Collegiate Series 2025 Rules

Version: Rev A
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Summary of key changes in Rev A:

- 6.7.1 – 50 volts changed to 60 volts

Summary of key changes Version 1 (all changes in red text):

- 5.4.3 – added 20-page limit to Design Report
- 6.3.4 – driver fairing clearance to steering wheel changed to 2 inches
- 6.5.3.1 – Added: Electrical routing must be battery → PEM → electrically power systems. (Any system receiving electric power of more than a household 9V battery or up to 4 AA batteries must receive its power from the kart's main battery pack(s) and the energy used must be measurable by the PEM)
- 6.7.1 – Added: If the pack exceeds 50 volts, it must be sub-divided into modules that do not exceed 50 volts each and the pack must contain a service disconnect that electrically separates the pack into separate modules not exceeding 50 volts each.
- 6.7.4.7 – Added requirement for highly custom battery packs to submit Preliminary Battery Design Evaluation
- 6.9.1 – Added: Teams may be required to provide technical data and calculations at Technical Inspection to prove the wires are sized appropriately for the voltage and current load.
- 6.9.7 – Added: A wiring diagram of the kart's entire electrical system must be provided at technical inspection.
- 6.12 – Removed: Firewall requirement
- 6.15.1 – Added: Chain guard must cover the top of all sprockets and extend below each sprocket's vertical mid-point so that it will deflect a broken chain downward.
- 6.21.4 – Added: It is recommended to keep a clear space 2 inches down from the top plane of the driver fairing and 4 inches wide for the placement of technical inspection stickers.
- 6.22.1 – Removed: Minimum driver weight requirement
- 6.24.7 – Added: All bolted joints must have a minimum of 2 full threads protruding beyond the nut.
- 6.26.1 – Added: MUST COMPLETE THE WELD PROCESS CHECK REQUIREMENTS IN APPENDIX C
- Appendix C – Added to explain welding process check requirements.
- 6.27 – Removed: Wet/damp conditions
- 7.4.1 – Added: Maximum of 6 members per team is allowed in the pit area.

- 7.5.7 – Added: Karts must not exceed 15 miles per hour at any point on pit lane.

Process to revise this ruleset:

- At his/her discretion, the Director of Event Operations (DEO) may request feedback and input from other stakeholders and subject matter experts.
- The DEO will draft the revised rules document.
- The DEO will circulate the draft rules document to and gain approval from the Race Operations Director, Purdue Risk Management, and Purdue Legal.
- The DEO will publish the final approved rules document to the evGrandPrix website and notify all participants.

1.0 INTRODUCTION

1.1 **The mission of the Purdue evGrandPrix Collegiate Program is to provide a fun and exciting opportunity for students to apply their engineering and technology education to design and build an electric go-kart to compete against other collegiate teams. The goal is for students to develop important professional skills that create incredible career opportunities.**

1.2 This integrated program is learning by doing within a Motorsports environment. Using electrically powered go-karts as the focus, the program inspires students to commit their creative energies to learning about, developing, and showcasing the future of electric vehicle technologies.

1.3 To compete in the evGrandPrix, students organize a team at their school and partner with industry, government agencies, and community outreach programs that help to fund the program.

1.4 The evGrandPrix is an educational program that has a Motorsports theme. The primary objective is to ensure that an effective ruleset has been put in place to give the students the opportunity to immerse themselves in applying STEM principles while making sure risks are minimized. Safety is the top priority, and the goal is to maintain a safe environment that enables a fun and rewarding educational experience for all participants.

2.0 RISK AND SAFETY

2.1 Assumption of Risk, Liability Release, Medical Insurance, Acknowledgement, and Indemnity

ASSUMPTION OF RISK – EVERY MEMBER AGREES TO BE BOUND BY THE RULES AND ASSUMES ALL OF THE RISK OF SUCH MEMBER'S INVOLVEMENT AND/OR PARTICIPATION IN AN EVENT.

LIABILITY RELEASE – RECOGNIZING THAT KART RACING AND ALL OF THE ACTIVITY ASSOCIATED WITH IT ("ACTIVITY") CAN BE A HAZARDOUS UNDERTAKING, MEMBERS FOR THEMSELVES, THEIR HEIRS, EXECUTORS, REPRESENTATIVES, SUCCESSORS AND ASSIGNS, AGREE, BY THEIR MEMBERSHIP, THAT THEY RELEASE AND DISCHARGE EVGRANDPRIX, PURDUE UNIVERSITY, THE TRUSTEES OF PURDUE UNIVERSITY, AND ANY OF ITS OR THEIR DEPARTMENTS, TRUSTEES, AFFILIATED, EMPLOYEES, OFFICERS, AGENTS, AND INSURERS ("THE RELEASED PARTIES") FROM ANY AND ALL LIABILITY FOR DAMAGES TO PROPERTY, PERSONAL INJURY, AND/OR DEATH, IN ANY WAY RELATING TO ANY EVENT OR THE MEMBERS' INVOLVEMENT AND/OR PARTICIPATION IN THE ACTIVITY, REGARDLESS OF HOW THE INJURY OR EVENT MIGHT ARISE INCLUDING WITHOUT LIMITATION RACE OFFICATING, RULE INTERPRETATION AND VIOLATIONS, PHYSICAL CONDITION OF THE TRACK, AND/OR EMERGENCY TREATMENT OR RESCUE.

ACKNOWLEDGEMENT – MEMBERS RECOGNIZE THIS RELEASE APPLIES REGARDLESS OF WHETHER OR NOT INJURY OR EVENT MIGHT BE CAUSED IN WHOLE OR IN PART BY THE

NEGLIGENCE OR OTHER FAULT OF THE RELEASED PARTIES. MEMBERS MAY BE ASKED TO ACKNOWLEDGE THIS ASSUMPTION OF RISK AND RELEASE BY OTHER AGREEMENTS THEY MIGHT SIGN AS A PREREQUISITE TO PARTICIPATE IN THE ACTIVITY.

INDEMNITY – EACH MEMBER ACKNOWLEDGES THAT MEMBER IS RESPONSIBLE FOR VIOLATION OF MEMBER'S AGREEMENTS BY MEMBER, MEMBERS'S REPRESENTATIVES INCLUDING LOVED ONES AFFECTED BY MEMBER'S INVOLVEMENT PARTICIPATION, AND MEMBER'S PARTICIPANTS AND GUESTS. THIS RESPONSIBILITY APPLIES TO ALL VIOLATIONS OF MEMBER'S AGREEMENTS WITH EVGRANDPRIX. THIS INCLUDES THE MISUSE OF CREDENTIALS AND THE FAILURE TO ACCEPT THE ASSUMPTION OF RISK, THE WAIVER AND RELEASE OF LIABILITY, THE BINDING NATURE OF THE RULES, EVGRANDPRIX'S INTERPRETATION OF THE RULES, AND THE FINALITY OF THE APPEAL PROCEDURE. MEMBER UNERSTANDS THAT THIS RESPONSIBILITY INCLUDES THE DUTY TO INDEMNIFY AND HOLD THE RELEASED PARTIES HARMLESS FROM AND AGAINST ANY AND ALL LOSSES, LIABILITIES, DAMAGES, COSTS OR EXPENSES (INCLUDING BUT NOT LIMITED TO REASONABLE ATTORNEYS' FEES AND OTHER LITIGATION COSTS AND EXPENSES) INCURRED BY ANY OF THE RELEASED PARTIES AS A RESULT OF ANY CLAIMS OR SUITS THAT I (OR ANYONE CLAIMING BY, UNDER OR THROUGH ME) MAY BRING AGAINST ANY OF THE RELEASED PARTIES TO RECOVER ANY LOSSES, LIABILITIES, COSTS, DAMAGES, OR EXPENSES THAT ARISE DURING OR RESULTING FROM MY PARTICIPATION IN THE ACTIVITY, REGARDLESS OF WHETHER OR NOT CAUSED IN WHOLE OR PART BY THE NEGLIGENCE OR OTHER FAULT OF ANY OF THE RELEASED PARTIES.

2.2 Safety

2.2.1 Safety Policy – While the evGrandPrix seeks to maintain safe conditions for competitors and others, members recognize that conditions may not be safe and can be affected by human error. At any event, each member acknowledges and agrees that racing is a hazardous activity and each member's involvement and/or participation is with expressed assumption of this risk.

2.2.2 While acknowledging the inherent risk of racing to competitors and other members involved and/or participating in an event, members are personally responsible for their own safety, for the safety of each member of their team, and for the safety of their racing equipment.

2.2.3 evGrandPrix may take any action including canceling, postponing, temporarily stopping, or delaying an event, if evGrandPrix staff determines that safety requires such action. evGrandPrix may order off the track any member or kart that evGrandPrix determines constitutes a hazard. evGrandPrix may prohibit any member or member's equipment from entering or continuing in an Event.

3.0 GOVERNING AUTHORITY

3.1 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 Collegiate evGrandPrix Program. The specifications contained herein will be always enforced.

3.2 The specifications and requirements herein are to be interpreted and penalties applied and enforced by the evGrandPrix Director or a committee he/she establishes for that purpose.

3.3 Race Events are sanctioned by Purdue University and/or a qualified organization of its choosing.

3.4 This document is a living document that is continually edited and updated. All updates will be communicated and published to all participants. If an item is not specifically listed as authorized, it is assumed to be prohibited until addressed. Participants may request a rules clarification or deviation by completing and submitting the *Rules Request form* to the evGrandPrix Director. The request must be submitted no later than 30 days before the event to which it pertains. The evGrandPrix Director or a committee he/she establishes will review the request and respond as soon as reasonably possible.

