FORMULA STUDENT ALPE ADRIA 2024 INSPECTION SHEET
COMBUSTION

CHANGELOG

Version	Comments	Date	Responsible person
0.0	Helmet equipment added/egress	14.07.2024	

INFORMATIONS

UNIVERSITY: _____

VEHICLE NUMBER: _____

SES PASSED: ☐ YES / ☐ NO

IAD PASSED: ☐ YES / ☐ NO

ENGINE: _____

BORE/STROKE: _____

FUEL TYPE: _____

ETC: ☐ YES / ☐ NO

ABS: ☐ YES / ☐ NO

Present the vehicle for inspection in following order:

1. Pre-Inspection
2. Mechanical Inspection (including Hybrid system inspection)
3. Weighting
4. Tilt Test
5. Noise Test (including ETC inspection)
6. Brake Test

NOTES:

- This form must always stay with the vehicle!
- Technical inspection approval is invalid if inspection sheet is lost.
- If there is a conflict between this form and the rules, the rules prevail.

Used Symbols:

- • Information
- ▶ Action
- Δ Check in responsibility of the team
- O Check

PART I: COMMENTS FROM DOCUMENT REVIEW

MECHANICAL

PART II: PRE-INSPECTION

☐ TIS STATUS UPDATE

► Set online TIS status to *In Progress*

☐ TIRES

[1] O **DRY TIRES** – Make: _____

[2] O **DRY TIRES** – Size: _____

[3] O **DRY TIRES** – Compound: _____

[4] O **RAIN TIRES** – Make: _____

[5] O **RAIN TIRES** – Size: _____

[6] O **RAIN TIRES** – Compound: _____

[7] O **RAIN TIRES** – 2,4 mm min. tread depth molded by tire manufacturer

☐ DRIVER GEAR & SAFETY

[8] O **FIRE EXTINGUISHERS** – Two (2) hand-held, 0,9 kg (2 lb.) minimum, dry chemical (10BC, 1A10BC, 34B, 5A 34B, 20BE or 1A 10BE), with pressure/charge gauge, Aqueous Film Forming Foam (AFFF) are prohibited, 1 WITH VEHICLE securely installed on push-bar, 1 in paddock. (Must see BOTH at inspection).

[9] O **UNDERWEAR** – Nomex or equivalent, fire resistant underwear (no cotton, no polyester, no bare skin). No holes.

[10] O **SOCKS** – Nomex or equivalent, fire resistant socks (no cotton, no polyester, no bare skin). No holes.

[11] O **GLOVES** – Fire resistant material. Leather allowed only over fire resistant material. No holes.

[12] O **ARM RESTRAINTS** – SFI Standard 3.3 or equivalent

[13] O **EQUIPMENT** – Nothing should be mounted on helmet that is not certified part with/for the helmet - if headset is connected with jack to tx/rx on the car, driver egress has to be done with system connected

[14] O **HELMETS** – Snell K2010, K2015, K2020, M2010, M2015, M2020, SA2010, SAH2010, SA2015, SA2020, EA2016 or newer.SFI 31.1/2010, 31.1/2015, 31.1/2020, 41.1/2010, 41.1/2015, 41.1/2020 or newer FIA 8860-2010, FIA 8860-2018, FIA 8859-2015 (with SA 2015), FIA 8858-2010 (with SA(H) 2010) or newer. Closed Face, no Open Face, must have integrated shield (no dirtbike helmets). No camera mounts.

[15] O **DRIVER SUITS** – Single piece SFI 3.2A/5 (or higher), SFI 3.4/5 (or higher), FIA 8856-2000/2018 (or higher), and LABELED AS SUCH. No holes.

[16] O **HAIR COVER** – Fire resistant (Nomex or equiv.) balaclava of full helmet skirt REQUIRED FOR ALL DRIVERS. No holes.

[17] O **SHOES** – SFI 3.3 or FIA 8856-2000/2018

[18] O **SEWING OR STITCHING** – Teams must show compliance to T13.3 if driver's clothing is embroidered. Fire resistant material must be used, examples: Carbon X, Indura, Nomex Polybenzimidazole (PBI) and Proban.

☐ TIS STATUS UPDATE

► Set online TIS status to *In Passed* or *Failed*

NON-COMPLIANCE / COMMENTS

APPROVAL

	Inspector Names	Date, Time	Signatures when passed
1.	_____ / _____	_____	_____

PART III: EGRESS TEST

☐ DRIVER POSITION

[19] O **ARM RESTRAINTS** – Must be installed so the driver can release them and exit unassisted regardless of vehicle's position.

[20] O **HEAD RESTRAINT** – Near vertical. Max. 25 mm from helmet. Helmet contact point 50 mm min. from any edge.

