VEHICLE AND TEAM EQUIPMENT

SPECIFICATIONS

Collegiate International evGrand Prix 2018

This document presents the vehicle specifications to be followed for the building of a racing Go Kart, and the team equipment needed to compete in the 2017-2018 evGrand Prix event.

The specifications contained herein will be strictly enforced at all times including, but not limited to, practices, qualifications, races, efficiency runs, technical competition, and outreach activities. Every person or group of persons who undertake, organize or participate in these events shall sign an affidavit deeming that person is acquainted with the rules and his/her participation shall constitute his acceptance of them. In addition, honorable conduct and good sportsmanship of all participants will be demanded.

The specification and requirements are to be interpreted and enforced by the World Karting Association (WKA). A team will be disqualified if failing to conform to these specifications.

The High School evGrand Prix is an educational event that has a Motorsports theme. The Rules Committee has reviewed and used numerous regulatory documents and standards in the development these rules. The prime objective is to assure we have put an effective rule set in place to give our students the challenge of innovation and development while making sure the risks are minimized and student safety remains the top priority. The educational aspect of the rule set incorporates some of the same safety evaluations and abatement procedures that students may have to perform in their careers as they go forward as graduates. The High School evGrand Prix has a ZERO tolerance policy regarding safety compliance both on and off the track. We want to maintain a safe, educational and exciting event to further the learning experience of all students involved.

The primary focus of this document is safety. Definitions of roles, within the High School evGrand Prix, student teams and classes will be explained in supplemental documents as well as on-line offerings thru Purdue University e-learning. Please check the High School evGrand Prix web site www.evgrandprix.org for the other rules and procedures including but not limited to:

A. Race Procedures
B. Outreach procedures
C. Design procedure
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1.0 Jurisdiction

1.1 **Interpretation –** All subsequent rules and specification in this document will be interpreted by the technical inspection team who will determine the acceptability of the vehicle and the safety equipment for the competition.

1.2 **Inspection Stickers –** An inspection sticker, indicating a race vehicle has been accepted for competition shall be positioned at a conspicuous place on the race vehicle chosen at the time of the technical inspection.

1.3 **Deviation Requests –** Any deviation request must be submitted by April 1 with action reported back by May 1.

1.4 **Workmanship –** The Technical Director has the right to question poor workmanship and the resulting safety hazard it presents and require the team to repair the deficiency

2.0 Race Vehicle Specifications and Requirements

2.1 **Vehicle Type –** The race vehicle selected and accepted for the competition will be a sprint go-kart vehicle type chassis. A purposely built or commercially available chassis is acceptable provided it is powered by an electric propulsion system and is equipped to meet all specifications contained within this document.

2.2 **Weight –** Battery packs alone cannot exceed 50% of the total vehicle weight as weighed without the driver or battery packs. Each race vehicle will be weighed at technical inspection to determine conformity to weight requirements. Per J2880 Standards.

2.3 **Material Specification**

2.3.1 **Materials -** For any additional revisions or other modifications to the Kart the following are material specifications:

A. 1" OD by .083" wall thickness seam for the kart components: welded or seamless round steel tubing, or
B. Unbent 1" by .083" wall thickness radius corner square seamed welded or seamless steel tubing, or
C. 1" OD by .125" wall thickness seam welded or seamless drawn round 6061-T6 aluminum tubing, or
D. 1.125" OD by .083" wall thickness welded or seamless drawn round 6061-T6 aluminum tubing.
E. 18 gauge or heavier sheet steel or sheet aluminum.
F. Aluminum (16-24 gauges) material allowed for use as fairings, cowlings, and shields and must not present a hazard.

2.3.2 Fasteners

2.3.2.1 Grade five (5) fasteners, at a minimum, are required for all non-metric screw / bolt type fasteners of .250 inch diameter and larger. A class 8.8 is required for metric fasteners of 6mm and larger. A grade five (5) fastener is indicated by three-lines on the head of the cap screw where the lines will be at a 120- degree angle. A class 8.8 is clearly marked as 8.8.

