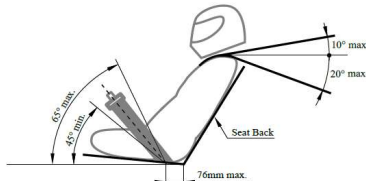
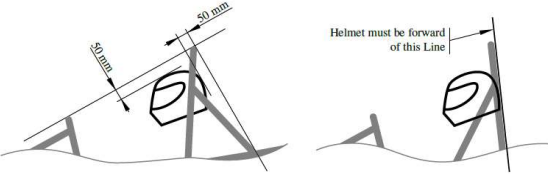


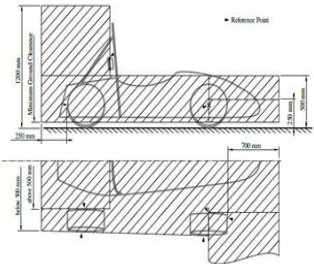
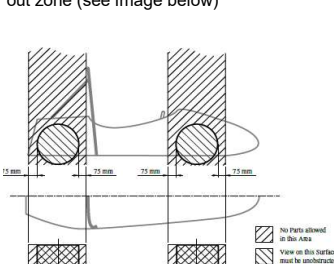
No.	Checkpoint	Rule No	Checkbox	Comments
<b>MECH 0 (PRE INSPECTION)</b>		IN2.1.1		
<b>Tires</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
1	<b>DRY Tires - check for any damage of the tire</b>	IN2.1.1		
	• Make:			
	• Size:			
	• Compound:			
• MARK TIRES WITH MARKER (to prevent tire change)				
2	<b>RAIN Tires - check for any damage of the tire</b>			
	• Make:			
	• Size:			
	• Compound:			
• Tread depth (+2.4 mm):				
• MARK TIRES WITH MARKER (to prevent tire change)				
<b>Driver gear (all in good condition)</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
3	Helmet (x2): Full Closed Integral Type A well-fitting, closed face helmet that meets one of the following certifications and is labeled as such: • Snell K2010, K2015, K2020, M2010, M2015, M2020, SA2010, SAH2010, SA2015, SA2020, EA2016 or newer • SFI 31.1/2010, 31.1/2015, 31.1/2020, 41.1/2010, 41.1/2015, 41.1/2020 or newer FIA 8860-2010, FIA 8860-2018, FIA 8859-2015 (with SA 2015), FIA 8858-2010 (with SA(H) 2010) or newer • Open faced helmets and off-road helmets (helmets without integrated eye shields) are not approved. • British Standards Institution BS 6658-85 Type A/FR rating (Types A and B are not accepted)	T13.3.2		
4	Balaclavas (x2) - Made from fire resistant material For the purpose of this section some, but not all, of the approved fire resistant materials are: Carbon X, Indura, Nomex, Polybenzimidazole (commonly known as PBI) and Proban.	T13.3.3		
5	Driving suit (x2) - A fire resistant one piece suit, made from a minimum of two layers that covers the body from the neck down to the ankles and the wrists. The suit must be certified to one of the following standards and be labeled as such: • SFI 3.2A/5 (or higher) • SFI 3.4/5 (or higher) • FIA Standard 8856-2000 • FIA Standard 8856-2018	T13.3.4		
6	Fire resistant underwear (x2) (long pants and long sleeve t-shirt). For the purpose of this section some, but not all, of the approved fire resistant materials are: Carbon X, Indura, Nomex, Polybenzimidazole (commonly known as PBI) and Proban.	T13.3.5		
7	Fire resistant socks (x2) - Made from fire resistant material. For the purpose of this section some, but not all, of the approved fire resistant materials are: Carbon X, Indura, Nomex, Polybenzimidazole (commonly known as PBI) and Proban.	T13.3.6		
8	Gloves (2 pairs) - Made from fire resistant material. For the purpose of this section some, but not all, of the approved fire resistant materials are: Carbon X, Indura, Nomex, Polybenzimidazole (commonly known as PBI) and Proban.	T13.3.8		
9	Shoes (2 pairs) - Certified with one of the following: • SFI Spec 3.3 • FIA Standard 8856-2000 • FIA Standard 8856-2018	T13.3.7		
10	Arm restraints (x2) - Certified with one of the following: • SFI Spec 3.3 • FIA Standard 8856-2000 • FIA Standard 8856-2018	T13.3.9		
11	All driver equipment covered in T13.3: must be in good condition. Specifically, it must not have any tears, rips, open seams, areas of significant wear or abrasion or stains which might compromise fire resistant performance. The officials reserve the right to impound all non-approved driver equipment until the end of the competition.	T13.3.10		
<b>Safety</b>				
No.	Checkpoint	Rule No	Checkbox	Comments

12	<p>Fire extinguishers (x2) dry chemical/dry powder fire extinguishers with a minimum firefighting agent capacity of 0.9 kg, larger capacity are acceptable. All extinguishers must be equipped with a manufacturer installed pressure/charge gauge.</p> <ul style="list-style-type: none"> <li>• pressure on GREEN</li> <li>• not expired</li> </ul> <p>The following are the minimum accepted ratings:</p> <ul style="list-style-type: none"> <li>• USA, Canada and Brazil: 10BC or 1A 10BC</li> <li>• Europe: 34B or 5A 34B</li> <li>• Australia: 20BE or 1A 10BE</li> </ul> <p>Aqueous Film Forming Foam (AFFF) fire extinguishers are prohibited. Halon extinguishers and systems are prohibited.</p>			
