Electric Vehicle Grand Prix

Official Rules and Regulations



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Vehicle Design/Safety and Team Rules

The Vehicle Design and Safety Rules are developed by the competition Rules Committee and enforced at the event by the Steward and Technical Inspectors. They are provided to promote a safe and fair competition for all involved.

Since safety is of key concern these rules should be considered minimum requirements. These rules will be in force and the requirements must be maintained during the entire competition.

Any vehicle may be re-inspected at any time during the competition to ensure compliance with the regulations within this document.

Experimentation of design and ingenuity are encouraged, but keep in mind the intent of safe competition for the driver and the other participants of the event. If a new concept being attempted does not fit the rules exactly, you are encouraged to contact Global EEE to get a ruling before proceeding with construction. It would be unfortunate to work so hard on a vehicle and only to have it disqualified at the competition. Remember that safety is a primary goal and inspectors uphold that.

To understand these rules please read the Competition (Sporting) Rules to learn how they will be enforced.

1.0 DIMENSIONS

1.1 Minimum track width (distance the tires are apart) is 2 feet (61 cm) center-to-center.

1.2 Maximum vehicle width is 4 feet (122 cm) 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 (366 cm).

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 provided that the material(s) or methods exhibit 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 rollover protection for the driver's head throughout the full range of its possible movement both from the top and from the sides.

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. With three legs, bracing must extend from the top of the roll bar and securely attach to the vehicle structure. The distance fore/aft measured between the roll hoop legs and the brace must be at least 25% of the height of the roll bar. 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 (with 80 kg driver weight) being dropped, upside down, from a height of one foot (30.5 cm), without failure.

4.4 The top of the driver's helmet must be at least 1.5 inches (3.8 cm) below the highest point of the roll bar when the driver is securely belted and in driving position.

4.5 Aluminum, composite or monocoque vehicles with integral rollover protection must meet comparable strength and clearance requirements. Rollover load bearing elements made exclusively of non-metal materials (fiberglass, carbon-fiber, wood, etc.) are forbidden.

5.0 VEHICLE BODY

5.1 The vehicle must have 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 if possible.

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 The vehicle must have a fixed floor pan that prevents the driver's body from contacting the ground, and to keep any track debris from entering the vehicle.

5.5 If the chassis contains a structural shell sufficient to protect the driver, then any outer 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 as body panels.

5.6 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.

5.7 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.

5.8 The nose area must not be dangerously pointed, with a minimum radius of 3 inches (7.6 cm) in at least one direction and 1 inch (2.54 cm) in the other direction.

6.0 STABILITY

6.1 The vehicle 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 full turning of less than 50 ft (15.2 m) curb to curb.

8.2 Any steering system must be well constructed and provide reliable steering action without looseness or binding. Cable activated steering or steer-by-wire are not permitted.

9.0 BRAKES AND AXLES

9.1 At least two wheels must have mechanical brakes, and must be fitted on either both front wheels or both rear wheels depending on vehicle construction.

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

9.3 The vehicle must not roll forward if pushed while brakes are applied. The vehicle must also be able to demonstrate a straight stop from a speed of 25 MPH (40 KPH) in less than 40 feet (12 m).

9.4 Regenerative braking is permitted in addition to conventional brakes.

9.5 Axles supported at both ends must have a diameter of at least 3/8 in (or 10 mm).

9.6 Axles supported only on one end must have a diameter of at least 1/2 in (or 12 mm)

9.7 Safety wire or cotter pins must be used to secure cantilevered wheel axle castellated nuts. Nylon lock nuts and double nuts alone are not acceptable. All other structural bolts must be secured with lock nuts.

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 The minimum ground clearance is to be judged by the car's ability to roll over a 2 inch x 2 inch (5.1 cm x 5.1 cm) square cross-section rod.

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 MOTOR AND TRANSMISSION

11.1 Vehicles must only be powered by electric motors.

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

12.0 MOTOR CONTROLLER

12.1 Any type of power (speed or torque) controller is allowed.

12.2 Power to the motor must be controlled by the driver, and turn off automatically when the driver releases the accelerator. An active forward switch mounted on the thumb throttle input device or elsewhere on the steering is required and must be activated during driver egress/ingress, with the controller set to recognize the switch.

12.3 Remote control of a vehicle is not permitted.

12.4 Computers on or off the vehicle are allowed if they present information only. The driver must have complete manual control of the vehicle and make all operational adjustments.