4.0 PARTCIPATION & ELIGIBILITY REQUIREMENTS

4.1 Each team must be comprised solely of students currently enrolled full-time in a degree program at a college or university. Teams may include students from multiple universities, but one university must be the official representing university for the entire team. All interactions between evGrandPrix and the team will be through the representing university. Students that have graduated within the past 6 months remain eligible to participate.

4.2 A representing university or student organizations within the university may compete with multiple karts, but each kart must have a designated team (race crew) during all official evGrandPrix events such as qualifying and the race. No student may serve on more than one race crew during evGrandPrix events.

4.3 During official evGrandPrix events, each kart's team (race crew) must consist of no less than three (3) people and must include one (1) driver, one (1) crew chief, and at least one (1) track worker. No student may be a member of more than one team during official evGrandPrix events. Only students are allowed to make modifications and repairs to the karts. This applies before, during, and after evGrandPrix events. Work performed on a kart by any individual that is not a student subjects that kart to a penalty at the DEO's discretion.

4.4 All drivers and crew chiefs must complete Drivers Safety training before participating in any evGrandPrix event.

4.5 Required Forms & Memberships

4.5.1 Participants: All participants are required to sign a *Waiver, Release, and Hold Harmless Agreement* and *Photo Release Form* (Appendix A). Each participant must provide hard copies of their forms to the evGrandPrix event staff at on-site registration (prior to participation) at every event they attend.

4.5.2 Teams: Each team must complete, sign, and return the *Annual Series Commitment / Participation Agreement* (Appendix A) to the Director of Event Operations prior to participating in an evGrandPrix event. A hard copy must be provided by the Team Captain to the evGrandPrix event staff at on-site registration (prior to participation) during the first event of each season.

4.6 Conduct – Good sportsmanship and honorable conduct are an essential aspect of the evGrandPrix Program and therefore always expected of participants.

4.6.1 If a team fails to comply with any rules within this document (including deliberately cheating) during an evGrandPrix event, all teams from that school are subject to penalty at the DEO's discretion, up to and including, expulsion from the evGrandPrix Program.

4.6.2 Everyone associated with the evGrandPrix is expected to behave in a respectful and orderly manner. This policy includes but is not limited to teams, drivers, family members, crew, spectators, sponsors, and guests. Physical violence, verbal abuse, threats, or intimidation directed at anyone during or outside an event will be subject to immediate disciplinary action, including disqualification and ejection from the event.

5.0 CHAMPIONSHIP SCORING

The evGrandPrix Collegiate Championship is a combination of race and non-race events to provide a comprehensive learning experience for students.

5.1 **evGrandPrix Overall Championship Scoring**

Final Race Placement = 50 points

Energy Efficiency during the race = 20 points

Design Report = 30 points

SERIES TOTAL = 100 Points

5.2 **Final Race Placement (50 points)**

Race Placement – Each kart will be ranked in the order they finish the race. Points will be allocated as follows:

RACE FINISH POINTS					
Position	**Pts**	**Position**	**Pts**	**Position**	**Pts**
1	50	12	16	23	0
2	40	13	14	24	0
3	35	14	12	25	0
4	32	15	10	26	0
5	30	16	8	27	0
6	28	17	6	28	0
7	26	18	5	29	0
8	24	19	4	30	0
9	22	20	3	31	0
10	20	21	2	32	0
11	18	22	1	33	0

5.3 **Energy Efficiency (20 points) –** At the conclusion of the race, race officials will retrieve PEM data from each kart. Energy Efficiency Scoring will be calculated as described here.

- Karts that do not complete at least 25 laps are not eligible and receive an Efficiency score of zero.
- For eligible karts (completing 25 or more laps):
    - The kart that is most efficient (minimum W-hr/lap) will receive a score of 20. This is defined as MIN in the formula below.

- The with that is least efficient will receive a score of zero. This is defined as MAX in the formula below.
- All other karts will receive a score as follows:

  Kart Efficiency Points = 20 – ((Kart – MIN) x Pts. per W-hr.)

  where Pts. per W-hr. = 20/(MAX-MIN)

5.4 **Design Report (30 points)**

5.4.1 Each team will submit a written report to explain the design decisions they made and how they improved the performance of their kart.

5.4.2 The team will be graded using the "Design Report" rubric. The rubric is out of 100 percent.

5.4.3 The report must not exceed 4,000 words or 20 pages. If a report exceeds these limits, it will be judged solely on the content within the limits and everything thereafter will be ignored and not considered in the judging. Charts, graphs, and images that clearly communicate the designs incorporated into the kart, the predicted improvement, the actual results, and explanation of differences between predicted and actual results are encouraged.

5.4.4 Each team will be assigned a time to review their Design Report with Design Judges and field judges' questions. Following the judges' review, all participating team scores will be ordered from highest to lowest and assigned a point value from 30 to 0.

5.4.5 Reports not submitted by the published deadline will not receive a score.

5.5 **Championship Calculations** – Each kart's total points gained from the Race Placement, Energy Efficiency, and Design Report will be totaled and 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.

6.0 VEHICLE SPECIFICATIONS AND REQUIREMENTS

6.1 Chassis

6.1.1 **Frame** – Teams must race with a commercially available "sprint kart" chassis. Reducing the structural integrity of the OEM chassis in anyway is prohibited. It is permissible to add components to the chassis, but All parts of the race vehicle must always clear the ground. If any part of the race vehicle is seen to be dragging or deemed a potential a hazard during technical inspection, practice, qualifications, or race, penalties may be incurred.

6.1.2 **Wheelbase** – Distance must be 43" maximum and 39.75" minimum. Wheelbase measurement is taken on a line beginning at a point perpendicular to the rear axle centerline forward to the point on the horizontal spindle front axle centerline on which the hub rides nearest the kingpin bolt. Both sides must meet this max and min rule.

6.1.3 **Track Width** – Minimum track width is 28" as measured from the outside of one tire to the outside of the opposite tire. Maximum track width or kart width is 55 and 1/8" as measured from the outside to outside of the widest point of the kart.

6.2 Tires & Wheels

6.2.1 **Tires** – The approved tire for the series is Hoosier racing tire compound R60B. The sizes are 4.5/10.0/5 fronts and 7.1/11.0/5 rears. Tires must be run as supplied by the manufacturer, no alterations or additives are allowed. Those found to have altered a tire(s) will be subject to disciplinary action.

6.2.2 **Wheels** – All wheels shall be of racing quality and void of any defects. Wheel bearings shall be of a ground ball or roller type only.

6.3 Bumpers and Bodywork

6.3.1 **Front Impact 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.

6.3.1.1 Impact Bumper Push Back Brackets – All front nose/bumpers must use push back bumper brackets. A time or position penalty will be accessed should the front nose/bumper become dislodged during an event. Driver must be able to latch and unlatch the mount by hand with no tools.

6.3.2 **Rear Bumper** – All karts must have rear protection that extends from the outside of the rear tire/wheel assembly. This must be a CIK-style plastic rear bumper.

6.3.3 **Sidebars**

6.3.3.1 Sidebars, commonly referred to as “nerf” bars, must be of a “C” type as viewed from above and surround the mainframe in such a manner that any side impact will be transferred to the mainframe directly. Bottom bars must be two (2) inches, or less, above the ground, and top bars must be four (4) inches or more above the bottom bar. Distances shall be measured from the centerlines of the bars.

6.3.3.2 Sidebars may be used to mount batteries on the vehicle. Proper protection should be in place to protect battery packs and other components that are mounted on the side.

6.3.3.3 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.

6.3.4 Driver Fairing – A CIK-style driver fairing must be attached to all karts. The driver fairing must have a 2 inch clearance to any part of the steering wheel. Driver’s fairings may not exceed the level plane of the top of the steering wheel measured with the wheels in a straight line.

6.4 **Powertrain**

6.4.1 The kart’s drivetrain must receive all its power from 1 (or more) electric motor(s) and the motor(s) must receive its (their) energy from a battery pack. No internal combustion engines are allowed.

6.4.2 **Motor** – Any type of electric motor is allowed. Motors must be rated by the manufacturer to handle the expected power load over the duration of the race.

6.4.3 **Motor Controller** - Any type of power controller is allowed.

6.4.3.1 The forward power command to the motor must return to zero when the driver releases the accelerator pedal.

6.4.3.2 There are no restrictions on energy management throttle control. Computers on the vehicle are permitted.

6.5 **Power and Energy Limit**

6.5.1 The peak power available to the motor drive system must never exceed 14kW.

6.5.2 Power shall be defined as the instantaneous voltage multiplied by the instantaneous current delivered by the battery averaged over 500 milliseconds. The system may use any combination of instantaneous battery voltage and instantaneous current, so

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 the real time voltage present in their packs when setting control limits.

6.5.3 **Power Energy Monitor**

6.5.3.1 The power and energy limits will be enforced by the race officials using the Power Energy Power Monitor (PEM). 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. Electrical routing must be battery → PEM → electrically power systems. (Any system receiving electric power of more than a household 9V battery or up to 4 AA batteries must receive its power from the kart's main battery pack(s) and the energy used must be measurable by the PEM)

6.5.3.2 The PEM will record each kart's real-time power (as measured by actual pack voltage multiplied by actual pack current) during the race. Results will be reviewed after completion of the race and any kart that is deemed to have used more than 14kW of power from their battery pack, at any time, will be disqualified from the race. The PEM implements a very brief moving average to "smooth out" the data and, therefore, it ensures "blips" do not result in disqualification.