<b>APPROVAL STATUS</b>			<a href="#">Dashboard</a>	
MECH0	Approval (Control box) (DON'T CHANGE MANUALLY)		ONWAAR	
No.	Checkpoint	Rule No	Checkbox	Comments
<b>MECH 1: WITH THE TALLEST DRIVER INSIDE AND SECURELY STRAPPED IN (ready to race state)</b>				
<b>DRIVER RESTRAINT HARNESS</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
13	Car in ready to race condition and clean (at least at the first attempt)	IN5.1.1		
14	<b>ONLY FOR COMBUSTION</b> <b>NO FUEL IN FUEL TANK ! --&gt; IF YES, EMPTY AT PIT</b>			
15	Check bracelet for tallest driver	IN5.1.1		
16	<p>A six or seven point harness is installed with the one of the following certifications:</p> <ul style="list-style-type: none"> <li>• SFI Specification 16.1, SFI Specification 16.5</li> <li>• or FIA specification 8853/98.</li> <li>• or FIA specification 8853/2016.</li> </ul> <p>Date on belts must be valid: SFI spec harnesses must be replaced following December 31st of the 2nd year after the date of manufacture as indicated by the label. FIA spec harnesses must be replaced following December 31st of the year marked on the label.</p>	T5.2		
17	<p>Note reclined or upright driving position: upright position – Position with a seat back angled at 30° or less from the vertical reclined position – Position with a seat back angled at more than 30° from the vertical</p> 	T5.1.3 T5.1.4		
18	<p>Shoulder belt:</p> <ul style="list-style-type: none"> <li>• Width: Without HANS Device: 75mm, With HANS Device: 50mm</li> <li>• 180-230 mm apart measured center to center</li> <li>• Between -20° &amp; +10° from horizontal</li> <li>• Tilt lock adjuster</li> <li>• From anchor point straight to drivers body</li> </ul>	T5.5		
19	<p>Lap belt:</p> <ul style="list-style-type: none"> <li>• Reclined: between 45° &amp; 60° from horizontal</li> <li>• Upright: between 60° &amp; 80° from horizontal</li> <li>• From anchor point straight to drivers body</li> <li>• In side view it must be capable of pivoting freely</li> </ul>	T5.4		
20	<p>Anti-submarine belt:</p> <ul style="list-style-type: none"> <li>• anchorage points should be approximately 100mm apart</li> <li>• can use the same attachment point as the lap belts (check 90mm<sup>2</sup>)</li> </ul>	T5.6		
21	<p>Harness Installation:</p> <ul style="list-style-type: none"> <li>• No aluminium allowed</li> <li>• Minimal thickness 1.6mm</li> <li>• 60mm<sup>2</sup> cross section, if lap&amp;submarine belt are mounted on one tab 90mm<sup>2</sup></li> <li>• 2 M8 grade 8.8 minimal or equivalent, or one M10</li> </ul>	T5.3.2		
22	Harnesses, belts and straps must not pass through a firewall, i.e. all harness attachment points must be on the driver's side of any firewall.	T5.3.3		
<b>Safety CHECK with seated driver (tallest driver) (ready to race state)</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
23	<p>Head restraint</p> <ul style="list-style-type: none"> <li>• Be vertical or near vertical in side view.</li> </ul>	T5.7		
24	<ul style="list-style-type: none"> <li>• Be padded with an energy absorbing material: <ul style="list-style-type: none"> <li>-that meets either the SFI 45.2 standard</li> <li>-or is listed in the FIA technical list n°17 as a type B material for single seater cars</li> </ul> </li> </ul>			
25	<ul style="list-style-type: none"> <li>• Minimum thickness of 40mm</li> </ul>			
26	<ul style="list-style-type: none"> <li>• Have a minimum width of 150 mm</li> <li>• Have a minimum height of 150 mm</li> </ul>	T5.7.2		

