

# ELECTRATHON AMERICA

(This is a text only version of the Design Rules. The Electrathon America Handbook contains additional information, illustrations, graphics, and design tips not included in the web format. Contact [info@ElectrathonAmerica.org](mailto:info@ElectrathonAmerica.org) to order a printed copy of the handbook.)

## STATEMENT OF PURPOSE:

*To create and develop a sport that improves public understanding of electric vehicles through continuously improved vehicle and event rules.*

## COMPETITION OBJECTIVES:

1. To drive electrically powered vehicles as far as possible in one hour on a closed loop course using limited electrical energy.
2. To provide a forum where skill and ingenuity may be displayed, compared and tested.
3. To improve public awareness and understanding of efficient alternative electric vehicles and related technology.
4. To create an affordable sport defined by established rules in which groups and Individuals can participate competitively and safely.

## VEHICLES

Electrathon vehicles are single person, lightweight, aerodynamic, high efficiency, electric vehicles with three or four pneumatic tires. They must meet specific design and safety rules. They are powered by lead acid battery packs not exceeding 64 pounds (67 for gel cell batteries).

## SAFETY

Safety is of key concern at all events. The design of the vehicles is only one variable in the safety of an event. Inspection of the vehicles to ensure that they meet safety rules, having a course that is free from obstructions, and making sure participants and spectators are not in harms way are just some of the requirements of sanctioning and of these regulations.

For these safety reasons local Event Organizers, Promoters, and Event Stewards may not make ANY changes to the Electrathon America Design and Event Rules other than were specific guidelines for deviation are listed. To be an Electrathon America Sanctioned Event the Event Rules must be enforced during the event and all vehicles participating in the event must meet the current Vehicle Design rules.

## MEMBERSHIP

A Competitor Membership is for those wishing to build a vehicle and/or drive one. It includes number registration of one vehicle, one Rulebook, and one vote on any suggested rule changes that are presented by the Electrathon America Board during the Event Season. The membership voting rights also include the vote to appoint Electrathon America Board Members. Membership also includes a one year subscription to the ELECTRA Newsletter. See the membership application form at the back of this handbook.

All memberships are valid for the Event Season during which they are paid. The event season is from January 1st to December 31st. All rule changes approved by member vote will take effect January 1<sup>st</sup> of each event year. Rule changes will be posted on the website and published in the ELECTRA newsletter as they are approved.

The rules (text only) can be viewed online [www.ElectrathonAmerica.org](http://www.ElectrathonAmerica.org) or Printed copies can be purchased directly from Electrathon America. The printed Handbook includes additional graphics, photos, and information not included on the website.

Officers and Board members can be contacted via internet E mail addresses available on the Electrathon America website. Members are encouraged to communicate with Board Members with rule suggestions and any other information to help improve the sport and its educational value.

Regional representatives are encouraged to participate as advisors to the EA board. Member surveys are used as needed to solicit opinion on rules and policy from the membership.

### **RULE CHANGE PROPOSALS**

Suggestions for rule changes of either the Design Rules or Event Rules must be presented to an Electrathon America Board Member in writing. If a proposal is consistent with the spirit of Electrathon America competition and will benefit the sport, the Board may present the proposal to the current year membership for an official vote. If passed any rule change will be included in a Rule Book Update at the beginning of the year.

# VEHICLE DESIGN RULES

*The Vehicle Design Rules are maintained by Electrathon America and enforced at sanctioned events.*

*They are provided to promote safe and fair competition.*

*Since safety is of key concern these rules should be considered minimum requirements. These rules will be in force and these requirements must be maintained during the entire competition. Any vehicle should be able to pass inspection at any time during a competition.*

*Experimentation of design and ingenuity are encouraged, but keep in mind the intent of safe competition for the driver and the other participants of an event. If a new concept is being attempted that does not fit the rules exactly it may be wise to contact an event official or an Officer of Electrathon America before proceeding with construction. It would be unfortunate to complete a vehicle and then have it disqualified at a competition. Please remember that safety is a primary goal.*

*To better understand these rules please read the Event Rules to learn how these rules will be enforced.*

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## **1.0 DIMENSIONS**

1.1 Minimum track (distance the tires are apart) is 2 feet center to center.

1.2 Maximum vehicle width is 4 feet at its widest point when the steering system is positioned as if driving in a straight line.

