



ATVC INDIA RULE BOOK



**INFI LEAGUE**  
— **MOTOR SPORTS** —

**INFI LEAGUE MOTORSPORTS**

**Present**

**ATVC INDIA**

**Season-2022**

**Applicable For Combustion Event Being Conducted in2022**

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## 1. Participation Requirements:

A team must have an official name and logo.

A team shall consist of 30 members. A team having less than 15 members will not allow participation.

- 1.1 **Current Status:** Team members must be **enrolled as degree-seeking undergraduate students** in a college or university. Team members must be 18 years or more in age at the time of the competition.
- 1.2 **Driver's:** Both the drivers must hold a valid, government-issued driver's license four-wheelers driver's license. No learner's driver's license will be allowed to drive during the competition. Driver must hold their license during competition.
- 1.3 **Insurance:** Individual accident insurance coverage is required and is the sole responsibility of the participant.
- 1.4 **Liability Waiver:** All on-site participants and faculty are required to **sign a liability waiver upon registering on-site.**
- 1.5 **Responsibility:** All participating team members and faculty advisors must be sure that they are individually linked to their respective colleges. During the event, all the team members are compulsory to wear shoes.

**Changes in Team Member:** Any registered team can replace Team Captain, Manager, Driver, Members, and Faculty advisor only once at the event registration desk while submitting documents.

**Team Captain and Vice-Captain are the primary point of contact for his/her team toward the organizer.**

## **2. General Vehicle Requirement:**

### **2.1 General Requirements**

The vehicle must be capable of carrying one person 190 cm (75 in.) tall weighing 113 kg (250 lbs). The vehicle must have four (4) or more wheels not in a straight line.

### **2.2 Ergonomic Design**

Drivers must comply with the roll cage minimum clearances, sit comfortably in a driving position, and wear all the necessary driver's equipment. All controls on a vehicle must be accessible to all drivers.

Teams shall be prepared to demonstrate compliance to T.I. requirement in the design event.

### **2.3 Engine**

Any Briggs & Stratton engine with below mentioned is allowed for ATVC2022.

Model 19 engine came with separate fuel tank. Team has to mount the fuel tank separate from engine Fuel tank shall be mounted separately from the engine.

The team have to report the engine model number and specification in CAE report prior to event in the submission of reports.

The team must have to use engine with following specifications:

- Engine Cubic Capacity: 305 CC
- Gross Horsepower: 10 HP
- Engine Fuel: Gasoline
- Power of torque: 12.7 Lb/ft

## 2.4 Regulation

No modifications are permitted in any component of an engine itself, including the pistons, ports and valves, crankshaft, camshaft, connecting rod, spark plugs, armature, etc. The stock engine governor must be used and set such that the engine **does not exceed 3800 rpm** in any condition.

The stock Briggs and Stratton air cleaner must be used, but it can be relocated using a remote mounting kit. Any changes made will have to pass inspection and is at the sole discretion of the technical inspectors.

Changes to the Carburetor, such as re-jetting, adjusting the float or venturi is not permitted.

Exhaust muffler must be the stock part supplied with the engine.

The exit may be re directed, or the exhaust may be relocated by using a tube having an ID of 32mm (1.25 in).

In case of any modifications, the entire system must be securely fastened at all times during the competition.

## 3. Faculty Advisor:

Each team can consist minimum one and maximum two faculty advisors appointed by the College/university.

- 3.1 **Responsibility:** Faculty advisor can only advise to their teams on general engineering and project management. Also, they can review, monitor their overall design, fabrication, testing and ensure the safety of vehicle and driver in house manufacturing as well on-event too.

During the event presence of a faculty adviser is mandatory.

- 3.2 **Limitations:** Faculty advisors are not allowed to involve directly or indirectly in report writing, fabrication or repair any part of a vehicle and ensures it is done by the participants.

Faculty Advisors are not allowed to participate during the technical inspection, cost, business, or design presentations.

The team captain or other designated members of the team must do all the presenting work. However, Faculty Advisors may silently observe the process and work for improvement in future participation years.

## **4. Brake System**

The vehicle must have a hydraulic braking system that acts on all wheels and is operated by single foot. Pedal must directly actuate the master cylinder through a rigid link (i.e., Cables are not allowed). At static and dynamic condition, Braking system must be capable of locking and sliding all wheels on paved or unpaved surface.

### **4.1 Independent Circuits:**

The braking system must consist of two or more independent hydraulic circuits such that in case of a leak or failure at any point in one system, braking power shall be maintained on at least two wheels. Each hydraulic circuit must have its own separate fluid reservoir either through physically separate reservoirs or by the use of a full-height dam in an OEM-style reservoir.

### **4.2 Brake Location:**

The brake(s) on the driven axle must operate through the final drive. Inboard braking through universal joints is permitted. Braking on a jackshaft through an intermediate reduction stage is prohibited.

### **4.3 Cutting Brakes:**

Cutting brakes are permitted. They can be hand or feet operated. The primary brake system must be able to lock all four wheels with a single foot. If using two separate pedals to lock two (2) wheels apiece; the pedals must be close enough to use one foot to lock all four wheels.

Any application of the brakes, must cause the brake light to illuminate.

### **4.4 Brake Lines:**

All brake lines must be securely attached to the vehicle frame, and not hang below the vehicle frame or suspension components. All brake lines must be placed in such a manner, that they are not damaged by suspension

and steering components, or any other sharp edges.

All brake lines shall have full range of motion within the steering and suspension system. At no time shall the brake lines be loaded in tension or become engaged with the vehicle's tires and wheels. Only Steel lines, or steel braided rubber hoses are permitted. Plain plastic and rubber brake lines are prohibited.

## 5. Throttle System

The vehicle's throttle system must be able to move the throttle arm to full throttle on the engine and return to idle when released. Any changes to the throttle after inspection is not permitted.

Electronic or hydraulic throttle engagement is not permitted.

### 5.1 Pedal:

Only mechanical foot operated pedal is allowed. The throttle pedal shall actuate a throttle cable. The foot pedals must be positioned ensuring ease of egress by the driver. The driver's feet should not get trapped behind any pedal.

Any mechanical extensions on top of the pedals are prohibited.

### 5.2 Pedal Stop:

A substantial, mechanical, wide-open throttle stop must be mounted at the pedal. Body panels or other flexible materials are explicitly prohibited.

### 5.3 Throttle Cable:

One end connects to the throttle pedal and other end to the throttle lever at the engine. The cable can be tension type or push-pull type. It is essential that the cable is covered (sheathed or jacketed) through its entire length from the front of the cockpit to the firewall. The throttle cable should be routed such that the movement of the cable through the sheath is smooth.

Cables systems with any jerky movement or signs that the cable might get stuck will not be allowed.

**Fail Safe:** All throttle controls shall be designed to return to the idle-stop in the event of a failure.

**Note:** Ensure sufficient gap is provided between the Accelerator pedal & steering column to that of Brake Pedal. Pedal Actuation shall not be hindered at any cause by the nearby components.

## 6. Driver Equipment

### 6.1 Helmet:

All drivers must wear a well-fitting Motocross style helmet with an integrated (one-piece composite shell) chin/face guard and a rating of: Snell M2010, 2015, SA 2005, British Standards Institution BS 6658-85 types A or A/FR. ISI rating is also acceptable. DOT rated helmets are not allowed.

**Note:** Some Motocross helmets have extended chin guards that will not contact the required neck collars when the head is flexed forward. This combination of helmet/collar system is prohibited.

Any non-specification helmets will be confiscated by the TEJ for the duration of the event. At the close of the endurance race, all confiscated items will be available for pick up.

6.2 **Eye Protection:** All drivers must wear motocross-style goggles with a full-circumference elastic band that wraps completely around the driver's helmet. "Quick Straps" or other quick-release systems are explicitly prohibited.

### 6.3 Lens Protection:

All goggles used by drivers must have tear-off or roll off lens protectors. These tear-offs or roll-offs are used to ensure the driver has unobstructed vision through their goggles. Teams must present their goggles and properly installed tear offs or roll-offs at tech inspection.

Teams without tear offs or properly functioning roll offs will not be allowed to take part in any dynamic event and also subject to being black flagged.



## 6.4 Neck Support:

All drivers must wear an adult size neck support / neck collar. The neck support must be a full circumference and SFI 3.3 rated. Horseshoe collars are not allowed. The support/collar must be in overall good condition and show no signs of wear or other injurious defects. The support/collar must bear the appropriate dated labels, and on Jan 1<sup>st</sup> 2022, be no more than three years old.

## 6.5 Clothing:

6.5.1 **Gloves:** Drivers must wear gloves to protect their hands. Durable, abrasion resistant gloves are required.

6.5.2 **Shoes:** Drivers shall wear socks and shoes. Any toe covered shoes are permitted.

**Fire resistant shoes are not mandatory**, regular sneakers/ running shoes would suffice. However, a shoe with narrow heel is preferable for drivers to ensure ease of pedal actuation.

6.5.3 **Upper Garments:** Drivers shall wear a fire-resistant shirt. The shirt must have a factory label showing an SFI rating, FIA rating, NFPA 2112 rating, or other fire-resistant rating.

6.5.4 **Lower Garments:** Drivers shall wear long pants made of natural materials such as cotton, denim, etc.

Drivers may also wear fire resistant pants having an SFI, FIA, NFPA 2112, or other fire-resistant rating.

**Note:** Jerseys, gloves, socks or other garments made from nylon or any other synthetic material which will melt or combust when exposed to open flame or extreme heat, are explicitly prohibited from use during competition.

## 7. Driver Resistant:

The purpose of the restraint system is to hold the driver securely in position within the frame of the vehicle at all times. It should also be capable of disengaging quickly, and allow the driver to leave the car in the shortest possible time. Only 5-point driver harness systems are allowed, such that all the belts join at a single, centrally located buckle. The restraint includes two shoulder belts, two arm restraints, the anti-submarine belt and the driver seat.

All driver restraint systems shall meet either SFI Specification 16.5/16.1, or FIA specification 8853/98. The material of shoulder and lap belts shall be of Nylon or Dacron polyester and in new or like-new condition, 76 mm (3.0 in.) in width, and free from injurious defects. Anti-submarine belts shall meet the same conditions, but have a minimum width of 51 mm (2.0 in.).