27	<ul style="list-style-type: none"> <li>• Be located so that for each driver: <ul style="list-style-type: none"> <li>– The restraint is no more than 25mm away from the back of the driver’s helmet, with the driver in their normal driving position.</li> <li>– The contact point of the back of the driver’s helmet on the head restraint is no less than 50mm from any edge of the head restraint.</li> </ul> </li> </ul>			
28	The head restraint and its mounting must withstand a force of 890N applied in the rearward direction at any point on its surface.	T5.7.3		
29	Roll bar or bracing that could be hit by driver’s helmet must be covered with 12 mm thick padding; <ul style="list-style-type: none"> <li>• SFI spec 45.1 or FIA 8857-2001</li> </ul>	T5.8.1		
30	All vehicle controls must be operated from inside the cockpit without any part of the driver, e.g. hands, arms or elbows, being outside the vertical planes tangent to the outermost surface of the side impact structure.	T4.9.1		
31	Minimum of 100 deg. field either side. Head rotation allowed or mirrors. If mirrors, must be firmly installed and adjusted	T4.10		
32	Ground clearance <ul style="list-style-type: none"> <li>• clearance + 30mm</li> </ul>	T2.2.1		
33	<p>MAIN HOOP &amp; FRONT HOOP HEIGHTS -</p> <p>When seated normally and restrained by the driver’s restraint system, the helmet of the tallest driver must:</p> <ul style="list-style-type: none"> <li>• Be a minimum of 50mm away from the straight line drawn from the top of the main hoop to the top of the front hoop.</li> <li>• Be a minimum of 50mm away from the straight line drawn from the top of the main hoop to the lower end of the main hoop bracing if the bracing extends rearwards.</li> <li>• Be no further rearwards than the rear surface of the main hoop if the main hoop bracing extends forward:</li> </ul> 	T4.3.1		
34	One shutdown button serves as a cockpit-mounted shutdown button and must <ul style="list-style-type: none"> <li>• have a minimum diameter of 24mm</li> <li>• be located in easy reach of a belted-in driver</li> <li>• be alongside of the steering wheel and unobstructed by the steering wheel or any other part of the vehicle</li> <li>• the international electrical symbol consisting of a red spark on a white-edged blue triangle must be affixed in close proximity</li> </ul>	T11.4.4		
35	Camera mounts: The body of any video/photographic camera which is not exclusively used as sensor for the AS unit must be secured at a minimum of two points on different sides of the camera body. If a tether is used to restrain the camera, the tether length must be limited so that the camera cannot contact the driver.	T11.10.5		
<b>SCRUTINEERING EQUIPMENT</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
36	Main scrutineering sticker	IN1.3		
37	<p>University Name</p> <ul style="list-style-type: none"> <li>• must be written fully, accepted abbreviations: <ul style="list-style-type: none"> <li>- University: Uni</li> <li>- Technical University: TU</li> <li>- University of Applied Sciences: UAS</li> <li>- Berufshochschule: BA</li> <li>- If the university officially uses an abbreviation in their proper name, this abbreviation is accepted</li> </ul> </li> <li>• at least 50mm high on both sides of the vehicle on a high contrast background</li> </ul>	T12.2		
38	<p>Vehicle Number</p> <ul style="list-style-type: none"> <li>• Placed on front and both sides</li> <li>• Height: at least 150mm high</li> <li>• Stroke width and spacing between numbers: at least 20mm</li> <li>• Color: Either white numbers on a black background or black numbers on a white background</li> <li>• Background shape: The number background must be one of the following: round, oval, square or rectangular. There must be at least 25mm between the edge of the numbers and the edge of the background</li> <li>• Clear: The numbers must not be obscured by parts of the vehicle</li> </ul>	T12.1		
