



สมาคมวิศวกรรถยนต์ไทย
Society of Automotive Engineers-Thailand

การพัฒนา ออกแบบ และสร้างยานยนต์

TSAE Auto Challenge 2024

19-21 มกราคม 2567 ณ สนามปทุมธานี สปีดเวย์



Inspection



ตัวอย่างกำหนดการแข่งขัน

Inspection

กำหนดการแข่งขัน 18th TSAE Auto Challenge 2024 Student Formula

วันแรก

			ผู้รับผิดชอบ
07.30 น.	ทีมแข่งขันลงทะเบียน / จัดสถานที่กรรมการ จัดสถานที่จอดรถเข้าแข่งขัน		TSAE / คุมเพื่อผู้จันทร์ GPI
08.10 - 08.30 น.	ประชุมผู้จัดการทีม / อาจารย์ที่ปรึกษา		ผศ.ดร.ก่อเกียรติ / ผศ.ดร.นักร้อง
08.00 - 18.00 น.	• Inspection		ผศ.ดร.นักร้อง / อ.มณเฑียร/ Toyota/ Honda/ Isuzu

วันที่สอง

			ผู้รับผิดชอบ
08.00 น.	ลงทะเบียน		TSAE / คุมเพื่อผู้จันทร์
08.10 - 08.30 น.	ประชุมนักขับ		ผศ.ดร.นักร้อง / คุมเพื่อผู้จันทร์
08.30 - 15.00 น.	• Inspection		ผศ.ดร.นักร้อง / อ.มณเฑียร/ Toyota/ Honda/ Isuzu

Inspection





FORMULA SAE®

Rules 2022



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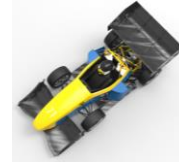
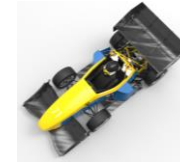
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Inspection



EV

EV

EV

IC



Pre Inspection

Boby / Structure

Chassis

Powertrain

Cockpit

EV

แบบฟอร์มการตรวจ Inspection

2023 TSAE Auto Challenge INSPECTION SHEET

Page 1

2023 TSAE Auto Challenge INSPECTION SHEET

CAR NUMBER:	TRANSPONDER NUMBER: -
SCHOOL:	
SES SUBMITTED? YES/NO :	FACULTY ADVISOR SIGNATURE
ENGINE MODEL:	NUMBER OF DRIVERS:
ENGINE BORE X STROKE:	TALLEST DRIVER: HEIGHT:
ABS? YES/NO :	

IMPORTANT

FORM MUST STAY WITH THE CAR UNTIL THAT SPECIFIC PART OF INSPECTION HAS BEEN COMPLETE

Inspection

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Page 1

2023 TSAE Auto Challenge INSPECTION SHEET

CAR NUMBER:	TRANSPONDER NUMBER: -
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SES SUBMITTED? YES/NO:	
ENGINE MODEL:	FACULTY ADVISOR SIGNATURE
ENGINE BORE X STROKE:	NUMBER OF DRIVERS:
ABS? YES/NO:	TALLEST DRIVER: HEIGHT:

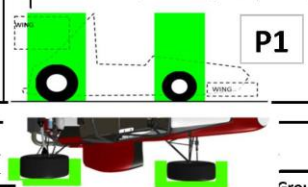
IMPORTANT

FORM MUST STAY WITH THE CAR UNTIL THAT SPECIFIC PART OF INSPECTION HAS BEEN COMPLETE

PRESENT THE VEHICLE FOR INSPECTION IN THE FOLLOWING ORDER:

PART 1. TECHNICAL INSPECTION	(EGRESS - 5 seconds max to exit for ALL DRIVERS)
PART 2. FUELING & TILT TABLE INSPECTION	(Re-INSPECTION NOISE LEVEL after Endurance Finished)
PART 3. NOISE LEVEL & BRAKING PERFORMANCE INSPECTION	

NOTE: If there is a conflict between this form and the rules, the rules prevail. Ref are only example of pictures. Must refer to the technical drawing Part B of the rules.

PART 1		TECHNICAL INSPECTION	
EXTERIOR, GENERAL		REF	
PUSH BAR - VE.2.2 Always with car (detachable), push & pull, usable by 2 people standing behind the car. EVs: HV disconnect tool, if used.		TS&E DECALS - TSAE logo on front and/or both sides, in prominent location.	
CAR NUMBERS - VE.1.1 On front & both sides of car, minimum 150 mm tall, 18 mm stroke & spacing. White-on-black or B-on-W only. Background shape: round, oval, rectangular or square. Visibility must not be obstructed.		SCHOOL NAME - VE.1.2 School name or recognized initials. Both sides of car, easily visible location, 50 mm tall min, Roman letters, high contrast background.	
PI BODY & STYLING - V.1 Open cockpit, formula style body. Four wheels, not in a line.		TECH STICKER SPACE - VE.1.4 25 cm wide x 20 cm high available space, located on centerline of upper front bodywork (nose) of car.	
WHEELBASE - V.1.2 Minimum 1525 mm.		JACKING POINT - VE.2.1 Horizontal, lateral tube at the rear. Orange color.	
OPEN WHEEL - V.1.1 Top 180° of wheel/tire unobstructed from above. Tires unobstructed from sides. Vertical keepout zones 75mm in front & behind tires.		300 mm wide by 25-30 mm O.D. Visible to person standing 1 meter behind car. 75 mm min ground clearance. Rear tires must come off the ground using Quick-Jack (lifts to 200 mm).	
DRIVER'S EQUIPMENT		SPECIALIZED TESTS	
FIRE EXTINGUISHERS - VE.2.3 Hand-held, dry chemical (no AFFF or halon), min specification: 10BC; 1A10BC; 34B; 5A 34B; 20BE; or 1A 10BE. Min 0.9 kg (2 lb). Two required: must present both at Tech.		IA TEST SPECIMEN - IN.8.1 Identical to IA installed. Identical to SES. Suitable failure mode (crushed element, not collapsed mount).	
NON - COMPLIANCE/ COMMENTS:			
(Inspector use only)		Group Preinspection	
Initials: Day: Time In: Time Out:		STAMP	
Initials: Day: Time In: Time Out:			
Initials: Day: Time In: Time Out:			
APPROVED BY:	DATE:		

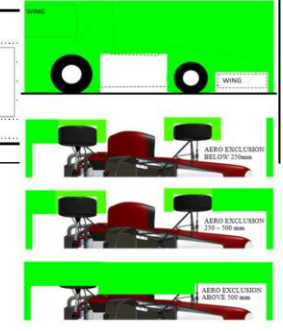
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CAR NUMBER:	SCHOOL:	
PART 1, cont'd.		
TECHNICAL INSPECTION (Cont'd)		
EXTERIOR, GENERAL, AERO (B1)		REF
TRANSPONDER is lent out during a competition period. (Local rule)		FRONT MOUNTED AERO - T.7.4 Max forward: 700 mm ahead of the front tires. Max width: OUTSIDE of the front tires (at hub height). Max height: 250 mm if in front of tires (w/out driver).
CAMERA MOUNTS - VE.2.5 If >0.25 kg, must be secured by two points (typical GoPro-brand camera is <0.25 kg). No cameras mounted to helmet.		
BODYWORK - T.7.2 No large openings (>6mm) in bodywork into driver compartment in front of or alongside driver. Body/nose: min 38 mm radius, +/-45° all directions.		REAR MOUNTED AERO - T.7.5 Max rearward: 250 mm behind the rear tires. Max forward: Headrest support (undertrays exempt). Max width: INSIDE of the rear tires (at hub height). Max height: 1.2 m above ground (w/out driver).
AERODYNAMIC DEVICES - T.7.1 No powered ground effects. Securely mounted - no oscillation or excessive movement. (Wings, undertray, splitter, endplates, vanes, etc.)		
EDGE RADII - T.7.1 Horizontal leading edges min 5 mm radius. Vertical forward-facing edges min 3 mm radius. Other edges: not sharp - GR.1.5		AERO BETWEEN WHEEL CENTERLINES - T.7.6 Max width: Line between front & rear tires (at hub height). Max height: 500 mm (except if w/in 400 mm of car centerline).
PRIMARY STRUCTURE, Tube Frame		REF
MAIN HOOP - F.5.8 Must be steel with smooth bends with no wrinkles. Must be 1 piece & extend to lowest frame member. Tube endpoints 380 mm apart (inside dim) at bottom attachment. Above Major Structure, max 10° to vertical. No part angled rearwards more than 10° from vertical. Bends in side view, and front view below the SIS must be braced to a frame node.		MAIN HOOP BRACING - F.5.9, F.6.6 Must be steel w/ no bends. One brace each side, attached within 160 mm of top of hoop. Min 30° included angle with hoop. Bracing must not be on same side of vertical as Main Hoop. Must take load back to bottom of Main Hoop, and Upper Side-Impact tube, thru properly triangulated structure.
FRONT HOOP - F.5.7 Closed-section metal tube (may be multi-piece). Must extend to lowest frame member. Max 20° to vertical. 10° max tilt towards cockpit opening if no rearward bracing. Bends in side view and front view below the SIS braced to a frame node.		ATTACHMENTS TO BRACING - T.2.13.9 If any item which is outside the envelope of the Primary Structure is attached to the Main Hoop braces, then additional bracing must be added to prevent bending loads in the braces in any rollover attitude (e.g. suspension mounts, radiator).
FRONT BULKHEAD - F.6.1 Closed-section metal tube.		FRONT HOOP BRACING - F.6.3 Two forward facing braces, attached within 50 mm of top of hoop. Extra rearward bracing required if Front Hoop leans backwards more than 10°. Bracing ends at Front Bulkhead or triangulated structure.
SIDE IMPACT STRUCTURE - F.6.4 Min of 3 tubes must connect the main and front hoops. Upper tube must be between 240 mm and 320 mm above highest surface of lower SIS tube (F.6.4.3). Lower tube must connect endpoints of Main and Front hoops. At least one diagonal per side: must triangulate the upper and lower members between the Main and Front hoops.		FRONT BULKHEAD SUPPORT - F.6.2 Min 3 tubes each side of car. Bottom: connect bottoms of bulkhead and Front Hoop. Top: connect within 50mm of top of bulkhead, 100 mm above and 50 mm below upper SIS tube (brace to Main Hoop if top tube does not connect near upper SIS). Diagonal tube(s) to completely triangulate connections to upper and lower SIS tubes.
SHOULDER HARNESS MOUNTING BAR - F.6.5 Uncut, closed-section tube. Attached to Main Hoop. Braced to Main Hoop if bent: minimum 30° between brace and bar.		BOLTED JOINTS IN FRAME - F.5.4, F.5.13 Edge of any bolt hole located > 1.5 x hole diameter from nearest edge of the material. No blind or welded threaded fasteners. Bolts 8 mm (5/16"), plates 2.0 mm (0.08"). (Primary structure joints only.) CRITICAL FASTENERS
BENT OR MULTIPLE TUBES - F.5.2 Min bend radius: 3x tube OD. A brace must connect from midpoint of bend to a frame node, within 30° of plane of bend (Upper SIS, Shoulder Harness Bar exempt from 30°). Brace material: same size as bent tube.		REMOVABLE BRACING - F.5.12 Double-shear (capped) or Slotted Bar joints only. No bends. No rod-end bearings.
INSPECTION HOLES - Tech may use ultrasound to measure wall thickness and/or ask 4.5 mm holes be drilled		

Inspection

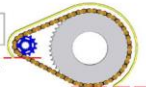
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Critical Fasteners Reference: T.8 Note: For all locations marked "CRITICAL FASTENERS" in this form, the following requirements apply: •Material rating: SAE Gr 5, Metric 8.8, or AN/MS. •Hex-head or socket-head; no pan head, flat head, or low-profile screws. •Positive locking: safety wire, lock pins, or locking nuts with 2 threads visible beyond nut. •Threadlock compounds not sufficient; no nylock nuts if >80 °C.	
Primary Structure, Monocoque	
MAIN HOOP ATTACHMENT - F.7.6 •Three points per side at 30 kN each, or two 45 kN. •Two axial plates and gussets. •Mounting plates on hoop min 2 mm thick.	FRONT BULKHEAD & SUPPORT - F.7.2 Identical to SES. •Diagonal required for standard honeycomb IA, Diagonal must be attached to AIP.
FRONT HOOP ATTACHMENT - F.7.4 •Three points per side: top, within 25mm of bends. •May be fully encapsulated. •Must not be attached only by adhesive, cores must fit tightly.	ATTACHMENT POINTS - F.7.8 •Two 8 mm bolts per joint. •One 10mm bolt on centerline allowed for hoop braces. •Backing plates: 2 mm steel. •No crushing of the core. •No blind or threaded inserts. •Requires inserts or no gap between inner and outer skins. •CRITICAL FASTENERS (positive locking)
SIDE IMPACT PROTECTION - F.7.5 Identical to SES.	IA ATTACHMENT, MONOCOQUE - F.8.5 Equivalent to: •Four 8 mm bolts for Impact Attenuator, •Eight 8 mm bolts for Anti Intrusion Plate
HARNES ATTACHMENT POINTS - F.7.9 •Test specimens: representative of vehicle construction. •Test loading direction: specific to harness installation.	ANTI INTRUSION PLATE, MONOCOQUE - F.8.2.2 Physical Impact Attenuator Data test, or 3-point bending and perimeter shear tests. •Bonded or laminated must extend to outside perimeter of bulkhead.
LAMINATE TEST SPECIMENS - F.4.3 Two or more for both SIS and primary structure constructions: •Three-point bending: 275 x 500 mm or 138 x 500 mm •Perimeter shear: 100 x 100 mm •Lap joint •Identical to SES and vehicle •Engraved with date, specimen name, max test load.	Impact Attenuator
STANDARD IMPACT ATTENUATOR - F.8.4.3 •Must be fully bonded to AIP. •Honeycomb must be horizontal; foam may be vertical. •If honeycomb, or if Plate >25 mm wider than AI on any side: diagonal or X required in bulkhead, or testing to show AIP deforms <25 mm. •Foam must not be degraded or damaged.	ANTI-INTRUSION PLATE - F.8.2 •1.5 mm steel or 4 mm aluminum. •Attached to bulkhead w/ eight 8 mm (5/16") bolts, bonded or laminated (AIP extending to outer edge of bulkhead tubes), or welded (AIP extending to centerline of bulkhead tubes). •Capable of taking vertical and transverse loads.
TEAM-DESIGNED IMPACT ATTENUATOR - F.8.4 •200 mm long x 200 mm wide x 100 mm high. •Attached to AIP w/ welds - 1:1 weld ratio, beads 25 mm min; or eight 8 mm (5/16") bolts; or adhesive (required for foam or honeycomb materials). •Must be capable of taking vertical and transverse loads. •Must be identical to test specimen.	CRITICAL FASTENERS: ATTENUATOR - F.8.2.3 •IA: Eight 8 mm bolts w/ positive locking •AI Plate: Eight 8 mm bolts w/ positive locking FRONT BULKHEAD DIAGONAL - F.8.4.3 •Unless tested for <25mm AIP deflection, diagonal structure is required for the standard foam IA when FBH > 400mm x 350mm; diagonal required for all standard honeycomb IAs. •Diagonal may be attached to AIP.
NON - COMPLIANCE/ COMMENTS:	
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APPROVED BY: _____	DATE: _____
<div style="border: 1px solid black; padding: 5px; display: inline-block; font-weight: bold;">Group BODY / STRUCTURE</div>	
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CAR NUMBER: _____ SCHOOL: _____	
PART 1, cont'd.	
ABS? YES/NO : _____	
TECHNICAL INSPECTION (Cont'd)	
TYRES & WHEELS	
DRY TYRES-Maker: _____ Size: _____ Compound: _____	RAIN TYRES - Maker: _____ Size: _____ Compound: _____ RAIN TYRES - 3/32 in. min. tread depth moulded by tire manufacturer.
WHEELS - V.4.1 •203 mm (8.0") min diameter. •Wheels with single wheel nut must have positive retainer. •Aluminum lug nuts hard-anodized and pristine condition.	STEERING, SUSPENSION, BRAKES
STEERING - V.3.2 •All steerable wheels must have positive stops to prevent linkage lock-up or contact with other parts. •7" max freely at the steering wheel. •NO STEER-BY-WIRE on front wheels. •No cables or belts. •No bonded joints in column without metal backup. •Rear steer limited to 6" total, with mechanical stops.	MODIFIED LUG BOLTS/STUDS - V.4.2.2 Verify good engineering practices are followed e.g. no drill holes for mass reduction.
STEERING WHEEL - V.3.3 •Continuous perimeter, near round (no concave sections). •Driver operable quick disconnect. •Not higher than top of front floop, in any angular position. •250 mm max rearward of front floop (F.5.7.5).	CRITICAL FASTENERS: SUSPENSION - V.3.1.4 Control arms, knuckle, spring load path, single wheel nuts. Exempt: lug nuts, multi-piece wheels, anti-roll bars, dampers. All fasteners must be tight (esp: jam nuts)
CRITICAL FASTENERS, Steering - V.3.2.8 Steering wheel, column, rack mounting, tie rods.	BRAKES - T.3.1 •Single pedal actuates all 4 wheels (one brake on limited slip OK) •Two separate hydraulic circuits w/ reservoir; no brake-by-wire. •Protected by structure/shields from drivetrain & collisions. •No plastic brake lines. •No parts below chassis/tub in side view.
GROUND CLEARANCE - V.1.4 Sufficient clearance so that no part of the car other than the tires will contact the track surface.	CRITICAL FASTENERS: BRAKES - T.3.1 •Pedal Assembly: including adjustment mechanism, caliper to knuckle mounts, rotor to hat. •Exempt: COTS caliper body assembly.
SUSPENSION PICK-UP POINTS - GR.1.5 Inspected thoroughly for integrity: binding, over-articulation.	BRAKE CONTROL SYSTEMS - GR.1.5 ABS, Traction, Yaw Control, etc: must have an approved FMEA.
SUSPENSION - V.3.1 •Full suspension including front and rear damping. •Spherical rod ends and bearings; double-shear or safety washers.	BRAKE PEDAL - T.3.1.11-13 Steel, aluminum, or machined titanium (no welded Ti). Alt mat. OK for pad face. Entire pedal-to-frame system capable of 2kN (loaded only by organizers).
STEERING COMPONENTS OUTSIDE FRAME - F.5.14 •Racks protected to top, bottom, and local chassis width.	NON - COMPLIANCE/ COMMENTS:
APPROVED BY: _____ DATE: _____	
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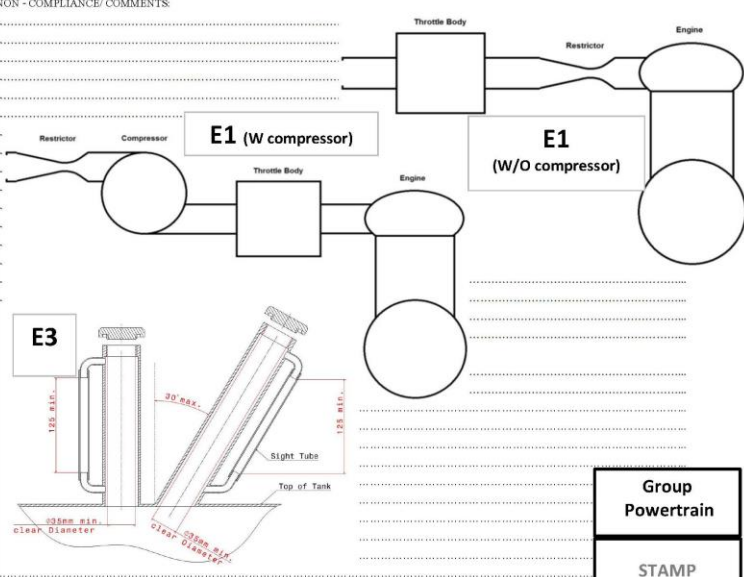
Inspection