**Release Mechanism:** All belts in the driver harness must join to a single, central, metal-to-metal, lever-type, and quick-release buckle. Cam-Lock, and other enclosed buckles susceptible to jamming from small debris (such as sand particles) are explicitly prohibited. The release mechanism (buckle) shall be protected against accidental unfastening from a direct pull, rollover or slide along the side.

### 7.1 SHOULDER BELTS:

The shoulder belt mounting point onto the chassis must be no higher than the vertical level of the shortest driver's shoulders. It should also not be lower than 100mm below the tallest driver's shoulder height.

The lateral spacing between the centers of the shoulder belt should be between 180mm and 230mm. The lateral movement of the shoulder belts must be restricted along their mounting by a separate structure. The shoulder belts should not come into direct contact with the firewall at any point. A layer of protection must be used to prevent the firewall damaging the belts. The shoulder belts should be looped around a straight horizontal tube. This tube must be welded within the plane of the RRH, and must meet the requirements of a secondary tube. The shoulder belts must run directly to the driver's shoulders, without being redirected by any part of the frame, bodywork or seat. The shoulder belts should be protected from damage from the aft of the RRH. The firewall can be extended to cover the shoulder belts from behind. Alternatively, pockets can be added around the

shoulder belt mounting points.

## 7.2 Lap Belts:

The lap belts must be connected to buckles on one side, and be directly connected to release mechanism. There should not be any redirection on any part of the vehicle including the driver seat. The belts must be mounted to the frame tabs with brackets supplied with the safety harness. . Lap belts may not be mounted by wrapping around tubes.

The belts must meet such that the release mechanism lies in the pelvic region of the driver, and not on the abdomen.

The lap belts need to be bolted to the vehicle frame with metal tabs. The bolts have to be graded, and be half threaded bolts, such that the part in contact with the lap belt is not threaded. Lap belts cannot be wrapped around tubes or secured with eye-bolts. All bolts in the driver harness must have the same nominal diameter as the mounting holes in the bracket.

The frame tabs for the lap belt must meet the following requirements:

The frame lap belt tabs shall be no less than 2.3 mm (0.090 in.) thick and configured for double shear mounting. Frame lap belt tabs configured in bending are explicitly prohibited.

The frame lap belt tabs shall be attached to the frame with no less than 38 mm (1.5 in.) of weld length per tab.

The frame lap belt tabs shall have no less than 6.4 mm (0.25 in.) of edge distance. (Edge distance is the measurement from the edge of the bolt hole to the outside edge of the tab.)

The frame lap belt tabs and lap belt shall be installed such that the lap belt tabs pivot freely. The frame lap belt tabs and their mounting shall be stiff and not readily deformed.

No lightening holes or other cutouts are permitted on the frame lap belt tabs

### 7.3 Anti-Submarine Belts:

Anti-submarine belts must be placed a location behind the chest line. The chest line is denoted by a straight-line parallel to the chest of the driver that extends to the floor of the vehicle. The anti-submarine belt must be positioned ahead of the lap belt mounting points. The anti-submarine belt must either be bolted to a frame tab (not in bending) or be wrapped around a secondary frame member. Tab must be in double shear.

If the tab is bolted, the belt must be firmly attached to the chassis by metal tabs, using a graded, semi threaded fastener, similar to the lap belts. The tab and welding specifications are same as that of lap belt tabs.

If the anti-submarine belt is wrapped around a secondary member, the lateral movement of the belt must be restricted to less than 25mm. Further, the belt must be protected from coming into contact with any other part of the vehicle, such as the belly pan. The mounting member must not be cantilevered.

In case the belt has to be redirected (such as by the seat), the maximum angle of redirection is 30 degrees with respect to the line of the belt.

**Note:** Quick disconnect fasteners for body panels are recommended that facilitate faster technical inspection process.

### 7.4 Arm Restraints:

The purpose of the arm restraints is to prevent the driver's arms from going outside the frame at all times. Arm restraints need to be securely attached to the driver harness. Arm restraints meeting SFI 3.3 ratings are allowed.

The restraints must show no damage or wear. They must have SFI rating labels stitched onto them. Arm restraints have the same date and age requirements as the rest of the driver harness system.

Arm restraints must allow the driver to release the harness and egress the vehicle unassisted, regardless of the vehicle's position. The arm restraints

are to be position on the driver's forearm, just below the elbow. The arm restraints should not restrict the driver's ability to reach the steering wheel, kill switch, harness release, or any other item needed to control the vehicle.

## 7.5 Head Restraint:

A head restraint must be mechanically fastened to the frame of the vehicle or the driver's seat. The purpose of the head restraint is to prevent the driver's head from moving rearward.

Any other methods of attachment are prohibited.

**Note:** Head restraints mounted directly on firewalls are explicitly prohibited.

## 7.6 Seats:

The seat shall work in concert with the driver harness to secure the driver within the envelope of the roll cage. The seat must be designed to support the driver in an upright position. An upright seating position is when the seat back angle is greater than 65 deg. with respect to the horizontal plane of ground. Seats may be conventional type, or a suspension seat.

## **7.7 Seat Construction:**

### **7.7.1 Conventional Seats:**

If a conventional seat is used, then it must be rigid and be made of metal or composite material. Seats made of any other material such as wood, plastic, etc. are prohibited. Conventional seats may have a removable seat cover and foam padding. Seats may be purchased from a manufacturer or constructed by teams.

### **7.7.2 Suspension Seats:**

Suspension seats or hammock seats need to be made of a material that is capable of supporting the weight of the driver without permanent damage or deformation. The suspension seat must be rigidly mounted in the car, such that the driver is held in place. The seat must not have more than 25mm of left-right or fore-aft movement. The suspension seat must not allow any part of the driver's body or limbs to leave the frame of the vehicle.

Suspension seats must be made of such a material that it is capable of taking load greater than the weight of the driver. The material must be stitched properly to prevent fraying or tearing of the material under stress. Any visible damage to the seat or excess movement when the driver is seated is not allowed, and can lead to being black flagged during the event. If carabiners are used to attach the seat to frame tabs, then they must be load rated to take the weight of the driver. The final discretion lies with the Technical Inspectors.

## 7.8 Seat Mounting Points:

All seats must use at least six mounting points to attach the seat to the vehicle frame. Conventional seats must have atleast four mounting points to attach the bottom plane of the seat and at least two mounting points to attach the seat back plane to the frame.

All the seat mounting points must be symmetric about the fore-aft center line of the vehicle. The back plane mounting points must be at or near the RRH plane of the frame. All members to which the seat mounting points are attached must meet the conditions of a secondary member. The seat bottom mount must be designed such that the vertical load is evenly distributed across the seat and the mounts.

Suspension seats must also be attached atleast six points to the frame of the vehicle. The suspension seat must be connected on both sides to the RHO or the RRH, within 50mm of the point at which the RHO and the RRH meet. The suspension seat must also be connected to the SIM on both sides, at a point such that there is a bracing member to the LFS within 50mm of this point. The seat should also be attached to the base of the RRH or LFS, at a point that is less than 50mm from the point at which the LFS meets the RRH. The seat should be designed such that it does not allow the driver to move within the frame of the car, thus ensuring he is within the vehicle frame envelop at all times.

All tabs used for mounting the seat must have a minimum thickness of 2.3 mm and at least 38 mm of weld length per tab. Mounting Tabs must not deform under load. The distance from the tab hole center to the weld line must not exceed 25 mm. If a frame member is drilled, a sleeve must be used as mentioned in the frame regulations.

## 8 Roll cage:

The roll cage must be a space frame of tubular steel. The following section outlines the requirements of the physical members and joining methods of the roll cage. Roll cage and Frame Members must be fully welded, and welds must not be ground, sanded or modified so as to prevent inspection

Required members are:

RRH	Rear Roll Hoop
RHO	Roll Hoop Overhead
FBM	Front Bracing Members
LFS	Lower Frame Side Members
LDB	Lateral Diagonal Bracing
SIM	Side Impact Members
USM	Under Seat Member

### 8.1 Roll Cage Materials

The material used for the Roll Cage Members and bracing must meet one of the following requirements:

- Circular steel tubing with an outside diameter of 25 mm (1.0 in) and a wall thickness of 3 mm (0.120 in.) and a carbon content of at least 0.18%.
- A steel shape with bending stiffness and bending strength exceeding that of circular steel tubing with an outside diameter of 25 mm (1.0 in.) and a wall thickness of 3 mm (0.120 in.).

The wall thickness must be at least 1.57 mm (0.062 in.) and the carbon content must be at least 0.18%, regardless of material or section size. The bending stiffness and bending strength must be calculated about a neutral axis that gives the minimum values. Bending stiffness,  $k_b$ , is given by:

$$k_b = E \cdot I$$

Where: E - Modulus of elasticity (205 GPa for all steels)

I - Second moment of area for the structural cross-section.



Bending strength,  $S_b$ , is given by:

$$S_b = \frac{S_y \cdot I}{c}$$

Where:  $S_y$  - Yield strength (365 MPa for 1018 steel)

$c$  - Distance from the neutral axis to extreme fiber

Documentation of the equivalency must include:

- 1) Typed calculations to be presented at Technical Inspection which proves sufficient bending stiffness and bending strength. All calculations must be in SI units, to three significant figures to the nominal tube sizes as specified by the invoice. Teams shall show figures for 1018 steel and the substitute material.
- 2) Invoices of the roll cage materials.
- 3) Material tests or certifications, which specify the carbon content and yield strength.

## 9 Driver Clearance:

### 9.1 Lateral Space

Minimum space is based on clearances between the driver and a straight edge applied to any two points on the outside edge of the roll cage structure. The driver's helmet shall have 152 mm (6 in.) clearance, while the driver's shoulders, torso, hips, thighs, knees, calves, arms, elbows, and hands shall have 76 mm (3 in.) clearance. Clearances are relative to any and all drivers selected at technical inspection, seated in a normal driving position, and wearing all required equipment.