39	<p>Push/pull bar</p> <ul style="list-style-type: none"> <li>• Colored red</li> <li>• Clearly visible UNI name written on a high contrast background</li> <li>• Push bar handle behind rear axle</li> <li>• Fire extinguisher easily accessible</li> <li>• HV gloves protected in a box, 2 pairs (EV Only)</li> <li>• Multimeter (EV Only)</li> <li>• 4mm banana plug test lead (EV only)</li> </ul>	T13.1		

40	<p>Quick jack</p> <ul style="list-style-type: none"> <li>• Colored red</li> <li>• Lift the car at least 100 mm so that all <b>driven</b> wheels are at least 100mm off the ground</li> <li>• Vehicle is adequately supported</li> <li>• Can be handled by one person</li> <li>• In the lifted position the vehicle must stand securely and stable</li> <li>• The quick jack must be locked and secured. This must function without the support of a person or additional weights.</li> <li>• Clearly visible UNI name written on a high contrast background</li> </ul>	T13.2		
41	<ul style="list-style-type: none"> <li>• SES present</li> <li>• IAD present</li> <li>• Laminate/test samples present</li> </ul>	IN5.1.1		
<b>APPROVAL STATUS</b>			<a href="#">Dashboard</a>	
MECH 1	Approval (Control box) (DON'T CHANGE MANUALLY)		ONWAAR	
<b>MECH 2: Chassis without driver</b>				
<b>PRESENT DOCUMENTS</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
42	Approved SES	T3.6		
43	Approved SESA (if applicable, monocoque only)			
44	IA test specimen and approved IA data (except for teams with a standard IA)	T3.18		
45	Laminate test specimens			
<b>GENERAL</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
46	<p>The chassis has to be constructed with node-to-node triangles: All structural frame members must meet the min. material requirements</p> <ul style="list-style-type: none"> <li>• Two roll hoops that are braced</li> <li>• A front bulkhead with support system and IA</li> <li>• Side impact structures</li> <li>• All hoops and bracings must meet the min. material requirements</li> </ul>	T3.1		
47	<p>Anti-submarine belt:</p> <ul style="list-style-type: none"> <li>• anchorage points should be approximately 100mm apart</li> <li>• can use the same attachment point as the lap belts (check 90mm<sup>2</sup>)</li> </ul>			
48	<p>Harness Installation:</p> <ul style="list-style-type: none"> <li>• No aluminium allowed</li> <li>• Minimal thickness 1.6mm</li> <li>• 60mm<sup>2</sup> cross section, if lap&amp;submarine belt are mounted on one tab 90mm<sup>2</sup></li> <li>• 2 M8 grade 8.8 minimal or equivalent, or one M10</li> </ul>			
<b>MAIN HOOP</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
49	<p>HOOP:</p> <p>Material must be steel and constructed from one piece .</p> <p>In side view the portion of the main hoop which is above its upper attachment point to the side impact structure must be inclined less than 10° from vertical</p> <p>In side view any portion lower than the upper attachment point to the side impact structure must be inclined either forward or not more than 10° rearward</p> <p>In a plane perpendicular to the longitudinal axis of the vehicle and through the lower endpoints of the roll hoop, no part of the primary structure may lie below 30 mm of the endpoints of the roll hoop</p>	T3.8 T3.7		
50	<p>BRACING:</p> <p>Material must be steel and the bracings must be straight.</p> <p>Bracings must be attached to the main hoop no lower than 160 mm below the top-most surface of the main hoop. The angle between bracings and main hoop must be greater than 30 deg.</p> <p>Proper construction for removable braces (if applicable) see T3.12</p>	T3.10		
<b>FRONT STRUCTURE</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