6.5.3.3 Teams are encouraged to tune their karts to this 14kW power limit during practice. It is the responsibility of the teams to understand and manage the power that their kart is using at any time.

6.5.3.4 The power limit will be monitored and enforced during race qualifications. It is up to the Director of Race Operations as to the penalty that is applied for breaking the power limit during qualifications.

6.5.3.5 The PEM will also measure the total energy used by each kart for the purpose of calculating efficiency. This number will be used to determine each kart's placement in the Energy Efficiency category.

6.6 **Throttle** – Karts 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.

6.7 **Battery Pack**

6.7.1 Battery Voltage –Battery packs, storage capacitors, and all other electrical components meant for energy storage are limited to a peak voltage of 100 volts. If the pack exceeds 60 volts, it must be sub-divided into modules that do not exceed 60 volts each and the pack must contain a service disconnect that electrically separates the pack into separate modules not exceeding 50 volts each.

6.7.2 Battery Capacity – A kart's total stored energy must never exceed 4,320 watt-hours. Teams may use this energy in any number of packs.

Example: A kart with a battery system that is 48-volt (nominal) with 90 Amp-hours (Ah) capacity produces 4,320 watt-hours of energy. The system may consist of two 45Ah packs, three 30Ah packs, or six 15 Ah packs. Other voltages and amp-hour combinations are permitted, so long as the total energy capacity of the kart (using manufacturer specified nominal cell voltages) does not exceed 4,320 watt-hours.

Energy storage capacitors may be used for regenerative braking systems, but the energy stored in capacitors is included in the max allowable energy calculation. Teams must provide a method to fully discharge capacitors before the race.

6.7.3 Battery and storage capacitors must be wired, so all electrical power is directed through the Power Energy Monitor device. The team is responsible for providing manufacturers specifications to document amp-hour and cell voltage and show total watt-hour calculations if asked by a technical inspector or race official.

6.7.4 Battery Pack Construction

6.7.4.1 Batteries must be enclosed in a solid, shatterproof enclosure, that will prevent the batteries from being punctured and meets the approval of the technical inspectors. The top of a battery pack must be covered by a non-conductive material. Polycarbonate is the recommended material for this purpose. The enclosure may 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.

6.7.4.2 Battery enclosures must be securely attached to the vehicle in such a manner to protect the battery cells during all racing situations, including impacts, and protect all personnel at all times. The battery pack and internal structures must be rigidly constrained (shalt not move) in all six degrees of freedom relative to the kart chassis. Race officials will inspect all battery attachment systems to determine that the batteries will remain securely attached to the kart during the race and any foreseeable accident scenario.

6.7.4.3 Current carrying members (i.e. copper, nickel wire or plate) shall not be used as structural components to constrain the pack or internal structures in any degree of freedom.

6.7.4.4 Battery packs must be safely removable from the kart with proper electrical terminal connections (rated for the expected current draw) and covers. Elasticized fasteners will not be allowed to secure the battery packs to the vehicle.

6.7.4.5 A single Anderson SB175 connector is the required connection from the battery to the powertrain of the kart. This allows the Power Energy Monitor to be installed for qualifying and race.

6.7.4.6 Battery cells inside the enclosure must be isolated by an insulating material and mounted to maintain electrical isolation.

6.7.4.7 Highly custom battery packs must submit a Preliminary Battery Design Evaluation (PBDE) per the requirements and deadlines posted on the evGrandPrix website. A highly custom battery pack is any pack that was assembled using individual cells (18650, 26550, 21700, etc) and/or pack assembly that requires welding of any kind. If a team purchases premade "modules", "bricks" or "blocks" and assembles those into a pack without welding, that is not a highly Custom pack. It is also strongly recommended to undergo a technical design review with evGrandPrix officials before the event.

6.7.5 Teams must provide battery cell datasheets at technical inspection.

6.8 **Battery Management System**

6.8.1 Any kart that utilizes battery cells containing lithium, a Battery Management System (BMS) must be installed.

6.8.2 The BMS must reliably, accurately, and constantly measure the total pack current, total pack voltage, and voltages of all cells. When single cells are directly connected in parallel, only one voltage measurement is needed.

6.8.3 The BMS must reliably, accurately, and constantly measure the temperatures of the battery cells whenever the kart's power is on.

6.8.3.1 The temperature sensor used must be in direct contact with the cell's negative terminal or the negative terminal busbar less than 10 mm away from the cell terminal.

6.8.3.2 The temperature of a minimum of 15% of the series connections of cells must be monitored by the BMS. The monitored cells must be equally distributed inside the battery pack.

6.8.3.3 Multiple cells may be monitored with one temperature sensor if all conditions in 6.8.3.2 are met for all cells.

6.8.3.4 Temperature sensors must have appropriate electrical isolation between the sensor and cell, or in the sensing circuit.

6.8.4 The BMS must isolate the battery pack (deactivate the kart) if it detects any of the following: a cell voltage outside the allowed minimum or maximum voltage levels stated in the cell data sheet, a cell temperature above 60 degrees Celsius or the maximum cell temperature stated in the cell data sheet, whichever is lower, any other unsafe condition.

6.8.5 All teams will be prepared to describe their BMS's wiring, programming, and general functionality during tech inspection. The Technical Inspector may also ask the team to demonstrate proper functioning of the BMS or request live cell data to be presented. The Technical Inspector will have the final say as on whether a kart's BMS meets the required safety functionalities.

6.9 **Wiring**

6.9.1 All wires must be sized to handle the voltage and current load that can be applied through the circuit. Teams may be required to provide technical data and calculations at Technical Inspection to prove the wires are sized appropriately for the voltage and current load.

6.9.2 Wiring must be well insulated and securely attached to the vehicle.

6.9.3 All wiring must be kept free from moving parts and protected from chafing. Wires that pass through a hole with sharp edges or sheet metal must be protected by an insulating grommet or another suitable device.

6.9.4 Terminals must be secured and protected so they will not come loose or short out during competition. No electrical terminals may be exposed.

6.9.5 No part of the electrical system may use the vehicle frame as a conductor, and the frame must remain ungrounded.

6.9.6 Every kart must have a green LED installed no more than 3 inches from the top of the driver fairing on the right side of the kart. The purpose of the LED is to signal power on. The LED must come on any time the kart is energized (Battery pack connected to the motor, driver kill switch on, and Emergency stop disengaged). The LED must be the Oznium flush mount LED with the following specifications: Diameter = 11mm; Color = Green; Housing Color = Black; Style = Aluminum (1W); Lens = With lens.

6.9.7 A wiring diagram of the kart's entire electrical system must be provided at technical inspection.

6.10 **Fusing**

6.10.1 A fuse or circuit breaker is required for the electrical circuit between the battery and any electrical load. Fuses must be sized to carry no more than 85% of the maximum allowable current for the wiring to which they are connected. This means the peak current of the fuse must be less than the peak current of the wire being used at all times.

6.10.2 All fuses or circuit breakers will be mounted in electrically rated enclosures as close as practically possible to the source of power.

6.10.3 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 before allowing the vehicle to operate in the event.

6.11 **Emergency Switches** – An emergency stop circuit must be employed on the vehicle. The circuit will consist of a driver kill switch located near the steering wheel (easily accessible by the driver) and a mushroom-style emergency stop switch located in a location that is easily recognizable, labeled, and accessible to emergency personnel.

6.11.1 The required mounting position for the emergency stop is on the left side of the kart on the top plane of the battery pack and between 10 to 15 inches in front of the rear axle.

6.11.2 The driver 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.

6.11.3 The power circuit will contain a contactor (also known as a solenoid relay) for the purpose of isolating the battery pack when not in use and during an emergency. The contactor should be as close as possible to the battery to minimize the wire distance of high voltage from the battery and prevent contact with high voltage when the contactor is disengaged. This contactor must have a current rating that exceeds the maximum peak current draw of the vehicle.

6.11.4 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) 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.

6.12 **Removed**

6.13 **Brakes** – All race vehicles shall be equipped with pedal-operated hydraulic brakes as supplied by the manufacturer, operating in such a manner as to stop both rear wheels equally. Brake linkages must have at least two (2) inches of 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. No hand brakes are allowed.

6.14 **Chain**

6.14.1 **Chain size -** #35 chain is the only allowable chain. Belt drive systems are allowable provided they are commercially available karting equipment or proper engineering analysis and testing adequately demonstrates safe use.

6.14.2 **Chain oilers –** No chain oilers are allowed.

6.15 **Mechanical Driveline Guards**

6.15.1 Open mechanical drivelines including chain, belt, and sprocket must be guarded to reduce the possibility of personal injury. All open mechanical components must be guarded 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 is to be securely mounted and must cover the top of all sprockets and extend below each sprocket's vertical mid-point so that it will deflect a broken chain downward.

6.15.2 The lowest part of drive sprockets and chain/belts must be at least 1/2" above the lowest structural member such that the structural member prevents the sprocket/sheave from contacting with the racing surface in all situations. A blank sprocket that is larger in diameter than the drive sprocket is one way to accomplish

this objective.

6.16 **Steering Control** – The steering control must be unaltered and as supplied from the manufacturer.