1.3 Maximum vehicle length is 12 feet.

## **2.0 CONFIGURATION**

2.1 All vehicles must be three-wheeled (cycle-car or tricycle) or four wheeled. Any configuration is allowed. All wheels must be load bearing, and remain in contact with the ground at all times, even under hard cornering conditions.

## **3.0 FRAME / FRAME MEMBERS**

3.1 All vehicles must have frame members that protect the driver in the event of collisions from any direction.

3.2 Frames may be constructed of various materials and styles providing that the material(s) or methods provide adequate structural strength for protection/safety. The design will need to be structurally sound in the opinion of inspectors and/or race officials.

## **4.0 ROLL BAR**

4.1 A roll bar must provide roll over protection for the driver's head both from the top and from the side.

4.2 The roll bar structure must be triangulated with at least three legs or panel equivalent. Triangulated bracing can be either forward or rearward. Bracing must extend from the top of the roll bar and securely attach to the vehicle structure. Any roll bar that is constructed from more than one continuous piece must be reinforced and braced triangularly from all junctions/joints in addition to the top.

4.3 The roll bar structure must be sturdy enough to withstand the vehicle being dropped, upside down, from an altitude of one foot, with the driver inside without failure.

4.4 The driver's helmet must be below a straight line drawn from the top of the roll bar to the top of a front tire or the highest structural point when the driver is securely belted in driving position.

4.5 Composite or monocoque vehicles with integral rollover protection must meet comparable strength and clearance requirements.

4.6 Padding must be installed to prevent injury from contacting the frame members in the event of an accident. Padding must be at least 1/2-inch thick and made of foam.

## **5.0 VEHICLE BODY**

5.1 All vehicles must provide a body/chassis structure sufficient to protect the driver from impact from any side. A suitable structure or shell is required to provide a barrier between the driver and any contact with another vehicle or the ground.

5.2 This body or structure needs to protect the driver's legs, feet, and side up to shoulder level protecting the rib cage from side impact.

5.3 The legs and feet must be enclosed to prevent them from leaving the vehicle in an accident and provide protection against a frontal impact.

5.4 If the chassis contains a structural shell sufficient to protect the driver, then any body provided need not be structural. However under no circumstances is the body to be made of cardboard, paper or any material that becomes weak when wet. Materials that are brittle, or produce sharp edges when broken (e.g. Plexiglas or brittle acrylic panels) are also not allowed.

5.5 A body is not required if the frame or chassis shell will prevent the driver's arms and legs from leaving the vehicle and prevent another vehicle's parts from entering the vehicle during an accident.

5.6 The vehicle must not have any sharp edges, corners or protrusions that could cause injury. Any questionable exposed portion of the vehicle should be cut off, rounded off or blunted with durable padding.

5.7 The vehicle must have a fixed floor pan that prevents the driver's body from contacting the ground.

## **6.0 STABILITY**

6.1 All vehicles must demonstrate stability at rest, while cornering, braking and at top speed.

6.2 Driver contact with the ground cannot be used for stability

6.3 Vehicles must be positively balanced and stable at all times while moving and at rest. Stability is critical for safety and must be maintained in off-camber turns, high-banked corners and in windy conditions.

## **7.0 LEANING VEHICLES**

7.1 Leaning vehicles are permitted provided the driver is not required to balance the vehicle and stability requirements are met.

7.2 Leaning vehicles must use a mechanical device for actuation.

7.3 Vehicles which lean must have the ability to lock out the leaning capability of the vehicle for driver access and exit.

## **8.0 STEERING**

8.1 Steering must permit a turning circle diameter of less than 50 feet curb to curb.

8.2 Any steering system must be well constructed and provide reliable steering action without looseness or binding.

## **9.0 BRAKES and AXLES**

9.1 At least two wheels must have brakes.

9.2 Brakes must be fitted to two wheels of the same axle. Either both front wheels or both rear wheels depending on the vehicle construction.

9.3 The two brakes must have separate actuation cables. If both brakes are to be actuated by a single hand or foot lever then both cables should be attached to the lever.

9.4 Regenerative braking is permitted in addition to conventional brakes.

9.5 The vehicle must not roll if pushed while brakes are applied. The vehicle must also be able to demonstrate a straight stop from a speed of 25 MPH in less than 40 feet.

