asked to prepare themselves for the inspection by means of the inspection form, such that this will facilitate a smooth inspection.

9.5 Paddock Exit and Movement Restrictions

During a race the boats are not allowed to leave the paddock without permission.

- Leaving the paddock without prior permission of the organization will lead to disqualification,
- No permission will have to be asked when a boat is to be driven to the racing test, the prologue, the sprint or the starting point of an element of a race.

10. RACING TEST

10.1 Racing Performance Demonstration and Evaluation Criteria

The participants are required to demonstrate the racing performance of their boats. During this demonstration the participants must race a prescribed circuit. The boat and the pilot will be judged on the following aspects:

- Controllability of the boat,
- Racing skills of the pilot,
- Stability,
- Freeboard in racing condition,
- Spray characteristics.

10.2 Racing Test Requirements for Removable Parts

In case parts have been classified as removable parts under rule 5.27 the racing test must be passed with and without the removable parts installed.

10.3 Organizational Discretion for Race Participation

Based on the results of the racing tests, the organization may decide to exclude a participant from one or more elements of the race even if the boat has been found technically in order. This may be a conditional exclusion based on, for instance, the expected weather conditions.

11. PILOT REQUIREMENTS AND COMMUNICATION

11.1 Minimum Pilot Age Requirements

The minimum age of a pilot at the time of the race is 18 years.

11.2 Life Jacket Requirements for Pilots

All pilots on board the boat must wear an approved life jacket.

- The capacity of the life jacket must be 150 Newton classed or equivalent.

- The life jacket may be automatically inflatable when meeting water
- The life jacket must be designed such that it keeps the head of the one wearing it above water (e.g. is supplied with a collar).

11.3 Minimum Pilot Mass and Ballast Requirements

All pilots expected to have a minimum mass during the race.

- To determine the mass all pilots will be weighed.
- During weighing pilots may not wear more clothing than what is reasonable for the race conditions expected, a helmet and an approved life jacket.
- In case a pilot weighs less than the required minimum mass, the mass of the ballast that he or she must carry throughout the race will be determined by subtracting the mass of the pilot from the minimum required mass.
- The applicable ballast will be marked with a unique mark for the applicable pilot.

11.4 Helmet Requirements for Pilots

All pilots must wear a helmet

- The helmet must be of a bright orange color.
- An open-faced helmet is preferred.

11.5 Pilot Communication System Requirements

All pilots shall be capable of communicating to one member of the onshore team (radio person) by any appropriate means

The means of communication must have a broadcast range of at least 3.7 km (2 nautical miles).

- The means of communication must be integrated into the helmet of the pilot or must be such that it can be worn in combination with the helmet used.
- The means of communication must be waterproof.
- The means of communication must be portable and supplied with a battery of sufficient capacity to last at least one race without being recharged.
- A full radio check of each boat will be part of technical scrutineering to guarantee that all radios are working.

11.6 Pilot Visibility and Footwear Requirements

All pilots should wear bright color clothes or a bright color wetsuit. If a pilot wears shoes, they may not be buoyant.

11.7 Pilot Licensing Requirement for High-Speed Boats

If the boat can move faster than 20 km/h the pilot must be able to show his or her boat driver permit to the organization.



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