6.16.1 All steering assembly fasteners shall be c-clipped or castellated and cotter pinned. All steering assembly fasteners shall be of grade five (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. No plastic steering components are allowed.

6.17 **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 c-clipped or 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. All bolts require safety wire, pints are not acceptable.

6.18 **Front Spindle and Rear Axle** – The front spindle and rear axle shall not extend beyond the wheel widths. Rear-axle size is a 50mm commercially available tubular axle. The axle must be made of steel only. No filler such as carbon fiber is permitted.

6.19 **Floor Pan -** The floor pan must fill the space inside of the frame extending from the front frame member to the seat and made of aluminum or steel.

6.20 **Seat -** Seats may be made of resin-impregnated fiberglass fabric. The fiberglass seat must be in good condition with no cracks or holes and be fastened to the 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. The seat bottom must be higher than the lower edge of the frame tubing.

6.21 **Decals**

6.21.1 Each kart must display the number assigned to them at registration. The number must be at least 5” tall and be displayed on the driver fairing, both side pods, and the rear bumper of the kart. The number must contrast the body panel color, so it is easily read from a distance of 20 feet. No other decals may be placed within 1” of the numbers.

6.21.2 The name of the school for which the team is competing must be displayed on the front and both sides of the kart and must be legible from 20 feet away.

6.21.3 The evGrandPrix logo must be displayed on the front bumper of the kart. A decal will be provided to all participants at check-in for the evGrandPrix race.

6.21.4 Other decals such as sponsors, are allowed and encouraged so long as they don't interfere with the visibility of the numbers, school name, and evGrandPrix logo. Technical Inspection stickers will be placed on the driver fairing just below the top of the fairing. It is recommended to keep a clear space 2 inches down from the top plane of the driver fairing and 4 inches wide for the placement of technical inspection stickers.

6.22 **Vehicle Weight**

6.22.1 Removed

6.22.2 If weight ballast is used, it must be mounted securely to the kart by a bolt(s) of at least 5/16" in diameter. Weights over 7 pounds must use at least two 5/16" bolts. All bolts must be cotter-keyed, safety wired or double nutted. All weight must be white in color for visibility. Mounting of weight to the nerf bars, front bumper or rear bumper is prohibited. No weight may be added to the driver.

6.23 **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.

6.24 **Fasteners**

6.24.1 Grade five (5) fasteners, at a minimum, are required for all non-metric screw/bolt-type fasteners of 0.250-inch diameter and larger. 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 fastener is marked as 8.8.

6.24.2 Kingpins, pedal attachment points, steering wheel bolts, and all parts of the brake throttle, and steering linkages shall be c-clipped, cotter-pinned or safety wired. If using cotter pins, they shall fit snugly in the holes and pass through the nuts or a serrated section of a castellated nut.

6.24.3 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 excessive rotation. These nuts may not be reused more than five (5) times as recorded in the team's safety log.

6.24.4 C-Clips or safety wire is to be used on bolts installed in threaded components. The safety wire must pass through the bolt head.

6.24.5 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 an inspection.

6.24.6 The front axle nuts must be nylon as supplied, and E-clips or snap rings installed.

6.24.7 All bolted joints must have a minimum of 2 full threads protruding beyond the nut.

6.25 **Plastics and Composites** – Plastics and composites are only allowed for non-structural members. Acrylic-based plastics are not allowed on the racing vehicle.

6.26 **Welds**

6.26.1 Only TIG welds of high quality, as determined by the technical inspectors, shall be accepted 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. ANY NON-FACTORY WELDS MUST COMPLETE THE WELD PROCESS CHECK REQUIREMENTS IN APPENDIX C AND BE CLEAN AND UNPAINTED FOR INSPECTION.

6.26.2 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.

6.27 **Removed**

6.28 **Data Acquisition** – Instruments and systems on or off the vehicle are legal for data acquisition purposes. Personal computers or laptops are not allowed to be mounted to a kart at any time. Students must utilize data acquisition instruments rather than full-size laptops

6.29 **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.

6.30 No karts with the ability for reverse direction are permitted.

6.31 **Cameras** - Cameras may be mounted on the kart provided it does not interfere with driver’s vision or ability to drive the kart. All cameras must be marked with a team name and kart number. Cameras cannot be larger than 2” x 2” x 2”, must be mounted with and approved mounting bracket from the cameras manufacturer and must pass tech inspection. No cameras are allowed to be mounted to a helmet.

7.0 EVENT REQUIREMENTS

The requirements in this section apply to all evGrandPrix events that involve the karts driving.

7.1 **Technical Inspection**

7.1.1 All karts must pass a technical inspection before participation in any track event. Passing technical inspection does not guarantee rules compliance. Following technical inspection approval, teams may make adjustments to improve their kart's performance (e.g. track width, caster/camber, Ackermann, seat position, sprocket size, etc.), but the kart must always comply with the rules. A kart may be protested and/or disqualified because of noncompliance with any rule. The Technical Inspection team has the right to inspect any kart at any time for any reason.

7.1.2 All teams are required to perform their own technical inspection on their kart and ensure compliance to the *technical inspection sheet* prior to presenting their kart to the Technical Inspector at the event. The Technical Inspector's role is to verify compliance.

7.1.3 Fire Extinguishers – Each kart must have at least one fire extinguisher accompanying the kart at all times, including by not limited to technical inspection, practice, qualifications, and the race. All fire extinguishers must meet the following:

- Capacity: 2.5 lbs.
- Equipped with a manufacturer installed pressure/charge gauge.
- Rating (U.S. & Canada): 10BC or 1A 10 BC
- Inspection (not expired)

7.1.4 Upon approval of the Technical Inspector, an inspection sticker, band, or other indicator will be placed on the kart to show that it has been approved to enter the track for the event.

7.1.5 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.

7.2 **Battery Charging**

7.2.1 Battery Charging – Battery charging and equipment is the responsibility of the race teams. A working BMS must be in place during all battery charging and battery charging must be supervised by a team member at all times. 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. Proper

care must be used to ensure safety for all when charging is occurring. If event staff have safety concerns, the DEO or Safety Director may ask the team to modify their charging process or location.

7.3 **Team Equipment**

7.3.1 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.

7.3.2 Helmet – The driver must wear a helmet which:

1. Is closed face with an integral, immovable chin guard
2. Contains an integrated visor/face shield supplied with the helmet
3. Meets an approved standard
    a. Snell K2010, K2015, K2020, M2010, M2015, M2020, SA2010, SAH2010, SA2015, SA2020
    b. SFI Specs 31.1/2010, 31.1/2015, 41.1/2010, 41.1/2015
    c. FIA Standards FIA 8860-2004, FIA 8860-2010, FIA 8860-2018, FIA 8859-2015
4. Is properly labeled with its standard.

7.3.3 Driver's suit must be manufactured for racing. The suit must be constructed of heavyweight, abrasion-resistant nylon. The driver's suit must cover the ankles and wrists while seated in the kart. Exposed skin will result in a black flag penalty.

7.3.4 All drivers must wear appropriate gloves that will prevent or minimize abrasions.

7.3.5 The driver shall wear an approved neck brace, socks covering the ankles, and full coverage shoes.

7.3.6 The driver shall wear an approved rib protector under his or her suit.

7.3.7 Long hair -- No hair may be outside of the driver's helmet. A head sock or other method must be used to restrain hair. This is a black flag offense.

7.3.8 Crew Clothing & PPE – At all times in the pit and paddock area, all crew members must wear long pants, shirts that cover the shoulder, and closed-toe shoes. Safety glasses must be worn by those in the vicinity of power tools in use or electrical work being performed. No jewelry (necklaces, bracelets, watches, etc.) is allowed.

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

7.4 Pits Requirements

7.4.1 Pit Passes – A pit pass is required to enter the pits. All crew members will be issued a pit pass (maximum of 6 per team) at check-in and must always keep it visible. Each pit pass is for the individual in which it has been issued and may not be transferred to another person. Persons without a pit pass are not allowed in the pits at any time and will be asked to leave by the event staff. The DRO shall have complete discretion regarding personnel in the pits and on the grid.

7.4.2 Non-Members in the Pits – If any person is found working on a go-kart in the pits which is not an official member of a crew, and that crew is aware of his/her presence, that go-kart and crew will be disqualified from further participation in the event for that day. Only individuals displaying a pit pass will be allowed on the grid for the race. Team advisors and support personnel should avoid working on the go-kart but are allowed to verbally direct and coach the student team members. The DRO shall have complete discretion regarding personnel in the pits and on the grid.

7.4.3 Leaving Pit Area –Once a go-kart enters the pits for a race event, it may not leave until the race is complete. Doing so disqualifies the go-kart from the event.

7.5 Driving Requirements

7.5.1 All drivers must complete the *Driver Safety Training* and be registered with event staff. The DRO or their designee will provide registered drivers with a method to designate them as a driver (bracelet or similar) and they must display this to the DRO or their designee each time they wish to enter the track. A photo ID may also be requested to verify identity.

7.5.2 All rookie drivers will have fluorescent tape on the rear of the kart to designate rookie status for the first on-track event attended. The Technical Inspector will apply the tape at technical inspection. A Driver will be considered a rookie until they finish their first event and get a satisfactory rating from the DRO.

7.5.3 Any foul driving, unnecessary bumping, crowding, chopping, blocking, or unsportsmanlike conduct on the track or pits is grounds for penalization or disqualification.