9.6 Axles supported at both ends must have a diameter of at least 3/8" or 10 mm.

9.7 Axles that are only supported on one end must have a diameter of at least 1/2" or 12 mm.

9.8 Safety wire or cotter pins must be used to secure cantilevered wheel axle nuts. Nylon lock nuts and double nuts alone are not acceptable.

## **10.0 WHEELS and TIRES**

10.1 Tires must be a pneumatic (inflatable) type.

10.2 Wheels and Tires of any diameter or width may be used.

10.3 Clearance between the vehicle's lowest point and the ground must exceed the height of the tire sidewalls to prevent the vehicle from sliding on the ground in the event of failure of any or all of the tires.

10.4 While in driving position the driver's body must not be able to come in contact with tires, wheels or spokes.

## **11.0 BATTERIES**

11.1 Batteries must be lead acid only. Wet cell, gel, or dry cell types are permitted. The 2004 competition season is the last year that wet cell batteries will be allowed. Gel cell or AGM (Absorbent Glass Mat) batteries will be the only type allowed starting in the 2005 competition season.

11.2 Battery number and voltage is not limited, but must meet specified weight limits, or must be the accepted battery types listed.

11.3 Batteries must display all original manufacturer's labels.

11.4 Batteries must be commercially retailed and available to any competitor. Custom built or specialized batteries are not allowed.

11.5 Batteries must be stock and unmodified in any way, and meet all conditions of the manufacturer's written warranty.

11.6 Total battery weight on sealed gel cell or AGM type batteries cannot exceed 67 pounds. Total battery weight on all other types cannot exceed 64 pounds unless listed below. Total battery weight includes any batteries used for controls actuation, or functioning of the vehicle. Computers, radios or similar equipment are not included.

Note: The 64 pound limit will be removed in the 2005 competition season.

Two of the following batteries will be allowed regardless of actual weight:

Optima SC 25A  
Optima SC3575 (side and top post)  
Genesis G42 (VP, VPX, EP, EPX)  
MK ES40-12  
Tysonic TY 12-40

11.7 Batteries cannot be exchanged or recharged from an outside source during a competition. Batteries may be recharged by regenerative braking. In Solar Class recharging through use of solar panels is also allowed.

11.8 Batteries must be securely attached to the vehicle in such a manner to withstand an impact or roll-over.

11.9 Batteries must be enclosed or covered to prevent acid leakage in the event of accidental damage to the battery.

## **12.0 ELECTRICAL SYSTEM**

12.1 A fuse or circuit breaker is required in any electrical circuit between the battery and any electrical device.

12.2 All fuses or circuit breakers should be mounted as close as practically possible to the source of power.

12.3 All fuses or breakers should be sized to protect the wiring to which they are connected. The current rating of fuses and breakers shall be no more than those listed in the following table for standard automotive cable.

## **13.0 ISOLATION SWITCH**

13.1 An isolation switch (kill switch) is required on all vehicles. This switch must have a break current rating that exceeds the maximum current draw of the vehicle.

13.2 The switch must be located in the main positive power cable between the battery and any motor controller.

13.3 An actuator may be attached to the switch for remote operation provided that it is durable and reliable.

13.4 Means must be provided for both the driver and race officials to actuate an isolation switch.

13.5 The driver must be able to actuate the switch while in driving position and without reaching outside the vehicle.

13.6 Race officials must be able to actuate the switch from outside the vehicle without reaching in.

13.6 Two switches may be installed if necessary

13.8 A circuit breaker may be used as the isolation switch.

13.9 The switch or actuator accessible from outside the vehicle must be mounted within a solid red triangle whose sides are at least 4 inches. It must be visible and in contrast to the vehicle color or graphics.

13.10 Wiring must be well insulated and securely attached to the frame or body. All wiring must be kept free from moving parts and protected from chafing.

13.11 Wiring that passes through a hole with sharp edges or through sheet metal must be protected by an insulating grommet or other suitable device.

13.12 Terminals must be secured so they will not come loose or short out during a competition.

13.13 No part of the electrical system may use the vehicle frame as a conductor. The frame must not be grounded.

#### **14.0 MOTOR and TRANSMISSION**

14.1 Vehicles must only be powered by electric motors.

14.2 All motors must be controlled by the driver and must turn off automatically when the driver releases the motor control.