CAR NUMBER: _____ SCHOOL: _____	
PART 1 - cont'd.	
ENGINE MODEL: _____	ENGINE BORE X STROKE: _____
TECHNICAL INSPECTION (Cont'd)	
Powertrain	
ENGINE / TRANSMISSION COMPARTMENT	
ENGINE - IC.1.1 Four -stroke piston engine, 710 cc maximum swept displacement. No hybrids. Waste heat recovery allowed.	FLUID ACCUMULATION - T.5.5.5 Absorbent materials and open collection devices (regardless of material) are prohibited below the highest point of the exhaust system in compartments containing the engine, drivetrain, exhaust and fuel systems.
INTAKE and FUEL SYSTEM LOCATION - IC.1.2 All parts of air intake system (including throttle body or carb, air intake ducting, air cleaner & air box), AND *all parts of the fuel storage, supply and fuel control systems (including fuel rail, throttle body or carburetor), must be within a surface defined by the top of the roll bar and the outside top edge of the tires.	BELLYPANS - T.5.5.4 Must be vented to prevent accumulation of fuel: 2 holes each (min of 25mm dia. *Specific locations: Lowest point in chassis; Aft of driver & front of fuel tank.
AIR INTAKE SYSTEM - IC.2.2 & .3 *Side and Rear Impact protection if <350 mm above ground. *Supported if cantilevered (isolated to frame, rigid to engine). *CRITICAL FASTENERS: securely attached to block or head with brackets & mechanical fasteners w/ positive locking mechanisms. OEM-type rubber bushings not sufficient.	FLUID LEAKS - T.5.5.1 Not permitted. Firewalls must prevent contact w/ driver. EXHAUST OUTLET - IC.7.2 *Outlet 45 cm (17.7") max behind rear axle centerline and 60 cm (23.6") max above the ground. *Located such that exhaust gases should not reach driver.
THROTTLE - IC.3 *Min qty of 2 springs 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. *Cable position min 50 mm from any exhaust component. *Idle air bypass control and throttle blippers are and not allowed without ETC process.	EXHAUST SYSTEM - IC.7.2 *Exhaust components outside bodywork forward of main hoop must be shielded from people approaching the car. *No fibrous wraps around exhaust tubes.
RESTRICTOR - IC.2.4 *Must be circular: max dia 20.0 mm for gasoline and 19.0 mm for ESS. *Cannot be movable or flexible. *Installed per below: NA: THROTTLE -> RESTRICTOR -> ENGINE FE: RESTRICTOR -> COMPRESSOR -> THROTTLE -> ENGINE	SCATTERSHIELDS GENERAL - T.5.2 *Required for clutches, chains, belts, CVT rotating parts, etc. *Not perforated. *End parallel to lowest part of front and rear sprockets. *Min 6mm fasteners *CRITICAL FASTENERS
HIGH PRESSURE HYDRAULICS - T.6.2 Pumps and lines must have 1 mm thick steel or aluminum shields to protect driver and workers. (Brakes & clutch exempt)	SCATTERSHIELD MATERIALS - T.5.2 *Size: for chains: 2.7 mm (0.105") min thick steel, 3x chain width; for belts: 3 mm (0.12") min thick aluminum 6061-T6, 1.7x belt width. *OEM engine drive sprocket cover OK.
COMPRESSORS - IC.2.5 *Turbo or super chargers allowed if not OEM to engine. *Must be between restrictor and throttle. *Intercoolers downstream of throttle. *Carbs not allowed if compressors are used. *Compressor recirculation valves ok if downstream of restrictor. *No enlarged air chambers (section > 28 cm ²) before throttle.	D'TRAIN FINGER GUARDS - T.5.2.10 Required to cover all drivetrain parts that spin while car is at rest. No holes >12 mm dia.
CATCH CANS - T.5.6 *Engine coolant (unless aircooled) and engine crankcase must have separate catch cans of 0.9 L min vol. *Oil(s) and water(s) must be separate *100 °C-capable material. *Behind firewall, below shoulder level. *3 mm min diameter vent, directed away from driver. *PCV OK if routed to intake sys upstream of restrictor. *Cannot connect breathers to exhaust. *Trans. diff. other systems (unless sealed): 10% or 0.5 L catch can.	COMPRESSED GAS CYLINDERS - T.6 *Unmodified COTS cylinder (labeled). *Nonflammable gas. *Regulator on tank. *Securely mounted, axis not pointed at driver. *Rearward of Main Hoop within the frame envelope, or in structural sidepod; not in cockpit. *Appropriate lines & fittings. *≤150mm from exhaust; metal, or protected per T.1.6.3.
	COOLANT - T.5.4 (IC) Only 100% water. NO ADDITIVES WHATSOEVER (EV) 100% water, or oil.
E2	ELECTRONIC THROTTLE CONTROLS (ETC) - IC.4 *Only for cars using ETC: Do NOT signoff this tech form until separate ETC inspection is approved. *Requires prior submission and approval. Inspected by special team. *Idle air bypass control and throttle blippers are ETC, and are not allowed without completing the ETC process.
	THROTTLE PEDAL - IC.3.1.3 Must have positive stop to prevent oversteering cable. Must return when not actuated.

Next page: Fuel system

FUEL SYSTEM	REF
FUEL TANKS - IC.5.2 & .3, F.9 *Must lie within major structure of the chassis, with side impact protection. *Rigid tanks cannot carry structural load & must be flexibly mounted. *Bladders or bags in rigid container. *No portion of fuel system below lower surface of frame. *Firewall between all parts of fuel system & driver.	FUEL FILLER NECK - IC.5.4 *Fuel-resistant materials, *min 35 mm inner dia, *within 30° of vertical. *Must prevent fuel spillage contacting driver, exhaust or ignition (add shields as needed). *Fueled w/o manipulating car in any way. *Cap secure and capable of withstanding pressurization (ie: threads or latch). *Easy access for common 2-gal jugs.
FUEL LINES - IC.5.7 *No plastic lines between tank & engine (reinforced rubber hoses OK). *Bulbs/burbs on hose connections. *No worm-gear clamps. *Must be securely attached, *protected from rotating equipment & collision damage. *Systems >10 bar see IC.6.2	E3 SIGHT TUBE - IC.5.4 *Fuel resistant materials, *transparent, *min 6mm inner dia. *Min 125 mm vertical height in area visible to fueler with vehicle fully assembled. *Sight tube must NOT run below top of tank. *Non-moveable fuel level line 12-25 mm below top of sight tube. (Clear filler neck OK as sight tube.)
GOOD PRACTICES, fuel lines - GR.1.5 *Hoses and fittings must be type-matched (no clamps on braided metal hoses, etc). *Fuel lines restrained and protected from stress, heat, and abrasion.	FUEL RAIL - IC.6.1 *Securely attached to block, head or intake manifold with brackets & mechanical fasteners. *No plastic or composite fuel rails, except if unmodified OEM part. *CRITICAL FASTENERS
FUEL TYPE - 95 octane gasoline Only (TSAE Local Rule)	FUEL VENTS - IC.5.6 *Must exit outside of the bodywork. *Must include a check valve to prevent leakage if car inverted.
FUEL STICKER - No STICKER (TSAE Local Rule)	

NON - COMPLIANCE/ COMMENTS:



Group Powertrain


STAMP

APPROVED BY: _____ DATE: _____

Inspection

2023 TSAE Auto Challenge INSPECTION SHEET Page 7

CAR NUMBER:		SCHOOL:	
PART 1, cont'd.			
TECHNICAL INSPECTION (Cont'd)			
ELECTRICAL			
ON-BOARD STARTER - IC.8.1 Required (remote starters and push-starts prohibited).		BRAKE LIGHT - T.3.3 •RED color, clearly visible from the rear, located on vehicle centerline. •Height between wheel centerline & driver's shoulders. •Round, triangle, or rectangular on black background. •15 cm ² minimum illuminated area. LED strips OK if elements closer than 20 mm apart and total length > 150 mm (5.9"). •Sufficient brightness for visible activation in bright sunlight.	
PRIMARY MASTER SWITCH - IC.9.3 •On driver's right, near roll bar. •Access from outside of car. •Rotary type. •No relay. •Must kill ALL electrical systems. •Marked with international symbol. •Lever horizontal when ON.		BRAKE PEDAL OVER TRAVEL SWITCH - T.3.2 •Must cut ignition & fuel pump. •No re-start if brake released or actuated a second time. •Must NOT rely on software to work. •Not resettable by driver. •Open Shutdown circuit (EV only)	
COCKPIT MASTER SWITCH - IC.9.4 •Pull-ON, Push-OFF type. •Alongside & unobstructed by steering wheel, easily reached by driver. •Must kill ignition & fuel pump(s). •Min dia 24 mm. •Marked with international symbol.	EL1		
BATTERY - T.9.2 •Attached securely to frame or chassis. •Hot terminal insulated. •Wet-cells in marine box if inside cockpit. •Type must be identifiable. •Overcurrent protection • Lithium: firewall per T.1.8 between driver; OEM battery or with rigid nonflammable case. •No circuits > 60 VDC.			
NON - COMPLIANCE / COMMENTS:			
			<div style="border: 1px solid black; padding: 5px; display: inline-block;">Group ELECTRICAL</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 5px;">STAMP</div>
APPROVED BY:		DATE:	



T7.3.3 The switch must be implemented with analog components, and not through recourse to programmable logic controllers, engine control units, or similar functioning digital controllers.

T7.3.4 The Brake Over-Travel switch must be a mechanical single pole, single throw (commonly known as a two-position) switch (push-pull or flip type) as shown below.

2023 TSAE Auto Challenge INSPECTION SHEET Page 8

2023 TSAE Auto Challenge INSPECTION SHEET

CAR NUMBER:		SCHOOL:	
SEF DEVIATIONS? YES/NO & SEF CORRECTED? YES/NO			
ENGINE MODEL:			
ENGINE BORE X STROKE:			
ABS? YES/NO			
IMPORTANT			
THIS FORM MUST STAY WITH THE CAR UNTIL THESE PARTS OF INSPECTION HAVE BEEN COMPLETED			
Total Weight Measurement	Dry	L	R
	F		
	R		
		Weight	L
		F	
		R	

PART 2

FUEL SYSTEM & TILT TABLE INSPECTION

SPILLAGE - No fluid leaks of any kind permitted when car is tilted to 45 degrees in the direction most likely to create spillage; Fuel tanks must be filled to their sight tube fill line.	VEHICLE STABILITY- All wheels in contact with tilt table when tilted to 60 degrees to the horizontal.
NON-COMPLIANCE / COMMENTS:	
<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-right: 20px;">STAMP</div> <div style="border: 1px solid black; padding: 5px; display: inline-block;">TILT Group</div>	
APPROVED BY:	

PART 3

NOISE LEVEL & BRAKING PERFORMANCE INSPECTION

NOISE LEVEL - 110 dB (C) ("C" scale) maximum during a static test, gearbox in neutral, UP TO a specified RPM (see Rule IN.10.4.1). 103 dBC at idle. Microphone level with the exhaust outlet(s), 0.5 m (19.7") 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.10.2.3.	BRAKING PERFORMANCE - Must lock-up all 4 wheels, come to a complete stop with them locked and keep the engine running (IC only). Electric vehicles must turn off ABS system before performing test to allow lockup.
MASTER SWITCH - Master switch on RHS of main roll hoop must cause engine to stop when actuated. (Perform at end of noise test)	ATTEMPTS:
NOISE LEVEL:	
ATTEMPTS:	
NOISE LEVEL after ENDURANCE :	
NON - COMPLIANCE / COMMENTS:	
<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-right: 20px;">NOISE Group</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-right: 20px;">STAMP</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-right: 20px;">STAMP</div> <div style="border: 1px solid black; padding: 5px; display: inline-block;">BRAKE Group</div>	
APPROVED BY:	
DATE:	

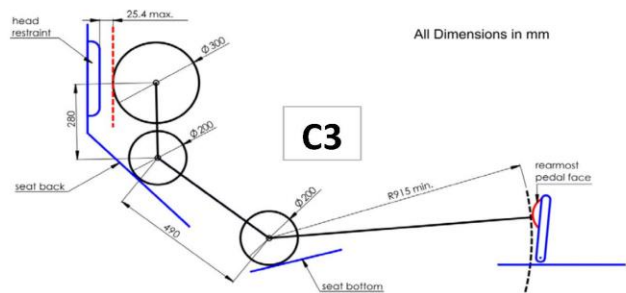
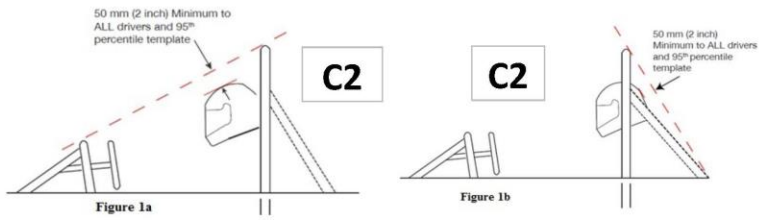
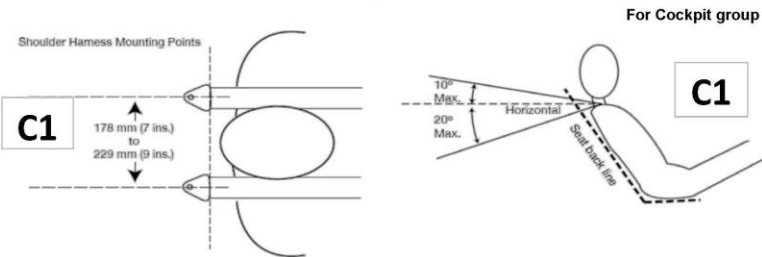
Once the vehicle is approved to compete in the dynamic events, ONLY modifications permitted as following:
 Adjustment of belts, chains, brake bias, driver restraint, head restraint, seat, pedal assembly, seat for different driver.
 Adjustment of engine operating parameters, fuel mixture, ignition timing, mirrors, tire pressure, wing angle,
 Replenishment of fluids. Replacement of worn tires, brake pads. The changing of wheels and tires
 Since this Form collects after passing all inspections, please bring to INSPECTION DESK this INSPECTION FORM