2.3.2.2 Kingpins, pedal attachment points, steering wheel bolts, and all parts of the brake throttle, and steering linkages shall be cotter pinned. All cotter pins shall fit snugly in the holes and pass through the nuts or through a serrated section of a castellated nut.

2.3.2.3 A distorted thread or expansion type steel lock nut may be used instead of cotter pins where the nut or bolt is not subjected to rotation. These nuts may not be reused more than five (5) times as recorded in the team's safety log.

2.3.2.4 Nylon-fiber locknuts are required to secure seat mounting bolts, chain guards, motor and controller mounts and floor pans. They may also be utilized on fasteners that are #10 or smaller in size. Nylon nuts must be snug and unable to be loosened by hand during inspection.

2.3.2.5 The front axle nuts must be castle type and cotter pinned or nylon and clipped.

2.3.3 Plastics and Composites – The only plastic or composite materials allowed on the vehicle are the seat, number panels, mirrors, nylon ties, data information display monitor, casing for the batteries, front impact crushable, rear crushable, side impact bumpers, and fairings.

A. All polycarbonate plastic sheets must be at least .0625 inch (1/16") thick or greater.

B. Composite Fiberglass reinforced resin can only be used for molded seats.

C. Polyethylene may be used to make crushable body components

Acrylic based plastics are not allowed on the racing vehicle.

2.3.4 Welds – Only TIG welds of high quality, as determined by the technical inspectors, shall be acceptable for any welds other than the original factory welds. Butt welds must be reinforced by an inner sleeve at least twice the tubing diameter in length. One 1/8" hole per weld must be drilled into the sleeve area to indicate the presence of the sleeve. ANY NON-FACTORY WELDS MUST BE CLEAN AND UNPAINTED FOR INSPECTION. **A close up picture (with date stamp) of unpainted weld**

with frame drawing showing location may suffice with prior notification to Technical Inspector. No plastic body filler or load will be allowed in seams. Any broken or poor quality welds observed on a race vehicle by the inspectors shall disqualify the race vehicle from further participation until the welds can be made to pass inspection.

2.4 Chassis

2.4.1 Frame – We recommend that you strongly consider a purpose built Electric Kart from Top Kart USA, However, any sprint Kart Frame will be acceptable. No Enduros, lay down style frame, or off set frames will be allowed. Nerf bars are a required part of the race vehicle frame. NO aluminum base frames will be allowed in the competition. All parts of the race vehicle must clear the ground by one (1) inch at all times. The clearance rule will be enforced if parts of the race vehicle are seen by an official to be dragging or as a hazard during technical inspection, practice, qualifications, or race. Penalties will consist of lap penalties, banning from practice sessions, restricting the race vehicle from participating in event or session.

2.4.2 Sidebars – Sidebars**,** commonly referred to as "nerf" bars, must be of a "C" type as viewed from above and surround the main frame in such a manner that any side impact will be transferred to the main frame directly. Sidebars must have a minimum effective width as measured from the top of the bumper to the bottom of the bumper of six (6) inches, and they must be in a vertical line with each other. Bottom bars must be seven (7) inches or less above the ground and top bars must be six (6) inches or more above the bottom bar. Distances shall be measured from the centerlines of the bars. ***While nerf bars may need modified to accommodate battery mounting, the system must remain as strong as or stronger than the original factory equipment regarding driver protection.***

2.4.2.1 Sidebars may be used to mount batteries on the vehicle.

2.4.2.2 Sidebars must extend to the middle of the rear tires at a minimum. They are not to extend beyond the outer edge of the rear tires.

2.4.3 Wheelbase – The Standard IKA for "Sprint" type chassis will be the standard for wheelbase.

2.4.4 Tread Width – The total width of the race vehicle shall be between thirty (30 minimum front) inches and fifty-five (55 maximum rear) inches measured from the outside-to-outside edge of the tires.