### 9.2 Vertical Space

The driver's helmet shall have 152 mm (6 in.) minimum clearance from any two points among those members that make up to top of the roll cage. These members are the RHO members (exclusive of any covering or padding); the RRH upper, LC; and the LC between points C (left and right). In an elevation (side) view, no part of the driver's body, shoes, and clothing may extend beyond the envelope of the roll cage.

## 10 Fuel System:

10.1 **Function:** All vehicles shall have a fuel system comprising of a fuel tank, fuel hose and fittings, and splash shields. The entire engine is considered to be part of the fuel system.

10.2 **Prohibited Additives:** The addition of nitrogen bearing additives, or additives designed to liberate oxygen is explicitly prohibited.

**Note: At the Event site fuel is available & hence outside fuel is restricted.**

10.3 **Location:** The entire fuel system, including carburetor, air cleaner cover, splash shield, and engine (excluding intake air hoses) must be located within the envelope of the vehicle's roll cage. The envelope shall be tested by means of a straight edge in contact with any two outer points of vehicle frame members. The fuel tank mountings must be designed to resist sustained vibration and shock.

10.4 **Fuel Tank:** One fuel tank is permitted on the vehicle. Fuel tanks shall be unmodified and free from injurious defects. All fuel tanks shall be remote mounted, and not affixed to the engine. Fuel tank mounting shall be fixed. Removable tanks are explicitly prohibited.

10.5 **Mounting:** Fuel tanks shall be mounted directly to a tube or tubes meeting the requirements of at least a secondary member. The tubes onto which the fuel tank mounts must be welded to the rest of the chassis frame. Cantilever mounting of fuel tanks to the vehicle frame is explicitly prohibited.

All four mounting holes on the fuel tank shall be used to mount the tank to the vehicle frame. Tabs used to join the fuel tank to the tubes of the vehicle frame shall be less than 50.8 mm (2.0 in) long, when measured along the tab from the center of the mounting hole to the outside of the attached frame member. No lightening holes or other cutouts are permitted on the frame fuel tank mounting tabs. All fasteners used to mount the fuel tank to the vehicle frame must meet the requirements of fasteners.

## 10.6 Fuel Lines and Filters:

10.6.1 **Location:** All fuel lines shall be located away from sharp edges, hot engine components and be protected from chafing or abrasion. Grommets are required where the lines pass through any member of the vehicle, a body panel, drip pan, etc. Fuel lines are prohibited in the cockpit.

10.6.2 **Rating:** All fuel lines shall be SAE rated fuel lines. The Briggs and Stratton fuel line is SAE J30R14 or 30R7-RP.  
All fuel lines shall be no larger than the stock fuel lines supplied with the engine.

10.6.3 **Dimensions:** Fuel lines must have 6.3 mm inner diameter and 12.7 mm outer diameter.

If a fuel filter is used, it must be a Briggs and Stratton stock filter.

10.6.4 **Fuel Sensors:** Fuel level gauges and sensors are allowed as long as the fuel tank is not modified. Fuel level gauges and sensors are allowed such that the capacity of the fuel system is not increased.

## 10.7 Splash Shields:

The purpose of a splash shield is to prevent fuel from being poured directly on the engine or exhaust while refueling the vehicle.

The splash shield shall be constructed of metallic material (greater than 0.5 mm). Shields must be generally rigid, shaped such that any spilled fuel runs towards the outside of the vehicle, and does not pool on the shield or anywhere on the vehicle.

Splash shields shall be mounted so they are engaged and effective at all times and are not adjustable.

No spill pan is required to be mounted for the competition.

The splash shield must be mounted lower than the structural member supporting the fuel tank.

If the fuel line passes through the splash shield, it must either pass through a grommet hole in the shield, the hole must be sealed to prevent spilled fuel from leaking to the engine.

**Note: For 20-Series B&S engines with fuel tank fixed on engine (default mounts), the vehicle must have a drip pan & splash shield as per following mentioned requirements below:**

## 10.8 Drip Pan Mounting:

Drip pans must be mounted using sound engineering practices. A drip pan mounting comprised only of fastening to the fuel tank filler neck is insufficient, and is not allowed. Drip pans must be graded or inclined such that all spilled fuel drains from the drip pan, fuel must not pool anywhere in the pan.

**10.8.1 Drip Pan Drain:** Fuel must drain from the drip pan through a drain line composed of pipe or tubing that carries fuel to the bottom of the vehicle and releases under the vehicle. Tubing shall be rated for fuel use, and shall have appropriate fuel rated markings.

Fuel may not be released onto the belly pan, flotation, or any other part of the vehicle. The drain line shall be mechanically fastened to the drip pan with a threaded connection or a hose barb and hose clamp, or a combination of the two. Adhesive connections are specifically prohibited. All materials in the drip pan system shall be rated for fuel or fuel resistant.

The nominal minimum inside diameter of the drain line is 12.7 mm and minimum inside diameter of fittings is 9.5mm.

**10.8.2 Drain Line Material:** Drains lines must be made of either fuel line material, or other pipe or tubing which is not weakened or dissolved by fuel. The drain line connection to the drip pan must be sealed. The cross section of the pipe shall not reduce throughout the length when compressed.

## 10.9 Splash Shields:

The splash shield can be prepared by two methods:

- a) Integrated Splash shield with Drip Pan. The flow must be towards a common drip pipe and there should be no logging of liquid.
- b) **Separate splash shield that covers the complete engine & exhaust area.** The splash shields shall be mounted such that they are effective at all times, and are not adjustable by the driver or team members. Splash shields shall be of resilient mounting and protect against fuel being poured on the hot surfaces of the engine. The splash shields must have a minimum of 3 in. vertical clearance from the exhaust finger guard and must always cover the entire exhaust area (when looked from top) . All sharp edges must be removed.

**Note:** Use of m-seal is strictly prohibited for both drip pan and splash shields.

## 9. Powertrain Guard

All powertrain components (CVTs, Gears, Sprockets, Belts and Chains) shall be shielded to prevent injury to the driver, track workers, or bystanders. Guards shall protect against hazardous release of energy should rotating components fail. Guards shall also protect against fingers, loose clothing, or other items from being entangled in the rotating components (pinch points). Universal joints, CV joints, hubs, rotors, wheels and bare sections of shafts are exempt from this requirement, and no need to be shield them.

Powertrain guards and shields must extend around the complete periphery of the rotating components (chains, gears, sprockets, belts, and CVT's) and have a width wider than the rotating part the guard is protecting.

Note: This means the entire periphery of the primary CVT pulley, not just the belt width.

All powertrain guards shall be constructed of the following required materials:

- Steel, at least 1.5 mm thick, meeting or exceeding the strength of AISI 1010 steel.
- Aluminum, at least 3.0 mm thick, meeting or exceeding the strength of 6061-T6 aluminum.

Holes and/or vents in the portion of the powertrain guard surrounding the rotating components are acceptable provided that in the event of a powertrain failure, no parts can escape. No direct path shall exist tangent to any rotating components.

Powertrain guards must be rigidly secured with sound engineering practices in order to resist vibration and shock.

Hence, holes or air vents made for using a CVT cooling system should have a diversion made of above-mentioned materials such that there exists no direct exit trajectory tangent to the rotating parts. Rather than periphery guard, component which rotate faster than the final drive shall be guarded on all sides.

- Guarding for pinch points shall prevent small, searching fingers from getting entrained in any rotating part.

- Flexible, non-rigid, fabrics are unacceptable for use as finger guards.
- Powertrain covers fastened with adhesive, ratcheting tie-downs, and other temporary methods are explicitly prohibited.

Any OEM, Factory Stock guard that are exempt from the requirements of this rule. But care should be taken that it complies with being completely protected including finger guards.

**Note:** Inboard Braking rotors should meet the rules of powertrain Guard & should prevent the unintentional contact of hands with the rotor.

## **10. Electrical System:**

An electrical system comprising of at least two engine kill switches, a brake light, two brake pressure switches, battery, and wiring is required. While designing and constructing this system proper engineering and electrical practices must be followed.

### **10.1 Battery Mounting:**

All batteries must be mounted with sound engineering practices, and not come loose at any point during the event. The terminals of the battery must be insulated and protected against a short electrical from each other.

### **10.2 Sealed Batteries:**

All batteries must be factory sealed and maintenance free. Batteries shall be incapable of being opened or serviced and not leak in the event of a collision or rollover.

### **10.3 Wiring and Connectors:**

All vehicle wiring and connectors shall be cleanly and neatly installed. Wiring should not pass close to sources of excessive heat, abrasion, chafing, and possible short circuit. Wiring must not get in the way of the driver, when entering/leaving the vehicle. All wiring must be shielded at all points, with electrical tape or heat shielding. No exposed wiring must be present on the vehicle.

## 10.4 Kill Switch:

Each vehicle must be equipped with two engine kill switches.

The vehicle shall be equipped with one or more of the following required switches:

- Polaris Part 4013381
- Ski-Doo Part 01-171 (<http://www.mfgsupply.com/01-171.html>)
- WPS 27-0152 (<http://www.parkeryamaha.com/skidoostopswitch.aspx>)
- WPS 27-0154(<http://www.parkeryamaha.com/skidoostopswitch.aspx>)

Note: Older versions of the approved switches are allowed.

## 10.5 Location:

### 10.5.1 Cockpit Switch:

The cockpit kill switch shall be mounted on the **Left side of the driver**, along the SIM, within reach of a driver that is properly secured in the vehicle.

### 10.5.2 External Switch:

One of the required kill switches must be located in such a way that easy to access by track marshals in emergency on the right side of the vehicle, aft of the plane of the RRH, and forward of the right FABUP. The external kill switch shall be generally perpendicular to the firewall ( $\pm 15$  deg), below frame point BR, and no further than 180 mm (7.0 inches), dimension "Z" in given figure, below frame point BR, and shall be mounted on a tab connected directly to the RRH. The external kill switch shall not be recessed more than 51 mm (2.0 inches) from the outside edge of the RRH tube.

#### 10.5.2.1 Mounting:

All engine kill switches must be mounted rigidly to the frame of the vehicle with clear unobstructed access for track marshals. They must not contain any sharp edges or be mounted in an unsafe manner using any kind of adhesives. Riveting the kill switches to the mounting tab is allowed.