Inspection

CAR NUMBER: _____		SCHOOL: _____	
PART 1, cont'd.			
TECHNICAL INSPECTION (Cont'd)			
COCKPIT - คู่มือรถแข่ง			
NUMBER OF DRIVERS: _____	TALLEST DRIVER: _____	HEIGHT: _____	
DRIVER'S EQUIPMENT			
HELMETS - VE.3.2 - TIS (TSAE local rule) •Closed-face with integral chin guard (no dirtbike helmets). •Face shield integral with helmet, impact resistant material. •Specification: Snell: K2010, K2015, K2020, M2010, M2015, M2020, SA2010, SAH2010, SA2015, SA2020; or SFI: 31.1/2010 thru /2015; 41.1/2010 thru /2015; or FIA: 8860-2004, 8860-2010, 8860-2018, 8859-2015. •No camera mounts: VE.2.5.3 •Place sticker on left side		DRIVERS' SUITS - VE.3.3.1 Single piece suit, no holes. Must be labeled. Specification: SFI 3-2A/5; FIA 1986; FIA 8856-2000 or 8856-2018	
		GLOVES - VE.3.3.6 Flame Resistant material (not all-leather). No holes. Leather palms allowed only over Flame resistant material. (No label required.)	
		SHOES - VE.3.3.5 No holes. Must be labeled. Specification: SFI 3.3; or FIA 8856-2000 or 8856-2018 Remark: SHOES - SFI 3.3 or FIA 8856-2000 (not apply in TSAE - local rule)	
BALACLAVA - VE.3.3.3 Required for all drivers. Flame Resistant material. Covers head, neck and hair. (No label required.)		SOCKS - VE.3.3.4 Flame resistant material (no cotton; no polyester). Must cover all bare skin. (No label required.)	
ARM RESTRAINTS - VE.3.3.7 Required for all drivers. Must be commercially manufactured. (No label required.)			
Cockpit REF			
VISIBILITY - V.2.2 100° min field of view to each side. Head rotation OK, or mirrors. If mirrors, must be firmly installed and adjusted.		MAIN HOOP & FRONT HOOP HEIGHTS - F.5.6.3 Helmet 50 mm (2.0") below lines between top of front and main roll hoops, and top of main hoop to rear attachment point of main hoop bracing. (Applies for every driver.)	
ROLL BAR PADDING - T.2.9 Installed on any bar that could be hit by the driver's helmet. •12 mm (0.5") thick. •Specification: SFI 45.1 or FIA 8857/2001 (pipe insulation or other foams not OK).	C2	DRIVER'S FOOT PROTECTION - T.L3.2 Feet must be rearward of the Front Bulkhead and no part of shoes or legs above or outside the Major Structure in side or front views when touching pedals. Remove nose bodywork if necessary for visual access.	
OTHER SIDE TUBES - F.5.1.2 Cockpit design must prevent driver's neck from hitting bracing or other side tubes.		EGRESS - IN.5.2 5 seconds max to actuate cockpit master switch and exit to side of vehicle, from driving position, wearing safety equipment. Wings must remain fixed in position. (See egress worksheet.)	
VEHICLE CONTROLS - T.1.4 No hands, arms, or elbows outside side impact system when actuating controls. All controls, including shifter, must be inside cockpit, and below topmost point of Front Hoop.		SEAT - T.1.5, T.1.6 •Insulated against heat conduction, convection and radiation. •Lowest point no lower than top of lower structure OR must have longitudinal 1.00" OD x 0.065" steel tube underneath.	
LAP BELT FIT - T.2.5 •Must pass over pelvis, not waist. •45-65° to horizon for upright driver; 60-80° for reclined.		FIREWALL - T.1.8 Rigid, nonflammable material. •Separates driver (line-of-sight to mid-height of driver's helmet) from fuel, cooling, oil, lithium battery, heat sources and all tractive system components other than outboard wheel motors. Wire/cable pass-throughs OK with grommets. Multiple panels OK w/ gaps sealed. •No gaps at sides or bottom. •Leaks cannot contact driver.	
SHOULDER HARNESS FIT - T.2.6 Angle from shoulder between 10° up and 20° down (vs horiz).	C1	FLOOR CLOSEOUT PANEL - T.1.7 Non-perforated, non-brittle material from foot area to firewall. Multiple panels OK if gaps less than 3 mm (1/8").	
SUB BELT FIT - T.2.7 •Snag, holding latch in place. •Position in side-view: 5 Point: aligned with or forward of shoulder belt line; 6 Point: vertical or rearward of latch.		DRIVER'S LEG PROTECTION - T.1.3 Covers inside cockpit over sharp parts or moving suspension and steering components.	
ARM RESTRAINTS FIT - VE.3.3.7 Installed so the driver can release them and exit unassisted regardless of vehicle's position.		NON-CRUSHABLE OBJECTS - F.6.2.4 25 mm clearance aft of AI Plate, Front Bulkhead including diagonals, and to pedals @ full travel and adjustment.	
HEAD RESTRAINT FIT - T.2.8 •Max 25 mm (1") forward gap to helmet. •Helmet contact point min 50 mm (2") from any edge. APPLIES TO ALL DRIVERS (may be adjusted for each driver)			

Driver Restraints		
DRIVER RESTRAINT HARNESS - T.2.2 5, 6 or 7 point and be labeled: SFI 16.1, 16.5, or FIA 8853-98, 8853-2016 (or lookup FIA D-number) •All lap belts must have Quick Adjusters. •Reclined drivers must have 6 or 7 point, and Quick Adjuster sub-belts OR 2 sets of sub belts. •Belts expire after expiration year (not months) marked on label (SFI & FIA).	C2	SHOULDER HARNESS POSITION - T.2.6 Mounting points 175-235 mm (7"- 9") apart. Tube wrap OK.
		SUB BELT POSITION - T.2.7 Sub belts cannot be re-directed by anything other than the driver's body.
HARNESS HARDWARE AND INSTALLATION - T.2.2 •Belts threaded through hardware per mfr instructions. •Hardware must be unmodified (no drilling, welding, etc).		BELT ATTACHMENT FASTENERS - T.2.5.8, T.2.6.3, T.2.7.4 •Lap & Shoulder 10 mm Grade 8.8 (3/8" SAE Grade 5). •Sub 8 mm (5/16") or as specified by harness manufacturer. •Pins required in clip/buckets •CRITICAL (positive locking) - T.8
HARNESS MOUNTS - T.2.4 •Belts must be protected by firewalls. •All belts attached securely to Primary Structure. •Tabs 1.6 mm (0.063") thick min, 60 mm2 shear area; tabs combining lap & sub belts 90 mm2. Double-shear preferred. •Tabs welded on both sides; bolt-on tabs use minimum of two 1/4" dia Grade 5 bolts. •Tabs aligned with load direction of belt, may be pre-bent.		HEAD RESTRAINT - T.2.8 •Min 150x150 mm (6"x6") AND height adjustment of 175 mm (7"); OR 150x280 mm (6"x11"), •38 mm (1.5") thick. •Near vertical. •Pad and mount must take 900 N rearward and 300 N lateral forces. •Energy absorbing material: SFI Standard 45.2 or FIA Tech List 17 (CONFOR blue CF45 or CF45M). •Mount must be within Main Hoop Bracing envelope, or add extra tube per F.5.10.
LAP BELT POSITION - T.2.5 •Pivoting mounting using eye bolt or shoulder bolt (no tube wrap). •Not re-directed by seat. •Belt centerline max 3" forward of seatback-seatbottom junction in side view.		
Cockpit templates		Overall
MAIN HOOP & FRONT HOOP HEIGHTS - F.5.6.5 Helmet of 95th percentile male (PERCY) to be 50 mm 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 915 mm from pedals.	C3	GOOD ENGINEERING PRACTICES - GR.1.5 •Proper use of fasteners. •Proper use of fluid lines and fittings. •Appropriate selection of materials regarding fluids, heat. •Protection from sharp edges - wiring, hoses, people. •Protection from heat - wiring, hoses, people. •Linkages not bound up or prone to overarticulation. •No excessive lash in joints and pivots.
COCKPIT OPENING - T.1.1 Template to pass from above cockpit to bottom of top SIS tube and less than 320mm from lowest point inside cockpit. Steering wheel & column, seat and padding can be removed; no removing firewall. Fore/aft translation of template OK.		VISIBLE ACCESS - IN.2.3 To all items on Tech Sheet without the use of mirrors, periscopes, etc.
COCKPIT INTERNAL CROSS SECTION - T.1.2 Template to pass from rearwards of the steering column to 100 mm rearwards of the pedals. Steering wheel may be removed; padding may be removed if removable with no tools & with driver in seat.		
NON-COMPLIANCE/ COMMENTS:		
STAMP		Group Cockpit และผู้ปกครอง
APPROVED BY: _____	DATE: _____	

Inspection



CAR NUMBER:		SCHOOL:								
TECHNICAL INSPECTION										
COCKPIT, ชุดรถบังคับ										
Driver's Name	Helmet Line	Head Rest-Fore & Aft	Head Rest-To Edges	Lap Belt	Shoulder Belts	Sub Belts	Egress	Drivers License	Inspector	

Helmet: 50 mm (2ins) min. below lines between Main & Front Hoops and between Main Hoop & rear attachment point of Main Hoop Bracing
 Head Restraint: Fore & aft, 25.4 mm (1 inch) max gap to back of helmet. Head Restraint: To edges: Helmet contact point min 50 mm from any edge.
 Lap Belt - Over hip bones and tight. Arm restraints connected to latch. Shoulder Belts: Tight, 10° up thru 20° down (from shoulder, relative to horizontal).
 If shoulder belts are labeled "FHR required" then driver must wear a neck support (e.g.: HANS).
 Sub Belts - Tight. Side-view position: 5-point: aligned with or forward of shoulder belt line, 6-point: vertical or rearward of latch.
 Egress: Max 5.0 sec: from "go" to BOTH feet on ground. Must include actuation of cockpit master switch.

CAR NUMBER:		SCHOOL:								
TECHNICAL INSPECTION										
COCKPIT, ชุดรถบังคับ										
Driver's Name	Helmet Line	Head Rest-Fore & Aft	Head Rest-To Edges	Lap Belt	Shoulder Belts	Sub Belts	Egress	Drivers License	Inspector	

Helmet Lines: 50 mm (2ins) min. below lines between Main & Front Hoops and between Main Hoop & rear attachment point of Main Hoop Bracing
 Head Restraint : Fore & aft, 25.4 mm (1 inch) max gap to back of helmet.
 Head Restraint : To edges: Helmet contact point min 50 mm minimum from any edge.
 Lap Belt: Over hip bones and tight. Arm restraints connected to latch.
 Shoulder Belts: Tight, 10° up thru 20° down (from shoulder, relative to horizontal).
 If shoulder belts are labeled "FHR required" then driver must wear a neck support (e.g.: HANS).
 Sub Belts - Tight. Side-view position: 5-point: aligned with or forward of shoulder belt line, 6-point: vertical or rearward of latch.
 Egress: Max 5.0 sec: from "go" to BOTH feet on ground. Must include actuation of cockpit master switch.

NON - COMPLIANCE/ COMMENTS: _____

APPROVED BY: _____ DATE: _____

Group Cockpit
และอุปกรณ์

STAMP

Once the vehicle is approved to compete in the dynamic events, ONLY modifications permitted as following.
 Adjustment of belts, chains, brake bias, driver restraint, head restraint, seat, pedal assembly, seat for different driver.
 Adjustment to engine operating parameters, fuel mixture, ignition timing, mirrors, tire pressure, wing angle.
 Replenishment of fluids. Replacement of worn tires, brake pads. The changing of wheels and tires

Inspection

Pre Inspection

2023 TSAE Auto Challenge INSPECTION SHEET

Page 1

2023 TSAE Auto Challenge INSPECTION SHEET

CAR NUMBER:	TRANSPONDER NUMBER: -
SCHOOL:	
SES SUBMITTED? YES/NO :	FACULTY ADVISOR SIGNATURE
ENGINE MODEL:	NUMBER OF DRIVERS:
ENGINE BORE X STROKE:	TALLEST DRIVER: HEIGHT:
ABS? YES/NO :	

IMPORTANT

FORM MUST STAY WITH THE CAR UNTIL THAT SPECIFIC PART OF INSPECTION HAS BEEN COMPLETE

Pre Inspection

EXTERIOR, GENERAL		REF
	PUSH BAR - VE.2.2 Always with car (detachable), push & pull, usable by 2 people standing behind the car. EVs: HV disconnect tool, if used.	
	CAR NUMBERS - VE.1.1 On •front & both sides of car, •minimum 150 mm tall, •18 mm stroke & spacing. •White-on-black or B-on-W only. •Background shape: round, oval, rectangular or square. •Visibility must not be obstructed.	
P1	BODY & STYLING - V.1 Open cockpit, formula style body. Four wheels, not in a line.	
	WHEELBASE - V.1.2 <u>Minimum 1525 mm.</u>	
	OPEN WHEEL - V.1.1 •Top 180° of wheel/tire unobstructed from above. V.1.1 •Tires unobstructed from sides. •Vertical keepout zones 75mm in front & behind tires.	

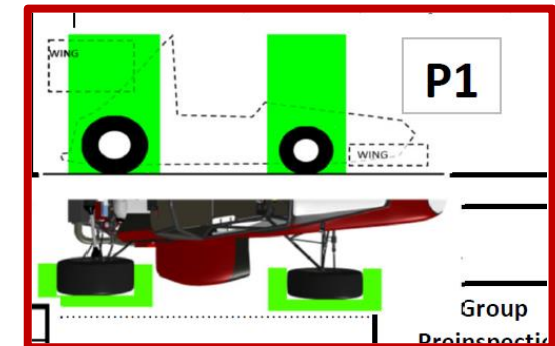
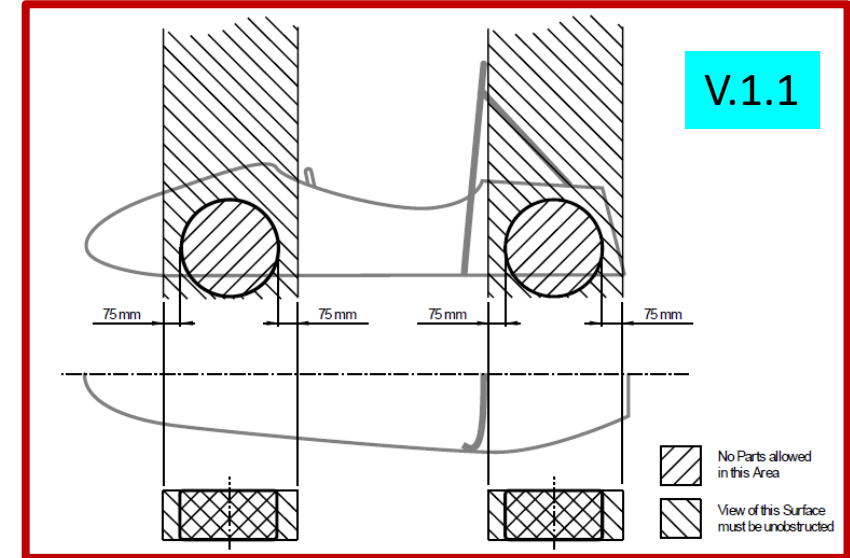
Push Bar

ตีคหมายเลขรถ

รถร่าง ของรถ Formula 4 ล้อ

ระยะห่างล้อหน้า-ล้อหลัง
ไม่น้อยกว่า 1525 มม

ล้อเปิด



Pre Inspection

	<p>TSAE DECALS - TSAE logo on front and/or both sides, in prominent location.</p>
	<p>SCHOOL NAME - VE.1.2 School name or recognized initials.</p> <ul style="list-style-type: none"> •Both sides of car, •easily visible location, •50 mm tall min, •Roman letters, •high contrast background.
	<p>TECH STICKER SPACE -VE.1.4 25 cm wide x 20 cm high available space, located on centerline of upper front bodywork (nose) of car.</p>
	<p>JACKING POINT - VE.2.1</p> <ul style="list-style-type: none"> •Horizontal, lateral tube at the rear. •Orange color.
	<ul style="list-style-type: none"> •300 mm wide by 25-30 mm O.D. •Visible to person standing 1 meter behind car. •75 mm min ground clearance •Rear tires must come off the ground using Quick-Jack (lifts to 200 mm).

