FORMULA STUDENT CZECH REPUBLIC INSPECTION SHEET 2023
EV Class

INFORMATIONS

University:
Vehicle number:
ESF PASSED:
TS VOLTAGE:
BODY PROTECTION R:
ABS:

USED SYMBOLS:
- • Information
- ▶ Action
- △ Check in responsibility of the team
- ○ Check

Present the vehicle for inspection in following order:
Pre-Inspection
1. Accumulator Inspection
2. Low Voltage Inspection
3. Mechanical Inspection
4. High Voltage Inspection
5. Tilt Test
6. Rain Test
7. Brake Test

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

PART I: PRE-INSPECTION

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

☐ TIRES

1 ○ **DRY TIRES** - Make:
_____

2 ○ **DRY TIRES** - Size:
_____

3 ○ **DRY TIRES** - Compound:
_____

4 ○ **WET TIRES** - Make:
_____

5 ○ **WET TIRES** - Size:
_____

6 ○ **WET TIRES** - Compound:
_____

7 ○ **WET TIRES** – 2,4 mm min. tread depth molded by tire manufacturer
_____

☐ DRIVER GEAR & SAFETY

8 ○ **FACE SHIELDS** - Made of impact resistant material.

9 ○ **UNDERWEAR** - Must be made from acceptable fire-resistant material as listed in T 13.3.11 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 allowed only over fire resistant material.

12 ○ **ARM RESTRAINTS** - SFI Standard 3.3 or equivalent.

13 ○ **HELMETS** - Snell K2010, K2015, K2020, M2010, M2015, M2020, SA2010, SAH2010, SA2015, SA2020, EA2016, SFI 31.1/2010, 31.1/2015, 31.1/2020, 41.1/2010, 41.1/2015, 41.1/2020 FIA 8860-2010, FIA 8860-2018, FIA 8859-2015 (with SA 2015), FIA 8858-2010 (with SA(H) 2010). Closed Face, no Open Face, must have integrated shield (no dirt bike helmets). No camera mounts.

14 ○ **DRIVER SUITS** - SFI 3.2A/5 (or higher) • SFI 3.4/5 (or higher) • FIA Standard 8856-2000 • FIA Standard 8856-2018

15 ○ **HAIR COVER** - Fire resistant (Nomex or equiv.) balaclava of full helmet skirt REQUIRED FOR ALL DRIVERS.

16 ○ **SHOES** - SFI 3.3 or FIA 8856-2000/2018

NON-COMPLIANCE / COMMENTS

PART II: EGRESS TEST

☐ DRIVER POSITION

17 ◯ **ARM RESTRAINTS**- Must be installed so the driver can release them and exit unassisted regardless of vehicle's position.

18 ◯ **HEAD RESTRAINT**- Near vertical. Max. 25 mm from helmet. Helmet contact point 50 mm min. from any edge.

19 ◯ **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.

20 ◯ **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.

21 ◯ **SHOULDER HARNESS MOUNTING** - Angle from shoulder between 10 deg. up and 20 deg. down to horizontal.

☐ 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	Driver ID	Signature when passed	Acc	SkidPad	AutoX	Endurance
1.	_____	_____	_____	☐☐	☐☐	☐☐	☐☐
2.	_____	_____	_____	☐☐	☐☐	☐☐	☐☐
3.	_____	_____	_____	☐☐	☐☐	☐☐	☐☐
4.	_____	_____	_____	☐☐	☐☐	☐☐	☐☐
5.	_____	_____	_____	☐☐	☐☐	☐☐	☐☐
6.	_____	_____	_____	☐☐	☐☐	☐☐	☐☐

- The time limit for ACCUMULATOR and ELECTRICAL (LV and HV) inspection is 120 minutes. Continuation of the inspection is possible after requeuing.
- During technical inspection all work carried out on the accumulator must be approved by a technical inspector.

PART III: ACCUMULATOR INSPECTION

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

☐TIS STATUS UPDATE / TIMER

▶ Set online TIS status ▶ Add timer to the hand cart ▶ Start timer

☐ REQUIRED RESOURCES

22 ◯ An ESO must attend.
- All accumulator containers to be used during the event.
- Accumulator Container Hand Cart.
- Charger.
- Tools needed for (dis-)assembly of the Accumulator Container.
- PDF or print-out of rule questions, if necessary.
- Pictures of accumulator internals, if necessary.
- Datasheets for used wiring, insulation materials, and TS components. (Printed or properly sorted on one laptop, not on a cell phone)
- Samples of all wire types used inside the accumulator container.
- Samples of all used accumulator container material.
- Fully assembled spare boards of all inaccessible TS boards inside the accumulator
- Laptop and cables to display data of the AMS

☐ SAFETY BRIEFING

- All accumulator containers to be used during the event.
- no jewelry, no rings
- no cell phone
- no badge / no necklace
- no sources of distraction
- wear safety glasses
- wear safety gloves

☐ BASIC SET OF HV-PROOF TOOLS

23 ◯ Insulated cable shear.
24 ◯ Insulated screwdriver.
25 ◯ Insulated spanners (n/a if no screwed connections in TS).
26 ◯ Multimeter with protected probe tips
27 ◯ Two 4mm banana plug test leads (1000V CAT III)

☐ SAFETY EQUIPMENT

28 ◯ Face shield.
29 ◯ Safety glasses (minimum three).
30 ◯ HV insulating gloves (minimum two pairs).
31 ◯ HV insulating blankets (two) (min 1 m²) with label or serial number and datasheet.