51	<p>FRONT HOOP:</p> <p>Material must be metal with a wall thickness at least 2 mm (APPENDIX 1)</p> <p>In side view, the front hoop can not be inclined more than 20 deg from vertical</p> <p>In a plane perpendicular to the longitudinal axis of the vehicle and through the lower endpoints of the roll hoop, no part of the primary structure may lie below 30 mm of the endpoints of the roll hoop</p>	T3.9 T3.7		
52	<p>BRACING:</p> <p>The front hoop must be supported by two straight braces extending forward</p> <p>Attached to front hoop not lower than 50mm from top (not applicable for monocoque)</p>	T3.11		

53	<p><b>BULKHEAD:</b> The front bulkhead must be supported back to the front hoop by a minimum of three tubes on each side</p> <ul style="list-style-type: none"> <li>• equivalent to a 1.5mm thick steel plate</li> </ul>	T3.13 T3.14		
<b>SIDE IMPACT STRUCTURE</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
54	<p><b>SIDE IMPACT:</b> Must consist of three members</p> <p>Top member must connect the front and main hoop and must be at a height of 240mm and 320 mm above the lowest member of the side impact structure</p> <p>The lowest member must connect the bottom of the main hoop and the bottom of the front hoop</p> <p>The diagonal member must be placed node-to-node between the upper end lower member</p>	T3.15		
<b>TEMPLATE FITTING</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
55	<p><b>PERCY:</b> Insert percy (template 1) into cockpit</p> <ul style="list-style-type: none"> <li>• Top is at least 50mm below the line between the main hoop and front hoop</li> </ul> <p>The figure has to be positioned in the vehicle as follows:</p> <ul style="list-style-type: none"> <li>• The seat adjusted to the rearmost position (Rearmost means towards the Rear Mainhoop)</li> <li>• The pedals adjusted to the frontmost position</li> <li>• The bottom 200mm circle placed on the seat bottom. The distance between the center of the circle and the rearmost actuation face of the pedals must be minimum 915mm.</li> <li>• The middle circle positioned on the seat back</li> <li>• The upper 300mm circle positioned 25mm away from the head restraint.</li> </ul>	T4.3		
56	<p><b>COCKPIT OPENING:</b> Insert template 2 into cockpit. The firewall may not be removed. Teams are allowed to remove the seat, steering wheel and all padding</p> <ul style="list-style-type: none"> <li>• Template passes down below the top of the Side Impact Structure (or 320mm above lowest point in car, monocoque only)</li> </ul>	T4.1		
57	<p><b>COCKPIT INTERNAL CROSS SECTION:</b> Check if pedals are in most forward position. Insert template 3 into cockpit. Steering wheel and padding may only be removed if no tools are required and the driver is able to do so from the driving position.</p> <ul style="list-style-type: none"> <li>• Template passes through to 100mm from pedals</li> </ul>	T4.2		
58	Wheelbase has to be a minimum of 1525 mm	T2.8.1		
<b>FRONT IMPACT PROTECTION</b>				
<b>No.</b>	<b>Checkpoint</b>	<b>Rule No</b>	<b>Checkbox</b>	<b>Comments</b>
59	<p><b>AIP:</b> Anti-Intrusion Plate present and thickness = min 1.5mm (steel) or 4.0mm (aluminium). CFRP allowed if SES &amp; IAD are approved</p> <ul style="list-style-type: none"> <li>• If the IA and AIP (IA assembly) are bolted to the front bulkhead, it must be the same size as the outside dimensions of the front bulkhead.</li> <li>• If it is welded to the front bulkhead, it must extend at least to the centerline of the front bulkhead tubing in all directions.</li> <li>• The AIP must not extend past the outside edges of the front bulkhead.</li> </ul> <p><b>IA:</b> Impact Attenuator present</p> <ul style="list-style-type: none"> <li>• At least 100mm high and 200mm wide for a minimum distance of 200mm forward of the front bulkhead.</li> <li>• Attached securely and directly to the Anti Intrusion Plate (AIP).</li> </ul> <p>No wing supports through IA</p>	T3.17 T3.17.2 T3.17.3 T3.17.5		