สติ๊กเกอร์ TSAE

ชื่อสถาบันการศึกษา

พื้นที่ติดสติ๊กเกอร์ เมื่อผ่านการตรวจหรือทดสอบ

Jacking Point



Jacking Point

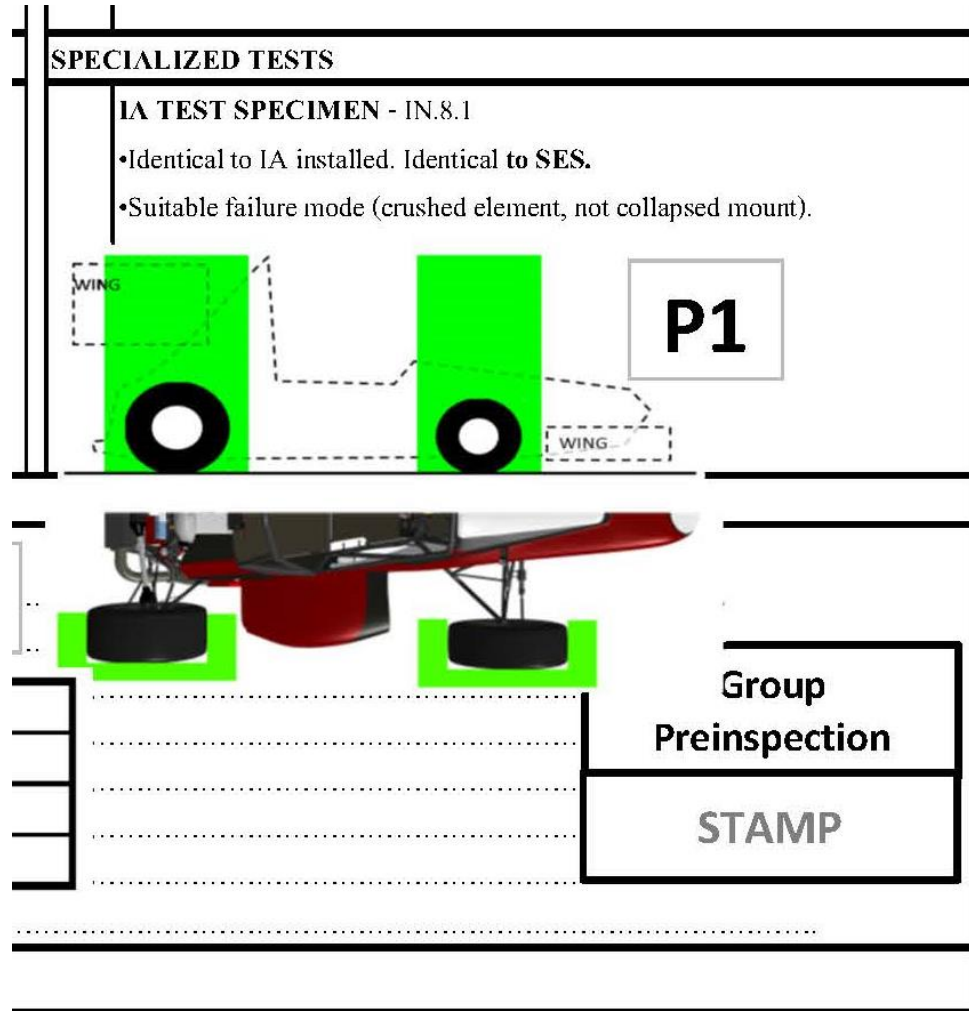
Pre Inspection

•Vertical keepout zones /5mm in front & behind tires.			
DRIVER'S EQUIPMENT			
FIRE EXTINGUISHERS - VE.2.3			
•Hand-held, dry chemical (no AFFF or halon), min specification: 10BC; 1A10BC; 34B; 5A 34B; 20BE; or 1A 10BE.			
•Min 0.9 kg (2 lb). •Two required: must present both at Tech.			
NON - COMPLIANCE/ COMMENTS:			
			P
(Inspector use only)			
Initials:	Day:	Time In:	Time Out:
Initials:	Day:	Time In:	Time Out:
Initials:	Day:	Time In:	Time Out:
APPROVED BY:		DATE:	

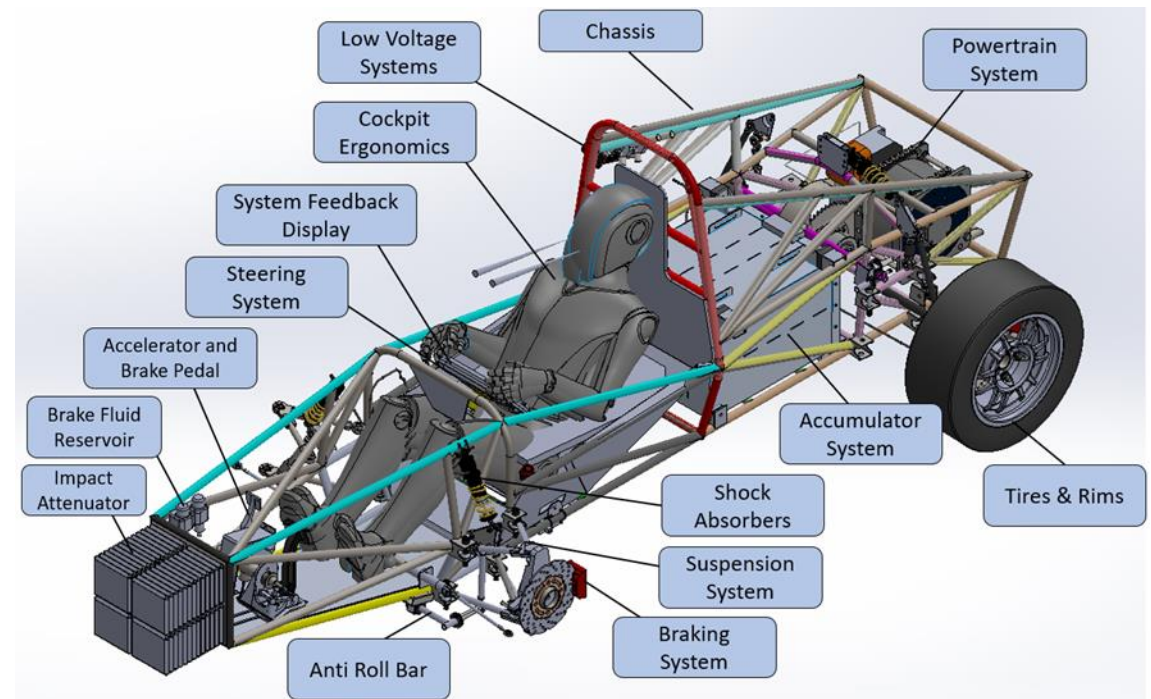
ดับดับเพลิง ไม่น้อยกว่า 2 ปอนด์



Pre Inspection



Impact Attenuator ที่ถูกทดสอบ



Pre Inspection

ทดสอบนักขับออกจากรถภายใน 5 วินาที ทุกคน



Boby / Structure

2023 TSAE Auto Challenge

CAR NUMBER:	SCHOOL:
PART 1 , cont'd.	
TECHNICAL INSPECTION	
EXTERIOR, GENERAL, AERO (B1)	REF
TRANSPONDER is lent out during a competition period. (Local rule)	
CAMERA MOUNTS - VE.2.5 •If >0.25 kg, must be secured by two points (typical GoPro-brand camera is <0.25 kg). •No cameras mounted to helmet.	
BODYWORK - T.7.2 •No large openings (>~6mm) in bodywork into driver compartment in front of or alongside driver. •Body/nose min 38 mm radius, +/-45° all directions.	
AERODYNAMIC DEVICES - T.7.1 •No powered ground effects. •Securely mounted - no oscillation or excessive movement. (Wings, undertray, splitter, endplates, vanes, etc.)	
EDGE RADII - T.7.1 •Horizontal leading edges min 5 mm radius. •Vertical forward-facing edges min 3 mm radius. •Other edges: not sharp - GR.1.5	

การติดตั้งกล้อง VDO

งานตัวถัง

อุปกรณ์แอโรไดนามิก

ไม่มีขอบคม ขอบไม่น้อยกว่า R 3 mm.



Boby / Structure

INSPECTION SHEET

Page 2

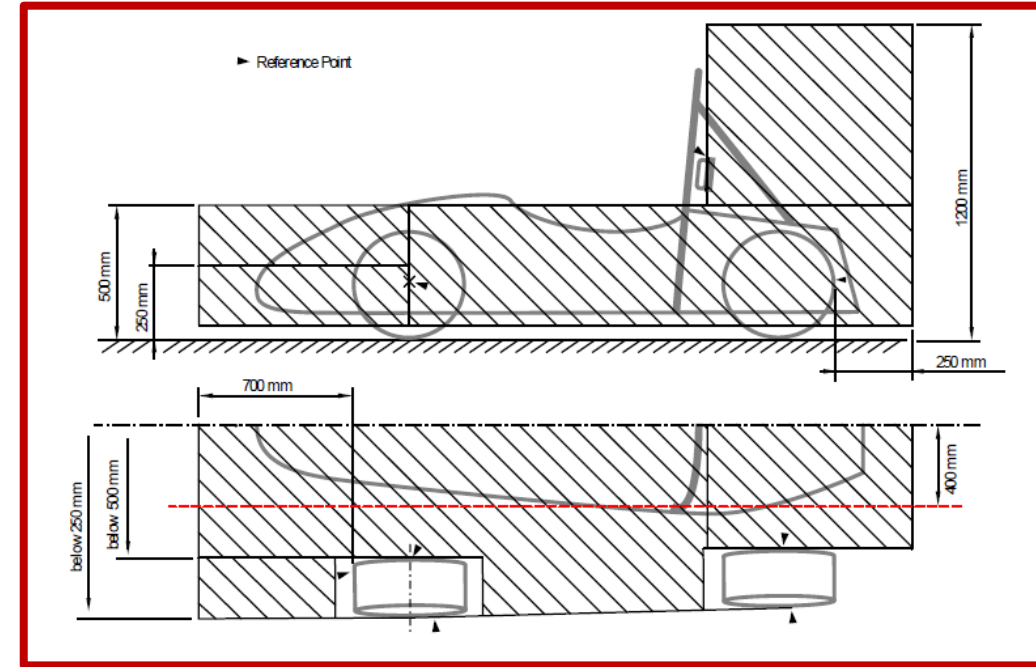
SECTION (Cont'd)

	<p>FRONT MOUNTED AERO - T.7.4</p> <ul style="list-style-type: none"> •Max forward: 700 mm ahead of the front tires. •Max width: OUTSIDE of the front tires (at hub height). •Max height: 250 mm if in front of tires (w/out driver).
	<p>REAR MOUNTED AERO - T.7.5</p> <ul style="list-style-type: none"> •Max rearward: 250 mm behind the rear tires. •Max forward: Headrest support (undertrays exempt). •Max width: INSIDE of the rear tires (at hub height). •Max height: 1.2 m above ground (w/out driver).
	<p>AERO BETWEEN WHEEL CENTERLINES - T.7.6</p> <ul style="list-style-type: none"> •Max width: Line between front & rear tires (at hub height). •Max height: 500 mm (exempt if w/in 400 mm of car centerline).

Aero ติดตั้งด้านหน้า

Aero ติดตั้งด้านหลัง

Aero ระหว่างเส้นศูนย์ล้อ



Boby / Structure

PRIMARY STRUCTURE, Tube Frame	REF
MAIN HOOP - F.5.8 •Must be steel with smooth bends with no wrinkles. •Must be 1 piece & extend to lowest frame member. •Tube endpoints 380 mm apart (inside dim) at bottom attachment. •Above Major Structure, max 10° to vertical. •No part angled rearwards more than 10° from vertical. •Bends in side view, and front view below the SIS must be braced to a frame node.	
FRONT HOOP - F.5.7 •Closed-section metal tube (may be multi-piece). •Must extend to lowest frame member. •Max 20° to vertical. •10° max tilt towards cockpit opening if no rearward bracing •Bends in side view and front view below the SIS braced to a frame node.	
FRONT BULKHEAD - F.6.1 Closed-section metal tube.	
SIDE IMPACT STRUCTURE - F.6.4 •Min of 3 tubes must connect the main and front hoops. •Upper tube must be between 240 mm and 320 mm above highest surface of lower SIS tube (F.6.4.3). •Lower tube must connect endpoints of Main and Front hoops. •At least one diagonal per side: must triangulate the upper and lower members between the Main and Front hoops.	
SHOULDER HARNESS MOUNTING BAR - F.6.5 •Uncut, closed-section tube. •Attached to Main Hoop. •Braced to Main Hoop if bent: minimum 30° between brace and bar.	
BENT OR MULTIPLE TUBES - F.5.2 •Min bend radius: 3x tube OD. •A brace must connect from midpoint of bend to a frame node, within 30° of plane of bend (Upper SIS, Shoulder Harness Bar exempt from 30°). •Brace material: same size as bent tube.	
REMOVABLE BRACING - F.5.12 •Double-shear (capped) or Sleeved Butt joints only. •No bends. •No rod-end bearings.	

Main Hoop

Front Hoop

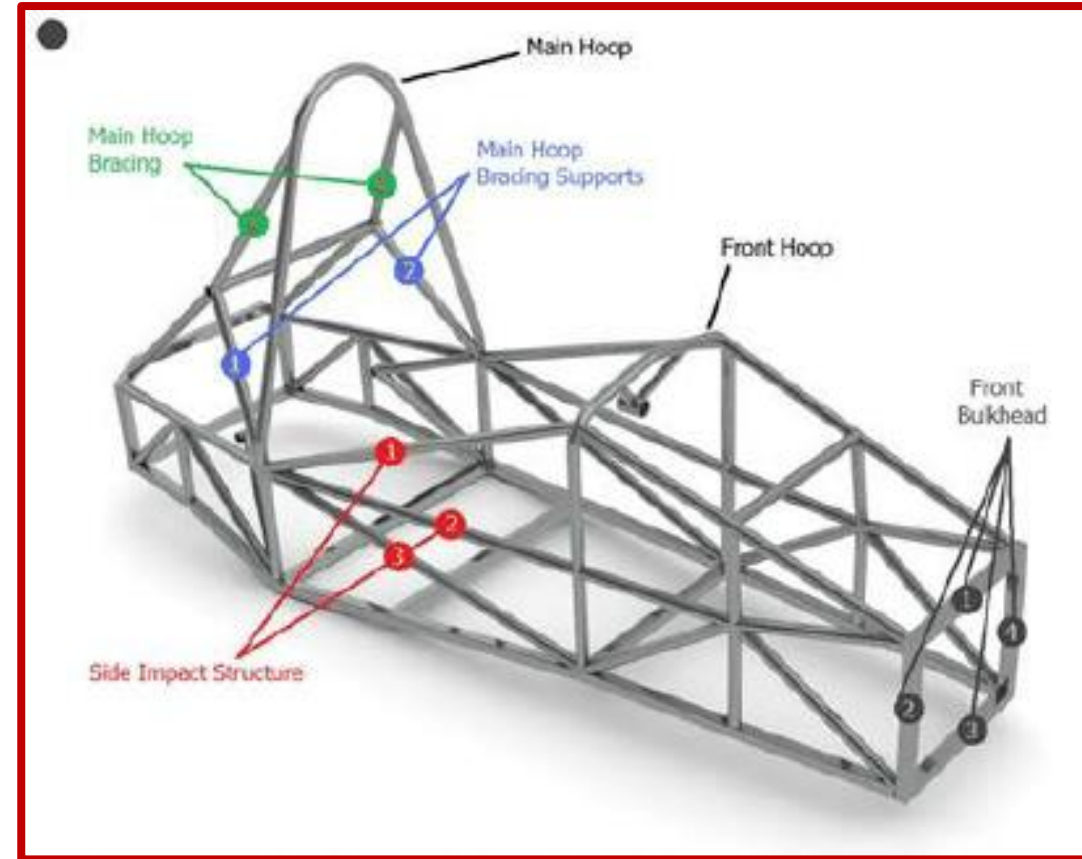
FRONT BULKHEAD

SIDE IMPACT STRUCTURE

SHOULDER HARNESS MOUNTING BAR

BENT OR MULTIPLE TUBES

REMOVABLE BRACING



Boby / Structure

<p>MAIN HOOP BRACING - F.5.9, F.6.6</p> <ul style="list-style-type: none"> •Must be steel w/ no bends. •One brace each side, attached within 160 mm of top of hoop. •Min 30° included angle with hoop. •Bracing must not be on same side of vertical as Main Hoop. •Must take load back to bottom of Main Hoop, and Upper Side-Impact tube, thru properly triangulated structure.
<p>ATTACHMENTS TO BRACING - T.2.13.9</p> <p>If any item which is outside the envelope of the Primary Structure is attached to the Main Hoop braces, then additional bracing must be added to prevent bending loads in the braces in any rollover attitude (e.g. suspension mounts, radiator).</p>
<p>FRONT HOOP BRACING - F.6.3</p> <ul style="list-style-type: none"> •Two forward facing braces, attached within 50 mm of top of hoop. •Extra rearward bracing required if Front Hoop leans backwards more than 10°. •Bracing ends at Front Bulkhead or triangulated structure.
<p>FRONT BULKHEAD SUPPORT - F.6.2</p> <p>Min 3 tubes each side of car: •Bottom: connect bottoms of bulkhead and Front Hoop; •Top: connect within 50mm of top of bulkhead, 100 mm above and 50 mm below upper SIS tube (brace to Main Hoop if top tube does not connect near upper SIS);</p> <ul style="list-style-type: none"> •Diagonal tube(s) to completely triangulate connections to upper and lower SIS tubes.
<p>BOLTED JOINTS IN FRAME - F.5.4, F.5.13</p> <ul style="list-style-type: none"> •Edge of any bolt hole located $> 1.5 \times$ hole diameter from nearest edge of the material. •No blind or welded threaded fasteners. •Bolts 8 mm (5/16"), plates 2.0 mm (0.08"). <p>(Primary structure joints only.) CRITICAL FASTENERS</p>
<p>INSPECTION HOLES - Tech may use ultrasound to measure wall thickness and/or ask 4.5 mm holes be drilled</p>

MAIN HOOP BRACING

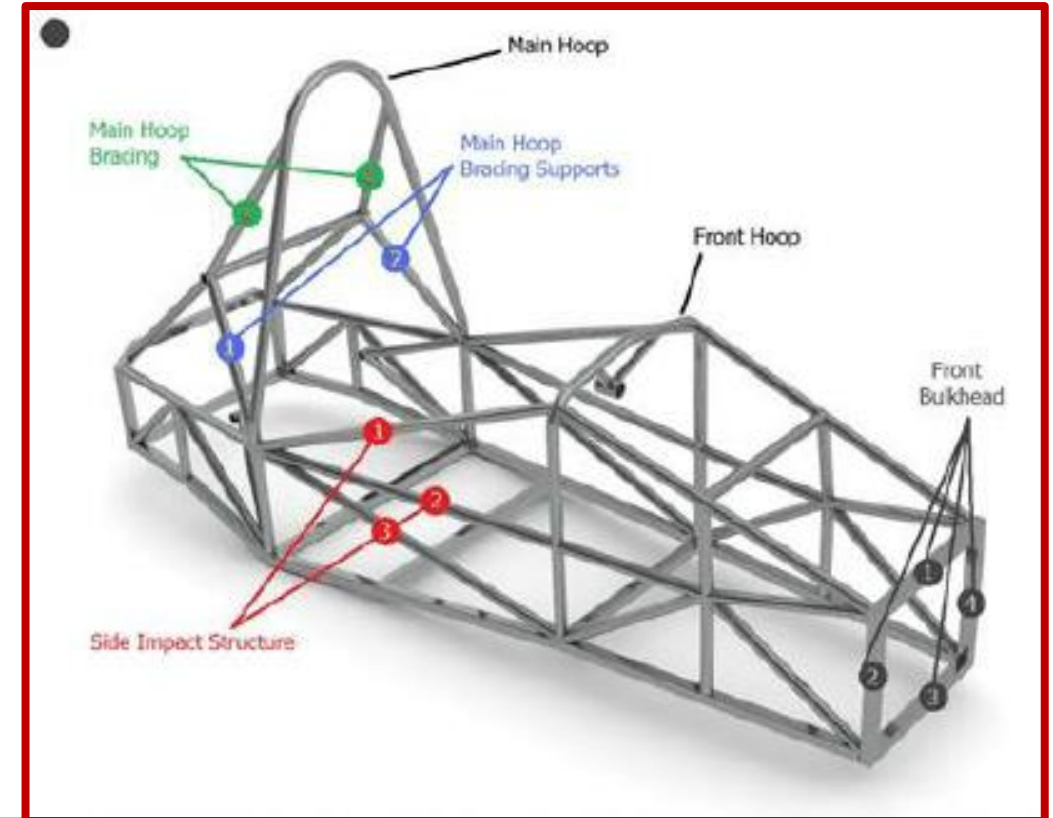
ATTACHMENTS TO BRACING

FRONT HOOP BRACING

FRONT BULKHEAD SUPPORT

BOLTED JOINTS IN FRAME

INSPECTION HOLES 4.5 mm.



