

University:	Dolor University	Present the vehicle for inspection in the following order 1. Pre-Inspection 2. Egress Test 3. Mechanical Inspection 4. Tilt Test 5. Noise Test 6. Brake Test
Vehicle number:	421	
Engine:		
Bore/Stroke:		
Fuel Type:		
ETC:		
ABS:		

INFORMATION

USED SYMBOLS

- Information
- ▲ Action
- △ Check is the responsibility of the team
- Check

NOTES

- This sheet must always stay with the push bar.
- Technical inspection approval voids if the inspection sheet is lost.
- If there is a conflict between this sheet and the rules, the rules prevail.

PART I: PRE-INSPECTION

APPROVAL

Inspector Names	Date and Time	Signatures when passed
_____	_____	_____
_____	_____	_____

○ TIRES

- | | |
|--|---|
| 1 ○ DRY TIRES - Make
_____ | 4 ○ WET TIRES - Make
_____ |
| 2 ○ DRY TIRES - Size
_____ | 5 ○ WET TIRES - Size
_____ |
| 3 ○ DRY TIRES - Compound
_____ | 6 ○ WET TIRES - Compound
_____ |
| | 7 ○ WET TIRES - 2.4 mm min. tread depth molded by tire manufacturer
_____ |

○ DRIVER GEAR AND SAFETY

- Fire-resistant clothing must not be older than 10 years, recognizable since no FIA hologram label present.
- 8 ○ **FACE SHIELDS** - Made of impact resistant material.
- 9 ○ **UNDERWEAR** - Must be made from acceptable fire-resistant material as listed in T 13.3.13 and must cover the driver's body completely from neck down to ankles and wrists.
- 10 ○ **SOCKS** - Nomex or equivalent, fire-resistant socks (no cotton, no polyester, no bare skin).
- 11 ○ **GLOVES** - Fire resistant material. No holes. Leather is allowed only over fire-resistant material.
- 12 ○ **ARM RESTRAINTS** - SFI Standard 3.3 or equivalent.
- 13 ○ **HELMETS** - Snell K2015, K2020, M2015, M2020, SA2020, EA2016 or newer, SFI 31.1/2015, 31.1/2020, 41.1/2015, 41.1/2020 or newer, FIA 8860-2010, FIA 8860-2018, FIA 8859-2015 or newer. Closed Face, no Open Face, must have integrated shield (no dirt bike helmets). No camera mounts.
- 14 ○ **FRONTAL HEAD RESTRAINT** - If FHR/HANS is used, it must be certified to one of the following standards and be labelled as such - FIA 8858-2010, FIA 8860-2004, SFI 38.1.
- 15 ○ **DRIVER SUITS** - SFI 3.2A/5 (or higher), SFI 3.4/5 (or higher), FIA Standard 8856-2000 or FIA Standard 8856-2018.
- 16 ○ **HAIR COVER** - Fire resistant (Nomex or equiv.) balaclava of full helmet skirt **REQUIRED FOR ALL DRIVERS.**
- 17 ○ **SHOES** - SFI 3.3 or FIA 8856-2000/2018.

NON-COMPLIANCE/COMMENTS

PART II: EGRESS TEST

APPROVAL

Inspector Names	Date and Time	Signatures when passed

DRIVER POSITION

- | | |
|---|--|
| <p>18 <input type="radio"/> ARM RESTRAINTS - Must be installed, so the driver can release them and exit unassisted regardless of the vehicle's position.</p> <p>19 <input type="radio"/> HEAD RESTRAINT - Near vertical. Max. 25 mm from helmet. Helmet contact point 50 mm min. from any edge.</p> <p>20 <input type="radio"/> MAIN HOOP AND FRONT HOOP HEIGHTS - Helmet of driver to be 50 mm below the line between the top of the front and main roll hoop</p> | <p>AND between the top of the main hoop to rear attachment point of main hoop bracing.</p> <p>21 <input type="radio"/> LAP BELT MOUNTING - Must pass over pelvic area between 45° and 65° to horizontal for upright driver, 60° to 80° for reclined. The lap belts must not be routed over the sides of the seat.</p> <p>22 <input type="radio"/> SHOULDER HARNESS MOUNTING - Angle from shoulder between 10° up and 20° down to horizontal.</p> |
|---|--|