13.0 BATTERIES

13.1 Allowable batteries will be specified by the competition organizers. Alternatives may be considered but must be preapproved by the competition organizers. For high school electric vehicle competitions only sealed lead acid (SLA) batteries are allowed with a total combined weight of 73 LB (33.2 kg).

13.2 Batteries must display the original manufacturer's labels.

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

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

13.5 Additional batteries of any other acceptable chemistry may be used to separately power an onboard computer (other than the motor controller), battery management system, radios or similar equipment. These additional batteries must be isolated electrically from the main vehicle battery bus. Under no circumstance may the additional batteries or external power source be used to cool/warm any equipment on the vehicle.

13.6 Batteries cannot be exchanged or recharged from an outside source during the competition except as stated in Sections 13.7 and 28.1. Batteries may be recharged by regenerative braking.

13.7 Solar panels/generators of any type are not allowed as a source of energy during racing.

13.8 Batteries may be exchanged (swapped) only if the total capacity or weight of the two packs does not exceed the maximum allowed by the competition rules. Since the rules require the maximum battery weight to be equal to or less than 73 LB (33.2 kg) then a team may use two packs weighing no more than a total of 73 LB (33.2 kg). Both packs must pass technical inspection prior to the start of the race, and will be re-inspected during and after the swap. Battery packs may not be swapped during a racing heat.

13.9 A battery management system (BMS) may be used for load balancing and measurement of cell voltage, temperature, and battery current.

14.0 ELECTRICAL SYSTEM

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

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

14.3 All fuses or breakers should be sized to protect the wiring and devices to which they are connected. The current rating of fuses and breakers shall be no more than those listed in the adjacent table for standard automotive cable. These are recommended ratings and the final ruling is up to the technical inspectors.

Wire size AWG	MAX Fuse or Breaker Size
20	5.5 AMPS
18	9 AMPS
16	12 AMPS
14	15 AMPS
12	20 AMPS
10	30 AMPS
8	80 AMPS
6	105 AMPS
4	140 AMPS
2	200 AMPS

15.0 ISOLATION SWITCH

15.1 A battery 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.

15.2 The switch must be located in the main positive power cable between the battery and any motor controller, with a properly rated fuse in line.

15.3 Means must be provided for both the driver and race officials to actuate an isolation switch. The driver must be able to actuate the switch while in driving position, with seatbelts and full racing attire (gloves, helmet, etc.) and without reaching outside the vehicle. Race officials must be able to actuate the switch from outside the vehicle without having to reach in too far or having to remove a canopy or cover.

15.4 An actuator (manual or automatic) may be attached to the switch to allow better access to the switch by the driver and officials, provided that it is durable and reliable.

15.5 Two switches may be installed in series if necessary for inside and outside access.

15.6 A properly rated circuit breaker may be used as the isolation switch.

15.7 The location of the switch or actuator must be clearly marked on the outside of the vehicle with a red/yellow triangle whose sides are at least 4 inches (10.2 cm). It must be visible and in contrast to the vehicle color or graphics.

15.8 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.

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

15.10 Terminals must be secured so they will not become loose or short out during a competition. Spring washers or nylon locks must be used where possible.

15.11 No part of the electrical system may use the vehicle frame as a conductor. <u>The frame must not be grounded</u>.

16.0 MIRRORS

16.1 Vehicles must be equipped with a minimum of 8 in^2 (52 cm^2) of total usable mirror surface area. This may be one or more mirrors.

16.2 The mirror(s) must allow the driver to see clearly to the rear on both sides of the vehicle. This will be tested in a manner deemed appropriate by the inspector and Race Steward.

16.3 The driver must be able to see clearly to the front and both sides of the vehicle.

16.4 Electronic sensing devices, such as video cameras and monitors, may not be used as a substitute for rear view mirrors.

17.0 SAFETY BELTS

17.1 Vehicles must be equipped with a quick-release five-point automotive seat belt system.

17.2 The lap belts, shoulder harness and anti-submarine strap must be securely attached to the vehicle frame and be capable of lifting the entire vehicle off the ground. Webbing for the lap and shoulder belts must be at least 3 in (7.6 cm) wide. The anti-submarine belt webbing must be at least 1.5 in (3.8 cm) wide. No part of the safety harness may be modified in any way, including cutting excess webbing. An SFI label with effective date attached by the manufacturer must be visible on the harness. A seatbelt with an expired date may be allowed provided the inspectors approve its use.