### 10.5.3 **Brake Light:**

All vehicles are mandated to have a functioning brake light to indicate that the brakes have been applied. Only stock OEM brake lights are allowed with no modifications being permitted on them. The wiring of the brake lights should be such that they fully light upon application of the brake but are not operational when the brake pedal is released.

#### 10.5.3.1 **Mounting:**

The brake light must also be within the frame of the chassis. No part of the brake light should be outside the envelope of the frame.

The vehicle must be equipped with a red brake light that must be clearly visible and appear bright in daylight. The brake light must be mounted at a minimum of 1 meter (39.4 in) above the ground. Light must be mounted such that it shines parallel to the ground, not up at an angle. A person standing 10 meters from the brake light in a 90 degrees cone behind the car should be able to tell if the brake light is on without any difficulty in bright daylight.

**10.5 Brake Light Switch:** Only two hydraulic pressure switches installed in each independent brake hydraulic circuit must be able to activate the brake lights. For cutting brakes, brake light activation is done through a hydraulic pressure switch. Mechanical switches or push pull type switches are not allowed.

## 11. Vehicle Identification and Markings:

**11.1 Transponder:** All vehicles that would be participating in the dynamic event would need to have a transponder. The transponder must be properly mounted and functioning properly at all times during the dynamics.

**11.1.1 Required Transponder:** All vehicles must be equipped with at least one MYLAPS rechargeable transponder. The only acceptable transponder type is the X2 MX.

X2 MX transponders must have current (during the event) subscription for the event and must be checked and activated prior to attending the dynamic events. All teams are responsible for their own transponders. Visit <http://www.mylaps.com> for more information.

**11.1.2 Mounting:** All vehicle transponders shall be mounted in the proper location, correctly oriented, and using sufficient fastening methods.

**11.1.2.1 Orientation:** The transponder shall be installed vertical to the frame in the orientation shown in figure. The transponder shall also be oriented so the transponder number can read “right-side up.”

**11.1.2.2 Location:** The transponder shall be mounted on the right side of the vehicle, forward of the seat, and preferably within the lower horizontal plane of the front suspension. The transponder shall be no more than 61 cm (24 in) above ground level.

The transponder shall have an open, unobstructed path between the antenna on the bottom of the transponder and the ground.

The signal can be interrupted by metal and carbon fiber but can function normally through fiberglass and plastic.

**11.1.2.3 Fastening:** Each transponder is supplied with a mounting bracket. The vehicle is advised to contain a small plate welded to the frame at the correct location as specified above to attach the transponder mounting bracket. The bracket can be attached with rivets, cable ties or bolts although attaching the bracket with 4 mm pan head or flat head bolts with locknuts or lock wire is advised.

**Vehicle Numbers:** Vehicle numbers are used by officials and track marshals to identify the teams. Teams must design numbers to be visible in all race conditions or keep them clean and conspicuous. Numbers shall not be obscured by any other portion of the vehicle.

**Caution:** Numbers that are not easily read may be black flagged and might not be scored during the endurance event.

**11.2 Required Numbers:** There must be three primary numbers present in the car making it clearly visible from the front, left and right side of the vehicle. Use of adhesive to stick the numbers to the body panels is prohibited.

### **11.3 Location:**

**11.4.1 Side Numbers:** The side numbers must be located on both sides of the vehicle, positioned above the Side impact member and behind the plane of the Rear Roll Hoop.

**11.4.2 Front Numbers:** The plane containing the front number should be inclined less than 45 degrees with the vertical when it is above the side impact member and less than or equal to 15 degrees with the vertical when placed below the side impact member.

**11.4.3 Number Size:** Size suitable for viewing from a distance, generally greater than 152 mm in height and be in contrast with the background to ensure easy visibility. No sharp edges should be present anywhere.

**11.5 Sponsor Identification:** Teams are free to display any form of advertising or graphics, as long as it is in good taste and not in conflict with the event or the organizers. The Organizers reserve the right to ban a certain graphic if found in contempt.

## 12. Firewall:

All vehicles shall have a firewall separating the cockpit from the engine and fuel tank compartments. The firewall shall be constructed of metal, at least 0.50 mm (0.02 in.) thick. The firewall shall be mounted in the plane of the RRH and cover the area between the ALC and BLC. Multiple metal panels may be used to form the firewall, provided there are no gaps between the joints. Select cutouts are allowed for control cables, brake lines, electrical cables, and 4WD/AWD components, provided the cutouts have proper grommets and sealing to prevent fuel from leaking into the cockpit. Large cutouts in the firewall are explicitly prohibited. Large cutouts include those for CVT ventilation, and other similar items. Air intakes may not penetrate the firewall and must remain within the roll cage envelope. CVT ventilation intakes may extend outside the roll cage envelope. Engine air intakes may not extend outside the roll cage envelope.

**13. Body Panels:** The cockpit must be protected with body panels that completely cover the area between the LFS and the SIM. No gaps can exist that are larger than 6.35 mm (0.25 in) and will be checked with a 6.35 mm (0.25 in dowel rod). These panels must be made of puncture resistant material, including: plastic, fiberglass, metal, or similar material .They must be designed to prevent debris and foreign particles intrusion into the Cockpit. The panels must be mounted securely to the frame using sound engineering practices (cable ties or hook-and-loop fastening is not acceptable).

- 14. Belly Pan:** The entire length of the cockpit must be fitted with a belly pan, so that no debris may enter the cockpit while seated normally. Material must be metal, fiberglass, plastic, or similar material. Expanded metal, fabric, or perforated panels are not allowed.

**Note:** Belly pan should withstand the load of the driver at all conditions.

- 14.1 Leg and foot shielding:** All steering or suspension links exposed in the cockpit shall be shielded with a sturdy, robust, metal cover.

The shielding must prevent the driver's legs and feet from coming in contact, becoming entangled, or struck by during operation or a failure. Universal joints in the steering system near the driver's feet must be shielded or sealed such that the driver may not become entangled in the joint.

**15. Fire Extinguisher:** All teams must carry two functional fire extinguishers. One fire extinguisher must be installed on the vehicle, and the remaining extinguishers shall be kept in pit area all the time. All team members shall be familiar with the use and operation of fire extinguishers.

**15.1 Mounting and Location:** The fire extinguisher mounting bracket shall be mounted in the plane of the vehicle's RRH. The fire extinguisher mounting bracket shall be affixed to the RRH via steel tabs with a minimum thickness of 3 mm (0.125 in.) thick.

The fire extinguisher shall be positioned on the right side of the driver, within the cockpit such that the fire extinguisher is below the driver's head, and the top half of the fire extinguisher is above the SIM. The fire extinguisher shall be easily accessible by track marshals.

The pull knob of the required bracket shall be easily actuated. To facilitate this, a minimum radial clearance around the pull knob of 64 mm (2.5 in.) is required. It is understood the area aft of the pull knob will be less than 64 mm (2.5 in.) due to the design of the bracket.

The fire extinguisher shall be affixed to the mount via hose clamps. The hose clamp adjusters shall be installed as not to interfere with the operation of the pull-knob on the Drake bracket. The hose clamp adjusters and protruding material shall be installed as not to snag on the clothing of a driver during egress.

**Note:** Radial clearance is the unoccupied space between the edge of the pull knob and the nearest obstruction. The measurement is not made to the center of the pull knob.

**15.2 Rating and Required Features:** All fire extinguishers for use on the vehicle shall have a minimum UL rating of 5BC. The dial pressure gauge shall be readily visible and indicate the unit has been properly charged. Each fire extinguisher shall be labelled with team and college name and vehicle number.

## 16. Fasteners:

Fasteners used for securing are following as:

- 1.) Driver harness
- 2.) Fuel System
- 3.) Fire Extinguisher
- 4.) Engine Kill Switch
- 5.) Steering, Braking and Suspension System
- 6.) Battery and Powertrain mount

Fasteners must meet the following criteria:

- 1.) Grade – The fasteners should meet or exceed the strength grades of either of SAE Grade 5/ Metric Grade 8.8 / AN/MS Specification.
- 2.) Captive - By using Nylon locknuts, cotter pins, safety wire. Thread sealants will not be considered captive.
- 3.) Thread projection – The threaded fasteners on which locknuts are used shall have at least two threads projecting past the end of the nut.
- 4.) Modification - Custom or unmarked fasteners are prohibited. Any modifications except for drilling holes for safety wire or shortening threads is prohibited.

**17. Tow Points:** At front and rear vehicle must have towing hitch points, along its longitudinal centerline. These hitch points are used both for dynamic events and for vehicle recovery. Tow points must be attached to the vehicle frame and must allow for transmission of both longitudinal and lateral towing loads. Towing loads will be imparted to the tow point by way of hook or clevis. Tow points shall have sufficient strength to serve as a vertical lift point for the vehicle.

**17.1 Front Tow Point:** Front tow points shall be constructed of tubular steel, not to exceed 31.75 mm (1.25 in.) and not less than 25.4 mm (1.0 in.) in diameter. Tubing thickness shall not be less than 0.89 mm (0.035 in.).

Front tow points shall be mounted no higher than the vehicle's SIM and not below the vehicle's LFS.

The front tow point shall be able to freely pass a gauge measuring 50.8 mm tall, 50.8 mm deep, and 203.2 mm wide (2.0 in. x 2.0 in. x 8.0 in.) behind the front tow point tube. Tow point may not interfere the front numbers.

**Note:** Front or Rear Bumper can't be considered as hitch point. If tubes are being used, they must be made of primary members. In addition, there must be lateral constraints for the hook or clevis to be properly in place

which is optimum for the effective transmission of vehicle loads while lifting. Note that a bumper must be a FIXED one and not removable part and should be present from GO-NO-GO till end of the event.

**17.2 Rear Tow Point:** Rear tow points shall be constructed from steel and meet the following requirements. Rear Hitch Plate may be directly welded to the frame and latch type hitch point both are acceptable.