2.4.5 **Tires** – Tires shall be between nine (9) inches and 12.75 inches outer diameter and of the pneumatic type only. No tire softener will be allowed in the pits or used in any fashion. Tires must be mounted for the proper rotation as prescribed by the manufacturer arrows on the tires. Penalty will result in loss of practice session, loss of qualifying time, or disqualification from the race. Replacements for a puncture will be handled on a case by case basis by the Director of Competition.

2.4.6 **Wheels** – All wheels shall be of racing quality and void of any defects. Wheel bearings shall be of ground ball or roller type only. Axle nuts shall be castellated and secured with cotter pins of at least 1/8" in diameter or nylon nuts with clips. Safety wire or bolts through the axle are not acceptable.

2.4.7 **Mirrors** – Mirrors will not be allowed on karts.

2.5 Bumpers and Bodywork

2.5.1 **Front Bumper –** All karts must be equipped with a commercially available front crushable, which is attached to the front bumper to minimize shock in the event of a front impact. The front crushable must be a CIK nose.

2.5.1.1 Front impact bumpers are **mandatory** starting with the 2018 collegiate race. They can be purchased from Top Kart USA at topkartusa.net

2.5.2 **Rear Bumper –** Karts may be equipped with rear protection by a CIK style plastic rear impact bumper. The rear protection shall extend to the outside of the rear tire/wheel assembly.

2.5.3 **Side Bumpers** – Side bumpers are optional however a kart's sidebars / nerf bars should be able to withstand a side impact, protecting the driver. Proper protection should be in place to protect battery packs and other components that are mounted on the side (see 2.6.6). If bumpers are used, they must not extend beyond the outer edge of the rear tires.

2.5.4 **Dislodged Or Missing Bumpers –** If a bumper, side pod, or driver fairing falls off the kart or is dragging, the kart will be flagged into the pits and required to replace or repair the dragging part.

2.6 Propulsion System

2.6.1 **Batteries –** All race vehicles must be powered from electricity supplied by a battery. All batteries and/or batteries packs made of individual cells must be encased in an acceptable enclosure that will not leak if punctured. Only batteries meeting these requirements

will be allowed to participate in events, in practice, or in competition. Batteries must be securely attached to the vehicle in such a manner to protect them from direct impact and withstand the forces of impact. Final judgment of mounting integrity is reserved for technical inspection. Gel type batteries are allowed, but liquid electrolyte type batteries are not acceptable for the event.

2.6.1.1 Regenerative braking strategies may be utilized.

2.6.1.2 Batteries must display all original manufacturers' labels. Teams must provide battery cell data sheets if requested.

2.6.1.3 Only batteries available either for purchase or donation to any competitor may be used. Batteries that are not commercially available must be approved.

2.6.2 **Battery Voltage –** Battery packs, capacitors and all other electrical components are limited to a nominal 88 volts (maximum of 100 volts) during race vehicle operation.

2.6.3 **Safety / Hazard Analysis –** It is required that all teams perform a Hazard Analysis. The analysis shall comply with OSHA 29 CFR 1910.120 (NFPA 70E). The individual team will be responsible for compliance, and that the race vehicle meets those requirements in the technical inspection review. Each team is responsible for safe operation of their race vehicle.

2.6.4 **Battery Capacity –** The total energy available will be limited to 4,320 watt-hours for the entire race regardless of battery chemistry. Total energy onsite should not exceed 12,960 watt-hours. Teams may use this energy in any number of packs (see examples below). Energy storage capacitors may be used for regenerative braking systems. Teams must provide a method to fully discharge capacitors prior to the race. All batteries do not need to be mounted on the race vehicle at once as pit stops may be taken to exchange battery packs. Battery and storage capacitors must be wired so all electrical power is directed through the Energy Power Monitor device. Team is responsible to provide manufacturers specifications to document amp-hour and cell voltage and show total watt-hour calculations if asked by a technical inspector or race official.