7.5.4 All drivers must constantly be aware of the traffic in his/her area and be prepared to yield to a faster competitor. A kart being passed is obliged to yield at the earliest chance. A blue flag will be shown, and that driver receiving the flag must follow the procedures of the Blue Flag. Failure to follow the Blue Flag will result in a Black Flag.

7.5.5 A kart that is significantly slower than others on the track must also stay out of racing line to allow others to pass freely and safely.

7.5.6 A go-kart may not improve its position with all four wheels off the track unless the kart(s) it passes are directly involved in an accident.

7.5.7 Karts must not exceed 15 miles per hour at any point on pit lane.

7.5.8 Drivers must signal by raising one hand so that go-karts behind them can see if they are driving out of the ordinary pattern, such as exiting to the pits, yellow flag, accidents, etc.

7.5.9 If their kart has shut down or spun out, drivers must signal by raising both hands high in the air to indicate they will not make any move until the field passes. If the kart is still drivable, the driver may continue driving once a track worker signals that the track is clear. If the go-kart is not able to continue, when it is safe, the driver should exit the kart and help the track workers move the kart to a safe location until the end of the event. The DRO will communicate to the teams when they may retrieve their damaged karts following the end of the event.

7.5.10 All hand signals should be made in such a manner so as not to confuse officials or other drivers on the track.

7.6 **Flags**

7.6.1 Green Flag – The green flag signifies the start of the session. The green flag and/or light will be displayed at the start of the race or practice session and kept visible as long as the track is clear for racing.

7.6.2 Yellow Flag – The yellow flag and/or yellow light will be displayed if the track is partially blocked for any reason. Drivers should raise one hand, slow down, hold their position, and be prepared to stop. Passing under the yellow will result in a penalty.

7.6.3 Blue Flag – The blue flag, with or without the diagonal yellow stripe, will be given to any kart that is being overtaken by the leaders The kart receiving the flag must immediately signal the direction they wish to be passed on, move over, and let the other kart pass.

7.6.4 Red Flag – When given to an individual kart, the red flag means to stop as quickly and safely as possible, pull inside the infield, and shut down the drive. This means there is something dangerously wrong with the kart, and the driver should stop promptly. When given to the entire field, the red flag and/or red light means the track is hazardous for racing, and all karts must stop immediately where they are

on the course. Karts cannot be worked on during a red flag. If and when the race is restarted, the karts will be positioned in order of the last completed lap, except for stoppage due to rain.

7.6.5 Rolled Black Flag – The rolled black flag will be given to any competitor whose driving conduct is bordering on penalization. This is only a warning and does not require the kart to leave the track.

7.6.6 Black Flag – The black flag means the driver must enter and stop inside their pit immediately for consultation by a race official.

7.6.7 White Flag – The white flag will be given to the leading kart one (1) lap before the end of the race.

7.6.8 Checkered Flag – The checkered flag signals the end of the race and all competitors should finish the lap at reduced speed and exit to the pits. After the checkered flag is displayed, the top five (5) placing karts are allowed to stay in the infield for post-race ceremonies.

7.7 **Practice**

7.7.1 Eligibility - All karts must pass technical inspection before entering the track.

7.7.2 If a large number of vehicles are in attendance, the DRO may break the practice time into groups. Any racer participating in the wrong warm-up group will be subject to penalization. When warm-up is completed, all racers will proceed to the pits to await further instructions.

7.8 **Qualifying**

7.8.1 Eligibility

7.8.1.1 All karts must pass technical inspection before entering the track.

7.8.1.2 All karts must have an approved transponder and PEM mounted before qualifications.

7.8.2 The race starting grid will be determined via sprint races. The number of karts in each sprint race will be determined by the DRO based on the number of entrants. Each kart will be assigned to a sprint race and gridded based on Design Report scores. The kart with highest Design Report score will be placed in position 1 of heat race #1. Second highest score will be position 1 of heat race #2. Third highest score will be position 1 of heat race #3. Fourth highest score will be position 2 of heat race #1 and so on. Sprint races will be conducted in similar fashion to the main race with all karts lining up in race order, performing at least one parade lap,

and then conducting a 15-lap race. Placement for the main race will be determined as follows:

Position 1: The winner of heat race #1
Position 2: The winner of heat race #2
Position 3: The winner of heat race #3
Position 4: 2nd place of heat race #1
Position 5: 2nd place of heat race #2
Position 6: 2nd place of heat race #3
And so on until all karts (maximum 33) are gridded for the main race.

If any or all heat races must be cancelled, race gridding will be done by Design Report points. If there is a tie in Design Report points, a random draw will break the tie.

7.8.3 Post-qualifying inspection - Each kart will undergo a post-qualifying inspection as determined by the Technical Inspector. This will include, but not limited to, weighing the driver, checking max power, verifying battery capacity, inspecting push-back bumpers. Karts found to be non-conforming to any rule may be penalized or disqualified, at the DRO's discretion. Penalty protests must be issued to the DEO within 15 minutes. Only the driver and crew chief are allowed to be present during post-qualifying inspection.

7.8.4 Each individual driver can qualify only one kart and must drive that kart in the main race. If for some unforeseen reason the qualifying driver is unable to drive the kart in the main race, the DRO must be notified. If the DRO approves the use of an alternate driver, the kart will be allowed to start at the rear of the starting field. If an alternate driver attempts to drive the kart in the race without prior approval, that kart will be disqualified.

7.8.5 If a kart is not able to participate in a sprint race qualifier, it may be permitted to start at the rear of the field at the discretion of the DRO.

7.9 **Race**

7.9.1 Race Length – The length of a race is 50 laps (13.5 miles) on the Purdue Grand Prix track. Race placement will be determined based on position at the finish line on the lap in which the leader completes their 50th lap.

7.9.2 Race Starting Format – The evGrandPrix may use a rolling start format that will include formation lap(s) to confirm transponders functionality and properly line up the field before the race start.

7.9.3 Unsafe conditions – If a kart exhibits any unsafe condition such as loose or missing parts, slow pace, or reckless driving, the kart will be shown the black flag by the head flagman and be required to return to the pits. Event staff will explain the reason for the flag and the kart may return to the race once the situation has been remedied.

7.9.4 Crew members are the only authorized persons to service the vehicle during a race event.

7.9.5 Post-race inspection - Each kart will undergo a post-race inspection as determined by the Technical Inspector. This will include, but not limited to, weighing the driver, checking max power and energy used, and inspecting push-back bumpers. Karts found to be non-conforming to any rule may be penalized or disqualified, at the DRO's discretion. Penalty protests must be issued to the DEO within 30 minutes. Only the driver and crew chief are allowed to be present during post-race inspection.

7.9.6 Rain Contingency – If foul weather interrupts a race before completion of 50% of the required laps, all karts will be red-flagged and will stop on the track at the start-finish line in single file order to await further instructions. Unless otherwise directed by the DRO, no work is to be done on the karts. The karts may be covered if desired. The DRO will determine if the event is to be postponed. If a race is to be restarted, the karts will restart in single file, in the order, they were scored on the lap before when the weather forced the delay. If 50% or more laps have been completed, the race will be deemed officially complete. Finish position will be based on the position of the lap before when the weather forced the delay.

7.9.7 Grid vs. Pit– The Grid area is defined by the Event Director as a place where karts will be placed before entering the track surface. Only team members and officials will be allowed in this area. The Pit area is defined as the area where the team plus support group can work on the kart.

7.9.8 Protest – All teams wishing to protest an action on track or a call made by an official must fill out the official race day protest form available at tech within 30 minutes of the end of the session in question.

7.9.8.1 This form must be filled out correctly listing the rule in question, the reason for the protest and be signed by both the driver and crew chief/principle.

7.9.8.2 The evGrandPrix has the right to claim any, and all equipment for testing should those items be called into question during a protest.

8.0 ROLES & POSITIONS

8.1 evGrandPrix Director – The evGrandPrix Director is assigned by Purdue University to oversee and manage the evGrandPrix Program.

8.2 Director of Event Operations (DEO) – The Director of Event Operations is designated by the evGrandPrix Director to manage evGrandPrix events including, but not limited to, Test & Tunes and the evGrandPrix race. The DEO is the final authority on rules interpretations and enforces proper and appropriate conduct of all Program staff, volunteers, participants, and spectators. The DEO may appoint personnel and organize subcommittees as deemed necessary to help carry out their duties. These duties include, but are not limited to, Safety Director, Technical Inspector, Chief Scorer, and Director of Race Operations.

8.2.1 Safety Director – The Safety Director is designated by the DEO and ensures all aspects of safety adhere to the rules and commonly known safe practices during evGrandPrix events. The Safety Director reports all concerns and recommendations to the DEO and the DEO determines and enforces the course of action.

8.2.2 Technical Inspector – The Technical Inspector is designated by the DEO for a technical inspection of each kart. Each kart must receive approval from the Technical Inspector before it is allowed to participate in an evGrandPrix event.

8.3 Director of Race Operations – The Director of Race Operations (DRO) is designated by the DEO. The DRO is responsible for all decisions during the race and oversees the race from start to end. The DRO is also responsible for driver training and track worker training.

8.3.1 Chief Scorer – The Chief Scorer is designated by the Director of Race Operations and is responsible for establishing qualifying times and accounting race laps and penalties to determine race finishing position.

8.3.2 Pit Steward – The Pit Steward is designated by the DRO and reports directly to the DRO. During the race, the Pit Steward has final authority in the pit area. When a kart suffers a penalty flag (black flag), the Pit Steward will enforce the penalty. The Pit Steward my designate Pit Workers to help with his/her responsibilities.