**Table: Tow Points and Dimensions**

Dimension	Symbol	Minimum	Maximum
Tab Thickness	None	8 mm (0.31 in.)	9.5mm (0.375 in.)
Hole Diameter	D	25.4 mm (1.0 in.)	31.75 mm (1.25 in.)
Hole-to-Tube Offset	X	19.0 mm (0.75 in.)	25.4 mm (1.0 in.)
Edge Distance	R	15.9 mm (0.625 in.)	25.4 mm (1.0 in.)
Width at frame connection	Y	76.2 mm (3.0 in.)	Unrestricted
Material	None	Steel 1080	



## 18. Scoring

Event	North	South
	<b>Static Events</b>	
<b>Design Evaluation</b>	<b>150</b>	<b>150</b>
<b>Cost Report</b>	<b>75</b>	<b>75</b>
<b>Business Plan</b>	<b>75</b>	<b>75</b>
<b>Total</b>	<b>300</b>	<b>300</b>
	<b>Dynamic Events</b>	
<b>Acceleration</b>	<b>50</b>	<b>50</b>
<b>Sledge Pull</b>	<b>50</b>	<b>50</b>
<b>Maneuverability</b>	<b>100</b>	<b>100</b>
<b>Suspension and Traction</b>	<b>100</b>	<b>100</b>
<b>Endurance</b>	<b>400</b>	<b>400</b>
<b>Total</b>	<b>700</b>	<b>700</b>
<b>Total Score = Static + Dynamic=1000</b>		

## 19. Technical Evaluation

All ATVC vehicles must pass a technical inspection before they are permitted to operate under power.

The evaluation will determine if the vehicle satisfies the requirements and restrictions of the ATVC 2022 rules.

If vehicles are not ready for technical evaluation when they arrive at the inspection site, they will be sent away.

Any vehicle may be re-inspected at any time during the competition and correction of any non-compliance will be required.

### 19.1 Engine inspection and governor setting- Governor Setting Check

Briggs & Stratton Technical Representatives will set the governors of all vehicles. Each vehicle engine will be confirmed by Briggs and Stratton technical staff that will:

- (1) Confirm whether it's comes under the specifications mentioned above and
- (2) Set the governor to the specified rpm. (3800)

### 19.2 Technical Safety Scrutiny -

Each vehicle will be inspected to determine if it complies with the requirements and restrictions of the **ATVC 2022** rules. This inspection will include an examination of the driver's equipment including helmet and arm restraints, a test of driver exit time and to ensure that all drivers meet the requirements of the rules. Each team must bring the following items to inspection.

**19.2.1 Frame Material Documentation:** Receipts documenting the materials purchased, or otherwise acquired, and used to build the frame. Note that material certificate from supplier as well as certificate of **MATERIAL COMPOSITION & MECHANICAL PROPERTIES CONFIRMATORY TEST AT AUTHORIZED LABORATORY ARE MANDATORY**. Roll cage tube material suppliers test report and Local Test Reports need to be submitted.

**19.2.2 Roll Cage Specification Sheet:** A completed copy of the Roll Cage Specification Sheet. In case of higher grade of Steel is used then the

supportive calculations should prove that cross-section is adequate and bending stiffness & strength is achieved.

**19.2.3 Technical Inspection check sheet:** At college level, **Technical Inspection check sheet** compliance is expected and the same should be submitted while technical evaluation is being done.

**19.2.4. Drivers Present:** All drivers must be present at technical inspection with a valid license and complete safety gears.

The safety scrutiny will also check for electrical systems, kill switch, lighting, reverse lamp, Buzzer (if installed), horn, wiring and their mountings etc. Both the external and cockpit kill switches will be tested for functionality. The system should pass the test.

## 20. Brake Test:

The objective of this test is to ensure the vehicle is safe for driving, while it goes up to its maximum speed. The test demands to attain the vehicle completes the patch of 30m in maximum time of 8sec and should be capable to stop with all four wheels locked within the distance of 10 ft. Every team should demonstrate that all four-wheel brakes are effective for high-speed braking. Each vehicle must come to rest in an approximately straight line after acceleration run specified by the inspectors. If a vehicle fails to pass any part of the inspection, it must be corrected/modified and brought into compliance with the rules before it is permitted to operate.

## 21. Design Evaluation:

21.1.1 The objective of the engineering design event is to evaluate the engineering effort that went into the design of the vehicle and how the engineering meets the intent of the market. Students will be judged on the creation of design specifications and the ability to meet those specifications, computer aided drafting, analysis, testing and development, manufacturability, serviceability, system integration and how the vehicle works together as a whole. Each of these parts of the engineering product development cycle will be judged within the following subsystems: Suspension, Steering, Brakes, Drive-train/Power-train, Chassis and Ergonomics.

21.1.2 The vehicle that illustrates the best use of engineering to meet the design goals and the best understanding of the design by the team members will win the design event.

21.1.3 The engineering design evaluation will be conducted online via any linking platform which will be intimated on our website [www.atvcofficial.in](http://www.atvcofficial.in)

21.1.4 The engineering design evaluation consists of two parts: Design Evaluation and an un-scored Design Report that will be used as a part of the design evaluation.

### 21.2 Design Report - Required Submission

21.2.1 Design Report - The design evaluation judging will start with the submission, before the event, of a Design Report. The Design Report will be reviewed by the design judges who will ultimately judge the team and vehicle at off-site Design Evaluation.

21.2.2 The Design Report should contain a brief description of the vehicle with a review of your team's design objectives, vehicle concepts, and a discussion of any important design features. Note or describe the application of analysis and testing techniques (FEA, part/system/vehicle testing, etc.). Evidence of this analysis and back-up data should be brought to the competition and should be made available, on request, for review by the judges.

A video of the vehicle along with each part used should be sent with the report. In case the vehicle is not fabricated by the time of off-site evaluation the team needs to present the engineering design of the vehicle along with the list of parts used and their invoice of purchase.

21.2.3 The Design Report will be used by the judges to sort teams into the appropriate design groups based on the quality of their review.

**Note:** While the Design Report is not explicitly scored, it may be considered to be the “resume of your car”, preparing your off-site Design Evaluation judges to view your design effort in its most positive light. Failure to convincingly point out your design success in the Design Report will almost certainly lead to Failure of your design judges to be impressed by your success.

### **21.3 Design Report - Vehicle Drawings**

The Design Report must include one set of three (3) view drawings showing the vehicle, from the front, top, and side. The design needs to be computer generated.

### **21.4 Changes in Design with respect to initial design**

Any changes made in the final design of the vehicle, as compared to initial design at the time of first design submission, needs to be documented with justification and presented at the event site failing which the team and machine will face penalty.

### **21.5 CAE Report - Required Submission**

21.5.1 CAE Report - The CAE evaluation judging will start with the submission, before the event, of a CAE Report. The CAE Report will be reviewed by the CAE design judges who will ultimately judge the team and vehicle at on-site Design Evaluation.

21.5.2 The CAE Report may include (but not limited to) the following analysis: Roll Cage (Meshing + Analysis + Justification), Static Analysis on Roll Cage, Dynamic Analysis on Roll Cage, Torsional Rigidity and Bending Stiffness Calculation on Roll Cage, Computational Fluid Dynamics Analysis (CFD), Multi-Body Dynamics Analysis (MBD), Thermal Analysis, Calculation and Analysis of Components which are fabricated by team & Fatigue Analysis.

Teams are advised to indicate input parameters, boundary conditions, simulation methods, simulation results and conclusions drawn from the simulations for all the different analysis included in the CAE Report. Evidence of this analysis and back-up data should be brought to the competition and should be made available, on request, for review by the judges. Teams are advised to use dedicated CAE software for carrying out analysis.

## 21.6 Format for Document Submission

### 21.6.1 Design Report

The Design Report must be submitted electronically in Adobe Acrobat Format (PDF). The document must be a single file (text, drawings and optional content are all inclusive).

The design report file must be named as follows:

Vehicle #\_institution name (full name) \_competition\_DesignReport.pdf

*EXAMPLE:* Vehicle # 001\_XYZ University\_ATVC 2022\_DesignReport.pdf.

The maximum size for the file is 25 megabytes and if the video file exceeds the limit, share on google drive.

### 21.6.2 Design Spec Sheet

Design Spec Sheets must be submitted electronically in Microsoft Excel<sup>®</sup> Format (\*.xlsx file). The format of the Spec Sheet **MUST NOT** be altered.

Similar to the Design Report, the Design Spec Sheet file must be named as follows: Vehicle #\_institution name (full name) \_competition\_specs.

*EXAMPLE:* Vehicle # 001\_XYZ University ATVC 2022\_specs.xlsx.

### 21.6.3 CAE Report

The CAE Report must be submitted electronically in Adobe Acrobat Format (PDF). The document must be a single file (text, drawings and optional content are all inclusive). The design report file must be named as follows:

Vehicle #\_institution name (full name) \_competition\_CAEReport. *EXAMPLE:*

Vehicle # 001\_XYZ University\_Baja ATVC 2022\_CAEReport.pdf. The maximum size for the file is 5 megabytes.

**WARNING:** Failure to exactly follow the above submission requirements may result in exclusion from the Design Event. If your file is not submitted in the required format or is not properly named then it cannot be made available to the design judges and your team will be excluded from the Design Event.

## 21.7 Document Submission Deadline

21.7.1 The Engineering Design event documents must be submitted online on or before the submission deadline. Failure to do so will lead to the team's disqualification from the design event. The deadline for the design event document submission and the submission procedure will be announced on ATVC website. Teams are advised to check the website on a regular basis to keep themselves updated regarding submission deadlines. Design Report submission will be acknowledged either on the competition website or by email. Teams should have a printed copy of this acknowledgement available at the competition as proof of submission in the event of discrepancy.

**Note:** It is the responsibility of the team to verify when the report was received by organizers; submission time will be the time the report is received by organizers.

## 21.8 Online Evaluation.

The design judges will evaluate the engineering effort based upon the team's Design Report, their responses to the judges' questions, and an inspection of the video of the vehicle.

## 21.9 Support Material for onsite evaluation

**Teams are required to bring three (3) color copies of the submitted design documents to the Design Evaluation event on-site.** Failure to bring the hard copies of the design documents at the Design Evaluation may result in disqualification from the design evaluation. Teams may also bring with them to Design Evaluation any photographs, drawings, plans, charts, posters, and binders, example components, or other materials that they believe, are needed to support the presentation of the vehicle and the discussion of their development process. Use of laptop or notebook computers might be allowed to support any additional information which teams may like to give. Use of projectors is not permitted.