[21] O **MAIN HOOP & FRONT HOOP HEIGHTS** – Helmet of driver to be 50 mm below line between top of front and main roll hoop AND between top of main hoop to rear attachment point of main hoop bracing.

[22] O **LAP BELT MOUNTING** – Must pass over pelvic area between 45 - 65 deg. to horizontal for upright driver, 60-80 deg. for reclined. The lap belts must not be routed over the sides of the seat.

[23] O **SHOULDER HARNESS MOUNTING** – Angle from shoulder between 10 deg. up and 20 deg. down to horizontal.

[24] O **EQUIPMENT** – if headset is connected with jack to tx/rx on the car, driver egress has to be done with system connected

☐ DRIVER EGRESS TEST

- All drivers must be able to exit the vehicle in less than 5s
- Driver must be seated in ready to race condition

☐ EGRESS PROCEDURE

- ▶ Both hands on the steering wheel. (in all possible steering positions)
- ▶ Pressing cockpit-mounted shutdown button
- The egress time will stop when the driver has both feet on the ground

DRIVER APPROVAL & RUN DOCUMENTATION

	Driver Name	Wristband ID	Inspector signature when passed	Acc	Skid Pad	AutoX	Endu-rance
1.				☐☐	☐☐	☐☐	☐
2.				☐☐	☐☐	☐☐	☐
3.				☐☐	☐☐	☐☐	☐
4.				☐☐	☐☐	☐☐	☐
5.				☐☐	☐☐	☐☐	☐
6.				☐☐	☐☐	☐☐	☐

PART IV: MECHANICAL INSPECTION

The time limit for this part of the inspection is 75 minutes. Continuation of the inspection is possible after requeuing.
During technical inspection all work carried out on the vehicle must be approved by a technical inspector.

☐ TIS STATUS UPDATE

▶ Set online TIS status to *In Progress*

☐ COMMENTS

▶ Check comments from first page

☐ VEHICLE WITH TALLEST DRIVER READY TO RACE

[25] O **PUSH BAR (red color)** – With vehicle, securely attached to vehicle, detachable, push & pull function for 2 people. University must be written on. The inspection sheet must always stay with push bar.

[26] Δ **CAMERAS** – Must be secured by two points, see T13.5. No cameras mounted to helmet.

[27] O **VISIBILITY** – Minimum of 100 deg. field either side. Head rotation allowed or mirrors. If mirrors, must be firmly installed and adjusted.

[28] Δ **VEHICLE CONTROLS** – All controls, including shifter, must be inside cockpit. No arms or elbows outside the SIS plane.

[29] O **DRIVER FLUID PROTECTION** – A firewall (rigidly mounted cover plate for cooling systems using plain water (except wheel motors and their cooling hoses)) must extend sufficiently far upwards and/or rearwards such that any point, less than 100mm above the bottom of the helmet of the tallest driver, is not in direct line of sight with any of the following parts: fuel system, engine oil system, cooling system and low voltage battery.

[30] O **ROLL BAR PADDING** – Roll bar or bracing that could be hit by driver's helmet must be covered with 12mm thick, SFI spec 45.1 or FIA 8857-2001 padding.

[31] Δ **OTHER SIDE TUBES –** Design prevents driver's neck hitting bracing or other side tubes

[32] O **HEAD RESTRAINT** – Near vertical. Must take 890N load. 40mm thick, SFI 45.2 standard. Max. 25mm from helmet. Helmet contact point 50mm min. from any edge. May be changed for different drivers. Minimum 150x150mm.

[33] O **DRIVER RESTRAINT HARNESS** – SFI 16.1, SFI 16.5, SFI 16.6, FIA 8853/98 or FIA 8853/2016. 6- or 7-point system – Two-piece lap belt (min. width 50mm), two shoulder straps (min. width 75mm) and two leg or anti-submarine straps (min. width 50mm). (7-point system must have three anti-submarine straps). Must be securely attached to prim. structure (25.4 x 2.4mm or equal.)

[34] O **LAP BELT MOUNTING** – Pivoting mounting with eye bolts or shoulder bolts attached securely to Primary Structure. Min. tab thickness 1.6mm. Attachment brackets to the monocoque must be steel, see T5.3.2.

[35] O **SHOULDER HARNESS MOUNTING** – Mounting points 180 - 230mm apart (measured center to center). Angle from shoulder between 10 deg. up and 20 deg. down to horizontal. Attach to Primary Structure - 25.4 x 2.4mm or 25.0 x 2.5mm steel tube min. NOT to put bending loads into Main Hoop Bracing without extra bracing. Additional braces if not straight to main hoop. Cannot pass through a firewall. Attachment brackets to the monocoque must be steel.