☐ SELF DEVELOPED PCBS

▶ Ask for a fully assembled spare boards of all inaccessible TS boards outside the accumulator
▶ Ask for a fully assembled spare PCB of self-developed PCBs, which carry LV and TS components at the same time.
32 ◯ Sufficient spacing regarding system voltage and implementation.
33 ◯ Sufficient insulation and temperature rating of coating if used, datasheet available.
34 ◯ Coating process according to datasheet
35 ◯ BSPD PCB(s) is standalone with only minimum interface

☐ CHARGER ASSEMBLY

36 ◯ Completely closed. Check openings in HV/TS enclosures, try to reach HV/TS potentials with an insulated test probe (100 mm length, 6 mm diameter).
37 ◯ Interlock integrated.
38 ◯ TSMP integrated
39 ◯ Emergency shutdown button integrated.
40 △ Emergency shutdown button ≥24 mm diameter.
41 ◯ TS wiring is orange, ask team to prove temperature rating > 85°C and voltage rating.
42 ◯ Conductive parts of charging equipment and accumulator are connected to protective earth (PE) while charging.

☐ DIS-CHARGE CIRCUIT AND BODY PROTECTION RESISTORS

▶ Switch off Charger. Measure resistance between TS+ and TS measuring points.
43 ◯ Resistance is BPRs[1]+ discharge resistor, if not measurable, ask for explanation and alternative measurement procedure.
44 ◯ Body protection resistor power rating is sufficient[2]

☐ INSULATION MEASUREMENT TEST

▶ Check low resistance connection between LV ground MP and PE/casing
▶ Choose test voltage according to IN 4.1.1.[3]

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[1] 2 x Body Protection Resistor (BPR)
Umax <200 VDC: 5 kΩ
200 VDC <Umax ≤400 VDC: 10 kΩ
400 VDC <Umax ≤600 VDC: 15 kΩ

[2] sufficient to short circuit TS+ and TS-

[3] $U_{max} \leq 250\ V_{DC}: U_{Test} = 250\ V_{DC}$
$U_{max} > 250\ V_{DC}; U_{Test} = 500 V_{DC}$

▶ Connect insulation tester to charger TS+ and LV ground.
▶ Connect charger (do not activate charger) to accumulator, keep AIRs opened.
▶ Measure resistance: R_{iso+} = kΩ
45 ◯ Resistance is much higher than minimal value[4].
▶ Connect insulation tester to TS- and LV ground.
▶ Measure resistance: R_{iso-} = kΩ
46 ◯ Resistance is much higher than minimal value [4].
47 ◯ Resistances are nearly equal.
▶ Open container housing, remove maintenance plugs.
▶ Check if no voltage is present.

☐ ASSEMBLY

48 ◯ All components and parts of the accumulator container are properly fixed.
49 ◯ TS potentials are insulated against the inner wall of the accumulator container if the container is made from conductive material.
50 ◯ All used fasteners must be secured by the use of positive locking except they are non-conductive and non-structural.
51 ◯ Tabs of pouch cells do not carry mechanical loads. Pouch cells carry mechanical loads only on the large surface areas.
52 ◯ No soldering in high current path
53 ◯ Every container contains at least one appropriately sized and rated fuse.
▶ Check the datasheet of fuse, main wire and cells and compare them to ESF.
54 ◯ Every container contains at least two appropriately sized and rated isolation relays (current and voltage).
55 ◯ Isolation relays and fuses are separated from cells by a barrier according to UL94-V0 or equivalent.
▶ Check datasheet of pre-charge relay and compare to ESF
56 ◯ Pre-charge relay is of mechanical type with appropriate voltage rating.
57 ◯ Maintenance plugs are located at both poles of each stack (including first and last stack). Removable from both poles.
58 ◯ Maintenance plugs are removable without tools.
59 ◯ Maintenance plugs have a positive locking mechanism.
60 ◯ Maintenance plugs must not be able to unintentionally create circuits or short circuits.
61 ◯ Stacks separated by Maintenance plugs ≤ 120 VDC.
62 ◯ Stacks separated by Maintenance plugs ≤ 6 MJ.
63 ◯ Stacks are insulated and separated by a fire-resistant barrier according to UL94-V0 for min. used thickness or equivalent.
64 ◯ Holes in container only for wiring harness, ventilation, cooling or fasteners, mechanical properties are not influenced.
65 ◯ External openings for cooling or mounted connected cooling ducts are not pointing towards the driver, or if the accumulator is out of the car, towards the operator of the accumulator hand cart.
66 ◯ Check openings in TS enclosures, try to reach TS potentials with an insulated test probe (100 mm length, 6 mm diameter).
67 ◯ If fully closed, an equalizing valve is implemented.
68 ◯ Spare accumulators of the same size, weight, and type.

☐ WIRING

69 ◯ All TS wires have proper overcurrent protection.
70 ◯ No other wires than TS wires are orange.
71 ◯ Securely anchored to withstand at least 200 N, if outside of enclosure.
72 ◯ Located out of the way of possible snagging or damage.
73 ◯ TS and LV wires separated (not valid for Interlock).
74 ◯ Every wire used in the Accumulator container (TS and LV) is rated for maximum TS voltage.
75 ◯ Ask team to prove that TS wires fulfill temperature rating > 85°C and voltage rating
76 ◯ Positive locking mechanism or if no positive locking possible, automotive certified components.
77 ◯ Connectors outside of TS enclosures are physically impossible to electrically connect in other than the design intended configuration
▶ Check if insulated tools needed for the assembly of certified components are available
78 ◯ Insulation is not only insulating tape or rubber-like paint

☐ INDICATOR LIGHT OR VOLTMETER

79 ◯ Indicator light or voltmeter installed
80 ◯ Marked with “Voltage Indicator”
81 ◯ Visible while opening the battery connector.
82 ◯ Hard wired electronics, supplied by TS
▶ Connect power supply with 60 V_{DC}[5]to accumulator TS connector.
83 ◯ Indicator light on or voltmeter showing present TS voltage.
84 ◯ Red (in case of indicator light) and visible in bright sunlight.