60	<p>If the IA assembly is not integral with the primary structure, i.e. Welded</p> <ul style="list-style-type: none"> <li>• minimum of 8pcs - 8mm metric grade 8.8 bolts must attach the IA assembly to the front bulkhead or equivalent, proved through the IAD</li> </ul>	T3.17.5		
61	The IA may be attached to the AIP by a minimum of 8pcs - 8mm metric grade 8.8 bolts. The bolts are considered critical fasteners	T3.17.5		
62	<ul style="list-style-type: none"> <li>• The attachment of the IA assembly must be designed to provide an adequate load path for transverse and vertical loads in the event of off-center and off-axis impacts.</li> <li>• Segmented foam attenuators must have the segments bonded together to prevent sliding or parallelogramming.</li> </ul>	T3.17.6		

63	<p>STANDARD IA:</p> <ul style="list-style-type: none"> <li>• if the front bulkhead width is larger than 400mm and/or its height is larger than 350mm a diagonal or X-bracing that is a front bulkhead support tube or an approved equivalent per T3.2, must be included in the front bulkhead. Or equivalent for monocoque bulkheads.</li> <li>• must use a 1:5mm solid steel AIP that is welded along its full perimeter to a steel bulkhead or use a 4mm solid aluminium AIP that is bolted to any bulkhead with a minimum of eight 8mm metric grade 8:8 bolts</li> <li>• if the "standard" honeycomb IA is used, the IA must be of pre-crushed type</li> </ul>	.T3.17.8		
<b>APPROVAL STATUS</b>			<a href="#">Dashboard</a>	
MECH 2	Approval (Control box) (DON'T CHANGE MANUALLY)		ONWAAR	
<b>MECH 3: WHEN ASSEMBLED</b>				
<b>BODYWORK &amp; AERODYNAMICS</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
64	No large holes in bodywork, except for cockpit opening and except for the venting holes	T2.3.1		
65	<p>DRIVER'S LEG PROTECTION</p> <p>Covers inside of cockpit over any sharp edges or moving suspension / steering components with rigid material. T 5.9.1 %I think this could be checked together with internal cross section template</p>			
66	<p>FLOOR PANELS:</p> <p>Floor panel installed from foot area until firewall. Gaps must be less than 3mm</p> <p>Deflection of floor panels which can occur with a seated driver or during a race can't cause a gap greater than 3mm</p> <p>Enclosed chassis structures, structures between the chassis and the ground and every local minimum that can accumulate fluids must have two venting holes of at least 25mm diameter in the lowest part of the structure to prevent accumulation of liquids.</p>	T4.7.1		
67	<p>AERO GENERAL:</p> <p>All wings securely attached, deflection may not exceed 25mm when a force of 50 N is placed at any random place in any random direction locally or 10mm when a force of 200N is applied at an surface area of 225cm<sup>2</sup> (Use sandbags)</p> <p>Front facing edges off aero dives must have a radius of 5 mm if horizontal and 3 mm if vertical and 38mm radius at 45° at the nosecone</p> <p>Attachment of the rear wing must be in the nodes of the MAIN HOOP (MAIN HOOP BRACINGS)</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Figure 15: Maximum dimensions and positioning of aerodynamic devices. The positioning space is further restricted, see T2.1.</p> </div> <div style="text-align: center;"> <p>out zone (see image below)</p>  <p>Figure 3: Keep-out-zones for the definition of an open-wheeled vehicle.</p> </div> </div>	T8		
68	<p>FRONT AERO:</p> <p>Measurements according T8 aerodynamic devices, figure 13 (Provided in scrutineering area)</p>			
69	<p>REAR AERO:</p> <p>Measurements according T8 aerodynamic devices, figure 13 (Provided in scrutineering area)</p>			
<b>COOLING SYSTEM</b>				
	Checkpoint	Rule No	Checkbox	Comments