17.3 The seat belt, shoulder harness and anti-submarine strap must be able to hold the driver in a position that does not allow any excessive movement. It must prevent the driver from sliding forward during a sudden stop. It must also maintain the driver's shoulders in the "driving position" in case of a sudden stop. The seat belt must be able to hold the driver securely in place if the vehicle rolls over.

17.4 Lap belts must be mounted in such a way that the belt rests and pushes on the hip bones and not the abdomen. If the seat is not of the bucket type (i.e. does not reach out to the sides of the driver) then the harness buckle must be positioned below the driver's waist.

17.5 Anchor points for the lap belts and anti-submarine strap must be no more than 1 in (2.54 cm) above the horizontal plain of the driver seat's lowest point. The shoulder harness must be attached to a structural point below the driver's shoulders.

18.0 HELMET

18.1 Drivers must wear a DOT approved full face hard shell helmet during the competition. Snell 2015 and ECE 22.05 are also acceptable helmets and must be clearly identified. Bicycle and skateboard helmets are not acceptable.

18.2 Chin straps on helmets must be securely fastened when the vehicle is in motion.

19.0 DRIVER ATTIRE

19.1 Drivers must be fully clothed during competition.

19.2 Long sleeve shirts, trousers and shoes are required (water socks and wrestling shoes are acceptable). Clothing made of cotton is preferred over synthetic polyesters.

19.3 Gloves are required for open cockpit vehicles. Gloves are optional for fully enclosed canopy vehicles. Fingerless gloves are also allowed.

19.4 Drivers must wear eye protection while operating the vehicles. Safety glasses with a Z87 rating, goggles, or a full face shield helmet are acceptable. Prescription glasses not designed specifically for sport or high impact applications are not sufficient.

19.5 Hair must be contained in such a way that all of it is unable to reach the drive train.

19.6 Necklaces, wrist and ankle bracelets, and large earrings must be removed.

20.0 CELL PHONE/COMMUNICATION DEVICES

20.1 Voice activated communication devices are allowed. The team must specify the frequency used and may not modify it during the race without approval. Teams may not interfere with the officials' or other teams' communications.

20.2 Push-to-talk-radios are permitted as long as the driver is not distracted by the action of push-to-talk. The talk button must be affixed to the vehicle in such a way that the driver's hands remain on the steering mechanisms at all times.

20.3 Cell phones are permitted only when the vehicle is at a stop (such as a breakdown) or when in hands-free mode on a continuously open line (no dialing).

20.4 Texting is banned whenever the driver is physically in the car.

20.5 Penalty for violation of rules 20.3 or 20.4 is the offending car and driver's immediate removal (disqualification). This ruling cannot be appealed.

21.0 DRIVING POSITION

21.1 Drivers must be in a sitting or recumbent (reclining) position. The recline angle must be at a minimum 30 degrees between the road surface and the drivers back while in driving state. Kneeling, or prone (head first) positions are 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, unaided, in under 20 seconds. This includes any external method of securing canopies. Drivers are expected to demonstrate compliance with this rule with an egress test while belted and in full driving attire.

22.2 Full canopies may not be taped to the vehicle around the entire perimeter making it difficult to egress unaided. Partial canopies not covering the egress section may be taped.

23.0 DRIVERS

23.1 Drivers must be at least 16 years of age and should hold a valid driver's license or learner's permit to operate a passenger vehicle. Exceptions may be granted on a case-by-case basis provided the driver has extensive karting experience.

23.2 Drivers will be observed by the Race Steward and Marshals during practice and qualifying sessions as well as during the race, and may be disqualified at the Steward's discretion.

23.3 All team members must sign a liability release form prior to the competition, in addition to their parent or legal guardian should the team member be under 18 years of age. Drivers may be required to sign an additional liability release by the venue owners.

24.0 BALLAST

24.1 Drivers must weigh a minimum of 80 kg (176 LB). This includes race clothing and helmet. Drivers below this weight limit must provide and securely install in the vehicle non-liquid ballast to increase their weight to the legal limit.

24.2 Ballast cannot be performance related such as communication equipment or computers.

24.3 Ballast must be securely attached to the vehicle in such a manner to withstand an impact or roll-over, and must be removable for weigh-in. If a vehicle loses its ballast during competition, it will be black flagged and may be disqualified.