[36] Δ **SUSPENSION** – Fully operational with dampers front and rear; 50mm minimum wheel travel (minimum jounce of 25mm) with driver in vehicle.

☐ VEHICLE WITHOUT DRIVER

[37] Δ **TECH STICKER SPACE** - 70 mm x 150 mm on centerline of front of vehicle in front of the cockpit opening

[38] Δ **SCHOOL NAME & OTHER DECALS** - School Name, or recognized initials - min. 50mm tall (all letters). on both sides in Roman letters. Must be clearly visible.

[39] Δ **VEHICLE NUMBERS** - On front & both sides of vehicle, minimum 150mm tall, 20mm stroke & spacing, 25mm min. between number and background edge, Black on White, White on Black only, specified background shapes. Must be clearly visible, font: Roman Sans-Serif characters.

[40] Δ **BODYWORK EDGES** - edges that could contact a pedestrian must have a minimum radius of 1.0mm (safety requirement)

[41] Δ **BODY & STYLING** - Open wheeled, open cockpit, formula style body. Vertical keepout zones 75mm in front and behind tires (no aero exceptions), tires unobstructed from sides.

[42] O **BODYWORK** - Min. 38mm radius on nose. No large openings in bodywork into driver compartment in front of or alongside driver, (except cockpit opening).

[43] O **AERODYNAMIC DEVICES** - Securely mounted. The deflection may not exceed 10mm when a force of 200N is applied over a surface of 225 cm2 and not more than 25mm when a point force of 50N is applied.

[44] Δ **AERODYNAMICS** - ALL aerodynamic devices maximum 250mm rearward of rear tires, maximum 700mm forward of front tires. Devices lower than 500mm from the ground rearward of the front axle must be no wider than vertical plane from the outside of the front and rear tires. Devices higher than 500mm behind the front axle must not be wider than the inside of the rear tires.

[45] Δ **AERO VERTICAL HEIGHT** - Devices forward of a vertical plane through the rearmost portion of the front face of the driver head restraint support, excluding any padding, set to its most rearward position, must be lower than 500mm from the ground. Rear device max 1.2 m above ground (incl. end plates); Front device max 250mm above ground outside of the inside plane of the front tires inside this plane max 500mm.

[46] O **EDGES/RADII** - Edges that could contact a pedestrian must have a minimum radius of: horizontal leading edges min 5mm; vertical forward facing edges min 3mm. All other edges must have a minimum radius of 1.0mm

[47] O **AIR INTAKE SYSTEM ROLL OVER PROTECTION** - All parts of air intake system (including throttle body or carb, air intake ducting, air cleaner & air box) must be within a surface defined by the top of the main hoop and the outside top edge of the tires.

[48] O **AIR INTAKE SYSTEM** - Must be supported if cantilevered (isolated to frame, rigid to engine). Any portion < 350mm above ground must have Side Impact protection to rule CV 1.3.2. Intercooler after throttle body.

[49] Δ **SEAT** - Insulated against heat conduction, convection and radiation. Lowest point no lower than top of of the upper surface of the lowest SIS member OR must have longitudinal, 25.4 x 1.65mm steel tube underneath.

[50] O **COCKPIT OPENING** - Fig. 11 (left) template passes down from above cockpit to below the upper side impact member. Steering wheel, seat & padding can be removed. No removing of firewall.

[51] O **COCKPIT INTERNAL CROSS SECTION** - Fig. 11 (right) template passes from the cockpit opening to 100mm rear of rearmost pedal contact area (in most forward position). Steering wheel and paddings can be removed (without tools).

[52] Δ **STEERING WHEEL** - Continuous perimeter, near round (no concave sections) with driver operable quick disconnect. 250mm max from front hoop.

[53] O **ROTATING PARTS** - Finger guards are required to cover any parts (e.g. fans) that spin while the vehicle is stationary. No holes >12mm dia.

[54] O **FUEL SYSTEM ROLL OVER PROTECTION** - All parts of the fuel storage, supply and fuel control system systems (including fuel rail, throttle body or carburettor), must lie within the surface envelope.

[55] O **FUEL FILLER NECK** - Min. 35mm dia., within 30◦ of vertical. Fuel resistant, transparent sight tube or transparent filler neck (material must be rated for at least 120◦C). min 125mm vert. height visible to fueler with vehicle fully assembled, with non-moveable fuel level line 12-25mm below top of sight tube. Sight tube must NOT run below top of tank. Must prevent fuel spillage contacting driver, exhaust or ignition. Fueled w/o manipulating vehicle in any way. Cap secure and capable of withstanding pressurization (ie: threads or latch.)