DRIVER EGRESS TEST

- | | |
|--|---|
| <p><input checked="" type="radio"/> All drivers must be able to exit the vehicle in less than 5 s.</p> | <p><input checked="" type="radio"/> Driver must be seated in ready-to-race condition.</p> |
|--|---|

EGRESS PROCEDURE

- | | |
|--|---|
| <p>▲ Both hands on the steering wheel - in all possible steering positions.</p> <p>▲ Pressing cockpit-mounted shutdown button.</p> | <p>▲ The egress time will stop when the driver has both feet on the ground.</p> |
|--|---|

DRIVER APPROVAL AND RUN DOCUMENTATION

Driver Name	Driver ID	Approved by	Acc	SkidPad	AutoX	Endurance
			○ ○	○ ○	○ ○	○ ○
			○ ○	○ ○	○ ○	○ ○
			○ ○	○ ○	○ ○	○ ○
			○ ○	○ ○	○ ○	○ ○
			○ ○	○ ○	○ ○	○ ○
			○ ○	○ ○	○ ○	○ ○

NON-COMPLIANCE/COMMENTS

PART III: MECHANICAL INSPECTION

APPROVAL

Inspector Names	Date and Time	Signatures when passed

INSPECTION RULES

- The time limit for each attempt at this technical inspection is 75 min. 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.
- Only tools needed for the (dis)assembly of parts for mechanical inspection.

○ TIS STATUS UPDATE/TIMER

- ▲ Set online TIS to Present
- ▲ Atach/place the timer
- ▲ Start the timer

○ VEHICLE WITH TALLEST DRIVER READY TO RACE

- | | |
|--|--|
| <p>23 ○ 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) fire extinguishers are prohibited, 1 WITH VEHICLE securely installed on push bar, 1 in paddock. (Must see BOTH at Tech.). On-board fire system possible.</p> <p>24 ○ PUSH BAR (red color) - With vehicle, securely attached to the vehicle, detachable, push and pull function for 2 people. University name on it.</p> <p>25 △ CAMERAS - Must be secured by two points on different sides of the camera body, see T 11.11. No cameras mounted to helmet.</p> <p>26 ○ VISIBILITY - Minimum of 100° field either side. Head rotation allowed or mirrors. If mirrors, must be firmly installed and adjusted.</p> <p>27 △ VEHICLE CONTROLS - All controls, including the shifter, must be inside the cockpit. No arms or elbows outside the SIS plane.</p> <p>28 ○ DRIVER FLUID PROTECTION - A firewall (rigidly mounted cover plate for cooling systems using plain water) must extend sufficiently far upwards and/or rearwards such that any point, less than 100 mm above the bottom of the helmet of the tallest driver, is not in a straight line of sight with any of the following parts: fuel supply system, hydraulic fluid (except brake system and dampers), flammable liquids and low voltage battery.</p> <p>29 ○ ROLL BAR PADDING - Roll bar or bracing that could be hit by the driver's helmet must be covered with 12 mm thick, SFI spec 45.1 or FIA 8857-2001 padding.</p> | <p>30 △ OTHER SIDE TUBES - Design prevents driver's neck hitting bracing or other side tubes</p> <p>31 ○ HEAD RESTRAINT - Near vertical. Must take 890 N load. 40 mm thick, SFI 45.2 standard or FIA technical list n°17 type B. Max. 25 mm from helmet. Helmet contact point 50 mm min. from any edge. May be changed for different drivers. Minimum 150x150 mm.</p> <p>32 ○ DRIVER RESTRAINT HARNESS - SFI 16.1, SFI 16.5, SFI 16.6, or FIA 8853/2016. 6- or 7-point system – Two-piece lap belt (min. width 50 mm), two shoulder straps (min. width 75 mm) and two leg or anti-submarine straps (min. width 50 mm). (7-point system must have three anti-submarine straps). Must be securely attached to prim. structure (25.4 × 2.4 mm or equal.)</p> <p>33 ○ LAP BELT MOUNTING - Pivoting mounting with eye bolts or shoulder bolts attached securely to Primary Structure. Min. tab thickness 1.6 mm. Attachment brackets to the monocoque must be steel, see T 5.3.2.</p> <p>34 ○ SHOULDER HARNESS MOUNTING - Mounting points 180 mm to 230 mm apart (measured center to center). Angle from shoulder between 10° up and 20° down to horizontal. Attach to Primary Structure - 25.4 × 2.4 mm or 25.0 × 2.5 mm steel tube min. NOT to put bending loads into the Main Hoop Bracing without extra bracing. Additional braces if not straight to the main hoop. Cannot pass through a firewall. Attachment brackets to the monocoque must be steel.</p> <p>35 ○ SUSPENSION - Fully operational with dampers front and rear; 50 mm minimum wheel travel (minimum jounce of 25 mm) with driver in vehicle.</p> |
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○ VEHICLE WITHOUT DRIVER