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

24.5 Ballasts cannot be carried in pockets or attached to the driver in any way unless approved by the technical inspectors. Under no circumstance is the total body-mounted ballast allowed to exceed 11 LB (5 kg) and must be equally distributed in at least two locations.

25.0 VEHICLE CLASSES

25.1 The EV Grand Prix recognizes two vehicle classes per 25.2 and 25.3. Teams must clearly indicate which class they are participating in prior to the competition. A school may enter a different car in each class. The organizers may allow multiple cars in one class from one school depending on the total number of participating teams. Stock and Open class cars will race together in the same heats with winners evaluated per regulations 34 and 41.

25.2 Stock Class refers to cars that are based entirely on the official kit (Appendix A) with minor modifications per regulation 26. Cars built with the official kit meet the design regulations outlined in this document provided they are assembled correctly.

25.3 Open Class refers to cars that are designed and built from the ground up, or based on the official kit but with extensive modifications, provided the total cost of the car is less than $10,000 USD. Parts donated to the team will also be included in the total cost calculation based on their market values. Teams participating in the Open Class may be required to provide evidence of costs of certain components, and are required to submit their Open Class car designs prior to the competition to ensure that they meet the design regulations outlined in this document. Schools/teams participating for the first time in the EVGP are not allowed to enter in the Open Class.

26.0 MODIFICATIONS TO THE VEHICLE KIT

26.1 A list of parts and components supplied in the official competition kit is in Appendix A.

26.2 For Stock Class cars, modifications and replacements are ONLY allowed for the floor, battery support board, mirrors, canopy, and batteries. Any replacements or enhancements to the chassis, mechanical parts, safety harness, seat, switches, fuses, or wires due to aging or damage are allowed and must adhere to all the vehicle rules and regulations and subject to rigorous technical inspection.

26.3 For Open Class cars, design changes may be made to any of the parts with the exception of the 48V 15A charger supplied in the official kit. Teams wishing to implement a bus voltage other than 48V may use a different charger provided the maximum nominal power is under 720 Watts. Example: a 36V drive system could have a charger with a maximum current of 20 Amps.

27.0 VEHICLE GRAPHICS

27.1 Any graphics design may be applied to the vehicle provided it is in good taste and is not offensive or profane.

27.2 The graphics must clearly display the school name. A car or team name may be displayed in addition to the team's sponsor names and/or logos.

28.0 NUMBERS AND EVENT STICKERS

28.1 Two stickers with the assigned 3-digit vehicle number and event name/sponsors will be provided to the team at registration or after inspection, and must be properly affixed to both sides of the vehicle.

28.2 An unobstructed space measuring 16 in wide by 12 in high (40.6 cm by 30.5 cm) must be made available on both sides of the vehicle to affix the event sticker.

28.3 The teams may be given the option to choose from a limited number of color choices for the stickers to ensure contrast with the background color and match the car's colors. This selection must be made no less than 21 days prior to the competition.

29.0 COMPLIANCE WITH VEHICLE DESIGN RULES

29.1 Vehicles must meet all Vehicle Design Rules to drive in the event. This is true for competition, qualifying, practice or testing and includes drivers' clothing, safety equipment, ballast, brakes, batteries, battery securing systems, seat belts, etc.

Competition (Sporting) Rules

The Competition (Sporting) Rules are developed by the competition Rules Committee and enforced at the event by the Steward and Marshals. The regulations are intended to provide a safe and equitable competition format and inspection process.

Since safety is of key concern these rules should be considered as minimum requirements. The rules will be in force and the requirements must be maintained during the entire competition. Any vehicle may be re-inspected at any time during the competition to ensure compliance with the regulations within this document. Remember that safety is a primary goal and inspectors uphold that. To fully understand the rules in this section please read the Vehicle Design, Safety and Team Rules above to learn how they will be enforced.

30.0 COMPETITION PERSONNEL

30.1 STEWARD is in charge of the rules and regulations aspect of the competition and is responsible for the following:

- Supervise the race
- Oversee the vehicle technical inspections
- Supervise Marshals and other track personnel
- Run driver/track personnel meeting
- Verify and certify lap totals and scoring

The Steward observes the competition in progress, the conduct of competitors and the condition of vehicles. The Steward has final authority on all disputes regarding competition issues and rules. Disputes not resolved by the Steward may be submitted as formal protests to the committee of judges appointed for the event.