2.6.4.1 As an example, a 48 volt system with 90 Amp hours of capacity (4,320 watt-hours) is permitted to use two 45Ah packs, three 30Ah packs, six 15 Ah packs, etc. Other voltage and amp hour combinations are permitted, as long as the total energy capacity per race does not exceed 4,320 Watt hours.

2.6.5 **Exchangeable Battery Pack –** Teams may make a pit stop to exchange batteries. This battery change may be made at will and as needed by each team.

2.6.6 **Battery Enclosure –** Batteries must be enclosed in a solid, shatterproof enclosure, which must meet the approval of the race safety officials. Battery cells inside the enclosure must be isolated by an insulating material and mounted to maintain electrical isolation. The side of a battery pack containing connections with live voltage must be covered by a nonconductive material. Polycarbonate is an encouraged, material for this purpose. In the case of lithium ion cells, the enclosure will prevent the cells from expanding, according to the manufacturer's specifications. Metal maybe used in construction of the enclosure provided that the cells are insulated as stated above. The enclosure will contain holes for running cables, and/or for heat dissipation. The purpose of the enclosure is not to create an airtight package, but to protect the batteries from damage in collisions, and to prevent objects and personnel from contacting the battery terminals. Acrylic is strictly prohibited for use in the battery enclosure.

2.6.6.1 **Battery Pack Fastening –**Batteries must be enclosed and adhere to battery specifications. Batteries will be safely removable, with proper terminal connections and covers. Elasticized fasteners will not be allowed to secure the batteries to the vehicle. Proper quick disconnects are required and must be rated for the expected current draw of the race vehicle. An acceptable quick disconnect is one of the Anderson Multipole family. Race officials will inspect all battery attachment systems to determine that the batteries will remain securely attached to the kart during the race and during any foreseeable accident scenario.

2.6.6.2 **Removal/Exchange Process –** Removal systems must be designed to be safely operated and take into consideration ergonomically acceptable standards for weight and size. Individual removable battery pack sections should weigh no more than 50 pounds for a one- person removal. Mechanical systems may be employed but must be approved by the technical inspector prior to use.

2.6.7 **Wiring –** All wires must be rated to handle the voltage and current load that can be applied through the circuit. For clarification please consult the wire size chart located in the National Electrical Code Article 400 Table 400.5(B). In all cases, manufacturer data will supersede the general information from the NEC. Wiring must be well insulated and securely attached to the vehicle. All wiring must be kept free from moving parts and protected from chafing. Wires that pass through a hole with sharp edges or

through sheet metal must be protected by an insulating grommet or other suitable device. Terminals must be secured and protected so they will not come loose or short out during competition. No electrical terminals may be exposed. No part of the electrical system may use the vehicle frame as a conductor and the frame must remain ungrounded. The vehicle will be checked for maximum frame to electrical leakage during Technical Inspection. Maximum voltage allowed is 5 volts measured from the most positive and the most negative of battery pack to frame with vehicle in run position. Voltage must dissipate to net zero upon application of a 10,000 ohm resistance.

2.6.8 **Fusing –** A fuse or circuit breaker is required for the electrical circuit between the battery and any electrical load. All fuses or circuit breakers will be mounted in electrically rated enclosures as close as practically possible to the source of power. All fuses or circuit breakers will be sized to protect the wiring to which they are connected. Fuses will be sized to carry no more than 85% of the maximum allowable current for the wiring. This means the peak current of the fuse has to be less than the peak current of the wire being used at all times. The main traction drive fuse will be inspected for appropriate type, voltage, and current rating. If the fuse must be replaced, the kart will need to be re-inspected prior to allowing the vehicle to operate in the event.