- 36 △ **TECH STICKER SPACE** - 45 × 175 mm on the centerline of front of the vehicle in front of the cockpit opening
- 37 △ **SCHOOL NAME AND OTHER DECALS** - School Name, or recognized initials - min. 50 mm tall (all letters). on both sides in Roman letters. Must be clearly visible.
- 38 △ **VEHICLE NUMBERS** - On front and both sides of vehicle, minimum 150 mm tall, 20 mm stroke and spacing, 25 mm min. between number and background edge, Black on White, White on Black only, and specified background shapes. Must be clearly visible, font: Roman Sans-Serif characters. Combustion hybrid vehicles have to be identified by an additional marking next to all three vehicle numbers with the capital letters "HY", Roman Sans-Serif, 75 mm high, white on red background.
- 39 △ **BODYWORK/AERODYNAMIC DEVICES EDGES** - Edges that could contact with any standing pedestrian without reaching to the vehicle must have a minimum radius of 3.0 mm for all forward-facing edges and 1.0 mm for all other edges (safety requirement).
- 40 △ **BODY AND STYLING** - Open wheeled, open cockpit, formula style body. Vertical keep-out zones 75 mm in front and behind tires (no aero exceptions), tires unobstructed from sides.
- 41 ○ **BODYWORK** - Min. 38 mm radius on nose. No large openings in bodywork into the driver compartment in front of or alongside the driver, (except cockpit opening). Any gaps between bodywork and other parts must be reduced to a minimum. No external concave radii of curvatures in front of the cockpit opening and T 8.2 (in side view).
- 42 ○ **AERODYNAMIC DEVICES** - Securely mounted. The deflection may not exceed 10 mm when a force of 200 N is applied over a surface of 225 cm² and not more than 25 mm when a point force of 50 N is applied.
- 43 △ **AERODYNAMICS** - ALL aerodynamic devices maximum 250 mm rearward of rear tires, maximum 700 mm forward of front tires. Devices lower than 500 mm 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 500 mm behind the front axle must not be wider than the inside of the rear tires.
- 44 △ **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 500 mm from the ground. Rear device max 1.2 m above ground (incl. end plates); Front device max 250 mm above ground outside of the inside plane of the front tires inside this plane max 500 mm.
- 45 ○ **AIR SYSTEM ROLL OVER PROTECTION** - All parts of the air intake system (including throttle body or carb, air intake ducting, air cleaner and air box) must be within a surface defined by the top of the main hoop and the outside top edge of the tires.
- 46 ○ **AIR INTAKE SYSTEM** - Must be supported if cantilevered (isolated to frame, rigid to engine). Any portion < 350 mm above ground must be protected from impacts, see CV T 3.15. Impact protection must follow CV T 3.16 when having bolted attachments. Intercooler after throttle body.
- 47 △ **SEAT** - Insulated against heat conduction, convection and radiation. The lowest point no lower than the top of the upper surface of the lowest SIS member OR must have a longitudinal, 25.4 × 1.65 mm steel tube underneath.
- 48 ○ **COCKPIT OPENING** - Fig. 12 (left) template passes down from above the cockpit to below the upper side impact member. The steering wheel, seat and padding can be removed. No removing of firewall.
- 49 ○ **COCKPIT INTERNAL CROSS SECTION** - Fig. 11 (right) template passes from the cockpit opening to 100 mm rear of the rearmost pedal contact area (in most forward position). The steering wheel and paddings can be removed (without tools).
- 50 △ **STEERING WHEEL** - Continuous perimeter, near round (no concave sections) with driver-operable quick disconnect. 250 mm max from the front hoop.
- 51 △ **ROTATING PARTS** - Finger guards are required to cover any parts (e.g. fans) that spin while the vehicle is stationary. No holes > 12 mm dia.
- 52 ○ **FUEL SYSTEM ROLL OVER PROTECTION** - All parts of the fuel storage, supply and fuel control system systems (including fuel rail, throttle body or carburetor), must lie within a surface defined by the top of the main hoop and the outside top edge of the tires.
- 53 ○ **FUEL FILLER NECK** - Min. 35 mm dia., within 30° of vertical. Fuel-resistant, transparent sight tube or transparent filler neck (material must be rated for at least 120 °C). min 125 mm vert. height visible to the fueler with the vehicle fully assembled, with a non-moveable fuel level line 12-25 mm below the top of the sight tube. The sight tube must NOT run below the top of the tank. Must prevent fuel spillage from contacting