[56] O **FUEL FILLER NECK LOCATION** - Must be located within the rollover protection envelope, except the whole filler neck is 350mm above the ground.

[57] Δ **REFUELING** - Must be able to be accomplished without the removal of any body parts of the vehicle.

[58] O **FUEL VENTS** - Must exit outside of the bodywork, and have a check valve to prevent leakage if vehicle inverted.

☐ REMOVE BODY PANELS

[59] O **JACKS** - Up to two devices that lift up all driven wheels min. 100 mm above the ground. In lifted position it is safe to enter and exit the vehicle and the devices must not extend out of the footprint of the four tires. University name must be written on. Vehicle pickup points must be indicated by orange triangles.

[60] O **DRIVER'S LEG PROTECTION** - Covers inside of cockpit over any sharp edges or moving suspension / steering components.

[61] O **DRIVER'S FOOT PROTECTION** - Feet must be rearward of the Front Bulkhead. The Front Bulkhead, together with the AIP, must cover the driver's feet in front view. No part of shoes or legs above or outside the Primary Structure (25x1.2 or equivalent) in side or front views when touching the pedals.

[62] O **PERCY** - Helmet of 95th percentile male (PERCY) to be 50mm below the lines between top of front and main roll hoops and between top of main hoop to rear attachment point of main hoop bracing. Center of bottom circle placed minimum 915mm from pedals.

[63] O **BRAKES** - Dual hydraulic system & reservoirs, operating on all four wheels, (one brake on limited slip differential is OK). System must be protected by structure or shields from drivetrain failure or minor collisions. No plastic brake lines. No brake-by-wire. No parts below chassis in side view. Brake pedal capable of 2000N, no failures if official exerts max force (seated normally in vehicle).

[64] Δ **BRAKE OVER TRAVEL SWITCH** - In the event of a failure in one or both of the brake circuits the brake pedal over travel will result in the shutdown circuit being opened.

[65] Δ **LOW VOLTAGE MASTER SWITCH** - Must be located on the right side of the vehicle, in proximity to the main hoop, at the 95th percentile male driver's shoulder height, in the middle of a completely red circular area of ≥ 50 mm diameter. Marked with LV and international symbol. Level horizontal when in ON position.

[66] O **TUBING & MATERIALS** - Team must show an APPROVED SES. No Magnesium tubes in primary structure.

[67] O **MONOCOQUE** - Must see laminate test specimen. Steel backing plates (≥2 mm thick) with perimeter near circular or oval used at attachment points (must be fully supported).

[68] O **BOLTED JOINTS** in primary structure - Distance hole centerline to the nearest free edge > 1.5 x hole diameter. According to SES if two panels are bolted together

[69] O **HARNESS ATTACHMENTS** for shoulder harness, lap belt and anti-submarine belt according to SES calculation, simulation and/or physical test.

[70] O **MAIN HOOP** - MUST BE STEEL. Check dimension as shown in approved SES. Must be made of one piece and extend to lowest frame member. Above Major Structure, must be within 10 deg. of vertical plane. Smooth bends without wrinkles.

[71] O **MAIN HOOP BRACING** - MUST BE STEEL. One straight brace on each side. Dimension as shown in the approved SES. Attached within 160mm from the top. Min. 30 deg. included angle with hoop. If main hoop is not vertical, bracing must not be on same side of the vertical plane as the main hoop. No bends. No rod-ends. Proper design for removable braces (capping etc.) on BOTH ENDS. Must take load back to bottom of main hoop and node of upper side impact tube through proper triangulated structure. (25.4 x 1.2mm or equivalent)

[72] O **FRONT HOOP** - Must be closed section metal tube. Can be multi-piece with gussets or additional attachments to the monocoque. Must extend down to lowest frame member. No lower than top of steering wheel. Max. 20 deg. to vertical. Check dimension as shown in approved SES.

[73] O **FRONT HOOP BRACING** - Two straight forward facing braces, 25.4 x 1.65mm or 25.0 x 1.75mm or 25.4 x 1.6mm wall steel or equivalent, attached within 50mm of top. Extra rearward bracing required if Front Hoop leans backwards more than 10 deg.

[74] O **SIDE IMPACT PROTECTION** - Min. of 2 tubes + diagonal must connect the main and front hoops in straight line. Upper tube between 240 - 320mm above lowest inside chassis point between FH and MH. Dimension as shown in approved SES.

75 O **FRONT IMPACT PROTECTION** - Team must show an APPROVED IAD and test piece, which both must reflect status on the car. IMPACT ATTENUATOR forward of bulkhead, 200 mm long x 200 mm wide x 100 mm high, these minimum volume dimensions cannot not be more than 350 mm above ground (can be measured with driver seated). IA must be securely fastened directly to AIP capable of taking transverse & vertical loads (no tape, etc.). Non-crushable objects forward of bulkhead must have been evaluated in IAD. No wing supports through the IA. Standard IA: Requires diagonal or X-brace if FBH dimensions larger than 400 mm width and/or 350 mm height.