14.3 All gears, chains, and sprockets must be covered if they could cause injury to the driver or others in the event of mechanical failure.

#### **15.0 MOTOR CONTROLLER**

15.1 Any type of power (speed) controller is allowed.

15.2 Power to the motor must turn off automatically when the driver releases the accelerator.

15.3 Remote control of a vehicle is not permitted.

#### **16.0 NUMBERS**

16.1 All vehicles must display vehicle competition numbers.

16.2 Vehicle numbers must be least 6 inches in height.

16.3 Numbers must be displayed and clearly visible on both sides of the vehicle.

16.4 The numbers must be in a contrasting color to the vehicle or number background. Out of state vehicles must also display their state abbreviation following the vehicle number in 3 inch high letters.

## **17.0 MIRRORS**

17.1 Vehicles must be equipped with a minimum of 8 square inches of total usable mirror surface area. This may be one or two mirrors.

17.2 The mirror(s) must allow the driver to see clearly to the rear on both sides of the vehicle.

## **18.0 SAFETY BELTS**

18.1 All vehicles must be equipped with at least a three-point automotive seat belt and shoulder harness.

18.2 The seat belt must be mechanically attached to the vehicle and be capable of lifting the entire vehicle from the ground.

18.3 Safety belts must be mounted to a structural point 3 inches below the driver's belt buckle.

18.4 The shoulder harness must be attached to a structural point 3 inches below the driver's shoulder.

18.5 The seat belt or seat structure must prevent the driver from sliding forward during a sudden stop. A crotch strap (anti-submarine device) is recommended.

## **19.0 HELMETS**

19.1 All drivers must wear a DOT approved helmet during competition. Bicycle and skateboard helmets are not acceptable.

19.2 Chin straps on helmets must properly and securely fastened while operating an Electrathon Vehicle.

## **20.0 DRIVER ATTIRE**

20.1 Drivers must be fully clothed during competition.

20.2 Long sleeve shirts, pants and shoes are required (water socks and wrestling shoes are acceptable).

20.3 Gloves are required for open cockpit vehicles. Gloves are optional for enclosed canopy vehicles. Fingerless gloves are allowed.

20.4 All drivers must wear eye protection while operating an Electrathon vehicle. Safety glasses with a Z87 rating, goggles or a full face shield helmet are acceptable.

## **21.0 DRIVING POSITION**

21.1 Drivers must be in a sitting or recumbent (reclining) position. A kneeling, or prone (head first) position is not permitted.

21.2 Arms and legs must remain within the vehicle body structure during competition.

## **22.0 EXITING THE VEHICLE**

22.1 Drivers must be able to exit their vehicle as it is driven in competition, unaided in 20 seconds. This includes any external method of securing canopies.

22.2 Handicapped participants will be allowed up to 2 minutes aided exit.

## **23.0 DRIVER**

23.1 All drivers must show a valid driver's license.

23.2 All drivers must sign a liability release prior to each event. Drivers under the age of 18 must have a parent or legal guardian co-sign their liability release on their behalf.

23.3 Drivers must have an Electrathon America Competitor Membership.

## **24.0 COMPETITOR MEMBERSHIP CARD**

24.1 This card may be made available by Electrathon America which can be presented as proof of current year paid membership. The Event Organizer may request a computer roster of current competitor members to verify memberships.

## **25.0 DRIVER'S WEIGHT**

25.1 Drivers must weigh a minimum of 180 pounds. This includes race clothing and helmet. Drivers under this weight limit must provide non-liquid ballast to increase their weight to the legal limit.

## **26.0 BALLAST**

26.1 Ballast cannot be performance related items such as communication equipment or computers. However, non-performance items such as cameras or music systems may be permitted as ballast provided they do not present a safety risk to the driver or other competitors.

26.2 Ballast must be removable for weigh in. Ballast must be securely attached to the vehicle in such a manner to withstand an impact or roll-over.

26.3 Each driver is responsible for providing the correct amount of ballast.

## **27.0 SOLAR ELECTRIC CLASS**

All other Standard Class rules apply with the following additions:

1.0 Solar panels are permitted provided they are an integral part of the vehicle body and do not protrude to the front, sides or rear.

2.0 Wings or trailers are not permitted.

3.0 Solar panels must be a standard silicone type. Maximum panel size (total surface area) is one square meter.