

Wildau Solar Boat Championships Rules

1 General Information

The rules for 2025 are based on a proposal by TH Wildau. All questions regarding these regulations must be submitted to the organisers in writing. The rules will be published on the website and are binding for all participants.

2 Liability and Insurance

The organisers and other involved parties shall not be held liable for any damages to people or property (including death, injuries, consequential damages, etc.) occurring before, during, or after the event. All participants must provide proof of liability insurance that covers at least the duration of the event.

Participants are fully responsible for the technical condition and safety of their boats at all times during the event.

All technical details of the boats must be documented in a boat pass. Approval for participation prior to the event or as the result of a technical inspection does not absolve participants from their responsibility.

3 Boat

Each solar boat may derive its energy exclusively from solar panels installed on the boat. The use of wind or muscle power is prohibited.

All boats must be equipped with a "kill switch" that is automatically and immediately activated upon voluntary or involuntary exit from the boat.

Each boat must be designed to allow the skipper and, where applicable, passengers to exit without any external assistance.

Each boat must feature an attachment point for a tow line capable of withstanding a pulling force equivalent to the boat's weight.

All boats must be equipped with two signalling devices, including an orange signal flag and an acoustic device such as a signal horn.

All boats must have a marker buoy attached to the boat by a line at least 5 metres in length.

Each boat must be equipped with a paddle to be used exclusively in emergency situations.

Each boat will be fitted with a measurement box developed by the organisers. This measurement box records the voltage applied to the motor, the current flowing to the motor, as well as the voltage and current supplied by the solar panels. The organisers will provide two current clamps with a diameter of 13 mm each, to be used for measuring the current of the motor and the solar panels. The boat's electrical system must be configured to provide two cables (voltage and ground) for measuring the voltages at the motor and solar panels, each with a diameter of 4 mm (banana plug). Additionally, the boat must accommodate the installation of a GPS module. The cable length between the



measurement box and the GPS is 1 metre. The measurement box has its own independent power supply.

All repairs to the boat's electrical system must be reported to the organisers in advance. Other repairs may be reported afterwards. Replacing the batteries will incur a time penalty.

4 Categories and Technical Requirements

There will be no division into categories. All boats will compete against each other in a single ranking. The results of the boats will be normalised. The normalisation is based on the measurement data recorded by the measurement box.

All participating boats must adhere to the following parameters:

- Maximum length: 8 m,
- Maximum width: 2.4 m,
- Maximum solar power: 3000 watts,
- Maximum battery capacity: 10 kWh, and
- Minimum speed: 6 km/h.

The technical specifications of each boat will be recorded in a boat pass for the Wildau Championship.

All solar panels must be securely mounted, either within a frame or using another stable method. The design of the mounting system must ensure that it can withstand strong winds from any direction.

The type and weight of the battery pack will be documented during the inspection of the boats.

The boats must be designed so that the batteries can be weighed separately.

The maximum permissible onboard voltage is 60 V DC or 75 V AC RMS.

The maximum permissible voltage for the main battery is 48 V DC.

The main battery may only be charged using the solar panels installed on the boat.

All live cables must be rated for the voltages and currents occurring in the onboard system. Each team is responsible for their own batteries.

All batteries used during the regatta must be commercially available and must not be modified under any circumstances. All details about the batteries used must be documented in the boat pass.

The batteries must be mechanically secured within the boat.

In addition to the kill switch, each boat must be equipped with a main switch that can shut down the entire system in an emergency, even under full load. This switch must be clearly labelled as the main switch, and the "On" and "Off" positions must be clearly indicated.

The electrical system must include a fuse connected in series, which must never be rated for more than 200% of the expected maximum load.

5 Identification

All boats must carry identification provided by the organiser. This identification must be clearly visible from all sides. Each team will receive two stickers.

Boats may be decorated and display sponsor advertisements as desired, provided the appearance does not violate standards of decency or dignity, or conflict with the interests of the organiser. The decision on this matter rests with the organiser.



6 Inspection and Boat Pass

Each team must submit their boats to an inspection conducted by the organiser or its representatives at any time prior to or during the regatta. Participants will be informed in advance about the time and location of the inspection. The organisers will invite the teams to the inspection.

Boats that do not comply with the regulations will be excluded from participation until they meet the requirements. A subsequent inspection will be required for approval. Any changes made to the boat after the initial inspection must be approved again by the organiser. Additional inspections may be conducted unannounced at any time during the regatta.