30.2 TECHNICAL INSPECTORS are experts intimately familiar with the rules and regulations of the competition and experience in the automotive field as it relates to the competition. They will scrutinize each vehicle for compliance with the design rules. Particular emphasis is placed on issues of safety. The inspectors shall use their fair judgment regarding compliance with the rules. When scrutinizing the vehicles, any inspector may point out a safety concern or rule violation even if it is not their area of inspection. For example, the mechanical inspector may point out an issue with the electrical system if they believe it does not comply with the rules or poses a safety concern. Also, inspectors may point out to the Steward a safety concern about a vehicle any time during the competition. Disputes on inspection decisions should be taken to the Steward. The Steward may appoint a Head Technical Inspector to oversee and coordinate the inspection process.

30.3 COURSE MARSHALS are assigned to specific positions around the track. They may be issued flags of various colors or whistle. It is their responsibility to keep the track and pit

lane safe for the competitors. This includes:

- Warning approaching drivers of obstructions on the track such as disabled vehicles or accidents
- Assisting drivers in distress
- Keeping spectators off the track and out of dangerous locations
- Escorting team members on the track to tend to a disabled vehicle
- Informing the Steward of hazardous situations

30.4 ADDITIONAL VOLUNTEERS are assigned to assist the Steward, Technical Inspectors, and Marshals throughout the event. They have no authority over any aspect of the competition and should not be consulted regarding questions pertaining to rules and regulations or technical matters. This includes Observers assigned to monitor the teams and cars at all times.

30.5 AWARDS JUDGES are appointed by the organizers to evaluate awards submissions and may visit team garages and ask to speak with certain teams members as part of the evaluations.

31.0 NUMBER OF TEAM MEMBERS

31.1 There is no limit to the number of team members on a team. As a minimum, the team must designate a team leader, teacher, two drivers (no more than four are allowed), a Safety Specialist (two preferred), and a Media and Guest Liaison.

31.2 Teams may designate other functions for the remaining members.

31.3 During registration team members will be provided two yellow vests which must be worn by members involved in the driver change (other than the two drivers) per 32.4 or accessing the track to provide support to a stopped vehicle

31.4 During driver changes in the race, only the two drivers being exchanged and two other supporting team members with yellow vests are allowed in the pit area. The Safety Specialist must oversee the driver change but may not be standing in the pit lane, and may not contribute to the driver change. If visitors are in the garage at the time of driver change and wish to watch the process closely, the team Media and Guest Liaison must escort them and ensure that the drivers and vehicle path are not obstructed in any way.

31.5 In case of a vehicle failure on the track during the race, the Marshals will signal the team to allow two members with yellow vests to proceed to the vehicle. The team members must be escorted by a Marshal unless instructed otherwise.

31.6 If the vehicle needs to be pushed to the pit area, a Marshal will instruct the team on the timing and the route to take. No other team members are allowed to assist unless

instructed and approved by a Marshal. If the vehicle requires minor repair (change tire, change fuse, etc.) then the Marshal may allow one or two additional team members to proceed escorted to the vehicle.

31.7 The organizers may set a limit on the number of team members allowed access to the garages at any given time. Under no circumstance should team members wander into other team garages unless expressly invited to do so.

32.0 SAFETY SPECIALISTS AND FIRE EXTINGUISHERS

32.1 The team must appoint two members to serve as the Safety Specialist during the event. Only one of the two members will serve at any given time, while the other member rests.

32.2 A red vest (or other designated color) will be provided and must be worn at all times by the Safety Specialist on duty.

32.3 The two Safety Specialists will be required to attend a mandatory meeting.

32.4 The Safety Specialist on duty must be with the vehicle at any given time while in the event area, including but not limited to, garages, technical inspection areas, while the vehicle is being transported from one area to another, during driver changes, and any other time when the vehicle is powered or moving.

32.5 It is the responsibility of the Safety Specialist to instruct the other team members about the basic safety procedures and requirements and to ensure that the team complies with these requirements.

32.6 Carrying a fire extinguisher on the vehicle is not required. However, it is recommended that the team bring an extinguisher and place it in the garage. The Safety Specialists should also familiarize themselves with the locations of fire extinguishers at the venue.

33.0 MEDIA AND GUEST LIAISON

33.1 Teams should appoint one member to act as Media and Guest Liaison, and might be provided a badge or vest of different color indicating this role.