2.6.9 **Emergency Switches –** An emergency stop circuit must be employed on the vehicle. The circuit will consist of a kill switch located on the steering wheel and a mushroom-style emergency stop switch located on the rear of the vehicle in a location which is easily recognizable, labeled, and accessible to emergency personnel. The kill switch and the emergency stop switch will be wired in series with the solenoid coil of the main contactor. Interrupting the current to the solenoid coil will turn off the main contactor and isolate the battery pack

2.6.9.1 The power circuit will contain a contactor (also known as solenoid relay) for the purpose of isolating the battery pack when not in use and during an emergency. This contactor must have a current rating that exceeds the maximum peak current draw of the vehicle

2.6.9.2 The “high current” or “power circuit” begins at the battery pack (positive terminal) and proceeds through your main power cable, through a high-current fuse, through a main contactor, to the motor controller (which has its own cables to the motor), and finally through a current shunt before reaching the negative terminal of the battery pack. Therefore, the low-current E-stop circuit that is in-line with the contactor’s

activation solenoid has the ability to interrupt the high-current circuit.

2.6.9.3 An indicator light must be included to signal when the main contractor is closed. The light must be placed near the emergency stop switch and must be visible to track personnel.

2.6.10 Power Limit – The traction drive power system must not exceed 14kW peak (18. 76hp peak) at any time during the race. Power shall be defined as the instantaneous voltage multiplied by the instantaneous current delivered by the battery. The system may use any combination of battery instantaneous voltage and instantaneous current, as long as this value does not exceed 14kW. The voltage used for this calculation is not the battery pack nominal voltage but the actual voltage, so teams must be aware of any over voltage present in their packs when setting control limits.

2.6.11 Power and Energy Limit Enforcement – The power and energy limits (14kW and 4,320 watt hour respectively) will be enforced by the race officials using an Energy Power Monitor (EPM) installed by the teams with the supervision of the race officials before the race. The race vehicles must pass technical inspection prior to installation of the EPM. Teams will prewire and prepare a mount on their vehicle as specified and must make wiring schematics available to the race officials before the measurement system can be installed.

2.6.11.1 The EPM preferred location is on the side or on top of the battery boxes. A 5”x 14”x5” area is needed for the box. The EPM will be connected using Anderson 175amp red style connectors.

2.6.11.2 **See Appendix A for EPM details and mounting/installation requirements.** All karts MUST have an EPM installed in order to race.

2.6.11.3 If a team exceeds the maximum power limit during the race, an indicator light will go off and they will be blacked flagged. The team may be disqualified from the race it continues to race over the power limit.

2.6.11.4 The vehicle is subject to re-inspection at any time**.**

2.6.12 Motor Specifications – Motors will be rated by the manufacturer to handle the expected power load over the duration of the race. The peak power available to the motor drive system will not exceed 14kW. There is no limit on motor RPM, but teams must be aware of the manufacturer’s

limitations for their motor. No single motor on a kart can weigh more than 60 pounds. No water-cooled motors will be allowed.

2.6.13 Kart Speed – Kart shall not exceed a maximum speed of 55 mph and karts will be checked during practice and races to ensure compliance.

2.7 Control Systems

2.7.1 Throttle – Race vehicles shall be equipped with a foot-operated throttle potentiometer with two return springs, which will return the potentiometer to produce zero speed signals when the pedal is released. One spring must be located between the throttle pedal and the vehicle frame. A throttle return spring must also be located on the potentiometer throttle box to assure the potentiometer returns to zero signal when the pedal is released or in case a throttle cable is broken to prevent undesired actions.

2.7.2 Motor Controller – Any type of power controller is allowed. Controller must be appropriately matched to the motor in order to stay within the power limit and teams must follow all manufacturer requirements related to the operation of the controller. The forward power command to the motor must return to zero when the driver releases the accelerator pedal. There are no restrictions to energy management throttle control. Computers on or off the vehicle are permitted, however; remote control of a vehicle is not permitted.

2.7.3 Battery Management System

2.7.3.1 The battery management system ("BMS") is one of the most critical safety systems on an electric vehicle. Any kart that utilizes a lithium battery pack shall have a BMS installed on the kart or within the pack itself.

2.7.3.2 The BMS is important during runtime, idle, and charging. It constantly monitors the current and voltage of each individual cell within the battery pack and should have the ability to isolate the pack (deactivate the kart) if it sees an unsafe voltage or current. BMS's should be properly installed so that it can monitor the voltage of each individual cell.