Participants are responsible for the technical condition and safety of their boats at all times. Approval of the boats by the organiser does not absolve teams of their own responsibility.

7 Competitions

All teams participating in the Wildau Solar Boat Championship 2025 must complete the following races in the specified order:

- 1. Endurance In three hours, the longest possible distance must be covered.
- 2. **Speed** Starting from the line, a straight 200-metre course must be completed, followed by a turn, and then another 200-metre course to the finish line. The total distance should be completed in the shortest possible time.
- 3. **Duel** Two boats compete head-to-head in a duel, navigating a small course.

Between races, boats are not allowed to recharge using any external power source.

8 Scoring

Different evaluation criteria apply to each race. Points are awarded in each category. The team with the highest total score is declared the overall winner. In the event of a tie, the boat with the lowest energy consumption per distance in the Endurance race will be declared the winner.

8.1 Endurance

The Endurance race is evaluated based on two criteria.

Energy consumption per distance: The measurement box installed in the boat calculates the motor power P_{Motor} from the motor current I_{Motor} and the motor voltage U_{Motor} using the equation:

$$P_{\text{Motor}} = U_{\text{Motor}} I_{\text{Motor}}.$$

The power is measured discretely at one-second intervals over the three-hour duration:

$$E_{\text{Consumption}} = \sum_{i=1}^{10800} P_{\text{Motor},i} \underbrace{\Delta t}_{1\ s}$$

From this, the energy consumption per distance is calculated as:

$$A_1 = \frac{E_{\rm Consumption}}{s}$$



where *s* represents the distance covered in three hours. The boat with the lowest energy consumption per distance ranks first, while the boat with the highest energy consumption per distance ranks last. Points are awarded as follows:

1st Place	15 points
2nd Place	11 points
3rd Place	9 points
4th Place	7 points
5th Place	5 points
6th Place	3 points
7th Place	2 points
8th Place	1 point

Solar quotient: In addition to distance and energy consumption, the utilisation of solar energy during the Endurance race is evaluated. Boats will only be scored in this category if they cover a maximum distance of $12 \ km$. The measurement box in the boat calculates the solar power P_{Solar} from the solar panel current I_{Solar} and voltage U_{Solar} using the equation:

$$P_{\text{Solar}} = U_{\text{Solar}} I_{\text{Solar}}.$$

The power is measured discretely at one-second intervals over the three-hour duration:

$$E_{\text{Solar}} = \sum_{i=1}^{10800} P_{\text{Solar},i} \underbrace{\Delta t}_{1 \ s}$$

The solar quotient is calculated as:

$$A_2 = \frac{E_{\rm Consumption}}{E_{\rm Solar}}$$

The boat with the lowest solar quotient ranks first, while the boat with the highest solar quotient ranks last. Points are awarded as follows:

1st Place	10 points
2nd Place	8 points
3rd Place	6 points
4th Place	4 points
5th Place	2 points
6th Place	1 point

8.2 Speed

The Speed race is scored based on time and energy efficiency per speed.

Time: The boat with the fastest time ranks first, while the boat with the slowest time ranks last. Points are awarded as follows:



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1st Place	10 points
2nd Place	8 points
3rd Place	6 points
4th Place	4 points
5th Place	2 points
6th Place	1 point

Energy efficiency per speed: For the Speed race, the energy consumption $E_{\text{Consumption}}$ is measured by the measurement box. The average speed \overline{v} is calculated from the recorded time and distance. Boats achieving an average speed of at least $5 \frac{km}{h}$ will be evaluated in this category. Energy efficiency per speed is calculated as:

$$A_3 = \frac{E_{\text{Consumption}}}{\overline{v}}$$

The boat with the lowest energy efficiency per speed ranks first, while the boat with the highest value ranks last. Points are awarded as follows:

1st Place	8 points
2nd Place	6 points
3rd Place	4 points
4th Place	3 points
5th Place	2 points
6th Place	1 point

8.3 Duel

In the Duel race, boats compete in pairs. The pairing is determined by the results of the Speed race. The fastest boat competes against the second fastest, the third fastest against the fourth fastest, and so on. The winner of a duel receives three points. If the number of participants is odd, the second-to-last boat will race against both the third-to-last boat and the slowest boat. If the second-to-last boat wins one or both duels, it receives three points.