33.2 From time to time, members of the media and special guests will be escorted by the organizers to the team garages. The team's Media and Guest liaison should be available to escort the visitors, provide explanations, and answer questions. The liaison must be courteous and polite. If the team is working on the car, the liaison must politely indicate where the visitors should stand so as not to interfere with the team's activities.

33.3 Teams are encouraged to have flyers and other printed material or barcodes that can be provided to the members of the media and guests visiting the garages. All material bearing the name of the event must ensure that it is represented accurately and the event partner and sponsor logos are presented accurately and clearly.

34.0 RACE FORMATS AND DETERMINATION OF WINNERS

34.1 The race is comprised of one hour of racing divided into two heats, each half an hour in length. A mandatory driver change will take place in the time window between minutes 12 and 18. The official time will NOT be stopped during the driver change, so teams are encouraged to be prepared once their vehicle comes into the pit lane. The blue (or white) flag will be waved at the pit lane entrance during the driver change window.

34.2 The white flag will be waived by all Marshals for two minutes after the end of the timed heat (at the 30 minute point) and fly for the entire two minutes. The purpose of the white flag is to alert drivers that they have two minutes or less to complete the final lap.

34.3 The checkered flag will be waved at the finish line for every car that crosses within the 2 minute period. Once drivers pass under the checkered flag they should move safely to the right lane and come to a complete stop until instructed by the Marshals to move again.

34.4 Even though the regulation time has ended at minute 30, cars will still receive credit for the last lap as long as it is completed within two minutes of the end of the race; i.e. by the 32 minute point.

34.5 Team scores for each of the half hour sessions will be the number of laps completed AND their Extra Time, which is the amount of time between the end of the timed session and when the vehicle passed the finish line next. For example, if a team completes 21 laps in 31 minutes 18 seconds, then their reported completed laps/time will be 21 laps + 78 secs.

34.6 The laps from the two half-hour sessions (heats) are added to arrive at a lap total. The finishing order is determined solely by laps unless there is a tie. If, and only if, after the two sessions are added, there is a tie in total laps between cars, then the two Extra Times from each session are added, and the cars are ranked with the lower total time prevailing. In the occurrence that laps and time are tied, the car to have the lower time for the entire last lap of the second race prevails.

34.7 For safety reasons, the Steward may divide the field of entrants into two groups which will race in separate heats. For example, if there are 29 entries, Group 1 will consist of 15 cars and Group 2 the remaining 14 cars. The order of racing will be Group 1 Heat 1, Group 2 Heat 1, Group 1 Heat 2, Group 2 Heat 2. The tabulation of results will follow the same method outlined in 36.5 and 36.6.

35.0 VEHICLE TECHNICAL INSPECTION

35.1 All teams must present their vehicles for inspection at the designated day/time. Vehicle drivers must also present themselves for inspection, for clothing, weigh-in, and vehicle exit test (egress test). It is the team's responsibility to allow enough time for inspection and any designated repairs or modifications. Teams are expected to inform themselves thoroughly of the current vehicle design rules.

35.2 Inspections will be performed as per the INSPECTION CHECKLIST by the Steward and the

official technical inspectors designated by the Steward. Disqualifications will be made by a joint decision of the technical inspector and the Steward (and the Head Technical Inspector if one is appointed). Inspection decisions are the sole responsibility of the Steward. The Steward may at his/her discretion inspect any vehicle following any race heat. Post-race inspections may be for checking ballast, battery, charger, compliance with the rules, or for safety issues. These are examples of possible inspections and are not comprehensive.

35.3 At the discretion of the event Steward, vehicles with minor non-compliance of performance regulations may be permitted to participate in the competition provided that the issue(s) of noncompliance does not compromise safety. Non-compliant vehicles may not be eligible for certain prizes and may not be included in the official results as deemed by the Steward.

36.0 DRIVERS AND TRACK PERSONNEL MEETING

36.1 The event Steward will gather all the drivers and track personnel, including the Timing Manager and course Marshals, and explain the event procedures including:

- Roles of Timing Manager and course Marshals
- Meaning and use of the flags
- Starting procedure
- Special course instructions
- Answers to questions

37.0 EXAMPLE EVENT SCHEDULE

37.1 The following is a typical event schedule. The organizers may modify this schedule prior to the event. The final schedule will be confirmed upon team registration at the event.