At the time of off-site evaluation, if the team wants to present additional data, they have to take prior permission from the judges and present it in form of pdf file.



## 22: COST EVENT-75 Points

22.1 Cost Event consists of two related sections: Cost Report and Prototype Cost. The cost report provides all the background information to verify the vehicle's actual cost. The prototype cost is the actual cost and the points related thereto.

### 22.2 Cost Report (Required Submission)

The Cost Report may contain a maximum of three sections:

#### 22.2.1 Report Section 1 - Overview (Optional)

The optional overview is intended to give each team the opportunity to point out, and briefly comment on, any design features or fabrication processes that are innovative or are expected to result in significant cost savings. Teams may also use the overview to explain items or processes that might appear to be discrepancies within the report. The overview section is limited to a maximum of four (4) pages and is optional. This should be included as part of the Cost Documentation (.pdf) file.

#### 22.2.2 Report Section 2 - Costing Sheets

The core of the report is the series of costing sheets. This section must contain the one-page summary sheet broken up into the individual subsystems. Each subsystem needs an individual sub-assembly sheet (Form A). Note that Vehicle Assembly Labor cost is for the labor it takes to assemble a subassembly to the frame. All fabricated parts on the sub-assemblies sheets (Form A) require a Form B. Note that the sub-system assembly time is the time it takes to assemble all the parts in that assembly together.

#### 22.2.3 Report Section 3 - Cost Documentation

This section includes copies of receipts, invoices, price tags, catalog pages, on-line prices, or other documentation, to substantiate the costs of the parts and materials of any item costing more than Rs.200. Cost documentation must be at full retail Indian prices. The use of foreign receipts, purchases from discount sites such as Craig's List, eBay or junk yards are not allowed. The report is expected to be comprehensive, well documented, truthful and accurate.

### 22.2.4 Cost Component Categories

Teams must put items that are specified in the correct component categories and sub categories or the items will not be considered. See Cost Template for more details on component categories.

22.2.5 Cost Event guidelines can be found at [www.atvcofficial.in](http://www.atvcofficial.in) in the login section.

### 22.2.5 Cost Report – Submission Format

1. The Microsoft Excel format (with the extension .xls (no macros) or .xlsx), using the supplied template posted on the ATVC website.

**This document should not be modified from its current form. This includes password protecting and embedding macros. Teams will receive zero (0) points for Cost if the report is in the incorrect format or the files have been modified.**

2. A PDF file with all of the cost documentation described above (C 4.2.1 to C 4.2.3). The cost report file must be named as follows: Vehicle #\_school name (full name) \_competition\_ Cost Report. For example: Vehicle # 001\_XYZ University\_ATVC2022\_CostReport.

### 22.2.6 Cost Report Submission Deadline

The Cost Report for ATVC 2022 must be submitted online. The deadline for the cost report and the submission procedure will be announced on [www.atvcofficial.in](http://www.atvcofficial.in). Teams are advised to check the website on a regular basis to keep themselves updated regarding submission deadlines. In case of failure to submit on time the teams will not be awarded marks for the same. Cost Report submission will be acknowledged either on the competition website or by email. Teams should have a printed copy of this acknowledgement available at the competition as proof of submission.

**Note:** It is the responsibility of the team to verify when the report was received by organizers; submission time will be the time the report is received by organizers. Teams will be cost audited at the virtual cost event or offsite competition.

### 22.2.7 Cost Correction

The judges may increase costs and/or fabrication times if they believe that the figures submitted are below current prices for the item, source, or process involved. Prices or times that are higher than the judge expects will not be corrected. Mathematical errors will be penalized. Reports that are highly inaccurate, highly incomplete, or in which the costs cannot be substantiated, may be rejected in their entirety and scored accordingly. Teams are required to produce a video of the vehicle at the off-site cost judging by their scheduled appointment time. Failure to report by the scheduled appointment time will result in an automatic zero for the event. If teams need to reschedule their appointment, it must be done prior to the start of the cost event evaluation.

### 22.3 Static Evaluation (Online)

22.3.1 The cost evaluation judges will evaluate the team's total cost, adjustments made, and effort taken to optimize the cost of the vehicle using appropriate pricing for various components of the vehicle.

22.3.2 Cost report hard copy

Teams must bring a hard copy of their cost report to the cost judges on-site. **Teams that fail to bring a hard copy at the event, will receive zero (0) score for their cost evaluation.**

### 22.3.3 Cost Eligibility

Upon review of the data, the cost evaluation judge reserves the right to disqualify cost reports that have not been sufficiently validated (i.e., either through lack of documentation or outdated receipts), are determined to not be complete based on review, or are outside a reasonable level of cost based on the other cars in the competition (i.e., either too high or too low).

## **23. BUSINESS PLAN EVENT – 50 Points**

### **23.1 Presentation - Objective**

The objective of the Presentation is for the team to convince the “executives” of a hypothetical manufacturing company to purchase the team’s ATVC vehicle design and put it into production at the rate of 2000 units per year.

23.1.1 For the presentation, teams are to assume that the judges are following 2 set of people –

Group 1 - Perspective Buyers

Group 2 - Investors (who need to be convinced that factory set up by the teams will make profit)

### **23.2 Presentation - Format**

23.2.1 Up to 3 members from a team are allowed to make the presentation to the judges.

#### **23.2.2 Total time for presentation**

Presentation: 10 minutes

Q&A: 15 minutes

23.2.3 Only the judges are permitted to ask questions. Any team member on the presentation floor/stage may answer the questions.

23.2.4 The Sales presentation guidelines and template can be found at website ATVC login panel.

### **23.3 Static Event**

23.3.1 Teams are required to keep their presentation ready at the time of offsite evaluation on their desktop.

### **23.4 Presentation - Scoring**

23.4.1 The presentation event will be scored based on the following five categories

- (1) Presentation Content including company financials and break even analysis.
- (2) Presentation organization, effectiveness & team's response to Judges' questions.
- (3) USP coverage – Market research, analysis, SWOT.
- (4) Marketing Strategy.
- (5) Project Schedule – Time Lines, Project Execution, Capital, Materials.

23.4.2 The team that makes the best presentation will receive the highest score regardless of the finished quality of their actual vehicle.

## 24: DYNAMIC EVENTS – 700 POINTS

The dynamic events are intended to determine how the ATVC vehicles perform under a variety of conditions. Note that the organizers may modify the dynamic events to address local conditions, weather or resources. Organizers may or may not provide a practice track to teams. A practice track allows teams to test or tune their vehicle within the limits of the rules. If the organizer provides a practice track, the course length and features are at the organizer’s discretion.

### 24.1 Scoring

Event	North	South
<b>Static Events</b>		
<b>Design Evaluation</b>	<b>150</b>	<b>150</b>
<b>Cost Report</b>	<b>75</b>	<b>75</b>
<b>Business Plan</b>	<b>75</b>	<b>75</b>
<b>Total</b>	<b>300</b>	<b>300</b>
<b>Dynamic Events</b>		
<b>Acceleration</b>	<b>50</b>	<b>50</b>
<b>Sledge Pull</b>	<b>50</b>	<b>50</b>
<b>Maneuverability</b>	<b>100</b>	<b>100</b>
<b>Suspension and Traction</b>	<b>100</b>	<b>100</b>
<b>Endurance</b>	<b>400</b>	<b>400</b>
<b>Total</b>	<b>700</b>	<b>700</b>
<b>Total Score = Static + Dynamic=1000</b>		

## **24.2 - PRACTICE**

### **24.2.1 - Objective**

Organizers may or may not provide a practice track to teams. A practice track allows teams to test or tune their vehicle within the limits of the rules.

### **24.2.2 - Course**

If the organizer provides a practice track, the course length and features are at the organizer's discretion.

### **24.2.3 - Procedure**

After a safety check, vehicles are signaled to enter the practice track. After a predetermined time set by the track worker, the vehicle is signaled to exit the practice track.

### **24.2.4 - Penalties**

Teams may be signaled to exit the practice track or barred from using the practice track if the track worker or competition officials observe unsafe conditions or behaviors.

### **24.2.5 - Signals and Signage**

See D.8.9 - Signals and Signage.

### **24.2.6 - Scoring**

There is no score awarded for practice.

## 25 - ACCELERATION

### 25.1 - Objective

The Acceleration Event is designed to measure each vehicle's ability to come up to speed quickly from a standing start.

### 25.2 - Course

Acceleration is measured as the time to complete a 30.48 m (100 ft.) flat, straight course from a standing start. The course surface may vary from pavement to loose dirt. The choice of course length and surface is at the organizer's discretion.

### 25.3 - Procedure

After a safety check, vehicles are positioned at the start line of the course. The track worker will check that the driver is ready to begin. Once the driver is ready, the track worker will signal the driver to proceed down the course. After completing the run on the course, the vehicle will be directed to the course exit. Each vehicle may make two (2) runs on the course.

### 25.4 - Penalties

- Stall At Start – Run DQ
- False Start – Run DQ
- Driving off Course – Run DQ

The organizer may modify the penalties imposed for different violations to account for differences in the length or design of specific event courses.

### 25.5 - Scoring

The maximum number of available points for the traction event is 50 points. Scoring will be based on the better of the two attempts. Timing will be performed with an electronic timing system.

### 25.6 – FORMULA

$$S_{ac} = 50 X \frac{T_{max} - T_{run}}{T_{max} - T_{min}}$$



## 26 SLEDGE-PULL

### 26.1 - Objective

This event tests the vehicle's relative ability to pull designated object, e.g. progressive weight skid, vehicle, or chain along a flat surface.

### 26.2 - Course

The sledge- pull event may take place on a straight or curved course. The organizer will determine the object to be pulled.

### 26.3 - Procedure

After a safety check, vehicles are positioned at the start line of the course. The track worker will check that the driver is ready to begin. Once the driver is ready, the track worker will signal the driver to proceed down the course. After completing the run on the course, the vehicle will be directed to the course exit.