the driver, exhaust or ignition. Fueled w/o manipulating the vehicle in any way. Cap secure and capable of withstanding pressurization (ie: threads or latch).

- 54 Δ **REFUELING** - Must be able to be accomplished

○ REMOVE BODY PANELS

- 56 \circ **DRIVER'S LEG PROTECTION** - Covers inside of cockpit over any sharp edges or moving suspension / steering components.
- 57 \circ **DRIVER'S FOOT PROTECTION** - Feet must be rearward of the Front Bulkhead and no part of shoes or legs above or outside the Major Structure (25x1.2 or equivalent) in side or front views when touching the pedals.
- 58 \circ **PERCY** - Helmet of 95th percentile male (PERCY) to be 50 mm below the lines between the top of the front and main roll hoops and between the top of the main hoop to rear attachment point of main hoop bracing. Center of bottom circle placed minimum 915 mm from pedals.
- 59 \circ **BRAKES** - Dual hydraulic system and 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. Any part of the brake system must be within the surface envelope. Brake pedal capable of 2000 N, no failures if official exerts max force (seated normally in the vehicle).
- 60 Δ **BRAKE OVER TRAVEL SWITCH** - In the event of a failure in one or both brake circuits the brake pedal over travel will result in the shutdown circuit being opened.
- 61 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.
- 62 \circ **TUBING AND MATERIALS** - Team must show an APPROVED SES. No Magnesium tubes in the primary structure.
- 63 \circ **MONOCOQUE** - Must see laminate test specimen. All samples must be marked with the following non-removable (e.g.: permanent marker or engraving, but no sticker) information: laminated structure acronym and date of testing. Steel backing plates (≥ 2 mm thick) used at attachment points (must be fully supported).
- 64 \circ **BOLTED JOINTS** - In primary structure - distance hole centerline to the nearest free edge $> 1.5 \times$ hole diameter.

without the removal of any body parts of the vehicle.

- 55 \circ **FUEL VENTS** - Must exit outside the bodywork and have a check valve to prevent leakage if the vehicle is inverted.
- 65 \circ **MAIN HOOP** - MUST BE STEEL. Check dimensions as shown in the approved SES. Must be made of one piece and extend to the lowest frame member. Above Major Structure, must be within 10° of vertical plane. Smooth bends without wrinkles.
- 66 \circ **MAIN HOOP BRACING** - MUST BE STEEL. One straight brace on each side. Dimension as shown in the approved SES. Attached within 160 mm from the top. Min. 30° Included angle with hoop. If the main hoop is not vertical, bracing must not be on the 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 the load back to the bottom of the main hoop and node of the upper side impact tube through proper triangulated structure. (25.4×1.2 mm or equivalent)
- 67 \circ **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 the top of the steering wheel. Max. 20° to vertical. Check dimensions as shown in the approved SES. Requires 6 attachment points – 2 on each side connecting to front bulkhead support structures and two connecting to front hoop bracing.
- 68 \circ **FRONT HOOP BRACING** - Two straight forward-facing braces, $25.4 \text{ mm} \times 1.65$ or 25.0×1.75 mm or 25.4×1.6 mm wall steel or equivalent, attached within 50 mm of top and must have a minimum distance of 100 mm between each other at the front hoop. Extra rearward bracing is required if the Front Hoop leans backwards more than 10° .
- 69 \circ **SIDE IMPACT PROTECTION** - Min. of 2 tubes + diagonal must connect the main and front hoops in a straight line. The upper tube between 240 - 320 mm above the lowest inside chassis point between FH and MH. Dimension as shown in approved SES.
- 70 \circ **FRONT IMPACT PROTECTION** - No non-crushable objects forward of bulkhead. IMPACT ATTENUATOR forward of the bulkhead, 200 mm long \times 200 mm wide \times 100 mm high. No portion of the required $100 \times 200 \times 200$ mm volume of the IA can be positioned more than 350 mm above the ground. No wing supports through the IA. IA must be securely fastened directly to AIP capable