76 O **ANTI INTRUSION PLATE** - A 1.5 mm solid steel or 4.0 mm solid aluminium sheet. Standard: attachment must be welded (full perimeter, size: min. to centerlines) or min. 8 screws M8 Grade 8.8 (critical fasteners T10) (size: min. outside dimensions). Non-standard: Must follow T3.16.6. CFRP plate is accepted if SES/IAD approved.

77 O **FRONT BULKHEAD SUPPORT** - Support back to front roll hoop; 3 tubes per side, all 25mm x 1.5mm wall steel tube or equiv. 1 bottom; 1 top within 50mm of top of bulkhead, and connecting within 100mm above and 50mm below upper SIS tube; 1 or more node-to-node diagonal to completely triangulate connections to upper and lower SIS tubes.

78 O **INSPECTION HOLES** - 4.5mm inspection holes required in non-critical areas of front & main hoops. Inspectors may ask for holes in other tube(s).

79 O **WHEELS** - 203.2mm (8") min. diam. No Aluminium or hollow wheel bolts. Single retaining nut must incorporate a device to retain the nut. Aluminum wheel nuts must be hard anodized.

80 O **FIREWALL** - Fire resistant material; must separate driver compartment from cooling, oil system & LV battery. Passthroughs OK with grommets. Multiple panels OK if gaps sealed. No gaps at sides or bottom. Must be rigidly mounted to the chassis. Material must meet UL94-V0, FAR25 or equivalent.

☐ VEHICLE LIFTED AND WHEELS REMOVED

81 O **SUSPENSION PICK-UP POINTS** - Inspected thoroughly for integrity.

82 O **FASTENERS** - Steering, braking, harness and suspension systems must use SAE Grade 5 or Metric Grade M8.8 or higher specs (AN/MS) with visible positive locking mechanisms, no Loctite or lock washers. Minimum of 2 exposed threads with locking nuts. Rod ends in single shear are captured by a washer larger than the ball diameter. Adjustable tie-rod ends must have jam nuts to prevent loosening. No Nylon lock nuts for Brake calipers or Brake discs. No button head cap, pan head or round head screws in critical locations, e.g cage structure or harness mount. Primary structure e/D > 1.5.

83 O **STEERING** - All steerable wheels must have positive stops placed on the rack to prevent linkage lock up or tires from contacting any part of the vehicle. 7 degrees max. free play at the steering wheel. NO STEER-BY-WIRE on front wheels. Rear wheel steering, max. 6 deg. and mechanical stops installed. Bonded joints in accordance with T3.2.8.

84 Δ **FLOOR CLOSEOUT PANEL** - Required from foot area to firewall; solid, non-brittle material; multiple panels are OK if gaps less than 3mm.

85 O **ENGINE** - Four cycle piston engine. Waste heat recovery allowed.

86 O **ON-BOARD STARTER** - Required.

87 O **COMPRESSORS** - Turbo or super chargers allowed if not OEM to engine; must be between restrictor and throttle. Carburetors are not allowed, if compressors are used. Compressor recirculation valves are ok if located downstream of restrictor.

88 O **INTAKE MANIFOLD** - Securely attached to block or head with mech. Fasteners (positive locking!). OEM type rubber bushings not sufficient.

89 O **RESTRICTOR** - Must be circular; max. diam. 20mm for gasoline fuelled vehicles and 19mm for E85 fuelled vehicles. Cannot be movable. Placed before compressor.

90 O **THROTTLE** - Must have minimum of 2 springs (1 spring when ETC installed) at the TB, each capable of closing the throttle independently. TPS not acceptable as a return spring. Cable must have smooth operation with no binding or sticking; min. 50mm from any exhaust component.

91 O **THROTTLE PEDAL** - Must have positive stop to prevent overstressing cable

92 O **ENGINE LUBRICATION SYSTEM** - Lowest point of the engine lubrication system not be lower than the lowest frame part. Otherwise protection structure mounted to chassis necessary.

93 O **GAS CYLINDERS LOCATION** - Axis not pointed at driver, within the rollover protection envelope (FIGURE 3), insulated from any heat source, must be shielded from the driver. The shields must be steel or aluminum with a minimum thickness of 1 mm.

94 O **GAS CYLINDERS** - Proprietary manufacture & labeled, Nonflammable gas, regulator on tank, securely mounted, appropriate lines & fittings. Positively retained, i.e. no tie-wraps. Maximum of 10bar allowed, except cylinders/tanks with directly mounted pressure regulator (-> 10bar).