Vehicles may not continue the attempt after they have stopped on the course.

### 26.4 - Penalties

Driving Off Course – Score as maximum progress at point of exiting the course.

### 26.5 - Scoring

The maximum number of available points for the traction event is 50 points. Scoring will be based on the better of the two attempts. If a vehicle cannot complete the course and get a time, it will be scored on the distance that it travels before stopping. Once the vehicle stops moving forward the attempt is over and the attempt is scored for distance at that point.

#### 26.6.1 - Method 1 (Different Distances)

If none of the vehicles are able to complete the course, then: The following equation will be used for the traction score ( $S_{tr}$ ):

$$S_{tr} = 50 \times \frac{D_{run} - D_{min}}{D_{max} - D_{min}}$$

Where:  $D_{min}$  is the shortest distance by any vehicle  $D_{run}$  is the distance traveled for the vehicle to be scored.  $D_{max}$  is the longest distance by any vehicle.

### 26.6.2 - Method 2 (Fixed Distance, All Succeed)

If there is (a) a set maximum distance and (b) all teams succeed in completing a full distance hill or pull, then the score will be based on the time for the full distance.

The following equation will be used for the traction score (Str):

$$S_{tr} = 50 X \frac{T_{max} - T_{run}}{T_{max} - T_{min}}$$

Where:  $T_{min}$  is the lowest (fastest) time by any vehicle  $T_{run}$  is the time recorded for a vehicle's run to be scored.  $T_{max}$  is the minimum of the following:

- The longest (slowest) time by any vehicle, or
- 2.5 times  $T_{min}$

### 26.6.3 - Method 3 (Fixed Distance, Some Succeed)

If there is (a) a set maximum distance and (b) at least one team climbs the hill or makes a full pull and others do not, then the vehicles going the full distance (Group I) will be scored based on time and the vehicles that fail to climb the hill or make a full pull (Group II) will be scored based on distance.

#### Group 1

Where:  $T_{min}$  is the lowest (fastest) time by any vehicle  $T_{run}$  is the time recorded for a vehicle's run to be scored.

$$S_{tr1} = 50 X \frac{T_{max}}{T_{run}}$$

#### Group 2

$$S_{tr2} = (S_{tr1}) X D_{run}$$

Where:  $D_{run}$  is the distance recorded for a vehicle to be scored.  $D_{course}$  is full length of the course to be run by the vehicle.

## 27 MANOEUVRABILITY

### 27.1 - Objective

Maneuverability is designed to assess each vehicle's agility and handling ability over off-road terrain. Teams will attempt to maneuver through the course with a minimum time.

### 27.2 - Course

The course may consist of a variety of challenges at the organizer's option, possibly including tight turns, pylon maneuvers, ruts, bumps, drop-offs, sand, rocks, gullies, logs, and inclines.

### 27.3 - Procedure

After a safety check, vehicles are positioned at the start line of the course. The track worker will check that the driver is ready to begin. Once the driver is ready, the track worker will signal the driver to proceed down the course. After completing the run on the course, the vehicle will be directed to the course exit.

Each vehicle may make two (2) attempts at the course.

### 27.4 - Penalties

The organizer will select penalty types imposed for different violations to account for differences in the length or design of specific event courses. Penalties are times added to the total time a vehicle took to complete the course for a given run. The organizer will announce penalties on their event website or at a mandatory team meeting.

## 27.8 - Scoring

The maximum number of available points for the maneuverability event is 100 points.

Scoring will be based on the best of the two attempts. Only vehicles that complete the maneuverability course within a time not exceeding 2.5 times that of the fastest vehicle will receive a score. If a vehicle is on the course for a time that exceeds 2.5 times the fastest time recorded to that point, then the attempt may be declared over and the vehicle may be removed from the course and scored as “Excess Time.”

Maneuverability scoring is based on the vehicle’s time to complete the course. Penalties are added to the vehicle’s time for a given run.

The following equation will be used for the maneuverability score ( $S_{ma}$ ):

$$S_{ma} = 100 X \frac{T_{max} - T_{run}}{T_{max} - T_{min}}$$

Where:  $T_{min}$  is the lowest (fastest) time by any vehicle  $T_{run}$  is the time recorded for a vehicle’s run to be scored.  $T_{max}$  is the minimum of the following:

- The longest (slowest) time by any vehicle or 2.5 times  $T_{min}$

## **28– SUSPENSION AND TRACTION EVENTS**

Suspension and traction events are designed to test the vehicle under unique off-road conditions that might be unique or specific to a particular ATVC India competition site.

### **28.1 - Objective**

Suspension events may require the vehicle to complete a course in a minimum time

### **28.2 - Procedure**

After a safety check, vehicles are positioned at the start line of the course. The track worker will check that the driver is ready to begin. Once the driver is ready, the track worker will signal the driver to proceed down the course. After completing the run on the course, the vehicle will be directed to the course exit.

Each vehicle may make two (2) attempts at the course.

### **28.3 - Penalties**

The organizer will select penalty types imposed for different violations to account for differences in the length or design of specific event courses. Penalties are times added to the total time a vehicle took to complete the course for a given run. The organizer will announce penalties on their event website or at a mandatory team meeting.

## 28.4 - Scoring

The scoring system and penalties employed by the event head must adhere to one of the options defined for either (a) the Maneuverability event, or (b) the Traction event. The maximum number of available points for the specialty event is 100 points. Scoring will be based on the best of the two attempts. Only vehicles that complete the S&T course within a time not exceeding 2.5 times that of the fastest vehicle will receive a score. If a vehicle is on the course for a time that exceeds 2.5 times the fastest time recorded to that point, then the attempt may be declared over and the vehicle may be removed from the course and scored as “Excess Time.”

S&T scoring is based on the vehicle’s time to complete the course. Penalties are added to the vehicle’s time for a given run.

The following equation will be used for the S&T score ( $S_{ma}$ ):

$$S_{ma} = 100 \times \frac{T_{min} - T_{run}}{T_{max} - T_{min}}$$

Where:  $T_{min}$  is the lowest (fastest) time by any vehicle  $T_{run}$  is the time recorded for a vehicle’s run to be scored.  $T_{max}$  is the minimum of the following:

- The longest (slowest) time by any vehicle or 2.5 times  $T_{min}$

## **29 - ENDURANCE**

### **29.1 - Objective**

The endurance event assesses each vehicle's ability to operate continuously and at speed over rough terrain with obstacles in potentially adverse weather conditions (rain, snow, etc.). The endurance event may be run for time or for distance. The default is four (4) hours and the vehicle with the most laps (orbits) around the course is declared the winner.

### **29.2 - Course**

The endurance course is a closed loop measuring approximately 1.5 km to 4.5 km. The endurance course may feature different surfaces (e.g. dirt, grass, sand, mud, gravel, stone, and asphalt). The endurance course will feature various obstacles and terrain to test the vehicle's durability, traction, and speed.

### **29.3 - Procedure**

#### **29.3.1 - Pre-Gridding**

Teams will pre-grid before the endurance event and be placed into starting position based on each team's acceleration timings, to be determined by the organizer. Pre-gridding will close at a pre-determined time by the organizer. Teams late to pre-grid will be gathered in the pit exit lane and released to the track after the race has started.

### **29.3.2 - Compliance Check**

During pre-gridding, or after pre-gridding closes, vehicle engines will be started and the Technical Inspector will perform a compliance check. During compliance check and gridding, the driver and vehicle may only have one team member accompany them. The compliance check includes, but is not limited to inspection of the following:

- Helmet Certification
- Helmet Fitment and Securement
- Safety Harness
- Driver Equipment
- Driver Wrist Band
- Fire Extinguisher
- Engine Kill Switches
- Brake System

Unprepared drivers or out-of-compliance vehicles deemed unsafe or not ready to drive will be ordered out of the gridding line by Technical Inspectors and sent to the paddocks to make corrections. Vehicles not ready to drive must check in at the pit exit lane to be admitted to the track.

### **29.3.3 - Gridding**

Once the compliance check is complete, vehicles begin to form the grid and approach the start line as marshalled by track workers or Technical Inspectors.

### **29.3.4 - Starting**

The endurance event may be started by a funnel start, standing staggered start or rolling start. A funnel start is when cars are arranged in a conical formation and released all at once. A standing staggered start is used to release cars in groups of two with a delay in between groups. A rolling start allows a run-in distance to the start line. The rolling start may be performed on the course. The start type will be determined by the organizer.

All vehicles will be considered to have begun the race simultaneously at the time when the starter releases the first vehicle onto the course regardless of their actual position in the grid.



### **29.3.5 - Running**

Endurance will be run as either:

- A single four (4) hour race
- A predetermined and published distance
- Elimination heats followed by a final in which the total time of one elimination heat plus the final is 4 hours. The organizer will announce the structure of the event prior to the start.

Vehicles will safely navigate the course and accrue laps (orbits) to be counted and scored.

### **29.3.6 - Driver Change**

Vehicle drivers may be changed at any time. Driver changes occur in the teams own pits.

The organizer reserves the right to require at least one driver change during the endurance event.

### **29.3.7 - Refueling**

#### **29.3.7.1 - Location**

The Fueling Zone (FZ) consists of the Fueling Area (FA), Fuel Quarantine Area (FQ), Crew Area (CA) and Harness Check Area (HC).

Only three (3) people from any given team, including drivers, are allowed within the Fueling Zone (FZ) at any one time.

Active refueling occurs in the FA. All stored fuel not in use is located in the FQ. Vehicles and drivers will proceed to the HC before returning to the track.

### **29.3.7.2 - Procedure**

Vehicles requiring fuel will exit the track at the designated location and proceed at walking-speed to the fuelling area.

Before refueling, the vehicle must be stopped, the engine shut off, and the driver completely out of the vehicle. The driver may not be tethered in any way, by harness, communications equipment, or clothing.

Before refueling, a team's pit crew member must have a fire extinguisher ready and pointed at the fuel transfer point on the vehicle. The exiting driver is the only team member permitted to remove the fuel tank cap.

A team refueling their vehicle before the driver is clear of the vehicle or who fail to have a fire extinguisher present and pointed at the fuel transfer point will be penalized.