2.7.3.3 Thermistors and/or thermocouples will be installed in the battery packs so the BMS can monitor the temperature of the cells inside the pack. The BMS will be programmed to isolate the battery pack if it sees a battery cell temperatures above 60° Celsius.

2.7.3.4 The BMS will be able to measure total pack current of the kart (normally done through a shunt or hall effect sensor) in order to prevent over-current and short-circuit conditions

2.7.3.5 The BMS will be properly programmed to isolate the battery pack (deactivate the kart) if it reads any battery cells below or above its manufacturer's voltage rating.

2.7.3.6 Every BMS will be installed with the ability to isolate the battery pack. This is normally done by interrupting the E-Stop circuit described in 2.6.9 which in turn opens the main contactor. A low-current relay controlled by the BMS can be installed in series with the kill switch and E-Stop in order to achieve this.

2.7.3.6.1 Battery packs with BMS's installed within them should still have the ability to "turn off" the battery pack.

2.7.3.7 All teams will be prepared to describe their BMS's wiring, programming, and general functionality during tech inspection. The Tech Inspector will have final say as on whether a kart's BMS meets the required safety functionalities.

2.7.4 Data Acquisition – Computers on or off the vehicle are legal for data acquisition purposes.

2.7.5 Remote Control – Remote control of a vehicle is prohibited. No control signal can be transmitted back to the race vehicle for "on the fly" adjustments.

2.8 Battery Charging

2.8.1 Chargers – Battery charging and equipment is the responsibility of the race teams. Chargers with open components and circuits or damage will not be allowed. A specific battery charging area will be provided where charging equipment can be set up and operated.

2.8.1.1 Charging will not be allowed in the pit area.

2.9 General Vehicle Safety

2.9.1 Brakes – All race vehicles shall be equipped with pedal operated hydraulic brakes operating in such a manner as to stop both rear wheels equally. Brake linkages must have at least two (2) inches clearance off the ground. A cotter pin must be placed through the pivot pin, which connects the

brake linkage lever to the master cylinder. Brake discs must be at least 1/8" thick. Brakes must be able to lock both rear wheels at maximum speed. Regenerative braking does not have to be brake pedal actuated.

2.9.2 Mechanical Driveline Guards (Chain Guard) – Open mechanical drivelines including chain, belt, or gears must be guarded to reduce the possibility of personal injury and contact with the racing surface. Totally encased drives are exempt from this section.

2.9.2.1 Sprockets and sheaves mounted on the rear axle drive components must include a blank sprocket guard. The blank sprocket guard must be at least 1/4" larger in diameter than that of the axle sprocket or sheave being used. The bottom of the blank sprocket must maintain at least a one inch clearance above the racing surface at all times (measured with the race vehicle fully loaded) . If tire wear or other circumstance create a condition where the guard, sprocket or sheave contacts the racing surface the race vehicle will be black-flagged to the pits for corrections.

2.9.2.2 All open mechanical components will be guarded by a metal guard to prevent whipping if chain or belt breaks, prevent incidental contact with moving parts, and to prevent injury from rotating parts and pinch points. The guard will be securely mounted.

2.9.3 Steering Control – The steering control shall be a direct acting mechanical system of suitable design for the maximum safety and prevention of over center lock. The steering shaft shall be either a minimum diameter of 5/8" solid rod or 19mm tubular steel. The steering wheel hub may be attached to solid shaft by a taper and key. Solid or tubular shaft hub connections may be made using a quality TIG weld made to the non-stressed side (upper or steering wheel side) of the hub. A through bolt of at least .3125 inch diameter may be used on tubular shaft provided that there will is no play evident between the hub and shaft during inspection.

2.9.3.1 All steering assembly fasteners shall be castellated and cotter pinned. All steering assembly fasteners shall be of grade 5 or better and a minimum of 3/8 inch in diameter. All rod ends shall be protected from collision. Nylon lock nuts are not permitted in the steering assembly.