95 O **SCATTERSHIELDS INCL. MOUNTING** - Required for clutches, chains, belts, etc. No holes. 6mm diam. Grade 8.8 minimum. End parallel to lowest part of the sprocket/pulley in front and rear.

96 Δ **SCATTERSHIELD MATERIALS** - For chains, 2mm min. thick solid STEEL, 3 x chain width. For belts, 3mm min. thick Al 6061-T6, 3 x belt width. Finger guards: cover all drivetrain parts that spin while vehicle is stationary. No holes >12mm dia.

97 O **LV BATTERY** - Rigid and sturdy casing and attached securely to frame or chassis. Battery behind firewall; wet-cells in IPX7 rated and acid resistant casing if inside cockpit. Must be contained within the rollover protection envelope, see T1.1.14. Grounded to chassis; hot terminal insulated; protected for short circuits (fused). No circuits >60 VDC.

98 O **STUDENT BUILD LV BATTERY** - Proper Insulation of internal connections; proper mounting of cells

99 O **LI-ION LV BATTERY** (only applicable if other than LiFePO4) - Has a fire retardant casing according to UL94-V0. Battery pack includes: an overcurrent protection that trips below maximum discharge current; overtemperature protection of ≥30% of the cells; voltage protection of all cells; it must be possible to display all cell voltages and measured temperatures on a team laptop.

100 O **HIGH PRESS HYDRAULICS** - Pumps and lines must have 1mm steel or aluminium shields protecting driver and workers.

101 Δ **COOLANT** - 100% water. NO ADDITIVES WHATSOEVER.

[102] O **CATCH TANKS** - Any coolant overflow or lube system vents must have separate catch tanks. 0.9 l minimum each, 100 deg. C material, behind firewall, below shoulder level. 3mm min. dia. vent away from driver down to the bottom level of frame. Cooling systems using plain water, unless sealed, require 100 ml catch tanks.

[103] Δ **FLUID LEAKS** - Oil, grease, coolant,fuel, Brake fluid -> none permitted

[104] O **FUEL SYSTEM** - All parts of the fuel system which can come in contact with the fuel must be rated for permanent contact with fuel. All fuel lines must be fitted in such a way that any leakage cannot result in the accumulation of fuel in the cockpit.

[105] O **FUEL RAIL** - Securely attached to block (no nylon nuts), head or int. manifold with brackets & mech. Fasteners (grade min. 8.8). Plastic, carbon fibre or rapid prototyping flammable materials are prohibited.

[106] O **FUEL TANKS** - Must lie within major structure of the chassis with full side impact protection & firewall between fuel supply & driver, min. 50mm away from exhaust components. Rigid tanks cannot carry structural load & must be flexibly mounted and must not touch anything else than its mounting.

[107] O **FUEL LINES** - No plastic lines between fuel tank & engine. Fuel injection systems must use metal braided hose with threaded fittings or reinforced rubber hose (beaded hose fittings must be used). Must be securely attached and protected from possible rotating equipment or collision failure. No plastic connectors in fuel line. High pressure injection systems see CV 2.5.2

[108] O **BELLYPANS** - In total minimum of two venting holes of at least 25mm diameter in the lowest part of the structure to prevent accumulation of liquids. One in each enclosed chassis structure. Additional holes are required when multiple local lowest parts exist in the structure.

[109] O **BRAKE LIGHT** - Only one RED brake light, clearly visible from the rear; on vehicle centerline; height between wheel centerline & driver's shoulders. Round, triangle, or rectangular on black background. 15 cm2 minimum illuminated area. LED strips OK if elements closer than 20 mm apart and total length 150 mm.

☐ TIS STATUS UPDATE

▶ Set online TIS status to *Passed* or *Failed*

NON-COMPLIANCE / COMMENTS

APPROVAL

	Inspector Names	Date, Time	Signatures when passed
1.	_____ / _____	_____	_____

PART V: HYBRID SYSTEM INSPECTION

☐ TIS STATUS UPDATE

▶ Set online TIS status to *In Progress*

☐ COMMENTS

▶ Check comments from first page

☐ HYBRID SYSTEM

110 O **MOTOR ASSEMBLY** – Check motor assembly on wheel hub, engine, etc. Follow critical fastening according T10.

111 O **MOTOR CASING** – Check motor casign, ask for drawing or spare part. 2mm aluminum wall according to T7.3.

112 O **LOW VOLTAGE BATTERIES** - LV batteries must be securely attached to the chassis and located within the rollover protection envelope Any wet-cell battery located in the cockpit must be enclosed in a non-conductive, water proof (according to IPX7 or higher) and acid resistant container. Completely closed LV battery cases must have an overpressure relief. Venting gases must be separated from the driver by a firewall.