☐ ACCUMULATOR MANAGEMENT SYSTEM

85 ◯ A minimum of 30 % of cells equally distributed within TSAC(s) are monitored with temperature sensors.
86 ◯ Every temperature sensor is placed on the negative terminal of the monitored cell or in < 10mm distance on busbar.
87 ◯ If multiple TSACs are used, each one has its own, full AMS and includes exclusive SDC
▶ Ask the team to prepare TSAC for charging
▶ Connect charger to battery/batteries, start charging process.
▶ Do following procedure for all TSACs, if applicable
▶ Disconnect AMS current sensor connector
88 ◯ The AMS must open the shutdown circuit within 0.5 s.
▶ Disconnect one SINGLE voltage sense wire, if any wires are used.
89 ◯ The AMS must open the shutdown circuit within 0.5 s.
▶ Ask the team to connect their laptop to the AMS.
90 ◯ Cell voltages can be displayed.
91 ◯ Cell temperatures can be displayed.
▶ Disconnect AMS internal connector used for cell temperature measurement
92 ◯ Respective failed cell temperature measurement is displayed
93 ◯ Plausible accumulator current can be displayed.

☐ CHARGER SHUTDOWN CIRCUIT

94 ◯ IMD is integrated into the charging system
▶ Connect charger to battery/batteries, start charging process
95 ◯ Voltage indicator shows that HV is present
▶ Press shutdown button
96 ◯ AIRs open
97 ◯ Voltage indicator shows voltage <60 V
▶ Start charging, unplug TS accumulator connector
98 ◯ AIRs open.
99 ◯ Charger disabled, no voltage at charger connector

[4] Minimal Resistance = 500 Ω/V · U_{max} + BPR

[5] 60 V or half the nominal tractive system voltage, whichever is lower

☐ INSULATION MONITORING DEVICE

100 ◯ One IMD ground line is connected to the accumulator container and one ground line is connected to the charger casing by a separate wired connection
▶ $R_{T\,est}$ = kΩ[6]
▶ Activate charger output, connect R_{Test} between TS+ and LV GND.
101 ◯ Shutdown circuits opens within 30 s.
102 ◯ TS voltage decreases below 60 V_{DC} within 5 s after shutdown circuit opens.
103 ◯ Reactivation of charger output is not possible.
▶ Push the reset button, if any.
104 ◯ Reactivation of charger output is not possible.
▶ Remove R_{Test}. Wait 40 s until IMD resets status output.
105 ◯ Reactivation of charger output is not possible.
▶ Ask team to perform power cycle to unlatch all faults
▶ Activate TS, connect R_{Test} between TS- and LV GND
106 ◯ Shutdown circuits opens within 30

☐ ACCUMULATOR CONTAINER

▶ Invite mechanical scrutineer for assistance with point #107
▶ Team must show approved SES for the accumulator container.
▶ Team must show SES test samples for the accumulator container if alternative materials are used.
107 ◯ Accumulator container manufactured according to SES.
108 ◯ Internal vertical walls have to be rigidly fastened to the container. Minimum 75% of the height of the external walls. Divide the accumulator in sections of max. 12 kg.
109 ◯ Barriers do not divide any accumulator segment
110 ◯ Cells securely fastened towards all 3 directions.
111 ◯ Vehicle number, university name and ESO phone number(s) written on a high contrast background.
109 △ Roman Sans-Serif characters of at least 20 mm high are used.
110 ◯ Warning stickers with side length of ≥100 mm and text "Always Energized" and "High Voltage" (if TS >60 V) installed. (Triangle with black lightning bolt on yellow background)
111 ◯ Check if all parts and the cover/lid of the housing are rigidly fastened.

☐ HAND CART

112 ◯ Hand cart present with four wheels. Max. dimensions 1200 mm x 800 mm.
113 ◯ Hand cart has an always-on type brake system.
114 ◯ Hand cart provides a firewall with same width as the hand cart, starting at the lowest point of the hand cart (excluding wheels) and is >30cm higher than the handle.
115 ◯ The accumulator must be mechanically fixed to the hand cart while on the hand cart.
116 ◯ The accumulator must be protected from vibrations and shocks.
117 ◯ Label according to point #110 still visible while on hand cart.