The fueling area is to be clear of anyone not immediately servicing a car.

A fire extinguisher must be present and pointed at ANY transfer of fuel, including re-filling a smaller container from a larger one when a vehicle is not present.

### **29.3.7.3 - Driving in the Fuel Area**

All cars must operate at a walking speed while in the Fueling Area and when entering/exiting the area. Any team found speeding in the fueling area will be assessed a penalty.

Cars may not be pushed into the Fueling Area (FA) without a driver being present and prepared to drive (i.e., wearing all required safety equipment).

### **29.3.7.4 - Fuel Containers**

Fuel will be provided by the organizers in a specially designated fuel bunk.

Teams are not permitted to bring fuel to the event. The event organizers will supply fuel to the teams. Fueling will be done only in the designated FZ area.

Any team found with fuel in the paddocks during the event will be disqualified from participation in any event and points earned thus far will be eliminated.

Teams carrying additional removable fuel tanks may store them in their designated pit area, without fuel. All removable fuel tanks must have a cap with a check valve installed.

### **29.3.7.5 - Repairs in Fueling Area**

No work requiring a tool may be performed in the Fueling Area. Teams are allowed to make adjustments that do not require any tools. Examples include driver harness, seat position, spring-damper pre load, etc.

Tools of any kind, backpacks, wagons, extra driver equipment, and coolers are specifically prohibited. Extra driver equipment may be brought to the Fueling Area for use but extra driver equipment may not be stored in the Fueling Area.

### **29.3.8 - Service**

#### **29.3.8.1 - Remote Pit**

The organizers may elect to create a remote pit for minor repairs and adjustments.

#### **29.3.8.2 - Paddocks**

Teams whose vehicle requires service and repairs may exit the track at the designated location and proceed at walking speed to their paddock. No repairs are permitted on the course at any time.

### **29.3.9 - Recovery**

Vehicles disabled on the endurance course may be recovered by track workers, or by designated recovery crews. Track workers will attempt to assist disabled vehicles. It is the driver's responsibility to assist and cooperate with the course marshals in removing the vehicle. Drivers may not exit the vehicle to start the engine. Drivers must be seated and secured in the vehicle before track workers will attempt to restart the engine.

If track workers are unable to assist a disabled vehicle, a recovery crew will transport the disabled vehicle to the paddocks. Drivers being towed to the paddock are required to remain seated and secured in their vehicle with all safety equipment on.

Recovery crews are dispatched and operate on a "first come, first serve" basis. No priority will be given to any team over another.

### **29.3.10 - Finish**

The Endurance event is finished when the lead car crosses the finish line after the time limit or distance has been reached. Vehicles remaining on the track will be allowed to finish their lap. Vehicles in the fuel zone will not be allowed back on the track after this time.

As vehicles cross the finish line, track workers will direct vehicles to the paddocks or the impound area (if required). All post-event traffic shall be at walking-speed.

### **29.3.11 - Impound**

The organizers reserve the right to impound and inspect any vehicle during or after the endurance event. The Technical Inspectors will direct and instruct teams in impound how to proceed.

## **29.4 - Penalties**

Event Co-ordinators are the only personnel permitted to call and assess penalties during the endurance event. Co-ordinators are distributed throughout the endurance course during the event. Penalties during the endurance race will be signaled to and vehicles ordered off the track into the black flag area. Event Co-ordinators may stop any vehicle, at any time, if they believe it no longer complies with the requirements and restrictions of the rules. All timed penalties are enforced from when the vehicle is in the black flag area, i.e., the time spent being towed back to the pits, does not count towards the penalty.

### **29.4.1 - Driver Equipment**

Any driver that is not using all of the approved and required drivers' equipment will be flagged.

### **29.4.2 - Mechanical Faults**

All cars must remain in the as-approved condition in order to compete; any condition that is deemed to not meet this requirement will be flagged to make necessary repairs or adjustments. If a vehicle is stopped by officials for a mechanical fault, the fault must be corrected before it may re-enter the event.

### **29.4.3 - Vehicle Assists**

Certain areas of the endurance course have been identified as difficult obstacles. If a vehicle is assisted three times on the same obstacle, the vehicle may be black flagged and the driver warned that one more assist will result in removal of the vehicle for the remainder of the event.

### **29.4.4 - Roll Over**

If a vehicle rolls over (end over end, or over on its side) anywhere on the track two times (in any location, regardless of driver), the vehicle will be black flagged and the driver warned that one more roll-over will result in removal of the vehicle for the remainder of the event. Roll overs will be judged at the discretion of the Event Captains. Any vehicle that rolls over must be inspected by the Technical Inspectors before returning to the track.

## 29.5 - Scoring

### 29.5.1 - Points

The maximum possible points for endurance are 400 points.

### 29.5.2 - Determination of Winner

The team that completes the distance of the competition first or the greatest number of scored laps in the time set for the competition will be declared the winner.

### 29.5.3 - Scored Laps

Scored laps are the number of full laps actually completed during the endurance event. Only full laps count, partial laps do not count for score. A vehicle must cross the timing line under its own power for a lap to be counted.

### 29.5.4 - Finish Order

Finish order is the sequence in which vehicles cross the finish line after the lap scoring period has ended. Finish order determines the ranking of teams completing the same number of laps. For example, if the top four teams finish with the same number of laps, then they will be ranked 1st to 4th based on their finish order.

### 29.5.5 - Score

Endurance scoring is based on number of laps the vehicle completes in the allowed time:

$$S_{en} = 400 X \frac{L_{team} - L_{min}}{L_{max} - L_{min}}$$

Where:  $L_{max}$  is the maximum number of laps completed by any vehicle.  $L_{team}$  is the number of laps completed by the vehicle to be scored.  $L_{min}$  is the minimum number of laps completed by any vehicle.

## **30 - GENERAL EVENT PROCEDURES AND REGULATIONS**

### **30.1 - Safety**

#### **30.1.1 - Safety Vision**

Safety is the primary consideration in the design of Baja SAE India® vehicles and the conduct of the competitions. No event or competition is so important that teams and organizers cannot take the time to work safely. All participants will strive to create a safe competition where all participants return home in the same condition in which they arrived.

#### **30.1.2 - First Aid / CPR / AED**

While medical services are always on-site at ATVC India events, teams are encouraged to be familiar with or trained in first aid, CPR, and the use of AED machines.

#### **30.1.3 - Approaching Others**

All participants are empowered to directly and respectfully approach others if they see a hazardous or unsafe condition and notify the person in danger. Persons approached regarding a safety concern are obligated to respectfully acknowledge the situation and are encouraged to thank those who approached them for their concern.

#### **30.1.4 - Responsibility**

At all performance events, it is the responsibility of the team to ensure both the vehicle and driver meet and follow all the requirements and restrictions of the rules.

#### **30.1.5 - Personal Protective Equipment**

Teams are required to furnish and use their own PPE, appropriate for the task being performed. This includes, but is not limited to:

- Safety Glasses
- Gloves
- Closed Toe Shoes
- Arc Flash Protection
- Hearing Protection

### **30.1.6 - Key Hazards**

All participants are encouraged to pay careful attention to the following situations:

#### **30.1.6.1 - Ascending and Descending**

Maintain 3-point contact when ascending and descending stairs, ladders, steps, or tailgates. Watch for obstructions at the beginning and end of travel.

#### **30.1.6.2 - Pinch Points**

Stay clear of pinch points from rotating machinery, doors, and other equipment.

#### **30.1.6.3 - Hazardous Release of Energy**

Stay clear of sparks, chips, swarf, or other high-energy material. Check circuits for live wires before working on them. Depressurize high pressure air, oil, or water systems before working on them. Take care when working around presses, rams, or other hydraulic equipment. Use care when jacking or lifting vehicles or other objects

#### **30.1.6.4 - Vehicle Operations**

Do not drive when distracted. Utilize a spotter when backing a vehicle.

#### **30.1.6.5 - Walking / Path of Travel**

Take care to keep all walking paths clear of slip, trip, and fall hazards.



## **30.2 - Rules of Conduct**

### **30.2.1 - Sportsmanlike Conduct**

All ATVC India participants can be proud of the excellent sportsmanship and cooperation among teams that are two of the hallmarks of the series. Good conduct and compliance with the rules and the official instructions are expectations and requirements for every team member.

Unsportsmanlike conduct can include arguments with officials, disobedience of official instructions and the use of abusive or threatening language to any official or other participant. Depending on the seriousness of the infraction the penalty for such actions can range from a deduction of up to fifty percent (50%) of the team's points to expulsion of the entire team. Penalties of this type will only be imposed after a complete review of the incident by the organizers.

#### **30.2.1.1 - Prohibited Material**

Alcoholic beverages, firearms, weapons of any type, and illegal materials are prohibited at ATVC India sites. The penalty for violation of this rule is the immediate expulsion of the entire team, not just the individual(s) involved. This rule applies to team members, advisors and any individuals working with the team on-site.

#### **30.2.1.2 - Tobacco Products and Electronic Cigarettes**

The use of all tobacco products or using e-cigarettes on-site is prohibited.

#### **30.2.1.3 - Footwear**

All individuals on-site shall wear durable and sturdy closed toe shoes. Open-toed shoes, slippers, chappals etc. are explicitly prohibited.

#### **30.2.1.4 - Parties**

Disruptive parties either on or off-site must be prevented by the faculty advisor or team captain.

#### **30.2.1.5 - Housekeeping**

Clean-up of trash and debris is the responsibility of the teams. Please make an effort to keep the paddock area clean and uncluttered. At the close of the day, each team must clean their work area.

### **30.2.1.6 - Site Condition**

Please help the organizers keep the site clean. The sites used for ATVC India are generally private property and should be treated as such. Competitors are reminded that they are guests. All trash should be placed in the receptacles provided. Glass is not allowed on the grounds. Failure to clean the premises will result in an unsportsmanlike conduct penalty. Competitors are encouraged to clean their areas after meals.

### **30.2.1.7 - Personal Transportation**

The use of motorcycles, quads, bicycles, scooters, skateboards, rollerblades or similar person-carrying or motor driven devices by team members and spectators in any part of the competition area, including the paddocks is prohibited.