113 O Battery pack must have a fire retardant casing, see T1.2.1.

114 O Battery pack must include overcurrent protection that trips at or below the maximum specified discharge current of the cells.

115 O Battery pack must include overtemperature protection of at least 30% of the cells, meeting EV5.8.3, that trips when any cell leaves the allowed temperature range according to the manufacturer's datasheet, but not more than 60 °C, for more than 1 s and disconnects the battery.

116 O Battery pack must include voltage protection of all cells that trips when any cell leaves the allowed voltage range according to the manufacturer's datasheet for more than 500 ms and disconnects the battery.

117 O It must be possible to display all cell voltages and measured temperatures of battery pack, e.g. by connecting a laptop.

118 O **BATTERY VOLTAGE** – Check voltage of battery, team must perform the measuring <60VDC.

119 O **ACTIVE MATERIAL** – Mass of active material (cells, caps) must be below 3kg. Can be measured on spare cells and multiplied by amount used in pack.

120 O **COMPONENTS LOCATION** – All components must be inside surface envelope, battery must be inside rollover envelope.

121 O **SAFETY CRITICAL SIGNALS** – The team must present faulty SCS line ends up opening the AIR. (internal sensor, actuating buttons, steering wheel sensors etc.)

122 O **BATTERY COMPONENTS** – Check that safety components in battery pack are as specified in approved HSD (fuses, AIRs)

☐ TIS STATUS UPDATE

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NON-COMPLIANCE / COMMENTS

APPROVAL

	Inspector Names	Date, Time	Signatures when passed
1.	_____ / _____	_____	_____

PART VI: TILT TEST

☐ TIS STATUS UPDATE

▶ Set online TIS status to *In Progress*

☐ COMMENTS

▶ Check comments from first page

☐ TILT TEST

[123] O **FLUID LEAKAGE** - No fluid spill permitted when vehicle is tilted to 60 degrees in the direction most likely to create spillage. Tanks must be filled to scribe line with non-moveable fuel level line 12-25 mm below top of sight tube

[124] O **VEHICLE STABILITY** - All wheels in contact with tilt table when tilted to 60 degrees to the horizontal.

[125] O **FUEL TYPE:** _____

[126] Δ **GROUND CLEARANCE** - At least 30 mm min. with driver.

☐ TIS STATUS UPDATE

▶ Set online TIS status to *Passed* or *Failed*

NON-COMPLIANCE / COMMENTS

APPROVAL

	Inspector Names	Date, Time	Signatures when passed
1.	_____ / _____	_____	_____

PART VII: ETC INSPECTION

☐ TIS STATUS UPDATE

► Set online TIS status to *In Progress*

☐ COMMENTS

► Check comments from first page

☐ ACCELERATOR PEDAL POSITION SENSOR (APPS)

127 O Accelerator Pedal returns to original position if not actuated.

128 O At least two sensors with different transfer function are installed. (For digital sensors, a checksum is necessary)

129 O Sensors do not share supply or signal lines.

130 O Sensors are protected from beeing mechanically overstressed (positive stop of pedal).

131 O Minimum two springs installed to return pedal

► Disassemble one spring.

132 O Each spring still returns pedal with the second one disconnected (springs in the APPSs not counted.)

► Open throttle and disconnect APPS(s).

133 O Power to ETC system shuts down after 100 ms and throttle goes to idle position if less than two APPS are connected

☐ THROTTLE AND THROTTLE POSITION SENSOR (TPS)

134 O Two sources of energy to return the throttle to idle position. One must be a return spring (springs in the TPSs not counted.).

► Disconnect electronic throttle connector while throttle is open.

135 O Throttle must return to idle position in one second.

136 O At least two Throttle Position Sensors (TPS) installed

► Open throttle and disconnect TPS(s).

137 O Power to ETC system shuts down after 100 ms and throttle goes to idle position if less than two TPS are connected

☐ PLAUSIBILITY CHECKS

► Activate fuel pump (verify, that it is running), open throttle, insert a blocking device, command throttle to fully close.

138 O After 1 s, power to ignition, injection and fuel pump shuts down and throttle goes to idle position. This action must remain active until the TPS signals indicate the throttle returned to idle position for at least one second

NON-COMPLIANCE / COMMENTS

APPROVAL

	Inspector Names	Date, Time	Signatures when passed
1.	_____ / _____	_____	_____

PART VIII: NOISE TEST

☐ TIS STATUS UPDATE

▶ Set online TIS status to *In Progress*

☐ COMMENTS

▶ Check comments from first page

☐ NOISE TEST

▶ **TEST RPM** - Test at _____ rpm[1].