Boby / Structure

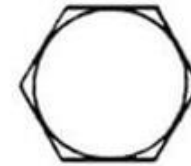
2023 TSAE Auto Challenge INS

Critical Fasteners Reference: T.8

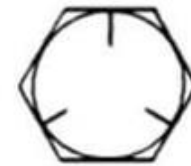
Note: For all locations marked "CRITICAL FASTENERS" in this form, the following requirements apply: •Material rating: SAE Gr 5, Metric 8.8, or AN/MS. •Hex-head or socket-head; no pan head, flat head, or low-profile screws. •Positive locking: safety wire, lock pins, or locking nuts with 2 threads visible beyond nut. Threadlock compounds not sufficient; no nylock nuts if >80 °C.

Material rating: SAE Gr 5,
Metric 8.8, or AN/MS.

SAE Grade 2



SAE Grade 5



SAE Grade 8



Metric Bolt Grades Compared to SAE



Metric Class 4.8



Metric Class 8.8



Metric Class 10.9

Boby / Structure

Primary Structure, Monocoque

	<p>MAIN HOOP ATTACHMENT - F.7.6</p> <ul style="list-style-type: none"> •Three points per side at 30 kN each, or two 45 kN. •Two axial plates and gussets. •Mounting plates on hoop min 2 mm thick. 	
	<p>FRONT HOOP ATTACHMENT- F.7.4</p> <ul style="list-style-type: none"> •Three points per side: top, within 25mm of bends. •May be fully encapsulated. •Must not be attached only by adhesive, cores must fit tightly. 	
	<p>SIDE IMPACT PROTECTION - F.7.5</p> <p>Identical to SES.</p>	
	<p>HARNESS ATTACHMENT POINTS - F.7.9</p> <ul style="list-style-type: none"> •Test specimens: representative of vehicle construction. •Test loading direction: specific to harness installation. 	
	<p>LAMINATE TEST SPECIMENS - F.4.3</p> <p>Two or more for both SIS and primary structure constructions:</p> <ul style="list-style-type: none"> •Three-point bending: 275 x 500 mm or 138 x 500 mm •Perimeter shear: 100 x 100 mm •Lap joint •Identical to SES and vehicle •Engraved with date, specimen name, max test load. 	

MAIN HOOP ATTACHMENT

FRONT HOOP ATTACHMENT

การป้องกันแรงกระแทกด้านข้าง

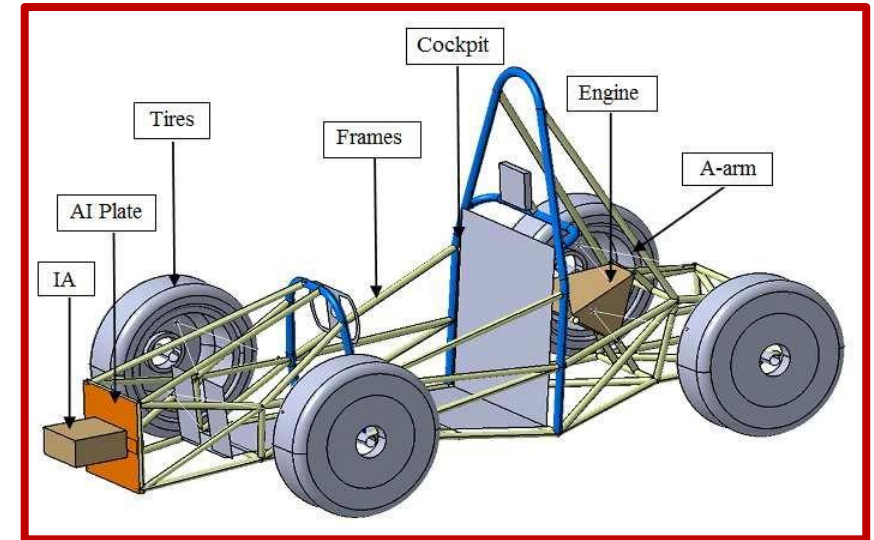
จุดยึดสายรัด

ตัวอย่างการทดสอบลามิเนต

Boby / Structure

FRONT BULKHEAD & SUPPORT

	<p>FRONT BULKHEAD & SUPPORT - F.7.2 Identical to SES. •Diagonal required for standard honeycomb IA, Diagonal must be attached to AIP.</p>
	<p>ATTACHMENT POINTS - F.7.8</p> <ul style="list-style-type: none"> •Two 8 mm bolts per joint. •One 10mm bolt on centerline allowed for hoop braces. •Backing plates: 2 mm steel. •No crushing of the core. •No blind or threaded inserts. •Requires inserts or no gap between inner and outer skins. •CRITICAL FASTENERS (positive locking)
	<p>IA ATTACHMENT, MONOCOQUE - F.8.5 Equivalent to: •Four 8 mm bolts for Impact Attenuator, •Eight 8 mm bolts for Anti Intrusion Plate</p>
	<p>ANTI INTRUSION PLATE, MONOCOQUE - F.8.2.2 Physical Impact Attenuator Data test, or 3-point bending and perimeter shear tests.</p> <ul style="list-style-type: none"> •Bonded or laminated must extend to outside perimeter of bulkhead.



ATTACHMENT POINTS

ติดตั้ง IA Bolt 4 ตัว ขนาด 8 mm.
 แผ่นปิด

แผ่นป้องกัน

Boby / Structure

Engraved with date, specimen name, max test load.

Impact Attenuator

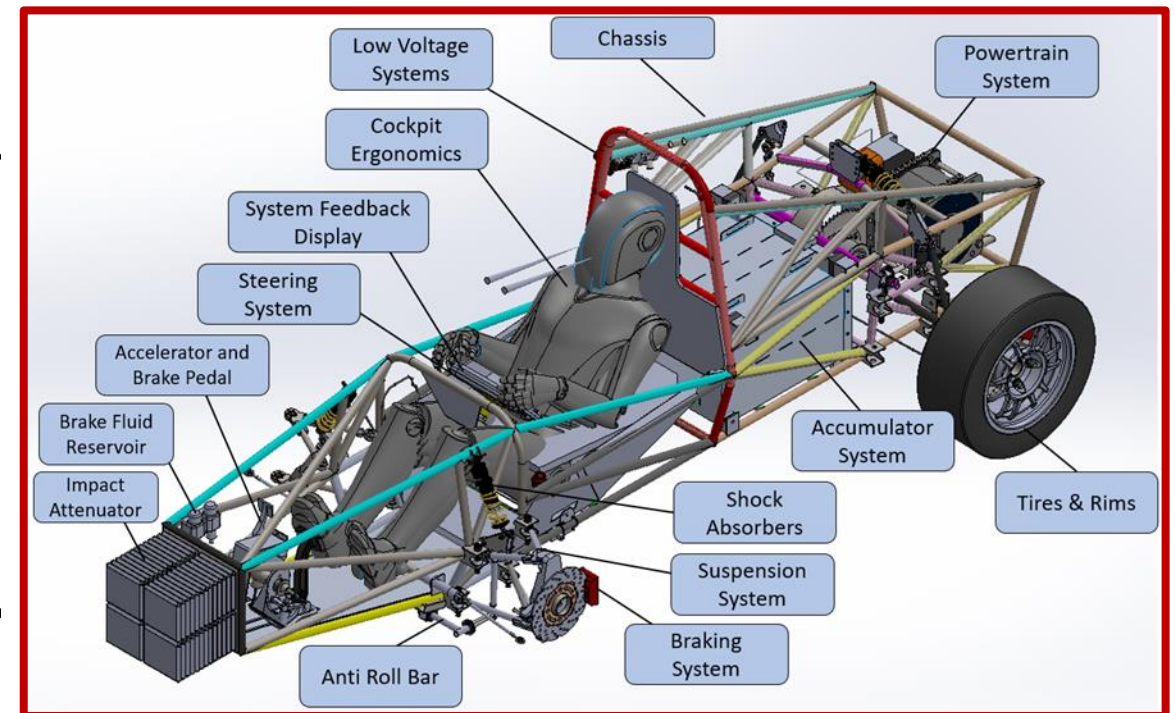
STANDARD IMPACT ATTENUATOR - F.8.4.3

- Must be fully bonded to AIP. •Honeycomb must be horizontal; foam may be vertical. •If honeycomb, or if Plate >25 mm wider than AI on any side: **diagonal or X required in bulkhead**, or testing to show AIP deforms <25 mm.
- Foam must not be degraded or damaged.

TEAM-DESIGNED IMPACT ATTENUATOR - F.8.4

- 200 mm long x 200 mm wide x 100 mm high. •Attached to AIP w/ welds - 1:1 weld ratio, beads 25 mm min; or **eight** 8 mm (5/16") bolts; or adhesive (required for foam or honeycomb materials).
- Must be capable of taking vertical and transverse loads.
- Must be identical to test specimen.

STANDARD IMPACT ATTENUATOR



Boby / Structure

Bonded or laminated must extend to outside perimeter of bulkhead.

ANTI-INTRUSION PLATE - F.8.2

- 1.5 mm steel or 4 mm aluminum. •Attached to bulkhead w/ eight 8 mm (5/16") bolts, **bonded or laminated** (AIP extending to **outer edge of bulkhead tubes**), or **welded** (AIP extending to **centerline of bulkhead tubes**).
- Capable of taking vertical and transverse loads.

CRITICAL FASTENERS: ATTENUATOR - F.8.2.3

- IA: **Eight** 8 mm bolts w/ positive locking
- AI Plate: Eight 8 mm bolts w/ positive locking

FRONT BULKHEAD DIAGONAL - F.8.4.3

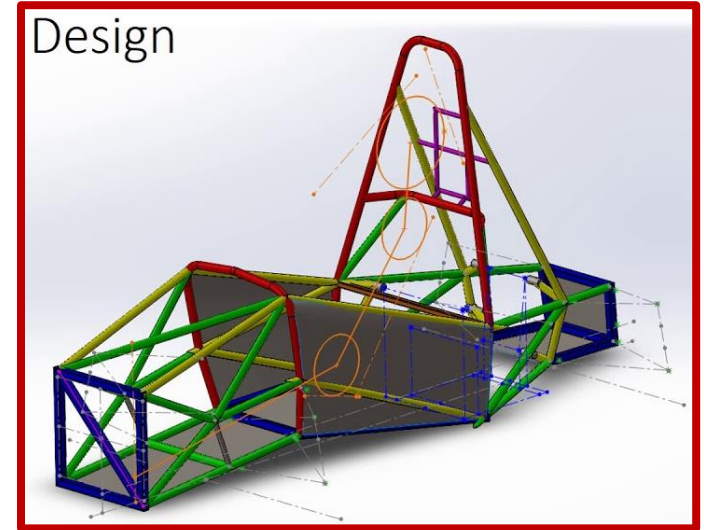
- Unless tested for **<25mm AIP deflection**, diagonal structure is required for the standard foam IA when **FBH > 400mm x 350mm**; diagonal required for all standard honeycomb IAs.
- Diagonal may be attached to AIP.

ANTI-INTRUSION PLATE

CRITICAL FASTENERS: ATTENUATOR

FRONT BULKHEAD DIAGONAL

Design



Chassis

2023 TSAE Auto Challenge INSPECTION SHEET		Page 4
CAR NUMBER:		SCHOOL:
PART 1 , cont'd.		
ABS? YES/NO :		
TECHNICAL INSPECTION (Cont'd)		
TYRES & WHEELS		
DRY TIRES-Maker: Size: Compound:		RAIN TIRES - Maker: Size: Compound:
WHEELS - V.4.1 •203 mm (8.0") min diameter. •Wheels with single wheel nut must have positive retainer. •Aluminum lug nuts hard-anodized and pristine condition.		RAIN TIRES - 3/32 in. min. tread depth moulded by tire manufacturer.

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Chassis

STEERING, SUSPENSION, BRAKES	
STEERING - V.3.2	<ul style="list-style-type: none"> All steerable wheels must have positive stops to prevent linkage lock-up or contact with other parts. •7° max freeplay at the steering wheel. •NO STEER-BY-WIRE on front wheels. No cables or belts. •No bonded joints in column without metal backup. Rear steer limited to 6° total, with mechanical stops.
STEERING WHEEL - V.3.3	<ul style="list-style-type: none"> Continuous perimeter, near round (no concave sections). Driver operable quick disconnect. •Not higher than top of Front IIoop, in any angular position. •250 mm max rearward of Front IIoop (F.5.7.5).
CRITICAL FASTENERS, Steering - V.3.2.8	Steering wheel, column, rack mounting, tie rods.
GROUND CLEARANCE - V.1.4	Sufficient clearance so that no part of the car other than the tires will contact the track surface.
SUSPENSION PICK-UP POINTS - GR.1.5	Inspected thoroughly for integrity: binding, over-articulation.
SUSPENSION - V.3.1	<ul style="list-style-type: none"> Full suspension including front and rear damping. Spherical rod ends and bearings: double-shear or safety washers.
STEERING COMPONENTS OUTSIDE FRAME - F.5.14	<ul style="list-style-type: none"> Racks protected to top, bottom, and local chassis width.

STEERING

STEERING WHEEL

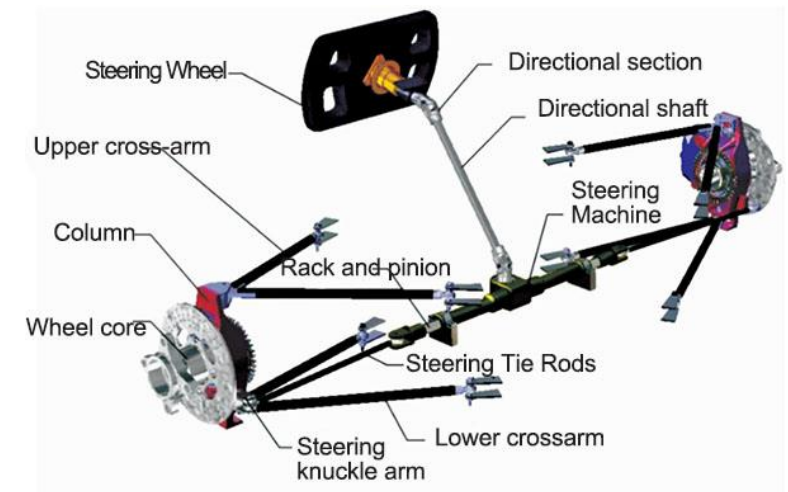
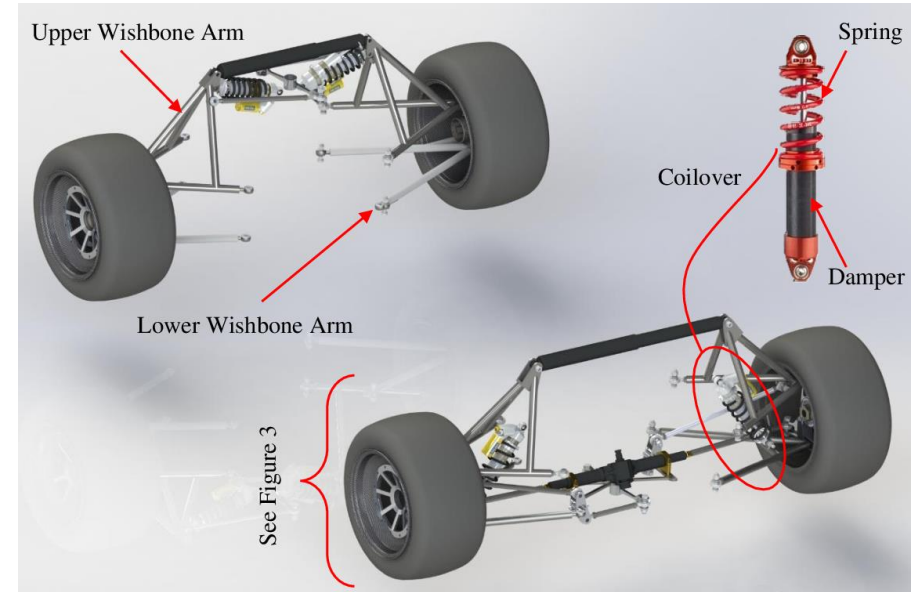
CRITICAL FASTENERS, Steering

GROUND CLEARANCE

SUSPENSION PICK-UP POINTS

SUSPENSION

STEERING COMPONENTS OUTSIDE FRAME



Chassis

MODIFIED LUG BOLTS/STUDS - V.4.2.2

Verify good engineering practices are followed e.g. no drill holes for mass reduction.