of taking transverse and vertical loads (no tape, etc.) Test piece presented and same as IA on vehicle. Standard IA: Requires diagonal brace if bulkhead >25.4 mm from IA on any side, adhesive used to mount standard IA to AIP must have a shear strength of at least 24 MPa.

- 71 ○ **ANTI INTRUSION PLATE** - A 1.5 mm solid steel or 4.0 mm solid aluminum sheet. Must be welded (size: min. to centerlines) or min. 8 screws M8 Grade 8.8 critical fasteners T10 (size: min. outside dimensions). CFRP plate is accepted if SES is approved. Attachment(s) using adhesive must be able to carry a load of 60kN in any direction.
- 72 ○ **FRONT BULKHEAD SUPPORT** - Support back to front roll hoop; 3 tubes per side, all 25 × 1.5 mm wall steel tube or equiv. 1 bottom; 1 top within 50 mm of top of bulk-head and connecting within 100 mm above and 50 mm below upper SIS tube; 1 or more node-to-node diagonal to completely triangulate connections to upper and lower SIS tubes.
- 73 ○ **INSPECTION HOLES** - 4.5 mm inspection holes required in non-critical areas of front and main

hoops. Inspectors may ask for holes in other tube(s).

- 74 ○ **JACKS** - One or two devices that must be available to safely lift and hold all driven wheels min. 100 mm above the ground. In lifted position the jack (s) must be locked/secured and function without the support of a person or additional weights. It must be safe for the driver to enter and exit the vehicle. The device must not extend out of the vehicle's projected surface area. Device pick-up points must be indicated by orange triangles on both sides. University name on it.
- 75 ○ **WHEELS** - 203.2 mm (8") min. diam. No Aluminum or hollow wheel bolts. Single retaining nut must incorporate a device to retain the nut. Aluminum wheel nuts must be hard anodized.
- 76 ○ **FIREWALL** - Fire resistant material; must separate driver compartment from cooling, oil system and LV battery. Passthroughs are OK with grommets. Multiple panels are OK if gaps are sealed. No gaps at the sides or bottom. Must be rigidly mounted to the chassis. Material must meet UL94-V0, FAR 25.853(a)(1)(i) or equivalent (THICKNESS NEEDED IN DATA SHEET).

○ **VEHICLE LIFTED AND WHEELS REMOVED**

- 77 ○ **SUSPENSION PICK-UP POINTS** - Inspected thoroughly for integrity.
- 78 ○ **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. Alternative fasteners allowed for steering and suspension if equivalency can be shown.
- 79 ○ **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° max. free play at the steering wheel. NO STEER-BY-WIRE on front wheels. Rear wheel steering, max. 6° and mechanical stops installed. No bonded joints in the steering column.
- 80 △ **FLOOR CLOSEOUT PANEL** - Required from foot area to firewall; solid, non-brittle material; multiple panels are OK if gaps less than 3 mm.
- 81 ○ **ENGINE** - Four cycle piston engine. Waste heat recovery allowed. Hybrid powertrains must use

purely electrical energy storage.