2.9.4 Steering Wheel – The steering wheel shall be of a circular or enclosed wing design. No post or handlebar steering wheels are allowed. The steering wheel shall be attached to the hub by at least three cotter pin bolts with cotter pinned nuts or by bolts with safety wired heads where a

threaded hub is used. Any sharp protrusions shall be covered. All nuts and bolts must be available for inspection.

2.9.5 Front Spindle and Rear Axle – The front spindle and rear axle shall not extend beyond the wheel widths. The rear axle shall be solid steel in diameter for cadet karts; all others must use a 40 mm or 50 mm tubular axle. Rear axles may be made of steel or aluminum or documented equivalent construction and strength.

2.9.6 Seat and Floor Pan – The floor pan must fill the space inside of frame extending from the front frame member to the seat and made of material that meets specification 2.3.

2.9.6.1 Seats may be made of resin impregnated fiberglass fabric. Fiberglass seat must be in good condition with no cracks or holes and be fastened to metallic seat supports using fender type washers and spacer grommets. No holes large enough for any part of the driver's body to inadvertently pass through shall be permitted. The seatback must not exceed a 135-degree angle from the floor pan. Seat bottom must be higher than the lower edge of frame tubing.

2.9.7 Seat Belts – Seat belts or any type of driver restraint system that holds a driver into the seat is prohibited. Drivers must not be held in the seat in any fashion that would pin them underneath the kart should it become inverted or become airborne.

2.10 Vehicle Identification

2.10.1 Numbers – Kart numbers will be assigned by the Director of Competition on a first come, first served basis with the exception of #1, which is reserved for the previous year's winner.

2.10.1.1 Only numbers 2-99 will be assigned to teams.

2.10.1.2 Numbers will be assigned upon the completion of technical inspection, in the order in which teams pass inspection.

2.10.1.3 It is mandatory that each kart display its racing number on all four sides. One on the top of the driver fairing, two near the rear of each side pod, and one in the center of the rear bumper.

2.10.1.4 Only Mylar stick-on numbers will be allowed. No taped numbers are allowed.

2.10.1.5 All number panels shall be made of substantial material (not cardboard) and all edges shall be rolled, folded under, or protected with rubber or comparable material edging for maximum safety.

2.10.2 School Affiliation – It is recommended that a decal displaying school affiliation be placed on the side pods of the kart.

2.10.3 Series Sponsor – A 4" x 4" area on the front panel of the race vehicle will be reserved for a series sponsor decal. Series sponsor decals must be displayed at all events during the season.

2.10.4 Race Sponsor(s) **–** A 4" x 4" area on each side panel of the race vehicle will be reserved for race sponsors decals. These must be displayed at all times the event is running.

2.10.5 Team Sponsor(s) – evGrand Prix encourages the recruitment of commercial sponsors (marketing partners) for individual team entries. Teams must clear their sponsors through Danny White and insure compliance with their affiliated school guidelines before entering into any agreement. Any information given to before recruiting a sponsor will be held in confidence. No team may be sponsored by any organization or business associated with alcohol or tobacco, or things of a sexual or denigrating nature. This includes bars, where the bar is not set apart (separate) from a family area. Danny White has final say on any discrepancies with the rule. Advertising of sponsors on the racing vehicle shall be limited to signage located on front, rear and side panels and crushable of the race vehicle. The advertising in the front shall be kept at least 3 inches from each side of the front number panel.

3.0 Team Equipment

3.1 Required Safety Equipment – All team required safety equipment is the responsibility of the individual race team and shall be brought to technical inspection and shall also be available for re-inspection at any time.

3.2 Appearance – It is essential that every effort be made to present the most professional racing appearance possible. To this end, certain minimum requirements shall be imposed on all competitors.