☐ SEALING OF COMPONENTS

▶ After all tests have been passed successfully seal the inspected TS housings:
118 ◯ Accumulator container(s) including spares
119 ◯ Charger
120 ◯ Additional Part:
121 ◯ Additional Part:

☐ TIS STATUS UPDATE

▶ Inform scrut management about attempt result
▶ update attempt info table on the beginning of the section

NON-COMPLIANCE / COMMENTS

[6] $R_{T\,est}$ = (max. TS voltage · 250 Ohm/V) - BPR

PART IV: ELECTRICAL INSPECTION

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

☐ TIS STATUS UPDATE / TIMER

▶ Set online TIS status ▶ Add timer to the car ▶ Start timer

☐ REQUIRED RESOURCES

122 ◯ An ESO must attend.
- TSAC mounted into vehicle
- LV battery or cell datasheet
- For self-developed LV battery packs: an opened LV battery pack, laptop, and cables to display data of the LV battery AMS
- Datasheets for used wiring, insulation materials, and TS components. (Printed or properly sorted on one laptop, not on a cell phone)
- At least all non-passed parts of the ESF. (Printed or properly sorted on one laptop, not on a cell phone)
- Samples of all wire types used for the tractive system
- Photographs of all inaccessible TS connections

☐ LV BATTERY

123 ◯ Voltage ≤60 V_{DC}
124 ◯ Rigid and sturdy casing
125 ◯ Only for wet-cell batteries: IPX7 rated and acid resistant casing if inside cockpit
126 ◯ Behind Firewall
127 ◯ Short circuit protection (e.g., fused)
128 ◯ Proper insulation of internal electrical connections
129 ◯ Proper mounting of cells
130 ◯ Complete battery pack inside rollover protection envelope
131 ◯ Has overpressure relief, gas vent behind firewall (only applies to fully enclosed battery case)

▶ Following checks only for Li-Ion batteries other than LiFePO4:

132 ◯ UL94-V0 for min. used thickness or equivalent casing
133 ◯ Overcurrent protection that trips below max. discharge current
134 ◯ Overtemperature protection of at least 30 % of the cells (max. 60°C or datasheet, whichever is lower)
135 ◯ Voltage protection of all cells
136 ◯ Signal failures electrically disconnect the LV battery (SCS) (check the schematics of LV battery AMS)

▶ Ask the team to connect their laptop to the AMS

137 ◯ Cell voltages can be displayed
138 ◯ Cell temperatures can be displayed

☐ MASTER SWITCHES

139 ◯ TSMS & LVMS installed easily accessible on the right side of the vehicle and located next to each other
139 △ All master switches are located above 80% of shoulder height of Percy
140 ◯ Rigidly mounted and no need to be removed during maintenance
141 ◯ Rotary type with removable handle
142 △ Handle length ≥50 mm
143 ◯ "ON" position in horizontal
144 ◯ "ON" and "OFF" positions marked
145 ◯ TSMS with locking mechanism for “OFF” position
146 ◯ LVMS marked with “LV” and symbol showing a red spark in a white edged blue triangle
147 ◯ LVMS mounted on a red circular area on high contrast background
148 △ Circular area diameter ≥ 50 mm
149 ◯ TSMS marked with “TS” and triangle with black lightning bolt on yellow background
150 ◯ TSMS mounted on an orange circular area on high contrast background
151 △ Circular area diameter ≥ 50 mm

☐ MEASURING POINTS

152 ◯ Two TS measuring points on exclusive orange background
153 ◯ A black LV ground measuring point installed
154 ◯ Next to the master switches
155 ◯ 4 mm shrouded banana jacks
156 ◯ Nonconductive cover
157 ◯ Cover removable without tools
158 ◯ Correctly marked (“TS+”, “TS-”, “GND”)

☐ TS SHUTDOWN DEVICES

159 ◯ Two shutdown buttons installed next to the main hoop, right and left on the vehicle at approx. height of the driver's head. Push Pull or Push-Rotate-Pull functionality
160 ◯ Marked with red sparked sticker
161 △ Diameter >39 mm
162 ◯ One cockpit shutdown button installed. Push-Pull or Push Rotate-Pull functionality
163 ◯ Marked with red sparked sticker
164 ◯ Easy actuation by the driver
165 △ Diameter ≥24 mm
166 ◯ Inertia switch rigidly mounted to the chassis with correct orientation (according to datasheet) and can be unmounted for functionality test

- Check interlocks on ...

167 ◯ TS accumulator container(s)
168 ◯ Inverters
169 ◯ HVD
170 ◯ Power distribution boxes
171 ◯ Data Logger box
- If outboard wheel motors are used:

172 ◯ Outboard wheel motors. (Interlocks must act before a TS wiring failure.)
173 ◯ Suspension member (interlock must act in case of suspension failure)

☐ TS VOLTAGE

➡ Measure voltage at TS measuring points

174 ◯ Equal or less than 60 V_{DC}

☐ DIS-CHARGE CIRCUIT AND BODY PROTECTION RESISTORS

▶ Switch off LV. Measure resistance between TS+ and TS- measuring points
175 ◯ Resistance is 2x BPR[7]+ discharge resistor. If not measurable, ask for explanation and alternative measurement procedure
176 ◯ Body protection resistor power rating is sufficient [8]
177 ◯ Dis-charge power rating is sufficient for continuous dis-charge

☐ TS WIRING

178 ◯ All TS wiring and components have to be in the envelope and behind the impact structures
179 ◯ TS wires of outboard wheel motors must not be able to reach the cockpit opening in case of a wire break. Wiring outside of impact structure is the shortest possible distance.
180 ◯ All TS wires and connectors have proper overcurrent protection
181 ◯ Check the set value of OCP in the motor controller against ESF. If bought, check that no major changes regarding OCP have been made. With self-developed briefly check the schematic vs PCB of the HW OCP (SW OCP is not allowed).
182 ◯ TS wiring channels are orange
183 ◯ No other wires than TS wires are orange
184 ◯ TS wiring outside electrical enclosures in separate nonconductive enclosure or orange shielded cable
185 ◯ Securely anchored to withstand at least 200 N, if outside of enclosure
186 ◯ Located out of the way of possible snagging or damage
187 ◯ Shielded against rotating/moving parts
188 ◯ No wire lower than the chassis
189 ◯ TS and LV wires separated (n/a for interlock)
190 ◯ Ask team to prove that TS wires fulfill temperature rating > 85°C and voltage rating[9]
191 ◯ Suitable temperature rating for used position
192 ◯ Positive locking mechanism on every screwed connection. (Photographs for all inaccessible TS connections)
193 ◯ Insulation is not insulating tape or rubber-like paint