8:30 AM	Registration and garage assignment at track
9:00 AM	Driver/Safety/Media personnel meetings Teams prepare for inspection Final technical inspection and scrutineering opens
10:00 AM	Track opens for practice and qualification
11:30 AM	Technical inspection and qualification closes
12:30 PM	First race heat begins
3:45 PM	Final heat ends
4:30 PM	Awards presentations

38.0 RULES OF THE TRACK

38.1 It is contrary to the spirit of this competition and its rules for vehicle-to-vehicle contact to take place. Intentional contact with another vehicle will result in an immediate black flag and disqualification. Failure to remain aware of the surrounding vehicles as evidenced by repeatedly cutting off, taking a line away from a faster vehicle, or other such negligent behavior, shall result in an immediate black flag and removal of the offending driver. The vehicle may continue with an alternate driver that meets all criteria as a driver for the event. However, mandatory driver changes must still be met and the disqualified driver may not participate.

38.2 Vehicles determined to be driving at speeds that are too slow may be removed at the discretion of the race Steward if they consider the vehicle to be a safety hazard. Slow vehicles may be flagged to allow faster cars to pass them safely.

39.0 QUALIFYING AND STARTING GRID

39.1 Grid positions for the start of the first heat are determined based on the rankings of the best qualifying lap. The second heat grid positions will be based on the rankings of the first heat. The Steward may elect to adopt a different starting lineup strategy on the day of the race to account for unforeseen circumstances such as inclement weather or venue constraints. The vehicles will be positioned at the starting line on the grid markers. Depending on the number of teams in each heat the Steward will decide the process for the grid start. If the number of teams is high, the Steward may elect a staged start in which the green flag will be waived for the first vehicle, then it will be waived again for each successive vehicle with a separating time that will be determined by the Steward.

39.2 The Steward and Marshals will ensure that all vehicles have sufficient braking power prior to starting a race heat. A brake push test will be performed on every vehicle once on the starting grid. The Steward and any of the track officials may also inspect the mirrors, seatbelts, helmets and ballast.

40.0 ELECTRICAL CHARGING

40.1 Teams may use electric outlets provided by the event as a source to charge their batteries prior to the start of the race. Once the race begins, teams will not be allowed to charge.

40.2 Teams that attempt to charge after the start of the race will be automatically disqualified.

40.3 For teams that utilize two battery packs (one for each heat), both packs must be charged prior to the start of the race. Charging the second pack during the first heat or the break between heats is strictly prohibited.

40.4 Teams may replace their batteries for any reason prior to the start of the race, but must inform the Race Steward to get a re-inspection. The inspection is not guaranteed to be completed in a timely manner allowing the team to start the heat on time.

40.5 In multi-day events vehicles will be locked up overnight (parc fermé) and no access to the vehicle will be allowed during that time.

41.0 TROPHIES AND AWARDS

41.1 At the conclusion of the competition the organizers will award trophies to the top three finishers in the Stock Class, the top three finishers in the Open Class, and the top overall finishers (could be Stock or Open Class). Cars with the fastest qualifying time and fastest race lap time will also be recognized. In addition, other categories evaluated by the Awards Judges, such as technical innovation, best use of 3D printing, vehicle graphics, among others, will be announced. Teams will be evaluated by the Steward and officials in terms of safety and sportsmanship and recognized during the awards ceremony.

42.0 SPORTSMANSHIP

42.1 All persons associated in any way with this competition are expected to conduct themselves in a cordial manner. Confrontations or arguments will not be tolerated and participants are subject to disqualification and removal from the venue.

43.0 PENALTIES AND DISQUALIFICATION

43.1 At the sole discretion of the Steward, any vehicle or driver or team member may be penalized or disqualified and removed from the competition. Penalties or disqualification may result for violations of safety, design or event rules, deliberate cheating, anti-social behavior, or poor sportsmanship. Examples of penalties for unspecified infractions are:

- Pit lane drive-through or lap reduction for small infractions.
- Heat or event disqualification for violations such as no ballast, cheating, or competing knowingly without brakes.
- Event disqualification, or forfeit of awards, for safety violations such as knowingly competing with faulty safety equipment, or multiple or second violations after being warned previously.
- Immediate removal from the venue for smoking or consumption/possession of alcohol or illegal substances.