CRITICAL FASTENERS: SUSPENSION - V.3.1.4

Control arms, knuckle, spring load path, single wheel nuts.
Exempt: lug nuts, multi-piece wheels, anti-roll bars, dampers.
All fasteners must be tight (esp: jam nuts)

BRAKES - T.3.1

- Single pedal actuates all 4 wheels (one brake on limited slip OK)
- Two separate hydraulic circuits w/ reservoirs; no brake-by-wire.
- Protected by structure/shields from drivetrain & collisions.
- No plastic brake lines. •No parts below chassis/tub in side view.

CRITICAL FASTENERS: BRAKES - T.3.1

- Pedal Assembly: including adjustment mechanism, caliper to knuckle mounts, rotor to hat.
- Exempt: COTS caliper body assembly

BRAKE CONTROL SYSTEMS - GR.1.5

ABS, Traction, Yaw Control, etc: must have an approved FMEA.

BRAKE PEDAL - T.3.1.11-.13

Steel, aluminum, or machined titanium (no welded Ti). Alt matl. OK for pad face. **Entire pedal-to-frame system** capable of 2kN (tested only by organizers).

MODIFIED LUG BOLTS/STUDS

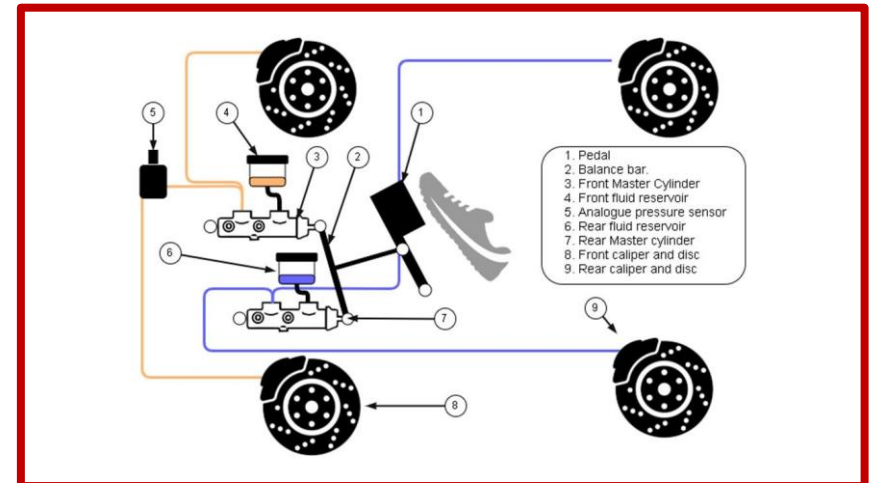
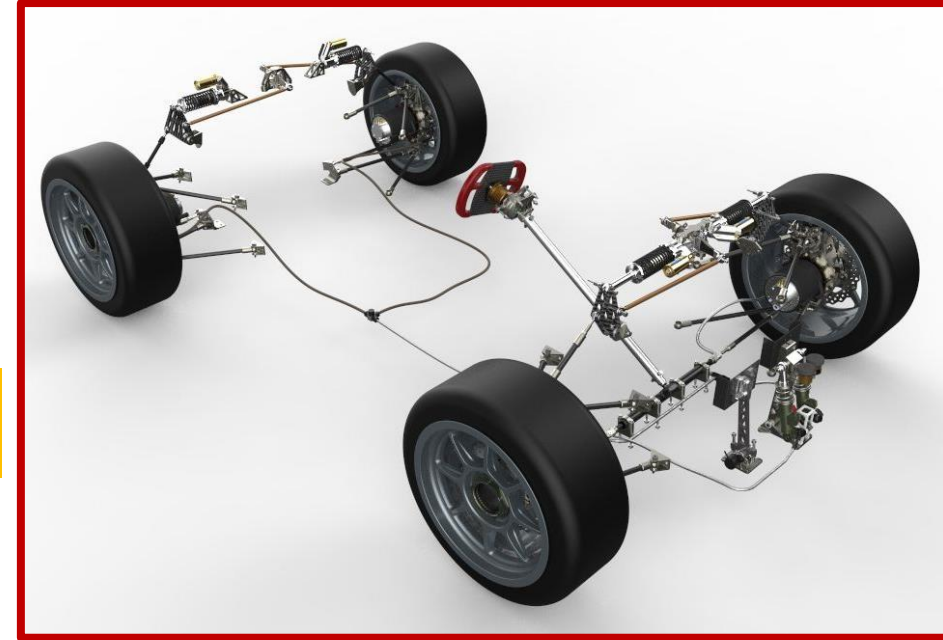
CRITICAL FASTENERS: SUSPENSION

BRAKES

CRITICAL FASTENERS: BRAKES

BRAKE CONTROL SYSTEMS

BRAKE PEDAL



Powertrain

ENGINE / TRANSMISSION COMPARTMENT

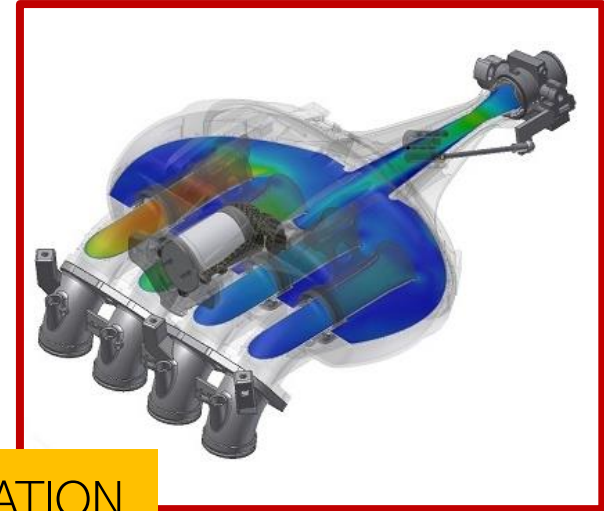
<p>ENGINE - IC.1.1 Four -stroke piston engine, 710 cc maximum swept displacement. No hybrids. Waste heat recovery allowed.</p>	
<p>INTAKE and FUEL SYSTEM LOCATION - IC.1.2 All parts of air intake system (including throttle body or carb, air intake ducting, air cleaner & air box), AND •all parts of the fuel storage, supply and fuel control systems (including fuel rail, throttle body or carburetor), must be within a surface defined by the top of the roll bar and the outside top edge of the tires.</p>	
<p>AIR INTAKE SYSTEM - IC.2.2 & .3</p> <ul style="list-style-type: none"> •Side and Rear Impact protection if <350 mm above ground. •Supported if cantilevered (isolated to frame, rigid to engine). •CRITICAL FASTENERS: securely attached to block or head with brackets & mechanical fasteners w/ positive locking mechanisms. OEM-type rubber bushings not sufficient. 	
<p>THROTTLE - IC.3</p> <ul style="list-style-type: none"> •Min qty of 2 springs 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. •Cable position min 50 mm from any exhaust component. •Idle air bypass control and throttle blippers are and not allowed without ETC process. 	

ENGINE

INTAKE and FUEL SYSTEM LOCATION

AIR INTAKE SYSTEM

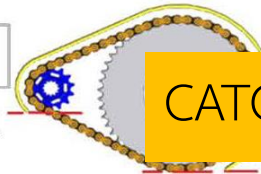
THROTTLE



Powertrain

<p>RESTRICTOR - IC.2.4</p> <ul style="list-style-type: none"> •Must be circular: max dia 20.0 mm for gasoline and 19.0 mm for E85. •Cannot be movable or flexible. •Installed per below: NA: THROTTLE -> RESTRICTOR -> ENGINE FI: RESTRICTOR -> COMPRESSOR -> THROTTLE -> ENGINE 	E1
<p>HIGH PRESSURE HYDRAULICS - T.6.2</p> <p>Pumps and lines must have 1 mm thick steel or aluminum shields to protect driver and workers. (Brakes & clutch exempt.)</p>	
<p>COMPRESSORS - IC.2.5</p> <ul style="list-style-type: none"> •Turbo or super chargers allowed if not OEM to engine. •Must be between restrictor and throttle. •Intercoolers downstream of throttle. •Carbs not allowed if compressors are used. •Compressor recirculation valves ok if downstream of restrictor. •No enlarged air chambers (section > 28 cm²) before throttle. 	
<p>CATCH CANS - T.5.6</p> <ul style="list-style-type: none"> •Engine coolant (unless aircooled) and engine crankcase must have separate catch cans of 0.9 L min vol. •Oil(s) and water(s) must be separate •100 °C-capable material. •Behind firewall, below shoulder level. •3 mm min diameter vent, directed away from driver. •PCV OK if routed to intake sys upstream of restrictor. •Cannot connect breathers to exhaust. •Trans, diff, other systems (unless sealed): 10% or 0.5 L catch can. 	

E2

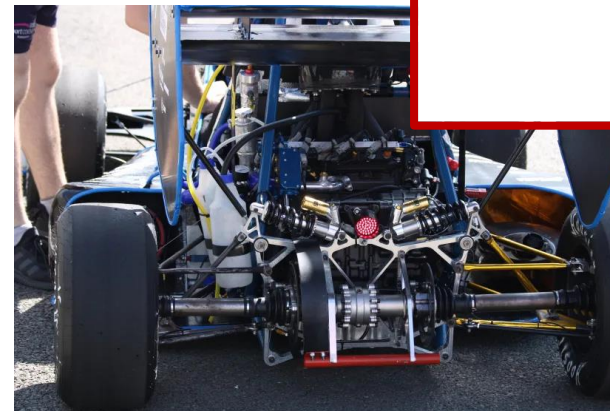
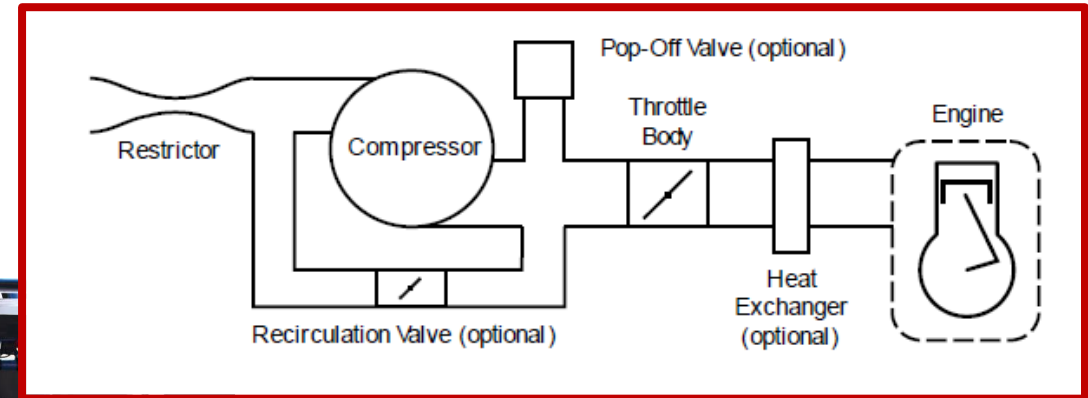
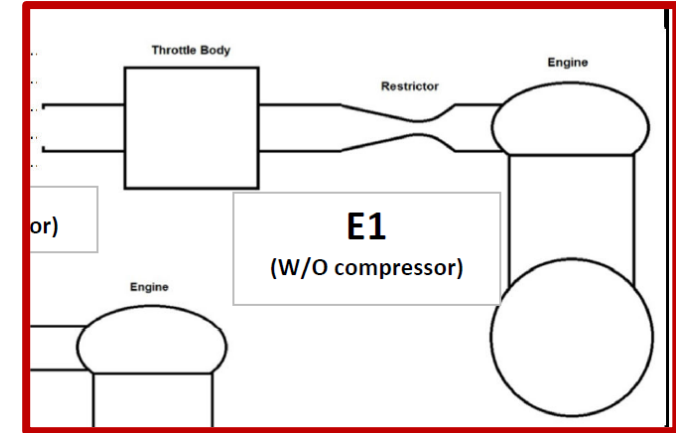


CATCH CANS

RESTRICTOR

HIGH PRESSURE HYDRAULICS

COMPRESSORS



Powertrain

	<p>FLUID ACCUMULATION - T.5.5.5 Absorbent materials and open collection devices (regardless of material) are prohibited below the highest point of the exhaust system in compartments containing the engine, drivetrain, exhaust and fuel systems.</p>
	<p>BELLYPANS - T.5.5.4 Must be vented to prevent accumulation of fuel: 2 holes each min of 25mm dia. •Specific locations: Lowest point in chassis; Aft of driver & front of fuel tank.</p>
	<p>FLUID LEAKS - T.5.5.1 Not permitted. Firewalls must prevent contact w/ driver.</p>
	<p>EXHAUST OUTLET - IC.7.2 •Outlet 45 cm (17.7") max behind rear axle centerline and 60 cm (23.6") max above the ground. •Located such that exhaust gases should not reach driver.</p>
	<p>EXHAUST SYSTEM - IC.7.2 •Exhaust components outside bodywork forward of main hoop must be shielded from people approaching the car. •No fibrous wraps around exhaust tubes.</p>
E2	<p>SCATTERSHIELDS GENERAL - T.5.2 •Required for clutches, chains, belts, CVT rotating parts, etc. •Not perforated. •End parallel to lowest part of front and rear sprockets. •Min 6mm fasteners •CRITICAL FASTENERS</p>

FLUID ACCUMULATION

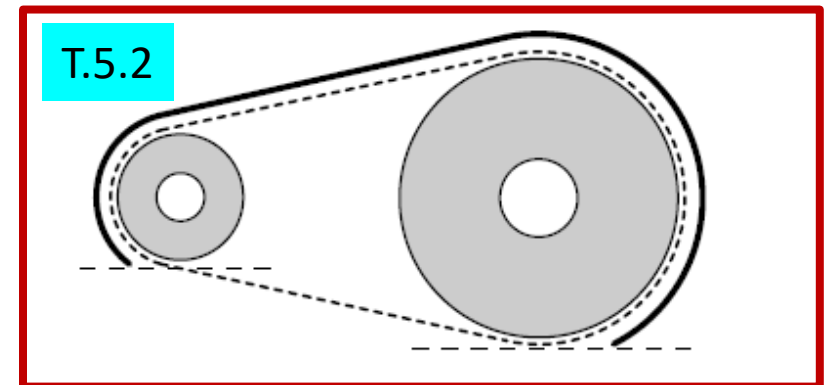
BELLYPANS

FLUID LEAKS

EXHAUST OUTLET

EXHAUST SYSTEM

SCATTERSHIELDS GENERAL



Powertrain

SCATTERSHIELD MATERIALS - T.5.2

- Size: for chains: 2.7 mm (0.105") min thick steel, 3x chain width; for belts: 3 mm (0.12") min thick aluminum 6061-T6, 1.7x belt width.
- OEM engine drive sprocket cover OK.

SCATTER SHIELD MATERIALS

D'TRAIN FINGER GUARDS - T.5.2.10

- Required to cover all drivetrain parts that spin while car is at rest.
- No holes >12 mm dia.

D'TRAIN FINGER GUARDS

COMPRESSED GAS CYLINDERS - T.6

- Unmodified COTS cylinder (labeled). •Nonflammable gas.
- Regulator on tank. •Securely mounted, axis not pointed at driver.
- Rearward of Main Hoop within the frame envelope, or in structural sidepod; not in cockpit. •Appropriate lines & fittings.
- <=150mm from exhaust: metal, or protected per T.1.6.3.

COMPRESSED GAS CYLINDERS

COOLANT - T.5.4

- (IC) Only 100% water. NO ADDITIVES WHATSOEVER
- (EV) 100% water, or oil.

COOLANT

ELECTRONIC THROTTLE CONTROLS (ETC) - IC.4

- Only for cars using ETC: Do NOT signoff this tech form until separate ETC inspection is approved. •Requires prior submission and approval.
- Inspected by special team. •Idle air bypass control and throttle blippers are ETC, and are not allowed without completing the ETC process.

ELECTRONIC THROTTLE CONTROLS

THROTTLE PEDAL - IC.3.1.3

- Must have positive stop to prevent overstressing cable.
- Must return when not actuated.