☐ HV WARNING STICKERS

▶ Check for warning stickers on TS containing enclosures. (Triangle with black lightning bolt on yellow background)
194 ◯ Inverter(s)
195 ◯ Motor(s)
196 ◯ Power Distribution box(es)
197 ◯ Energy meter box
198 ◯ Other TS containing enclosures

☐ TRACTIVE SYSTEM PROTECTIONS

▶ Check opening in TS enclosures, try to reach TS potentials with insulated test probe (100 mm length, 6 mm diameter)
199 ◯ Not possible to reach any TS potentials
200 ◯ TS components and containers protected from moisture

☐ HIGH VOLTAGE DISCONNECT

201 ◯ Clearly marked with "HVD"
202 △ Distance to ground greater than 350 mm
203 ◯ Inside roll-over protected envelope
204 ◯ Easily visible while standing behind the vehicle
205 ◯ No remote actuation (e.g., through wires)
206 ◯ Integrated interlock
▶ Ask not trained person to assist and ask for removing HVD
207 ◯ Removed within 10 s without tools
208 ◯ TS protection still given (insulated test probe). If a dummy connector is used, it must be stored at the push-bar.

☐ TRACTIVE SYSTEM ACTIVE LIGHT

209 ◯ Mounted below highest point of the main roll hoop (no lower than 75mm) and within the roll-over protected envelope (including mounting)
• Cockpit indicator light . . .
210 ◯ . . . is inside the cockpit and marked with “TS off”
211 ◯ . . . is visible for the driver

☐ DATA LOGGER

212 ◯ data logger is enclosed in a housing
213 ◯ All TS current flowing from/to accumulator flows through the data logger
214 ◯ The TS voltage sense connection is connected to the most positive and most negative pole off TS accumulator. Connection must not carry any current.

☐ FIREWALLS

• Separates any point of the driver (less than 100 mm above the bottom of the helmet of the tallest driver) from any TS component (including TS wiring) . . .
215 ◯ . . . behind the driver’s back
216 ◯ . . . at the sides of the driver
217 ◯ . . . at the front of the vehicle
218 ◯ First layer, facing TS must be made of Aluminum with a thickness of at least 0.5 mm
219 ◯ Second layer, facing driver must be made of electrically insulated material (no CFRP)
220 ◯ Material meets UL94-V0 for min. used thickness or equivalent

☐ ACCELERATOR PEDAL POSITION SENSOR (APPS)

221 ◯ Returns to original position if not actuated
222 ◯ At least two sensors with different transfer functions, each having a positive slope sense with either different gradients and/or offsets to the other(s) are installed. (For digital sensors, a checksum is necessary)
223 ◯ Sensors do not share supply or signal lines

[7] Body Protection Resistor (BPR)

[8] sufficient to short circuit TS+ and TS-

[9] max. TS voltage

224 ◯ Sensors are protected from being mechanically overstressed (positive stop of pedal)
225 ◯ Minimum two springs installed to return pedal
226 ◯ Each spring still returns pedal with the second one disconnected (springs in the torque encoders not counted)

☐ BRAKE LIGHT

227 ◯ Only one brake light
228 ◯ Located on vehicle centerline, height between wheel center line and driver's shoulder
229 ◯ Round, triangle, or rectangular on black background
230 △ 15 cm2 minimum illuminated area OR LED strips with a total length greater than 150 mm with elements <20 mm apart

☐ INSULATION MEASUREMENT TEST

▶ Choose test voltage according to IN 4.1.1[10]
▶ Connect insulation tester to T+ and LV GND measuring point
▶ Measure resistance: R_{iso+} = kΩ
231 ◯ Resistance is much higher than minimal value[11]
▶ Connect insulation tester to T- and LV GND measuring point
▶ Measure resistance: R_{iso-} = kΩ
232 ◯ Resistance is much higher than minimal value[12]
233 ◯ resistances are nearly equal

☐ GROUNDING CHECKS

• Measure resistance between any conductive parts of the vehicle within 100 mm around any TS component, the seat mounting points and the harness attachment points and the LV GND measuring point:

Part (if applicable)	**Conductive** (max. 300 mΩ @ 1 A)	**May become conductive** (max. 100 Ω @ 0 A)
Main Roll Hoop	☐	
Frame / Monocoque	☐	☐
Driver harness mounting points	☐	
Seat mounting points	☐	
Firewall(s)	☐	
Carbon fiber part within 10 cm around TS parts:		☐
Suspension Front left	☐	☐
Suspension Front right	☐	☐
Suspension Rear left	☐	☐
Suspension Rear left or right	☐	☐
Accumulator container	☐	
Accumulator Management System Data Connector	☐	
Conductive housings with TS parts inside	☐	
Radiator	☐	
Additional Part:	☐	☐
Additional Part:	☐	☐
Additional Part:	☐	☐
Additional Part:	☐	☐
Additional Part:	☐	☐

☐ TIS STATUS UPDATE

▶ Inform scrut management about attempt result
▶ Update attempt info table on the beginning of the section

[10] $U_{max} \leq 250\ V_{DC}$ -> $U_{Test} = 250\ V_{DC}$
$U_{max} > 250\ V_{DC}$ -> $U_{Test} = 500 V_{DC}$

[11] Minimal Resistance = 500 Ω/V · U_{max} + BPR

[12] Minimal Resistance = 500 Ω/V · U_{max} + BPR

PART V: MECHANICAL INSPECTION

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

- 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.
- Only tools needed for the (dis)assembly of parts for mechanical inspection.