- 82 ○ **ON-BOARD STARTER** - Required.
- 83 ○ **COMPRESSORS** - Turbo or super chargers allowed if not OEM to engine; must be between the restrictor and throttle. Carburetors are not allowed if compressors are used. Compressor recirculation valves are ok if located downstream of restrictor.
- 84 ○ **INTAKE MANIFOLD** - Securely attached to block or head with mech. Fasteners (positive locking!). OEM-type rubber bushings are not sufficient. If less than 350 mm, must be shielded (CV 1.3.2)
- 85 ○ **RESTRICTOR** - Must be circular; max. diam. 20 mm for gasoline fueled vehicles and 19 mm for E85 fueled vehicles. Cannot be movable. Placed before the compressor.
- 86 ○ **THROTTLE** - Must have a minimum of 2 springs (1 spring when ETC installed) at the TB, each capable of closing the throttle independently. TPS is not acceptable as a return spring. The cable must have a smooth operation with no binding or sticking; min. 50 mm from any exhaust component.
- 87 ○ **THROTTLE PEDAL** - Must have a positive stop to prevent overstressing cable
- 88 ○ **ENGINE LUBRICATION SYSTEM** - The lowest point of the engine lubrication system is not lower than the lowest frame part. Otherwise, a protection structure mounted to the chassis is nec-

- essary.
- 89 ○ **GAS CYLINDERS** - Proprietary manufacture and labeled, Nonflammable gas, regulator on tank, securely mounted, axis not pointed at driver, within the rollover protection envelope, or in structural side pod, insulated from the exhaust, appropriate lines and fittings. Positively retained, i.e., no tie-wraps. Gas cylinders/tanks and their pressure regulators must be shielded from the driver. The shields must be steel or aluminum with a minimum thickness of 1 mm.
 - 90 ○ **SCATTERSHIELDS INCL. MOUNTING** - Required for clutches, chains, belts, etc. No holes. 6 mm diam. Grade 8.8 minimum. End parallel to the lowest part of the sprocket/pulley in front and rear.
 - 91 △ **SCATTERSHIELD MATERIALS** - For chains, 2 mm min. thick solid STEEL, 3 x chain width. For belts, 3 mm min. thick Al 6061-T6, 3 x belt width. Finger guards: cover all drivetrain parts that spin while the vehicle is stationary. No holes > 12 mm dia.
 - 92 ○ **LV BATTERY** - Rigid and sturdy casing and attached securely to frame or chassis. Battery behind a firewall; wet cells in IPX7 rated and acid resistant casing if inside cockpit. Must be contained within the rollover protection envelope, see T 1.1.16. Grounded to chassis; hot terminal insulated; protected for short circuits (fused). No circuits > 60V_{DC}. Completely closed LV battery cases must have an overpressure relief. Venting gases must be separated from the driver by a firewall.
 - 93 ○ **STUDENT BUILD LV BATTERY** - Proper Insulation of internal connections; proper mounting of cells.
 - 94 ○ **LI-ION LV BATTERY** - 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 percent of the cells; voltage protection of all cells; it must be possible to display all cell voltages and measured temperatures on a team laptop.
 - 95 ○ **HIGH PRESS HYDRAULICS** - Pumps and lines must have 1 mm steel or aluminum shields protecting driver and workers.
 - 96 ○ Including all autonomous system high pressure hydraulics like the ASB.
 - 97 △ **COOLANT** - 100 percent water. NO ADDITIVES WHATSOEVER.
 - 98 ○ **CATCH TANKS** - Any coolant overflow or combustion engine lubrication system vents must have separate catch tanks. 0.9L or 10 percent of the fluid being contained minimum volume each, whichever is greater. 100°C material, behind firewall, below shoulder level. 3 mm min. dia. vent away from the driver down to the bottom level of the frame. Trans or diff., cooling systems using plain water, unless sealed, require 100 mL catch tanks.
 - 99 △ **FLUID LEAKS** - Oil, grease, coolant, fuel, Brake fluid → none permitted
 - 100 ○ **FUEL RAIL** - Securely attached to block (no nylon nuts), head or int. manifold with brackets and mech. fasteners (grade min. 8.8). Plastic, carbon fiber or rapid prototyping flammable materials are prohibited.
 - 101 ○ **FUEL TANKS** - Must lie within rollover protection envelope (T 1.1.16), except the filler neck if its 350 mm above the ground, with full side impact protection and firewall between fuel supply and driver, min. 50 mm away from exhaust components. Rigid tanks cannot carry structural load and must be flexibly mounted and must not touch anything else than its mounting.
 - 102 ○ **BELLYPANS** - In a total minimum of two venting holes of at least 25 mm 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.
 - 103 ○ **FUEL LINES** - All parts of the fuel system which can come in contact with the fuel must be rated for permanent contact with fuel. Fuel injection systems must use a metal braided hose with threaded fittings or reinforced beaded rubber hose with approved clamps (beaded or barbed hose fitting must be used if hose and clamp style connection used). Must be securely attached and protected from possible rotating equipment or collision failure. No plastic connectors in the fuel line. High-pressure injection systems see CV 2.5.2. All fuel lines must be fitted in such a way that any leakage cannot result in the accumulation of fuel in the cockpit. Must be rated for temperatures of at least 120°C. Use of unmodified OEM fuel lines and connectors (including plastic) is acceptable.
 - 104 ○ **BRAKE LIGHT** - Only one RED brake light, clearly visible from the rear; on vehicle centerline; height between wheel centerline and driver's shoulders. Round, triangle, or rectangular on black background. At least 15 cm² illuminated area. LED strips OK if elements closer than 20 mm apart and total length ≥ 150 mm.