8.3.3 Gate Attendant – The Gate Attendant is designated by the DRO and is responsible for ensuring everyone entering the track area has the proper credentials and is wearing the appropriate PPE.

8.4 **Crew Chief** – Each team must have a designated Crew Chief. The Crew Chief is the official spokesman for the crew. No one other than the Crew Chief may handle a situation with the

Director of Race Operations, Director of Safety, or Director of Event Operations. The Crew Chief is responsible for ensuring their team and vehicle adhere to all rules.

8.5 **Track Workers** – To participate, each team must provide one track worker to work the event. All track workers must complete an approved track workers training session.

APPENDIX A – PARTCIPATION FORMS

Waiver, Release and Agreement on Indemnity

I desire to participate in the evGrandPrix Collegiate Series (the "Activity") organized and conducted by Purdue University ("Purdue"). In consideration of permission granted by Purdue to allow me to participate in the Activity, I (together with my parent or guardian, if I am under the age of eighteen or under a legal disability) (sometimes referred to collectively as "Participant" below) represent, covenant and agree, on behalf of myself and my heirs, assigns, and any other person claiming by, under or through me, as follows:

1. I acknowledge that the Activity involves certain risks (some of which I may not fully appreciate) and that injuries, death, property damage or other harm could occur to me or others. I accept and voluntarily incur and assume all risks of any injuries, damages, or harm which arise during or result from my participation in the Activity, regardless of whether or not caused in whole or in part by the negligence or other fault of evGrandPrix, Purdue, The Trustees of Purdue University, and/or any of its or their departments, trustees, affiliates, employees, officers, agents or insurers ("Released Parties"). I further acknowledge and agree that Purdue has exercised reasonable care in (a) warning me that the Activity involves certain risks and dangers and (b) providing me with the disclaimers and the other cautionary statements set forth in this document.
2. I waive all claims against any of the Released Parties for any injuries, damages, losses or expenses, whether known and unknown, which arise during or result from my participation in the Activity, regardless of whether or not caused in whole or part by the negligence or other fault of any of the Released Parties. I release and forever discharge the Released Parties from all such claims.
3. I agree to indemnify and hold the Released Parties harmless from and against any and all losses, liabilities, damages, costs or expenses (including but not limited to reasonable attorneys' fees and other litigation costs and expenses) incurred by any of the Released Parties as a result of any claims or suits that I (or anyone claiming by, under or through me) or any third-party may bring against any of the Released Parties to recover any losses, liabilities, costs, damages, or expenses that arise during or result from my participation in the Activity, regardless of whether or not caused in whole or part by the negligence or other fault of any of the Released Parties.
4. I give permission for Workshop instructors, volunteers and emergency personnel to make necessary first aid decisions in the event of an accident, injury, or illness I may suffer during my participation in the Activity. If I need medical treatment, I shall be financially responsible for any costs incurred as a result of such treatment.
5. I have carefully read and reviewed this Waiver, Release and Agreement on Indemnity. **I execute it voluntarily, and I understand it and the legal consequences of signing it, including (a) releasing the Released Parties from all liability, (b) promising not to sue the Released Parties, and (c) assuming all risks of participating in the Activity.** I understand that this document is to be governed by and construed as broadly as possible under the laws of the State of Indiana. I agree that if any portion is held invalid or unenforceable, I will continue to be bound by the remaining terms.

EXECUTED this _____ day of _____, 20_____.

_____ _____

Participant Signature Participant's Printed Name

PARENTAL CONSENT (only if participant is under the age of 18)

I, the parent and/or legal guardian of the minor signing above, understand the nature of the Activity, as well as the minor's experience and capabilities, and I believe the minor to be qualified to participate in the Activity. I allow the minor to participate in the Activity.

I hereby acknowledge and agree to each of the provisions set forth in the above document and, on behalf of myself, the above-referenced minor, and any other person(s) claiming by, under or through either one of us, I agree to comply with and be bound by its terms. I understand that I am responsible for the obligations and acts of the minor as described in this document. **I execute it voluntarily, and I understand it and the legal consequences of signing it, including (a) releasing the Released Parties from all liability on my and the minor's behalf, (b) promising not to sue the Released Parties on my and the minor's behalf, and (c) assuming all risks of the minor's participation in the Activity.** I understand that this document is to be governed by and construed as broadly as possible under the laws of the State of Indiana. I agree that if any portion is held invalid or unenforceable, I and the minor will continue to be bound by the remaining terms.

_____ _____

Parent or Guardian Signature (if applicable) Parent/Guardian Printed Name

Date: _____

Minor's Name: _____

Annual Series Commitment / Participation Agreement

I agree to follow all the rules, regulations, and stipulations within the current official evGrandPrix rules. This agreement bonds not only myself, but the school I represent as well.

I have read the evGrandPrix rules. I understand that it is a living document, and it is my responsibility to keep the latest copy available for review.

By signing this agreement, I agree to the terms herein.

Team Liaison:

_____	_____	_____
Signature	Printed Name	Date

_____
Official School Name

Photo/Video Release Form

I, _____ (please print),

grant permission to Purdue University and its agents and employees the irrevocable and unrestricted right to reproduce the photographs and/or video images taken of me, or members of my family, for the purpose of publication, promotion, illustration, advertising, or trade, in any manner or in any medium. I hereby release Purdue University and its legal representatives for all claims and liability relating to said images or video. Furthermore, I grant permission to use my statements that were given during an interview or guest lecture, with or without my name, for the purpose of advertising and publicity without restriction. I waive my right to any compensation.

I acknowledge that I am

☐ over the age of 18

☐ the legal guardian of the following

If legal guarding of model(s), please list name(s) here:

Signature _____

Date _____

Address _____

_____

APPENDIX B – Power and Energy Monitor

PEM Specs

Traction drive power and energy will be limited to the maximums outlined in the rules. An electronic instrument will be mounted on the vehicle to indicate and measure, at a minimum, instantaneous power from the battery and the accumulated energy used from the battery. This instrument is referred to as the Power and Energy Monitor (PEM).

The purpose of the PEM is to accurately measure and record the power and energy delivered by the battery of each racer during event competitions. Electric from the battery power, expressed in watts, is calculated using the instantaneous voltage multiplied by the instantaneous current. Energy consumed from the battery, expressed in watt-hours, is calculated by integrating the power over time. During a racing event, a penalty will be assessed to racers that exceed a defined peak power limit. At the conclusion of the event, the total energy consumed by the racer will be noted by a race official.

The objective of the PEM is to encourage electric drive innovation by removing restrictions on specified configurations and components, such as motors and controllers, in favor of a maximum performance envelope. This open formula fosters team competition and design variety while preserving competitive racing throughout the field.

--- **The PEM hardware module will be provided to teams by race officials before a competition**

--- **Teams are responsible for mounting the PEM using only the approved bracket and wire harness**

--- **Proper PEM operation will be verified by officials after technical inspection and during open track practice**

--- **It is the responsibility of teams to report any issues they have with the PEM to an official as soon as they become aware of such issue**

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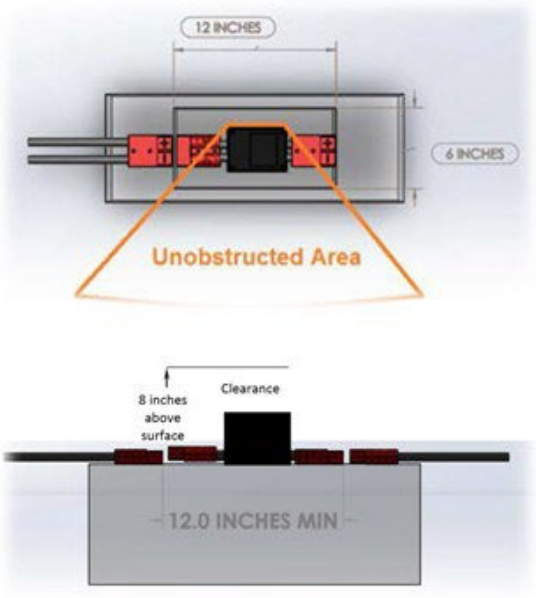
PEM Vehicle Integration Requirements



On each kart, the following mounting space will be required:

--- A flat **unobstructed and non---conductive** area of 12 inches by 6 inches

--- This area should be on top of the battery pack

--- On one end of the PEM

- \+ is the maximum battery voltage
- – is the minimum battery voltage

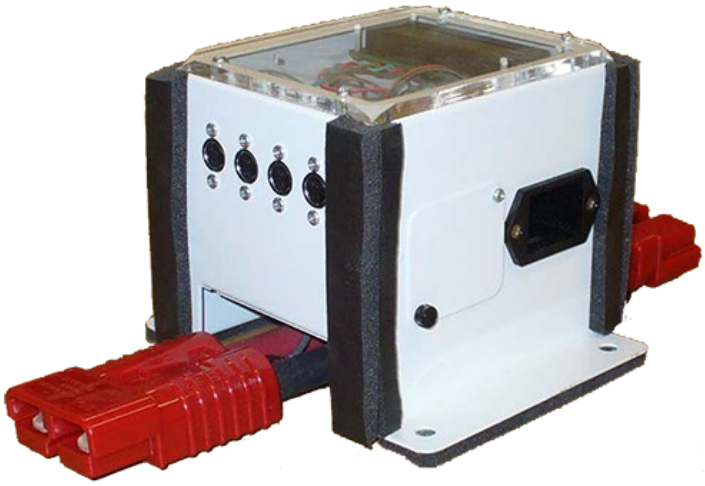
--- On the other end of the PEM

- \+ goes to the positive---end of the drive system (the fuse is first in this system)
- – goes to the negative end of the drive system (B--- on the controller)