THROTTLE PEDAL



Powertrain

FUEL SYSTEM	REF
<p>FUEL TANKS - IC.5.2 & .3, F.9</p> <ul style="list-style-type: none"> •Must lie within major structure of the chassis, with side impact protection. •Rigid tanks cannot carry structural load & must be flexibly mounted. •Bladders or bags in rigid container. •No portion of fuel system below lower surface of frame. •Firewall between all parts of fuel system & driver. 	
<p>FUEL LINES - IC.5.7</p> <ul style="list-style-type: none"> •No plastic lines between tank & engine (reinforced rubber hoses OK). •Bulbs/barbs on hose connections. •No worm-gear clamps. •Must be securely attached, •protected from rotating equipment & collision damage. •Systems >10 bar see IC.6.2 	
<p>GOOD PRACTICES, fuel lines - GR.1.5</p> <ul style="list-style-type: none"> •Hoses and fittings must be type-matched (no clamps on braided metal hoses, etc). •Fuel lines restrained and protected from stress, heat, and abrasion. 	
<p>FUEL TYPE - 95 octane gasohol Only (TSAE Local Rule)</p>	
<p>FUEL STICKER - No STICKER (TSAE Local Rule)</p>	

NON-COMPLIANCE/COMMENTS:

FUEL TANKS



FUEL LINES



GOOD PRACTICES

Powertrain

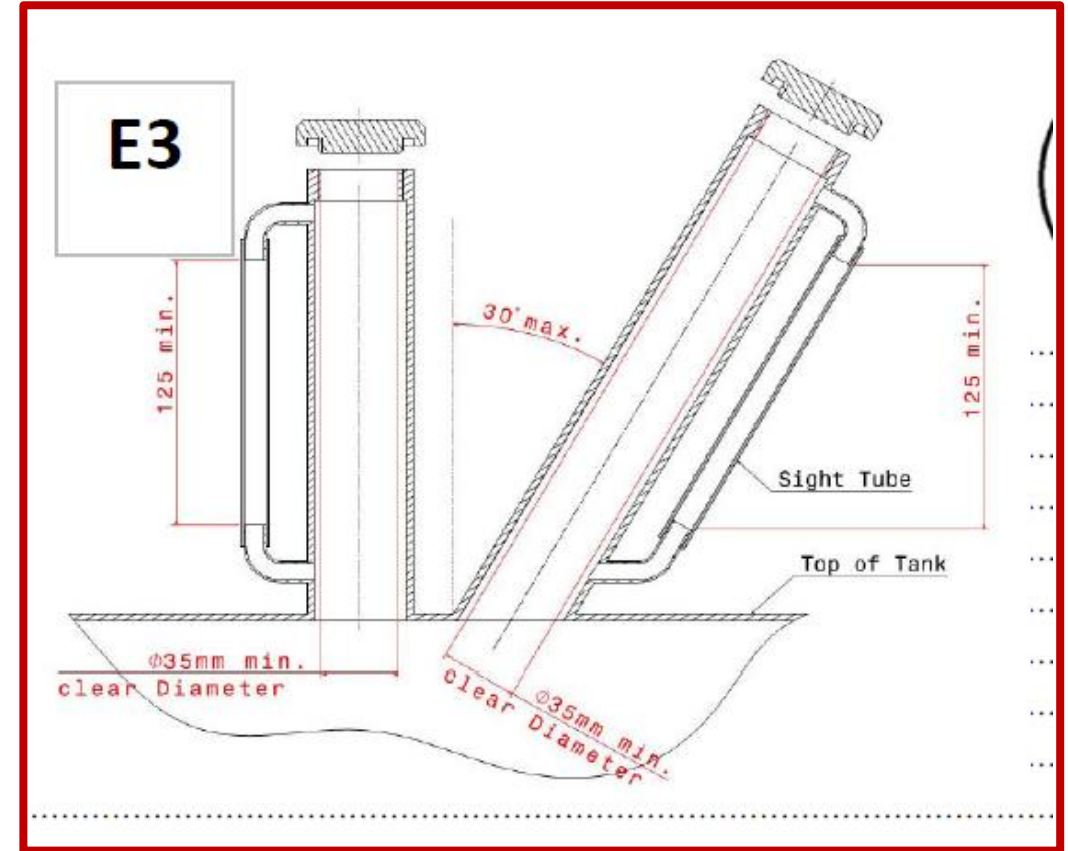
<p>E3</p>	<p>FUEL FILLER NECK - IC.5.4</p> <ul style="list-style-type: none"> •Fuel-resistant materials, •min 35 mm inner dia, •within 30° of vertical. •Must prevent fuel spillage contacting driver, exhaust or ignition (add shields as needed). •Fueled w/o manipulating car in any way. •Cap secure and capable of withstanding pressurization (ie: threads or latch). •Easy access for common 2-gal jugs.
	<p>SIGHT TUBE - IC.5.4</p> <ul style="list-style-type: none"> •Fuel resistant materials, •transparent, •min 6mm inner dia. •Min 125 mm vertical height in area visible to fueler with vehicle fully assembled. •Sight tube must NOT run below top of tank. •Non-moveable fuel level line 12-25 mm below top of sight tube. (Clear filler neck OK as sight tube.)
	<p>FUEL RAIL - IC.6.1</p> <ul style="list-style-type: none"> •Securely attached to block, head or intake manifold with brackets & mechanical fasteners. •No plastic or composite fuel rails, except if unmodified OEM part. •CRITICAL FASTENERS
	<p>FUEL VENTS - IC.5.6</p> <ul style="list-style-type: none"> •Must exit outside of the bodywork. •Must include a check valve to prevent leakage if car inverted.

FUEL FILLER NECK

SIGHT TUBE

FUEL RAIL


FUEL VENTS



Inspection

2023 TSAE Auto Challenge INSPECTION SHEET Page 7

CAR NUMBER: _____		SCHOOL: _____	
PART 1, cont'd			
TECHNICAL INSPECTION (Cont'd)			
ELECTRICAL			
ON-BOARD STARTER - IC.8.1 Required (remote starters and push-starts prohibited).			BRAKE LIGHT - T.3.3 •RED color, clearly visible from the rear, located on vehicle centerline. •Height between wheel centerline & driver's shoulders. •Round, triangle, or rectangular on black background. •15 cm ² minimum illuminated area. LED strips OK if elements closer than 20 mm apart and total length > 150 mm (5.9"). •Sufficient brightness for visible activation in bright sunlight.
PRIMARY MASTER SWITCH - IC.9.3 •On driver's right, near roll bar. •Access from outside of car. •Rotary type. •No relay. •Must kill ALL electrical systems. •Marked with international symbol. •Lever horizontal when ON.			
COCKPIT MASTER SWITCH - IC.9.4 •Pull-ON, Push-OFF type. •Alongside & unobstructed by steering wheel, easily reached by driver. •Must kill ignition & fuel pump(s). •Min dia 24 mm. •Marked with international symbol.	EL1		BRAKE PEDAL OVER TRAVEL SWITCH - T.3.2 •Must cut ignition & fuel pump. •No re-start if brake released or actuated a second time. •Must NOT rely on software to work. •Not resettable by driver. • Open Shutdown circuit (EV only)
BATTERY - T.9.2 •Attached securely to frame or chassis. •Hot terminal insulated. •Wet-cells in marine box if inside cockpit. •Type must be identifiable. •Overcurrent protection • Lithium: firewall per T.1.8 between driver; OEM battery or with rigid nonflammable case. •No circuits > 60 VDC.			
NON - COMPLIANCE/ COMMENTS:			
.....			
			Group ELECTRICAL
			STAMP
APPROVED BY: _____		DATE: _____	



T7.3.3 The switch must be implemented with analog components, and not through recourse to programmable logic controllers, engine control units, or similar functioning digital controllers.

T7.3.4 The Brake Over-Travel switch must be a mechanical single pole, single throw (commonly known as a two-position) switch (push-pull or flip type) as shown below.

Inspection

2023 TSAE Auto Challenge INSPECTION SHEET

Page 8

2023 TSAE Auto Challenge INSPECTION SHEET

CAR NUMBER:
SCHOOL:
SEF DEVIATIONS? YES/NO & SEF CORRECTED? YES/NO
ENGINE MODEL:
ENGINE BORE X STROKE:
ABS? YES/NO

IMPORTANT

THIS FORM MUST STAY WITH THE CAR UNTIL THESE PARTS OF INSPECTION HAVE BEEN COMPLETED

Total Weight Measurement	Dry			Weight		
	F	L	R	F	L	R

PART 2	
FUEL SYSTEM & TILT TABLE INSPECTION	
SPILLAGE - No fluid leaks of any kind permitted when car is tilted to 45 degrees in the direction most likely to create spillage; Fuel tanks must be filled to their sight tube fill line.	VEHICLE STABILITY - All wheels in contact with tilt table when tilted to 60 degrees to the horizontal.
NON-COMPLIANCE / COMMENTS:	
APPROVED BY: STAMP TILT Group	
PART 3	
NOISE LEVEL & BRAKING PERFORMANCE INSPECTION	
NOISE LEVEL - 110 dB (C) ("C" scale) maximum during a static test, gearbox in neutral, UP TO a specified RPM (see Rule IN.10.4.1). 103 dBC at idle. Microphone level with the exhaust outlet(s), 0.5 m (19.7") 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.10.2.3.	BRAKING PERFORMANCE - Must lock-up all 4 wheels, come to a complete stop with them locked <i>and keep the engine running (IC only)</i> . Electric vehicles must turn off ABS system before performing test to allow lockup.
MASTER SWITCH - Master switch on RHS of main roll hoop must cause engine to stop when actuated. (Perform at end of noise test)	ATTEMPTS:
NOISE LEVEL:	
ATTEMPTS:	
NOISE LEVEL after ENDURANCE :	
NON - COMPLIANCE / COMMENTS :	NON - COMPLIANCE / COMMENTS :
APPROVED BY: STAMP NOISE Group	APPROVED BY: STAMP BRAKE Group
DATE:	DATE:

Once the vehicle is approved to compete in the dynamic events, ONLY modifications permitted as following.
 Adjustment of belts, chains, brake bias, driver restraint, head restraint, seat, pedal assembly, seat for different driver.
 Adjustment to engine operating parameters, fuel mixture, ignition timing, mirrors, tire pressure, wing angle,
 Replenishment of fluids. Replacement of worn tires, brake pads. The changing of wheels and tires
 Since this Form collects after passing all inspections, please bring to INSPECTION DESK this INSPECTION FORM



Inspection

2023 TSAE Auto Challenge INSPECTION SHEET

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CAR NUMBER:		SCHOOL:	
PART 1 , cont'd.			
TECHNICAL INSPECTION (Cont'd)			
COCKPIT , อุปกรณ์นักขับ			
NUMBER OF DRIVERS:		TALLEST DRIVER:	HEIGHT:
DRIVER'S EQUIPMENT			
HELMETS - VE.3.2 - TIS (TSAE local rule) , <ul style="list-style-type: none"> •Closed-face with integral chin guard (no dirtbike helmets). •Face shield integral with helmet, impact resistant material. •Specification: Snell: K2010, K2015, K2020, M2010, M2015, M2020, SA2010, SAI2010, SA2015, SA2020; or SFI: 31.1/2010 thru /2015; 41.1/2010 thru /2015; or FIA: 8860-2004, 8860-2010, 8860-2018, 8859-2015. •No camera mounts: VE.2.5.3 •(Place sticker on left side) 			DRIVERS' SUITS - VE.3.3.1 Single piece suit, no holes. Must be labeled. Specification: SFI 3-2A/5; FIA 1986; FIA 8856-2000 or 8856-2018
BALACLAVA - VE.3.3.3 Required for all drivers. Flame Resistant material. Covers head, neck and hair. (No label required.)			GLOVES - VE.3.3.6 Flame Resistant material (not all-leather). No holes. Leather palms allowed only over Flame resistant material. (No label required.)
ARM RESTRAINTS - VE.3.3.7 Required for all drivers. Must be commercially manufactured. (No label required.)			SHOES - VE.3.3.5 No holes. Must be labeled. Specification: SFI 3.3; or FIA 8856-2000 or 8856-2018 Remark: SHOES - SFI 3.3 or FIA 8856-2000 (not apply in TSAE-- local rule)
			SOCKS - VE.3.3.4 Flame resistant material (no cotton; no polyester). Must cover all bare skin. (No label required.)

เรียกตรวจอุปกรณ์พร้อมกันทุกทีม ช่วงบ่ายของ การแข่งขันวันแรก

Cockpit

Cockpit	REF
VISIBILITY - V.2.2 100° min field of view to each side. Tread rotation OK, or mirrors. If mirrors, must be firmly installed and adjusted.	
ROLL BAR PADDING - T.2.9 Installed on any bar that could be hit by the driver's helmet. •12 mm (0.5") thick. •Specification: SFI 45.1 or FIA 8857/2001 (pipe insulation or other foams not OK).	
OTHER SIDE TUBES - F.5.12 Cockpit design must prevent driver's neck from hitting bracing or other side tubes.	
VEHICLE CONTROLS - T.1.4 No hands, arms, or elbows outside side impact system when actuating controls. All controls, including shifter, must be inside cockpit and below topmost point of Front Hoop.	
LAP BELT FIT - T.2.5 •Must pass over pelvis, not waist. •45-65° to horizon for upright driver, 60-80° for reclined.	
SHOULDER HARNESS FIT - T.2.6 Angle from shoulder between 10° up and 20° down (vs horiz).	C1
SUB BELT FIT - T.2.7 •Snug, holding latch in place. •Position in side-view: 5 Point: aligned with or forward of shoulder belt line; 6 Point: vertical or rearward of latch.	
ARM RESTRAINTS FIT - VE.3.3.7 Installed so the driver can release them and exit unassisted regardless of vehicle's position.	
HEAD RESTRAINT FIT - T.2.8 •Max 25 mm (1") forward gap to helmet. •Helmet contact point min 50 mm (2") from any edge. APPLIES TO ALL DRIVERS (may be adjusted for each driver)	

ทัศนวิสัย

แผ่นรองโรลบาร์

ท่อด้านข้างอื่นๆ

การควบคุมยานพาหนะ

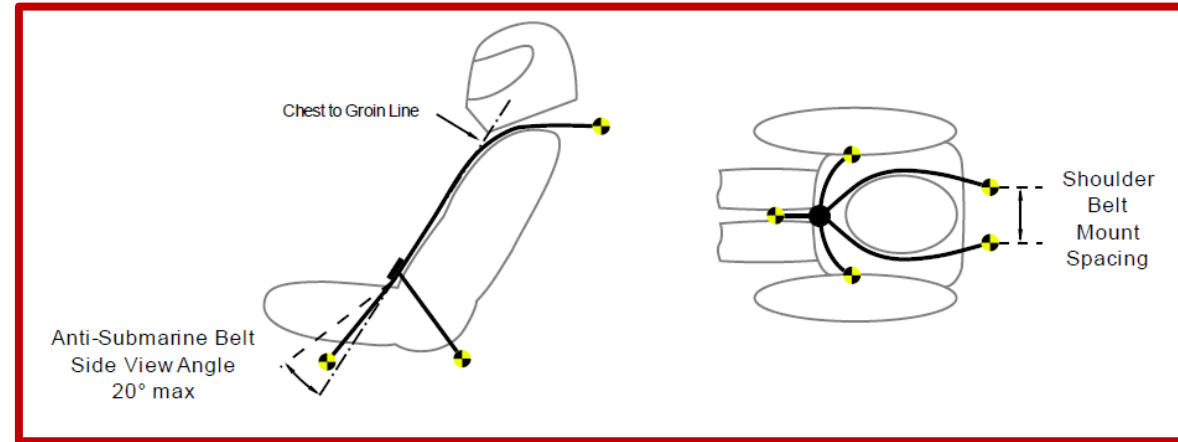
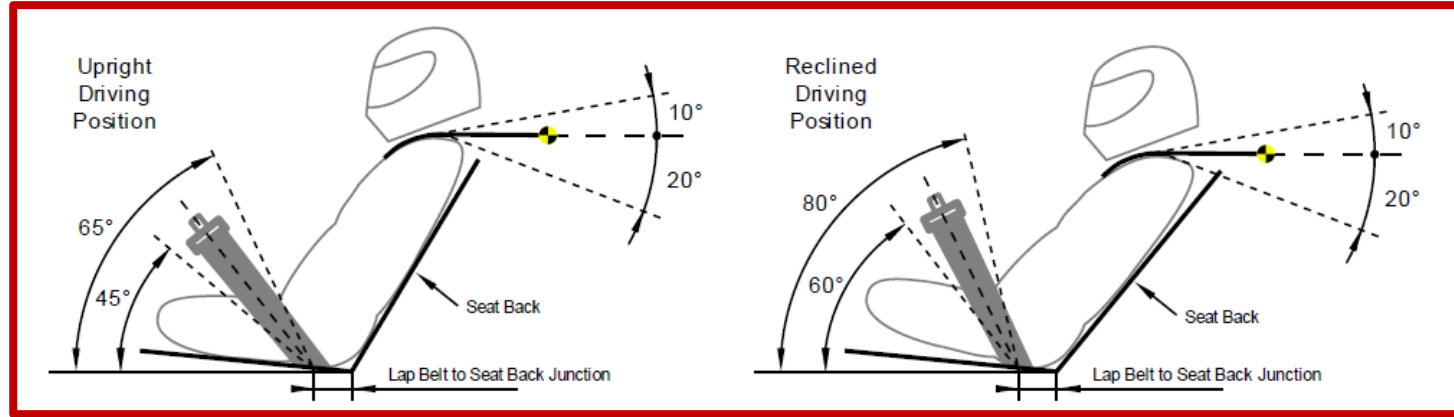
LAP BELT FIT

SHOULDER HARNESS FIT

SUB BELT FIT

ARM RESTRAINTS FIT

HEAD RESTRAINT FIT



Cockpit

C2	MAIN HOOP & FRONT HOOP HEIGHTS - F.5.6.3 Helmet 50 mm (2.0") below lines between top of front and main roll hoops, and top of main hoop to rear attachment point of main hoop bracing. (Applies for every driver.)
	DRIVER'S FOOT PROTECTION - T.1.3.2 Feet must be rearward of the Front Bulkhead and no part of shoes or legs above or outside the Major Structure in side or front views when touching pedals. Remove nose bodywork if necessary for visual access.
	EGRESS - IN.5.2 5 seconds max to actuate cockpit master switch and exit to side of vehicle, from driving position, wearing safety equipment. Wings must remain fixed in position. (See egress worksheet.)
	SEAT - T.1.5, T.1.6 •Insulated against heat conduction, convection and radiation. •Lowest point no lower than top of lower structure OR must have longitudinal 1.00" OD x 0.065" steel tube underneath.
	FIREWALL - T.1.8 Rigid, nonflammable material. •Separates driver (line-of-sight to mid-height of driver's helmet) from fuel, cooling, oil, lithium battery, heat sources and all tractive system components other than outboard wheel motors. Wire/cable pass-throughs OK with grommets. Multiple panels OK w/ gaps sealed. •No gaps at sides or bottom. •Leaks cannot contact driver.
	FLOOR CLOSEOUT PANEL - T.1.7 Non-perforated, non-brittle material from foot area to firewall. Multiple panels OK if gaps less than 3 mm (1/8").
	DRIVER'S LEG PROTECTION - T.1.3 Covers inside cockpit over sharp parts or moving suspension and steering components.
	NON-CRUSHABLE OBJECTS - F.8.2.4 25 mm clearance aft of AI Plate, Front Bulkhead including diagonals, and to pedals @ full travel and adjustment.