○ BRAKE SYSTEM PLAUSIBILITY DEVICE (BSPD)

- 105 △ Must be directly supplied from the LVMS and no additional functionality implemented on all required Printed Circuit Boards (PCBs) and the interfaces must be reduced to the minimum necessary signals.
▲ Disconnect brake system encoder from BSPD while the throttle is open.
- 106 ○ Power to ignition and fuel pump(s) must shut down.
▲ Disconnect throttle position sensor from BSPD and press brake pedal while throttle is open.
- 107 ○ Power to ignition and fuel pump(s) must shut down.
▲ Team simulates a throttle of >25 percent, press brake representing hard braking (>500 ms).
- 108 ○ Must open the shutdown circuit and kill ignition and fuel pump(s).
- 109 ○ Reactivation by the driver is not possible. May reset itself if the opening condition is no longer present.
▲ Power cycle vehicle (reset BSPD).

○ ACCELERATION PEDAL POSITION (APPS)

- 110 ○ Accelerator Pedal returns to the original position if not actuated.
▲ Disassemble one spring.
- 111 ○ At least two sensors with different transfer functions are installed. For digital sensors, a checksum is necessary.
- 112 ○ Sensors do not share supply or signal lines.
- 113 ○ Sensors are protected from being mechanically overstressed - positive stop of the pedal.
- 114 ○ Minimum two springs installed to return pedal.
- 115 ○ Each spring still returns the pedal with the second one disconnected - springs in the APPSs not counted.
▲ Open throttle and disconnect APPS(s).
- 116 ○ 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)

- 117 ○ 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 the throttle is open.
- 118 ○ Throttle must return to idle position in one second.
- 119 ○ At least two Throttle Position Sensors (TPS) installed.
▲ Open throttle and disconnect TPS(s).
- 120 ○ 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.
- 121 ○ 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 the idle position for at least one second.

○ HYBRID

- 122 ○ **HSD** - Hybrid system definition accepted?
- 123 ○ **LOW VOLTAGE** - Voltage < 60 V are allowed. The hybrid system will be incorporated into the CV shutdown circuit. The HSC AIR must be part of the Shutdown circuit.
- 124 ○ **BATTERY** - Maximum weight 3 kg without cooling liquid, but with electronic safety relay and casing. Fuel cells, flywheels and pressure containers are prohibited. Must have fire-retardant casing (T1.2.1). Must be removable. Must meet T11.7.7.
- 125 ○ **BMS** - Battery management system is required.
- 126 ○ **FIREWALL** - A firewall must be present between the low-voltage battery and the fuel tank.
- 127 ○ **POSITION** - All components must be inside surface envelope, battery must be inside rollover envelope.
- 128 ○ **MOTORS (EV 2.1)** - Only electric motors are allowed. Motor attachments must follow T 10 (critical fasteners). Motor casings must follow T 7.3. The motor(s) must be connected to the accumulator through a motor controller.