139 O **NOISE LEVEL 1** - 110 dB(C) (fast weighting) maximum during a static test, gearbox in neutral, UP TO a specified rpm (see Rule CV 3.2). Microphone level with the exhaust outlet(s), 0.5 m from the outlet(s), at 45 degrees to the outlet. If multiple outlets, all to be checked. If movable tuning or throttling device, see IN 10.1.6.

140 O **NOISE LEVEL 2** - 103 dB(C) (fast weighting) maximum during a static test, gearbox in neutral at idle. Microphone level with the exhaust outlet(s), 0.5 m from the outlet(s), at 45 degrees to the outlet. If multiple outlets, all to be checked. Movable tuning or throttling device must be in "worst condition"

141 O **LOW VOLTAGE MASTER SWITCH** - Access from outside of vehicle, rotary type, no relay, must kill ALL electrical systems. Must cause engine to stop when actuated. (Perform at around 5000 rpm).

142 O **SHUTDOWN BUTTONS 1** - Push-pull or push-rotate. Unobstructed by steering wheel, easily reached by belted-in driver. Must kill ignition & fuel pump(s). Marked with international symbol. Must cause engine to stop when actuated (Perform at around 5000 rpm).

143 O **SHUTDOWN BUTTONS 2** - Push-pull or push-rotate. One button must be located on each side of the vehicle behind the driver's compartment at approximately the level of the driver's head. Must be easy reachable from outside the vehicle. Must kill ignition & fuel pump(s). Marked with international symbol. Must cause engine to stop when actuated (Perform at around 5000 rpm).

144 O **INERTIA SWITCH** - Rigidly attached to the vehicle, demountable for functionality check. Must open the shutdown circuit and kill ignition & fuel pump(s) when accelerated between 6g and 11g (T10.5). Must cause engine to stop when actuated (Perform at around 5000 rpm).

145 O **BRAKE PEDAL OVER-TRAVEL SWITCH** - Must constantly open the shutdown circuit if one brake circuit fails for brake balance bar in all possible positions. No re-start if released or actuated a second time. Push pull or flip type Must NOT rely on programming to work. Not resettable by driver (Perform at around 5000 rpm).

146 O **INTAKE SYSTEM LEAKAGE/BYPASS** - There is no air leakage or bypass of the intake system permitted. When the intake is closed completely, the engine should almost immediately stall

147 O **EXHAUST OUTLET** - Outlet no more than 45 cm behind rear axle centreline or more than 60 cm above the ground.

148 O **EXHAUST SHIELDING** - components outside the body forward of the rear axle must be shielded from people approaching the vehicle. No fibrous/cloth wraps around exhaust tubes.

☐ BRAKE SYSTEM PLAUSIBILITY DEVICE (BSPD)

149 Δ Must directly supplied from the LVMS & no additional functionality implemented on all required Printed Circuit Boards (PCBs) & the interfaces must be reduced to the minimum necessary signals.

▶ Disconnect brake system encoder from BSPD while throttle is open.

150 O Power to ignition & fuel pump(s) must shut down.

▶ Disconnect throttle position sensor from BSPD and press brake pedal while throttle is open.

151 O Power to ignition & fuel pump(s) must shut down.

▶ Team simulates a throttle of >25%, press brake representing hard braking (>500 ms).

152 O Must open the shutdown circuit and kill ignition & fuel pump(s).

153 O Reactivation by the driver is not possible. May reset itself if the opening condition is no longer present for more than 10s.

▶ Power cycle vehicle (reset BSPD).

☐ TIS STATUS UPDATE

▶ Set online TIS status to *Passed* or *Failed*

NON-COMPLIANCE / COMMENTS

APPROVAL

	Inspector Names	Date, Time	Signatures when passed
1.	_____ / _____	_____	_____

[1] Calculated for the specific engine per formula: TEST RPM = (15,25*60*1000)/(2*STROKE (mm))

PART IX: BRAKE TEST

☐ TIS STATUS UPDATE

▶ Set online TIS status to *In Progress*

☐ COMMENTS

▶ Check comments from first page

☐ BRAKE TEST

154 O **BRAKING PERFORMANCE** - Must lock all four wheels (roughly at the same time) and stop the vehicle in a straight line at the end of an acceleration run specified by the officials without stalling the engine.

155 O **BRAKE LIGHT** - has to be clearly visible even in bright sunlight

☐ TIS STATUS UPDATE

▶ Set online TIS status to *Passed* or *Failed*

NON-COMPLIANCE / COMMENTS

APPROVAL

	Inspector Names	Date, Time	Signatures when passed
1.	_____ / _____	_____	_____