43.2 It is the responsibility of the team to ensure that the car is carrying the correct ballast for the driver during qualifying and race heats. If Observers are utilized in a race, they will check the ballast during driver changes and any time the car is prepared to leave the garage area for qualifying or racing. The Steward and Marshals may conduct spot checks on ballast. If a car is determined to not have the correct ballast during the race, the team will be disqualified. If a car is carrying the correct ballast but drops any portion of the ballast onto the track it will be immediately black flagged and may be disqualified. During

qualification, the qualifying time will count only if proper ballast is used.

44.0 DISPUTES OR GRIEVANCES

44.1 A team may appeal a decision and/or penalty levied against them during the competition by filing a written protest. This process may also be followed if a team believes that a fellow competitor has violated the Vehicle Design or Competition Rules. A Protest and Appeals Form will be available at the competition. Such protests should limit themselves to issues where a clear illegal advantage was gained that affected the outcome of the event, or for appealing penalties that may have been improperly assessed (with evidence) that clearly disadvantaged the team. Protests must be filed with the committee of appeals adjudicating judges, and submitted no more than 15 minutes after the completion of the last heat. A protest fee of $50.00 (or local currency equivalent) is imposed to minimize frivolous protests. The fee will be returned to the team filing the protest ONLY if the judges rule in favor of the team.

45.0 PHOTOGRAPHY AND VIDEOGRAPHY LIMITATIONS

45.1 Teams, guests and media personnel are encouraged to take photos and videos throughout the event and to post them on social media and elsewhere with no restrictions. Individuals not wishing to appear in photos/videos should make every effort to sidestep the area in which a person is clearly taking photos/videos, and are encouraged to wear a badge with lanyard clearly stating NO PHOTOS or VIDEOS. Any individual posting photos/videos should refrain from doing so if it includes a person with such badge, or make every effort to blur out or remove such individual from the photo/video.

46.0 COMPLIANCE WITH SPORTING REGULATIONS

46.1 Teams must meet all Sporting Regulations to ensure a safe and fair competition for all participants. The organizers and officials will not tolerate noncompliance by any team or their guests and will issue warnings that may lead to expulsion or disqualification if not remedied immediately.

Appendix A - Official Competition Kit

Welded steel chassis and fasteners
Welded roll hoop with supports and fasteners
Welded seatbelt frame and fasteners (for anchoring lap belts/anti-submarine belt)
FRP outer body shell
Aluminum straps for connecting outer body floor to steel chassis with mounting fasteners
Canopy (optional – half or full)
Steering spindles with hardware – Qty 2 left/right
Steering wheel with mounting hardware
Adjustable steering tie rods and rod ends – Qty 2
NuGen Mobility wheel motor w/ hall sensor and thermal cable connector (+ backup connector)
14 inch solid front wheel with bearings and drum brake, tube and tire – Qty 2
Castle nut, spacers, and brake stop coupling nut for front wheels – Qty 2
Tubeless low rolling resistance 10 inch tire for rear wheel (motorized wheel)
Brake steel cables with black sleeve and cable stop– Qty 2
Brake pedal and mounting hardware
Padded light-weight seat and support netting
Five-point seat belt harness
Throttle/regen thumb control Hall sensor unit with deactivation red forward switch
Ring terminal lugs in 3 sizes for 6AWG power cable and 18 AWG low voltage cable
Tinned marine power cable– red – 6 AWG – 9 ft
Tinned marine power cable– black – 6 AWG – 9 ft
Low-voltage wire – 2 pair (black/red) – 25 ft
Quick disconnect master kill-switch with red key
Low voltage On/Off switches with label plates – Qty 3
In line fuse holders and 2 Amp fuses – Qty 3 each
Controller assembly with contactor, 100 Amp fuse, and shunt (manual/software online)
USB-RS232 cable for controller programming
SLC 12V battery weighing less than 18.25 LB (8.3 kg) each – Qty 4
Electronic data cycle analyst and display with wheel speed sensor and manual
Two-part Velcro with adhesive backing for body attachment – Qty 15 ft
Wrap around self-stick Velcro roll for seat support, and securing to battery board – Qty 45 ft
Zip ties (assorted colors and sizes)
Heat shrinkage tubing – box of assorted sizes
5-color electrical tape
Charger (48V, 15A) with Anderson connectors (input voltage and plug based on country)
Misc. electrical connectors and pins
Access to instructions, and technical support