3.3 Helmet – The driver's helmet must be one of the following ratings: Snell SA 2005-2015, Snell K 2005-2015, Snell M 2005-2015, CMS 2007 Youth Helmet, CMR 2007 Youth Helmet, SFI 24.1/2010, SFI 31.1/2010, SFI 41.1/2010, BSI A type and A/FR types. DOT or ECE R22.05 certified helmets will be accepted given they are within 5 years of their manufacturing date.

3.4 Driver's Protective Clothing

3.4.1 Drivers suit must be manufactured for racing. Suit must be constructed of heavy weight, abrasion resistant nylon

3.4.1.1 The driver's suit must cover the ankles and wrists while seated in the kart. Exposed skin will result in a black flag penalty.

3.4.2 To prevent or minimize abrasions, all drivers shall wear gloves of Kevlar, leather or vinyl material.

3.4.3 The driver shall wear approved neck brace, socks covering the ankles, and full coverage sturdy shoes, boots or racing shoes.

3.4.4 The driver shall wear an approved rib protector under his suit.

3.5 **Crew Clothing** – At all times in the pit and paddock area all crew members must wear shirts, closed toe shoes, full length pants, and safety glasses. No sweat pants, jeans with holes, polyester or plastic clothing, or shorts will be allowed. Sponsor and school logos are allowed. All graphics on clothing must be in good taste. It is encouraged that each team have a uniform look for visual impact and professionalism.

3.6 **Fire Extinguishers** – Each team will provide at least one CO_2-type Underwriters Laboratory approved fire extinguisher with a minimum capacity of 2 1/2 pounds. This must be brought to technical inspection, practice, qualifications, and the race. The fire extinguisher must have been inspected within the last twelve months, tagged, and sealed are required. All fire extinguishers within the pit area must display the inspection sticker provided at the technical inspection. Fire extinguishers must be on hand when the race vehicle is being energized.

3.7 **Additions** – All events will be NFPA610 compliant and also comply with all WKA/FIA standards, rules and regulations

4.0 Academic Challenge

4.1 Below are the categories used to determine the evGrandPrix Series Champion. The points will be determined at the conclusion of the evGrandPrix Finals.

4.1.1 **Race Placement –** This category is 40% of the total score. You will be given points based off your finish at the evGrandPrix Finals. For point totals see the addendum "Race Placement"

4.1.1.1 **Regional Events** – Regional events will be hosted in the northern and southern regions of Indiana for schools to test

their karts. These events have proved valuable for teams in getting their karts race-ready and also collaborating with other students.

4.1.2 Design Review – Design review is worth 20% of the total championship. Each team will be giving a presentation of how they designed, built, and tested their kart. The team will be graded using the "Design Review" rubric. The rubric is out of 100 percent. Once scored take your percentage and multiply it by 20 and that will determine the points assigned to this category.

4.1.3 Community Outreach – Community outreach is worth 20% of the total championship. Each team will be giving a presentation of how they marketed or outreached to the community about the program. The team will be graded using the "Community Outreach" rubric. The rubric is out of 100 percent. Once scored take your percentage and multiply it by 20 and that will determine the points assigned to this category.

4.1.4 Energy Efficiency – Energy Efficiency is worth 20% of the total championship. Each team will download the data from your Energy Power Manager (Black Box). Using the formula on the Energy Management Calculation sheet you will be given an "Energy Efficiently Rating". The ratings will be ordered from least amount of energy to most and assigned a place value. Your placement will be assigned to a point value. If there is a tie, then Race Placement will be the tie-breaker.

4.2 Code of Conduct – Each team member will be required to follow all guidelines outlined in the "Race Procedures" document. Failure to follow the guidelines could result in ejection, disqualification, or a point penalty. The severity of the penalty will be determined by the race officials.

4.3 Championship Calculations - Each team will total up the points earned in Race Placement, Design Review, Community Outreach and Energy Efficiency. After the totals are determined, then teams will be ranked from highest to lowest. The team with the highest points will be declared the series champion. In the case of a tie, Race Placement will be the deciding factor.

For questions please contact,

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