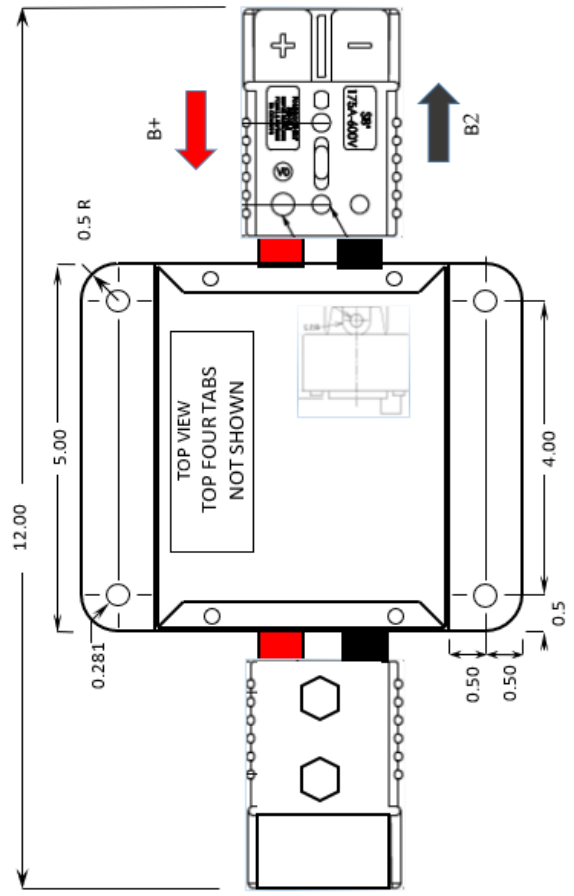
The connectors to the vehicle's drive system and the battery **MUST BE** the **RED ANDERSON SB175 POWERPOLE CONNECTOR** (175 amp).

Please note that **OTHER COLORS WILL NOT WORK** as they are notched differently.

See www.evgrandprix.org/parts for details and suppliers.



PEM Mounting Hole Diagram (not to scale):



APPENDIX C – Welding Process Check

Welding Process Check

Prior to welding any joint on the vehicle's chassis, each person shall individually complete two welding samples, defined below, using the same primary materials and processes as used in the roll cage element welds. All welding samples shall be submitted at Technical Inspection. Vehicles for which complete sets of welding samples are not submitted, or for which any of the welding samples are judged inadequate, will not be allowed to drive their vehicle on the track.

Welding samples shall be made from the same tube material, diameter, and thickness as the welds made by each person on the chassis. For information on best practices for weld samples, see examples at the end of this appendix.

All weld samples shall be indelibly marked, by permanent means such as engraving, etching, or stamping with all the following information:

- School Name or School Initials
- Welder Name or Welder Initials
- Date of construction of weld sample

Sample 1 – Destructive Testing:

The sample shall comprise a 90-degree joint, the leg length of which is unrestricted shall be (Figure 1) destructively tested. Passing samples will exhibit a joint failure in the base material and not in the weld metal. The testing method is free and either tensile or bending failure may be induced; however, the peak stress must be located at the weld. In the case of bending failure, take care that the largest bending moment is located at the weld. **Samples shall be tested prior to arrival at competition, and both pieces presented for inspection in the case of complete separation during testing.**

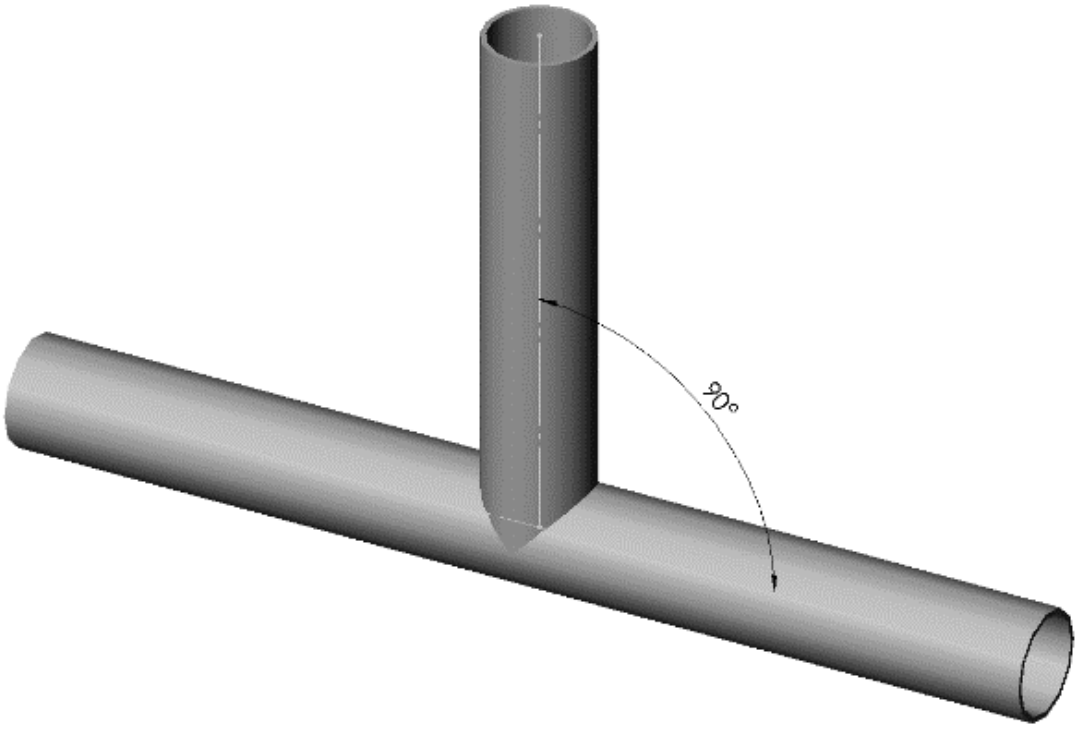


Figure 1: Welding Sample 1

Sample 2 – Destructive Inspection

The sample shall comprise of two tubes joined at a 30-degree angle with a length of at least 150 mm (5.9 in.) from the center of the joint (Figure 2) to the end of each extended leg. The sample shall be sectioned along the length of tube to reveal adequate and uniform weld penetration (Figure 2). **Samples shall be tested prior to arrival at competition, and both pieces presented for inspection in the case of complete separation during testing.**

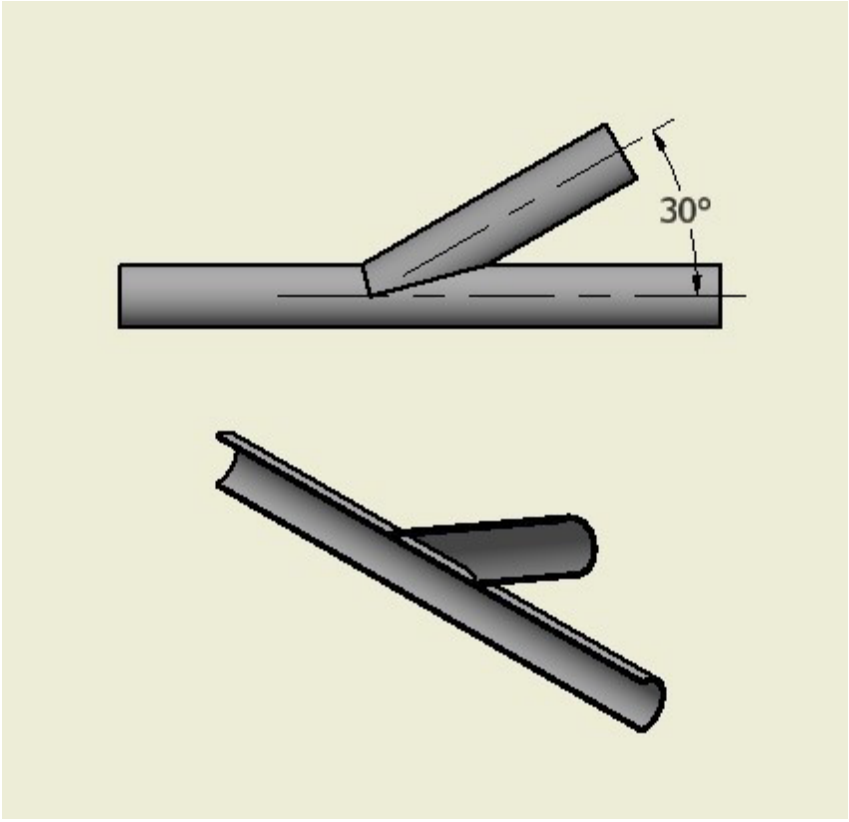
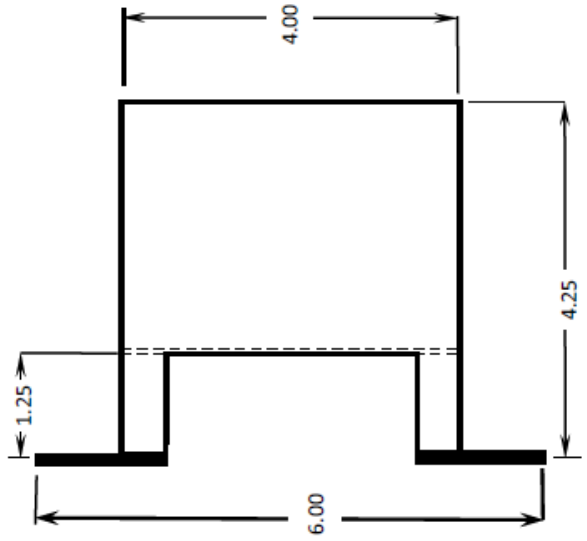