☐ TIS STATUS UPDATE / TIMER

▶ Set online TIS status ▶ Add timer to the car ▶ Start timer

☐ VEHICLE WITH TALLEST DRIVER READY TO RACE

234 ◯ **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.

235 ◯ **PUSH BAR (red color)** - With vehicle, securely attached to vehicle, detachable, push & pull function for 2 people. University name on it.

236 △ **CAMERAS** - Must be secured by two points on different sides of the camera body, see T11.10.5. No cameras mounted to helmet.

237 ◯ **VISIBILITY** - Minimum of 100 deg. field either side. Head rotation allowed or mirrors. If mirrors, must be firmly installed and adjusted

238 △ **VEHICLE CONTROLS** - All controls, including shifter, must be inside cockpit. No arms or elbows outside the SIS plane.

239 ◯ **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 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..

240 ◯ **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.

241 △ **OTHER SIDE TUBES** - Design prevents driver's neck hitting bracing or other side tubes

242 ◯ **HEAD RESTRAINT**- Near vertical. Must take 890N load. 40mm thick, SFI 45.2 standard or FIA technical list n°17 type B. Max. 25mm from helmet. Helmet contact point 50mm min. from any edge. May be changed for different drivers. Minimum 150x150mm.

243 ◯ **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 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.)

244 ◯ **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.

245 ◯ **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.

246 ◯ **SUSPENSION** - Fully operational with dampers front and rear; 50mm minimum wheel travel (minimum jounce of 25mm) with driver in vehicle.

☐ VEHICLE WITHOUT DRIVER

247 △ **TECH STICKER SPACE** - 45mm x 175mm on centerline of front of vehicle in front of the cockpit opening

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

249 △ **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.

250 △ **BODYWORK EDGES** - edges that could contact a pedestrian must have a minimum radius of 1.0mm (safety requirement)

251 △ **BODY & STYLING** - Open wheeled, open cockpit, formula style body. Vertical keep out zones 75mm in front and behind tires (no aero exceptions), tires unobstructed from sides.

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

253 ◯ **AERODYNAMIC DEVICES** - Securely mounted. The deflection may not exceed 10mm when a force of 200N is applied over a surface of 225 cm^2 and not more than 25mm when a point force of 50N is applied.

254 △ **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.

255 △ **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.

256 ◯ **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

257 △ **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.

258 ◯ **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.

259 ◯ **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).

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

☐ REMOVE BODY PANELS

261 ◯ **DRIVER'S LEG PROTECTION** - Covers inside of cockpit over any sharp edges or moving suspension / steering components.
262 ◯ **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.
263 ◯ **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.
264 ◯ **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).
265 △ **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.
266 ◯ **TUBING & MATERIALS** - Team must show an APPROVED SES. No Magnesium tubes in primary structure.
267 ◯ **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 (=>2mm thick) used at attachment points (must be fully supported).
268 ◯ **BOLTED JOINTS** in primary structure - Distance hole centerline to the nearest free edge > 1.5 x hole diameter.
269 ◯ **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.
270 ◯ **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)
271 ◯ **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. Requires 6 attachment points – 2 on each side connecting to front bulkhead support structures and two connecting to front hoop bracing.
272 ◯ **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 and must have a minimum distance of 100mm between each other at the front hoop .Extra rearward bracing required if Front Hoop leans backwards more than 10 deg.
273 ◯ **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.
274 ◯ **FRONT IMPACT PROTECTION** - No non-crushable objects forward of bulkhead. IMPACT ATTENUATOR forward of bulkhead, 200mm long x 200mm wide x 100mm high. No portion of the required 100x200x200mm³ 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 & vertical loads (no tape, etc.) Test piece presented and same as IA on vehicle. Standard IA: Requires diagonal brace if bulkhead >25.4mm from IA on any side.
275 ◯ **ANTI INTRUSION PLATE** - A 1.5mm solid steel or 4.0mm 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 approved.
276 ◯ **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.
277 ◯ **INSPECTION HOLES** - 4.5mm inspection holes required in non-critical areas of front & main hoops. Inspectors may ask for holes in other tube(s).
278 ◯ **JACKS** - One or two devices that must be available to safely lift up and hold all driven wheels min. 100mm 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 driver to enter and exit the vehicle. The device must not extend out of the area defined by the footprint of the four tires. Device pick-up points must be indicated by orange triangles on both sides. University name on it.
279 ◯ **WHEELS** - 203.2mm (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.
280 ◯ **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 FAR 25.853(a)(1)(i) or equivalent (THICKNESS NEEDED IN DATA SHEET).

☐ VEHICLE LIFTED AND WHEELS REMOVED

281 ◯ **SUSPENSION PICK-UP POINTS** - Inspected thoroughly for integrity.
282 ◯ **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.
283 ◯ **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. No bonded joints in steering column.
284 △ **FLOOR CLOSEOUT PANEL** - Required from foot area to firewall; solid, non-brittle material; multiple panels are OK if gaps less than 3mm.
285 ◯ **GAS CYLINDERS** - Proprietary manufacture & 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 exhaust, appropriate lines & 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.
286 ◯ **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.
287 △ **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.