MAIN HOOP & FRONT HOOP HEIGHTS

DRIVER'S FOOT PROTECTION

EGRESS

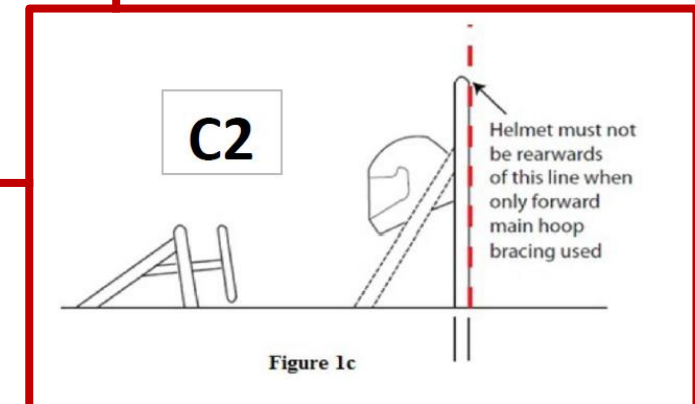
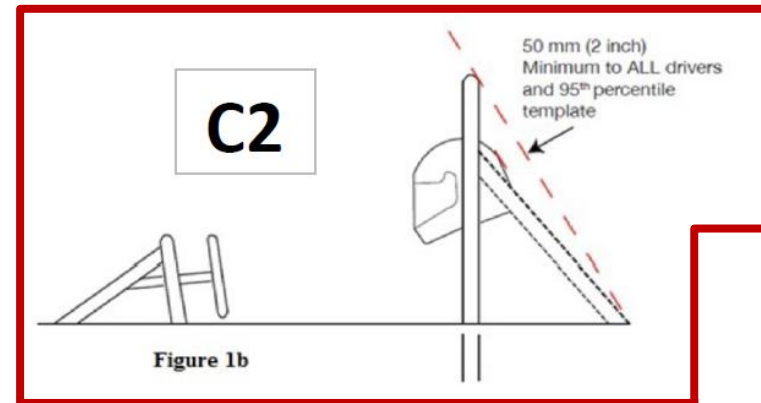
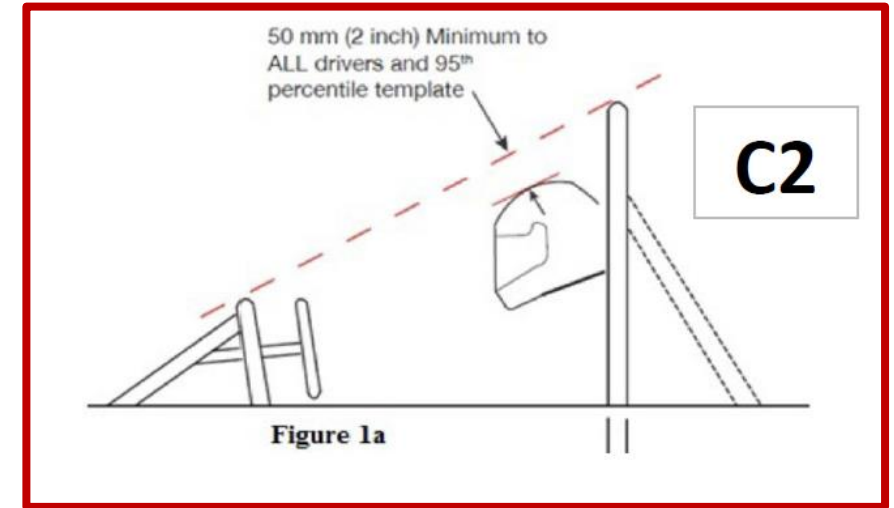
ที่นั่ง

FIREWALL

แผงปิดพื้น

การป้องกันขาของผู้ขับขี่

NON-CRUSHABLE OBJECTS



Cockpit

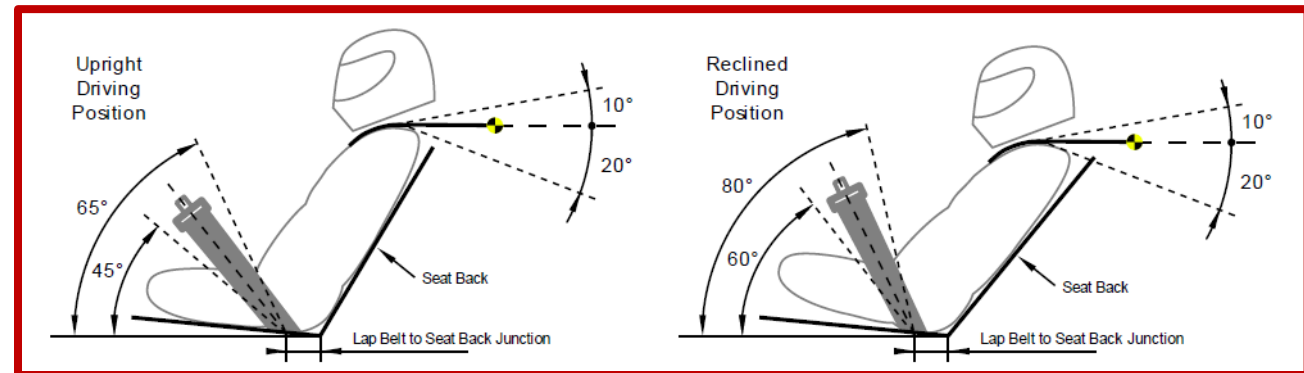
Driver Restraints		
<p>DRIVER RESTRAINT HARNESS - T.2.2</p> <p>5, 6 or 7 point and be labeled: SFI 16.1, 16.5, or FIA 8853/98, 8853/2016 (or lookup FIA D-number) •All lap belts must have Quick Adjusters.</p> <p>•Reclined drivers must have 6 or 7 point, and Quick Adjuster sub-belts OR 2 sets of sub belts. •Belts expire after expiration year (not month) marked on label (SFI & FIA).</p>		C2
<p>HARNESS HARDWARE AND INSTALLATION - T.2.2</p> <p>•Belts threaded through hardware per mfr instructions.</p> <p>•Hardware must be unmodified (no drilling, welding, etc).</p>		
<p>HARNESS MOUNTS - T.2.4</p> <p>•Belts must be protected by firewalls. •All belts attached securely to Primary Structure. •Tabs 1.6 mm (0.063") thick min, 60 mm² shear area; tabs combining lap & sub belts 90 mm². Double-shear preferred. •Tabs welded on both sides; bolt-on tabs use minimum of two 1/4" dia Grade 5 bolts.</p> <p>•Tabs aligned with load direction of belt, may be pre-bent.</p>		
<p>LAP BELT POSITION - T.2.5</p> <p>•Pivoting mounting using eye bolt or shoulder bolt (no tube wrap). •Not re-directed by seat. •Belt centerline max 3" forward of seatback-seatbottom junction in side view.</p>		

เข็มขัดนักขับ

การติดตั้ง

ที่ยึดสายรัด

ตำแหน่งเข็มขัด



Cockpit

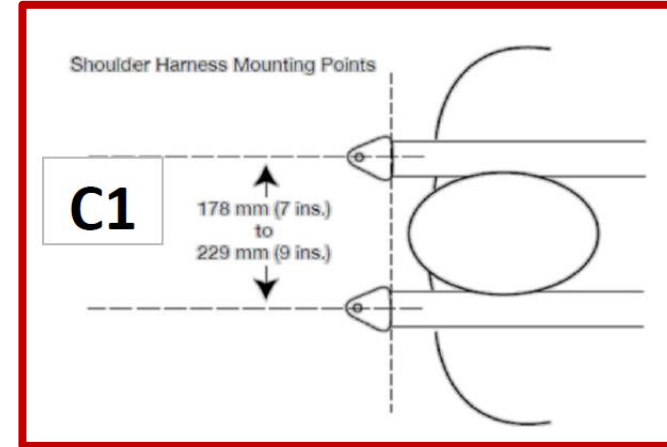
<p>SHOULDER HARNESS POSITION - T.2.6 Mounting points 175-235 mm (7"- 9") apart. Tube wrap OK.</p>
<p>SUB BELT POSITION - T.2.7 Sub belts cannot be re-directed by anything other than the driver's body.</p>
<p>BELT ATTACHMENT FASTENERS - T.2.5.8, T.2.6.3, T.2.7.4 <ul style="list-style-type: none"> •Lap & Shoulder 10 mm Grade 8.8 (3/8" SAE Grade 5), •Sub 8 mm (5/16") or as specified by harness manufacturer. •Pins required in clip-brackets •CRITICAL (positive locking) - T.8 </p>
<p>HEAD RESTRAINT - T.2.8 <ul style="list-style-type: none"> •Min 150x150 mm (6"x6") AND height adjustment of 175 mm (7"); OR 150x280 mm (6"x11"). •38 mm (1.5") thick. •Near vertical. •Pad and mount must take 900 N rearward and 300 N lateral forces. •Energy absorbing material: SFI Standard 45.2 or FIA Tech List 17 (CONFOR blue CF45 or CF45M). •Mount must be within Main Hoop Bracing envelope, or add extra tube per F.5.10. </p>

ตำแหน่งสายรัดไหล่

SUB BELT POSITION

ตัวยึดเข็มขัด

พนักพิงศีรษะ



Cockpit

Cockpit templates

MAIN HOOP & FRONT HOOP HEIGHTS - F.5.6.5

Helmet of 95th percentile male (PERCY) to be 50 mm 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 915 mm from pedals.

C3

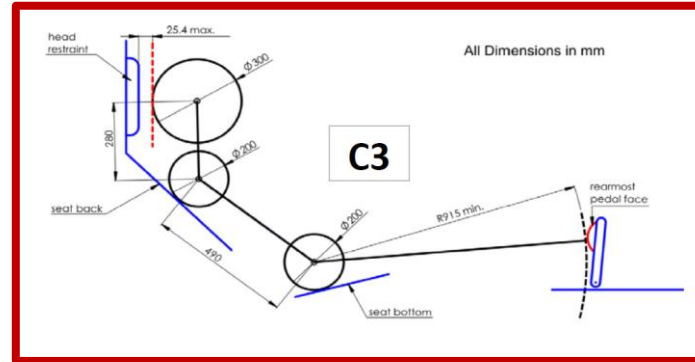
COCKPIT OPENING - T.1.1

Template to pass from above cockpit to bottom of top SIS tube and less than 320mm from lowest point inside cockpit. Steering wheel & column, seat and padding can be removed; no removing firewall. Fore/aft translation of template OK.

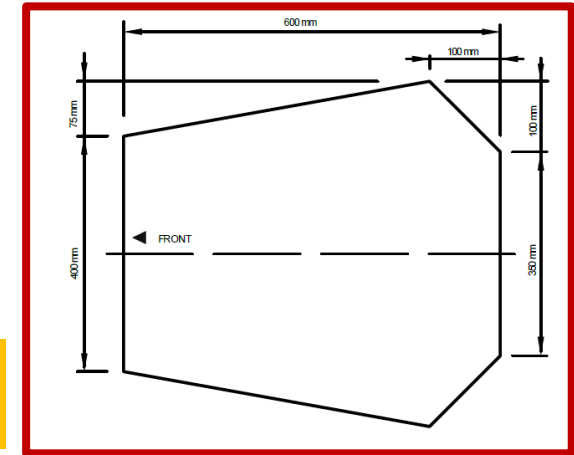
COCKPIT INTERNAL CROSS SECTION - T.1.2

Template to pass from rearwards of the steering column to 100 mm rearwards of the pedals. Steering wheel may be removed; padding may be removed if removable with no tools & with driver in seat.

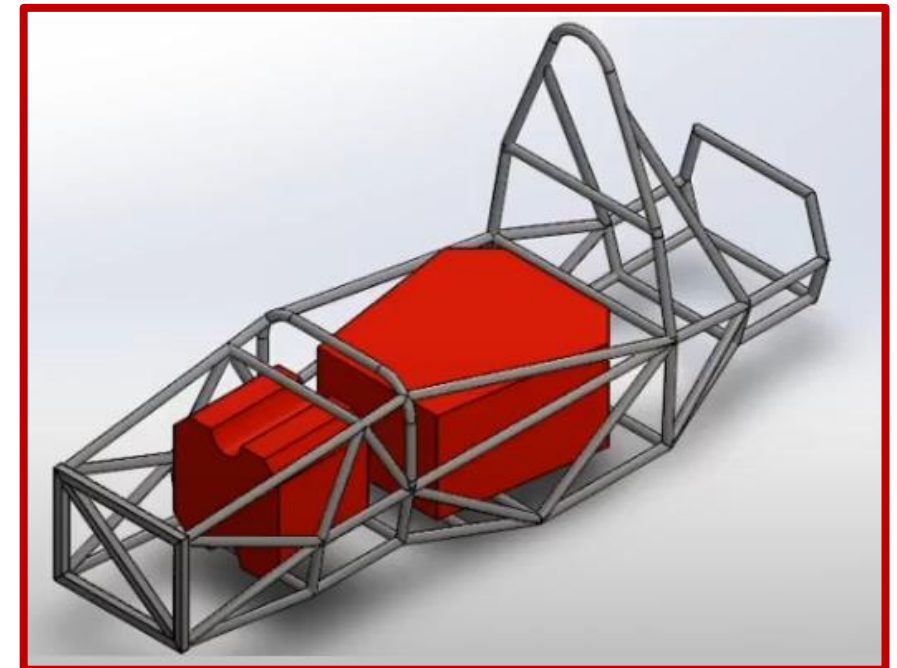
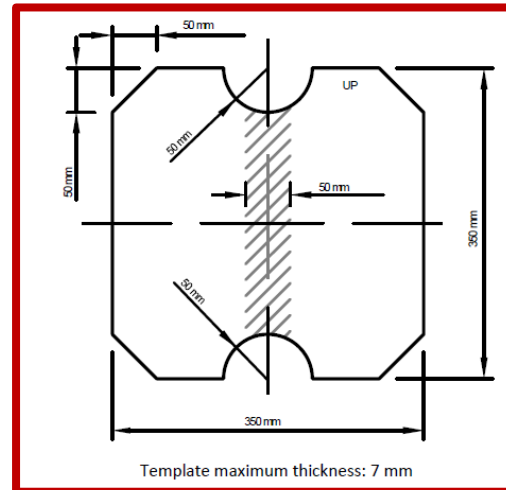
NON - COMPLIANCE/ COMMENTS:



MAIN HOOP & FRONT HOOP HEIGHTS



COCKPIT OPENING



Cockpit



Overall

GOOD ENGINEERING PRACTICES - GR.1.5

- Proper use of fasteners.
- Proper use of fluid lines and fittings.
- Appropriate selection of materials regarding fluids, heat.
- Protection from sharp edges - wiring, hoses, people.
- Protection from heat - wiring, hoses, people.
- Linkages not bound up or prone to over-articulation.
- No excessive lash in joints and pivots.

VISIBLE ACCESS - IN.2.3

To all items on Tech Sheet without the use of mirrors, borescopes, etc.

แนวปฏิบัติทางวิศวกรรมที่ดี

การเข้าถึงที่มองเห็นได้

Inspection

2023 TSAE Auto Challenge INSPECTION SHEET Page 12

CAR NUMBER:		SCHOOL:							
TECHNICAL INSPECTION									
COCKPIT . อุปกรณ์นักขับ									
Driver's Name	Helmet Line	Head Rest-Fore & Aft	Head Rest-To Edges	Lap Belt	Shoulder Belts	Sub Belts	Egress	Drivers License	Inspector

Helmet: 50 mm (2ins) min. below lines between Main & Front Hoops and between Main Hoop & rear attachment point of Main Hoop Bracing
Head Restraint: Fore & aft, 25.4 mm (1 inch) max gap to back of helmet. Head Restraint: To edges: Helmet contact point min 50 mm from any edge.
Lap Belt - Over hip bones and tight. Arm restraints connected to latch. Shoulder Belts: Tight, 10° up thru 20° down (from shoulder, relative to horizontal).
If shoulder belts are labeled "FHR required" then driver must wear a neck support (e.g.: HANS).
Sub Belts - Tight. Side-view position: 5-point: aligned with or forward of shoulder belt line, 6-point: vertical or rearward of latch.
Egress: Max 5.0 sec from "go" to BOTH feet on ground. Must include actuation of cockpit master switch.

CAR NUMBER:		SCHOOL:							
TECHNICAL INSPECTION									
COCKPIT . อุปกรณ์นักขับ									
Driver's Name	Helmet Line	Head Rest-Fore & Aft	Head Rest-To Edges	Lap Belt	Shoulder Belts	Sub Belts	Egress	Drivers License	Inspector

Helmet Lines: 50 mm (2ins) min. below lines between Main & Front Hoops and between Main Hoop & rear attachment point of Main Hoop Bracing
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NON - COMPLIANCE/ COMMENTS:	Group Cockpit และอุปกรณ์
	STAMP

APPROVED BY: _____ DATE: _____

Once the vehicle is approved to compete in the dynamic events, ONLY modifications permitted as following.
Adjustment of belts, chains, brake bias, driver restraint, head restraint, seat, pedal assembly, seat for different driver.
Adjustment to engine operating parameters, fuel mixture, ignition timing, mirrors, tire pressure, wing angle,
Replenishment of fluids. Replacement of worn tires, brake pads. The changing of wheels and tires

เรียกตรวจอุปกรณ์นักขับพร้อมกันทุกทีม
ช่วงบ่าย ของการแข่งขันวันแรก

Inspection