Figure 2: Welding Sample 2



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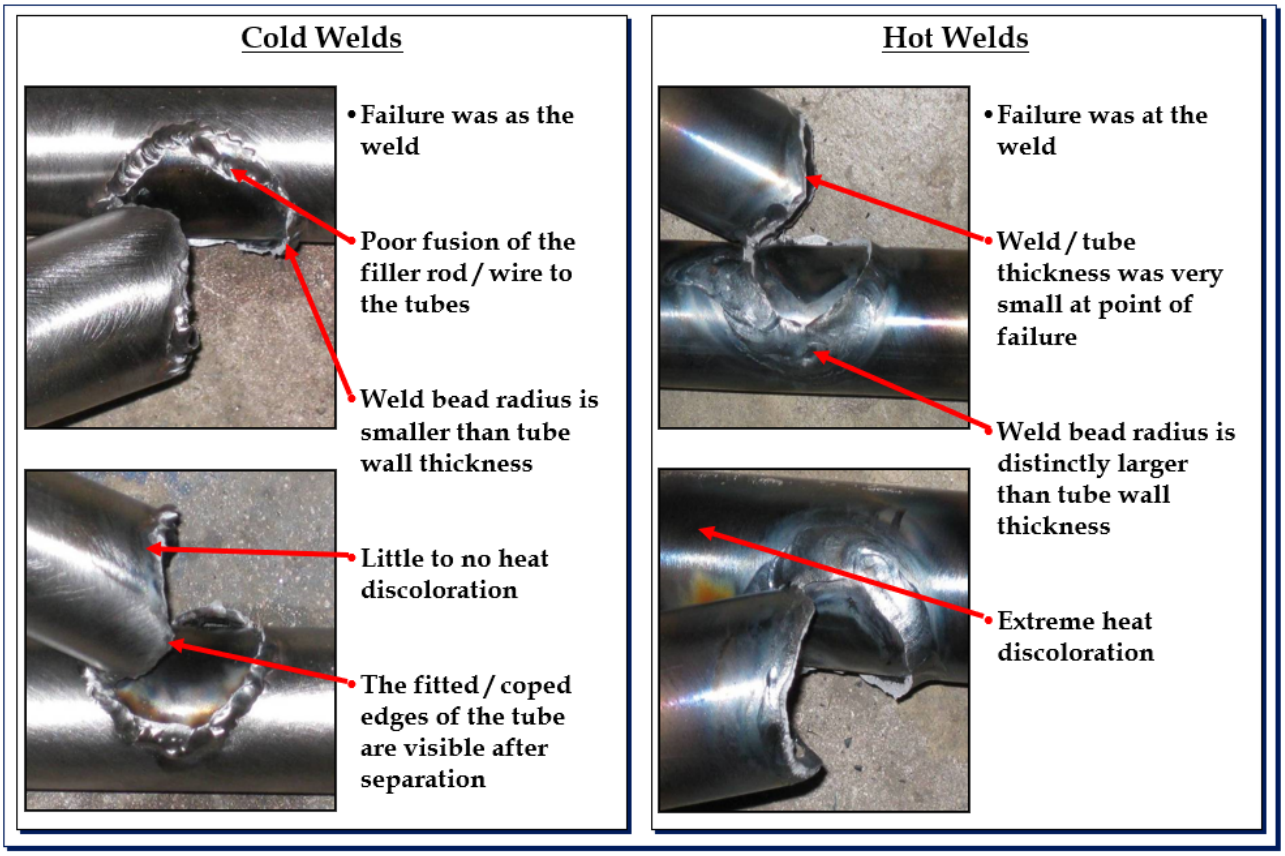
Examples of Failing Welds: Sample #1 (Destructive Testing)



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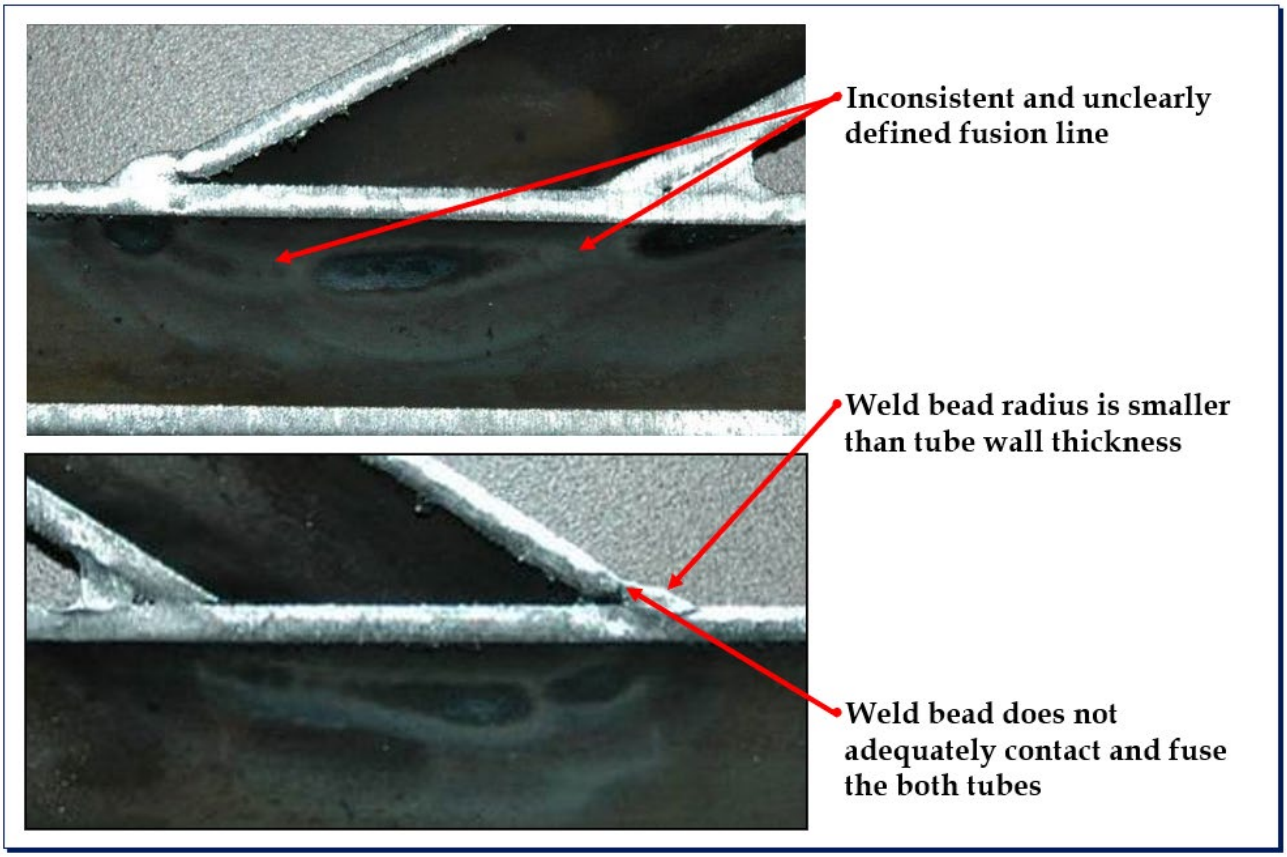
Examples of Failing Welds: Sample #2 (Destructive Inspection)



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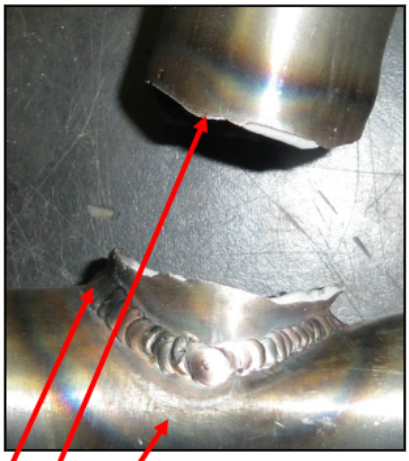
Examples of Passing Welds

Sample #1 – Destructive Testing

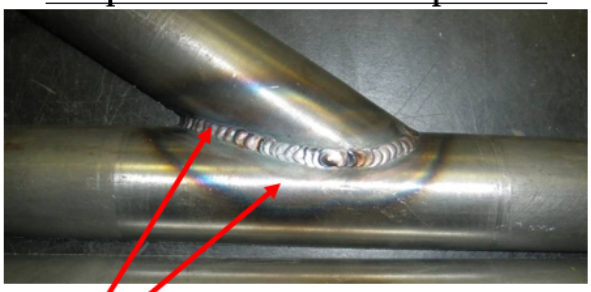


Failure was not at the weld

Weld bead radius is approximately the same as tube wall thickness

Moderate Heat Discoloration

Sample #2 – Destructive Inspections



Moderate Heat Discoloration

Weld bead radius is approximately the same as tube wall thickness

Clearly defined and substantially uniform width fusion line, no burn - through