288 ◯ **LV BATTERY** - Attached securely to frame or chassis.

289 ◯ **HIGH PRESS HYDRAULICS** - Pumps and lines must have 1mm steel or aluminum shields protecting driver and workers.

290 △ **COOLANT** - 100% water. NO ADDITIVES WHATSOEVER.

291 ◯ **CATCH TANKS** - Any coolant overflow or combustion engine lubrication system vents must have separate catch tanks. 0.9 l or 10% of the fluid being contained minimum volume each, whichever is greater. 100 deg. C material, behind firewall, below shoulder level. 3mm min. dia. vent away from driver down to the bottom level of frame. Trans or diff., cooling systems using plain water, unless sealed, require 100 ml catch tanks.

292 △ **FLUID LEAKS** - Oil, grease, coolant, fuel, Brake fluid -> none permitted

293 ◯ **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.

294 ◯ **ACCUMULATOR CONTAINER POSITION** - All accumulator containers must lie within the primary structure of the frame lower than the top of the SIS. All accumulator containers must be protected from side or rear impact collisions. If an accumulator container or parts of it are mounted outside of the primary structure (EV.3.5.1, EV 3.5.3) an additional impact structure according to T3.2 must be built to protect the accumulator.

295 ◯ **ACCUMULATOR CONTAINER ATTACHMENT** - Accumulator container must be attached to the primary structure with fasteners min. Grade 8.8. Fasteners have to follow T10. Mount ing as designed in SES. Brackets 1.6 mm steel or 4 mm aluminum with gussets to withstand bending loads. Monocoque needs 2mm steel backing plates or equivalent, mentioned in SES.

296 ◯ **PROTECTION OF TRACTIVE SYSTEM PARTS** - In side view no part of the tractive-system can project below the lower sur face of the frame or the monocoque, whichever is applicable

297 ◯ **PROTECTION OF TRACTIVE SYSTEM PARTS** - All parts belonging to the tractive system including cables and wiring must be contained within the envelope of any part of the frame which is made from any regulated tubing defined in T3.2. If tractive system parts are mounted in a position where damage could occur from a rear andside impact (below 350 mm from the ground), they have to be protected by a fully triangulated structure with tubes of a minimum outer diameter of 25.4 mm and a minimum wall thickness of 1.25 mm or equivalent

298 ◯ **MOTOR CASING** - 3mm Aluminum 6061-T6 or 2 mm steel. If rotating around the stator or the motor case is perforated a scatter shield around the motor should be installed of 1 mm 6061-T6 aluminum or steel.

☐ TIS STATUS UPDATE

- ▶ Inform scrut management about attempt result
- ▶ update attempt info table on the beginning of the section

NON-COMPLIANCE / COMMENTS

PART VI: HIGH VOLTAGE INSPECTION

!! TEST AT HIGH VOLTAGE !!

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

☐ TRACTIVE SYSTEM POWER-UP

▶ Suggest team to limit maximum motor speeds for upcoming inspections
▶ All driven wheels are off the ground, driven wheels removed
▶ Connect multimeter between TS+ and TS- measuring points
▶ Switch on TSMS with LVMS deactivated
299 ◯ Voltage at TS measurement points less or equal 60 V_{DC}
▶ Switch on LVMS with TSMS deactivated
300 ◯ IMD and AMS and TS Cockpit indicator light illuminate for 1 s to 3 s for visible check
301 ◯ Voltage at TS measurement points less or equal 60 V_{DC}
▶ Switch on TSMS and all shutdown buttons
▶ Reset any IMD or AMS errors
302 ◯ TS still deactivated
▶ Activate TS, measure TS voltage during TS power-up
303 ◯ System is pre-charged before second AIR closes
▶ Switch off TSMS
304 ◯ TS voltage decreases below 60 V_{DC} within 5 s
▶ Try to power-up TS with switched off TSMS
305 ◯ TS still deactivated
▶ Switch on TSMS
306 ◯ TS still deactivated

☐ TRACTIVE SYSTEM SHUTDOWN

▶ Connect multimeter between TS+ and TS - measuring point
▶ For every of the following switches, deactivation leads to TS shutdown, voltage decreases below 60 VDC within 5 s
307 ◯ LVMS
308 ◯ Shutdown button left
309 ◯ Shutdown button right
310 ◯ Cockpit shutdown button
311 ◯ Inertia switch
312 ◯ Break-over-travel-switch
▶ Show schematic of TS with all interlocks (ESF)
313 ◯ Interlocks

☐ TRACTIVE SYSTEM ACTIVE LIGHT

▶ Activate LVS
314 ◯ TSAL and Cockpit Indicator (CI) is green only, visible in bright sunlight
▶ Activate TS
315 ◯ TSAL flashes red with freq 2 Hz - 5 Hz, and CI is off
316 ◯ TSAL has fully illuminated surface visible by a person standing 3 m away from TSAL (1.6 m eye height) - use dedicated tool)
▶ Remove HVD, override HVD interlock (!! cover TS potentials !!), activate TS
317 ◯ TSAL and CI is off
▶ Restore car into ready-to-race condition
▶ Ask the team to demonstrate safe state of TSAL by disconnecting any signal influencing green light
318 ◯ TSAL is completely off (no red nor green light)