- 129 ○ **COOLING** - May only use air, water or oil as a coolant.
- 130 ○ **APPS** - At least two separate sensors must be used as APPS. They may share housing.
- 131 ○ **DEPLOYMENT** - The Hybrid System may only be deployed if the Combustion Engine is running or when the Starter Button is pushed.
- 132 ○ **HSC** - Must comply to T 11.7 regardless of chemistry type. If multiple HSCs are used, their total weight is limited to 3 kg.
- 133 ○ **SAFETY MECHANISMS** - The HSC must include overcurrent protection that trips at or below the maximum specified charge current of the cells. The disconnection mechanism must be designed as an AIR internal to the HSC, disconnecting the positive pole of the HSC. All electrical parts of the hybrid system must be IPxxB compliant when energized.
- 134 ○ **FUSE** - A fuse rated for the maximum specified discharge current of the cells must be implemented as required in T 11.7.7.

○ **TIS STATUS UPDATE/TIMER**

- ▲ Set online TIS to Passed or Failed
- ▲ Stop the timer
- ▲ Collect the timer

NON-COMPLIANCE/COMMENTS

PART IV: TILT TEST

APPROVAL

Inspector Names	Date and Time	Signatures when passed
_____	_____	_____
_____	_____	_____

TILT TEST

- 135 **FLUID LEAKAGE** - No fluid spill permitted when the vehicle is tilted to 60° in the direction most likely to create spillage. Tanks must be filled to the scribe line with non-moveable fuel level line 12-25 mm below the top of the sight tube.
- 136 **VEHICLE STABILITY** - All wheels in contact with tilt table when tilted to 60° to the horizontal.
- 137 **FUEL TYPE** - 98 or ethanol.
- 138 **GROUND CLEARANCE** - At least 30 mm with driver. If an active suspension is installed, the static ground clearance is measured in the lowest adjustable position

NON-COMPLIANCE/COMMENTS

PART V: NOISE TEST

APPROVAL

Inspector Names	Date and Time	Signatures when passed

NOISE TEST

- 139 ▲ **TEST RPM** - Test at 7500 rpm.
- 140 ○ **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° to the outlet. If multiple outlets, all to be checked. If movable tuning or throttling device, see IN 10.1.6.
- 141 ○ **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° to the outlet. If multiple outlets, all to be checked. Movable tuning or throttling device must be in "worst condition"
- 142 ○ **LOW VOLTAGE MASTER SWITCH** - Access from outside of vehicle, rotary type, no relay, must kill ALL electrical systems. Must cause the engine to stop when actuated. Perform at around 5000 rpm.
- 143 ○ **SHUTDOWN BUTTONS 1** - Push-pull or push-rotate. Unobstructed by the steering wheel, easily reached by belted-in driver. Must kill ignition and fuel pump(s). Must be red and marked with the international symbol. Must cause the engine to stop when actuated. Perform at around 5000 rpm.
- 144 ○ **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 easily reachable from outside the vehicle. Must kill ignition and fuel pump(s). Must be red and marked with the international symbol. Must cause the engine to stop when actuated (Perform at around 5000 rpm).
- 145 ○ **INERTIA SWITCH** - Rigidly attached to the vehicle according to manufacturer specification, demountable for functionality check. Must open the shutdown circuit and kill ignition and fuel pump(s) when accelerated between 6g and 11g (T 11.5). Must cause the engine to stop when actuated. Perform at around 5000 rpm.
- 146 ○ **BRAKE PEDAL OVER-TRAVEL SWITCH** - Must constantly open the shutdown circuit if one brake circuit fails for the brake balance bar in all possible positions. No restart if released or actuated a second time. Push-pull or flip type Must NOT rely on programming to work. Not resettable by the driver. Perform at around 5000 rpm.
- 147 ○ **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.
- 148 ○ **EXHAUST OUTLET** - Outlet no more than 45 cm behind rear axle centerline or more than 60 cm above the ground.
- 149 ○ **EXHAUST SHIELDING** - components that protrude from the side of the chassis in front of the rear axle must be to prevent contact by persons approaching the vehicle or a driver exiting the vehicle. No fibrous/cloth wraps around exhaust tubes.

NON-COMPLIANCE/COMMENTS

PART VI: BRAKE TEST

APPROVAL

Inspector Names	Date and Time	Signatures when passed
_____	_____	_____
_____	_____	_____

BRAKE TEST

- 150 **BRAKING PERFORMANCE** - Must lock all four wheels and stop the vehicle in a straight line at the end of an acceleration run specified by the officials without stalling the engine.
- 151 **BRAKE LIGHT** - Must be clearly visible even in bright sunlight.

NON-COMPLIANCE/COMMENTS