☐ INSULATION MONITORING DEVICE

319 ◯ One IMD ground line is connected to the accumulator container and one ground line is connected to the main hoop by a separate wired connection
▶ R_{Test} = kΩ[13]
• IMD indicator light . . .
320 ◯ . . . is inside the cockpit and marked with "IMD"
321 ◯ . . . is red and visible in bright sunlight, even from outside (check during power-on self-test)
322 ◯ . . . is visible for the driver
▶ Activate TS, connect R_{Test} between TS+ and LV GND
323 ◯ Shutdown circuits opens within 30 s
324 ◯ IMD indicator light illuminates
325 ◯ TS voltage decreases below 60 V_{DC} within 5 s after shutdown circuit opens
326 ◯ Reactivation of TS is not possible
▶ Push the reset button which is not accessible to the driver, if any and/or restart LVMS
327 ◯ Reactivation of TS is not possible
▶ Remove R_{Test}. Wait 40 s until IMD resets status output
328 ◯ Reactivation of TS is not possible
▶ Push all reset buttons in the cockpit if any
329 ◯ Reactivation of TS is not possible
▶ Push the IMD reset button, which is not accessible to the driver, if any
330 ◯ Reactivation of TS is possible
▶ Push and hold the reset button, which is not accessible to the driver, if any. Connect R_{Test} between TS- and LV GND measuring points
331 ◯ Shutdown circuits opens within 30 s
332 ◯ IMD indicator light illuminates

☐ ACCUMULATOR MANAGEMENT SYSTEM

• AMS indicator light . . .
333 ◯ . . . is inside the cockpit and marked with "AMS"
▶ Disconnect TS accumulator

[13] R_{Test} = (max. TS voltage · 250 Ohm/V) - BPR

334 ◯ . . . is illuminated red and visible in bright sunlight, even from outside

335 ◯ . . . is visible for the driver

☐ READY TO DRIVE ACTIVATION SEQUENCE

▶ Activate TS, press torque pedal
336 ◯ No turning of motors
▶ Let the team set the vehicle to ready to drive mode
337 ◯ Pressing brake pedal WHILE activating is necessary
338 ◯ Brake light in red color
▶ Repeat the activation sequence, but push the brake pedal only once before finally pushing the activation button
339 ◯ No ready to drive mode possible
▶ Disconnect the brake sensor
340 ◯ No ready to drive mode possible
▶ Set vehicle to ready to drive state
341 ◯ Ready to drive sound duration is 1 s to 3 s continuously
287 △ Ready to drive sound is min 80 dBA (2 m around the vehicle)
342 ◯ Ready to drive sound is easy recognizable and no animal sound or song part

☐ APPS AND BSPD

▶ Set vehicle to ready to drive state
▶ Disconnect ≥ 50 % of APPS
343 ◯ Motors do not turn
▶ Disconnect all APPS
344 ◯ Motors do not turn
▶ Set car to ready to drive state. Press accelerator pedal > 25%. Push brake pedal.
345 ◯ Motors stop turning.
▶ Release brake, while accelerator pedal still activated.
346 ◯ Motors do not turn.
▶ Release accelerator pedal slowly.
347 ◯ Motors turn again when APPS position is <5 %.
▶ Team simulates 5 kW power (complete BSPD circuitry must be used), press brake representing hard braking (>0.5 s)
348 ◯ TS shuts down
▶ Reactivate TS. Disconnect current sensor, press brake representing hard braking (>0.5 s)
349 ◯ TS shuts down
350 ◯ Reactivation of TS is only possible after 10 s without implausibility

☐ SEALING OF COMPONENTS

▶ After all tests have been passed successfully seal the inspected TS housings:
351 ◯ Motor Controller housing
352 ◯ Energy Meter housing
353 ◯ IMD housing
354 ◯ TSAL circuitry housing
355 ◯ BSPD casing /BSPD calibration
356 ◯ Additional Part:
357 ◯ Additional Part:

☐ DATA LOGGER

△ Check data logger functionality and connectivity

☐ TIS STATUS UPDATE

▶ Inform scrut management about attempt result
▶ update attempt info table on the beginning of the section

NON-COMPLIANCE / COMMENTS

PART VII: TILT TEST

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

☐ TILT TEST

358 ◯ **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.

359 ◯ **VEHICLE STABILITY** - All wheels in contact with tilt table when tilted to 60 degrees to the horizontal.

360 ◯ **FUEL TYPE:** 98 or ethanol

361 △ **GROUND CLEARANCE** - At least 30 mm min. with driver.

NON-COMPLIANCE / COMMENTS

PART VIII: RAIN TEST

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

☐ BRAKE TEST

▶ The vehicle is lifted off the ground. Tractive system has to be active (TSAL ON)

362 ◯ Tractive system voltage is present at TSMPs

▶ RAIN PROOF - No driver is allowed to sit in the vehicle during the test. Water like rain will be sprayed at the vehicle for 120 sec. Another 120 sec. of waiting without water spray.

363 ◯ The Insulation Monitoring Device does not react and not shut down the tractive system.

▶ Connect RT est between any TSMP and LVS GND.

364 ◯ Shutdown circuits opens within 30 s.

☐ NON-COMPLIANCE / COMMENTS

PART IX: BRAKE TEST

APPROVAL

	Inspector Names	Date and Time	Signatures when passed
1.	_____ / _____		
2.	_____ / _____		

☐ BRAKE TEST

365 ◯ **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 electrical braking from motors. The tractive system has to be shut down by the driver before braking. The Tractive System Active Light has to be Green during breaking or shortly after the vehicle stopped (may take up to 5 sec. after shut down).

366 ◯ **BRAKE LIGHT** - must be clearly visible even in bright sunlight.

NON-COMPLIANCE / COMMENTS