70	<p><b>COOLING GENERAL:</b> Any cooling overflow system must be equipped with a catch tank, located behind the firewall, below shoulder level</p> <p>Cooling catch cans minimal 10% fluid volume or 100ml, whichever is greater.</p> <p>Other fluids must have a minimum volume of 10% of the fluid being contained or 900 ml whichever is greater.</p> <p>Fluid must be 100% water, oil allowed for EV</p> <p>No fluid hoses out of the chassis or monocoque in direct line of sight of driver exceptions for in-wheel motors. Without stone-strike protection</p> <p>Catch cans, mountings and hoses must be made of material that is permanently rated for temperatures of at least 120°C</p>	T7.2		
71	Any catch can must vent through a hose with a minimum internal diameter of 3mm down to the bottom level of the chassis and must exit outside the bodywork.	T7.2.9		
72	<p><b>FLUID LEAKS:</b> Oil, grease, coolant, fuel, Brake fluid -&gt; none permitted</p>			
<b>SCATTERSHIELDS</b>				
	Checkpoint	Rule No	Checkbox	Comments
73	<p>Oil sump lower than chassis</p> <p>The lowest point of any lubrication system can only be lower than the line between the lowest point of the main hoop and the lowest chassis member behind the lubrication system if it is protected from hitting the ground by a structure mounted directly to the chassis.</p>	T7.3.1		
74	<p><b>SCATTERSHIELDS GENERAL:</b></p> <ul style="list-style-type: none"> <li>•Cover chains and belts from the drive sprocket to the driven sprocket/chain wheel/belt or pulley.</li> <li>• Start and end parallel to the lowest point of the driven sprocket/chain wheel/belt or pulley.</li> <li>• Scatter shields for chains and belts must be centered on the centerline of the chain or belt and remain aligned with the chain or belt under all conditions.</li> <li>• For metallic chains and belts: 2mm nonperforated steel.</li> <li>• For non-metallic chains and belts: 3mm nonperforated aluminum alloy 6061-T6.</li> <li>•The minimum width of the scatter shield should be at least three times the width of the chain or belt.</li> </ul>	T7.3.2 T7.3.5		
75	All fasteners attaching scatter shields, guards and their mountings must be 6mm metric grade 8.8 or stronger and must comply with T10.1.	T7.3.6		
76	Finger guards are required to cover any parts that spin while the vehicle is stationary. Finger guards may be made of lighter material, sufficient to resist finger forces. Mesh or perforated material may be used but must prevent the passage of a 12mm diameter object through the guard.	T7.3.7		
77	<p><b>MOTORCASING:</b> EV: Motorcasings have a minimal thickness of 3mm aluminium</p>	T7.3.4		
78	<p><b>GREASE COVERS:</b> All covers off drivesystems have to be fixated so the grease wont come out</p>			
<b>OTHER</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
<b>BELOW CV CLASS ONLY</b>				
<b>Check box if car is EV</b>		ONWAAR		
<b>CV ONLY: ENGINE, FUEL SYSTEM AND ELECTRICS</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
79	<p><b>ENGINE</b></p> <p>The engine(s) used to power the vehicle must be piston engine(s) using a four-stroke primary heat cycle with a displacement not exceeding 710 cm<sup>3</sup> per cycle.</p>	CV1.1		
80	Each vehicle must be equipped with an on-board starter, which must be used to start the vehicle.	CV1.2		
81	There must be a green light next to the engine start button (as defined in CV1.2.2), that indicates that the gearbox is in neutral. It must be marked with the letter "N". This letter must have a minimum height of 25 mm.	CV1.2.3		
82	<p><b>SURFACE ENVELOPE</b></p> <p>All parts of the engine air and fuel control systems (including the throttle and the complete air intake system, including the air filter and any air boxes) must lie within the surface envelope, see T1.1.17. ).</p> <p><b>AIR INTAKE</b></p>	CV1.3.1		
83	Any portion of the air intake system that is less than 350mm above the ground must be shielded from side or rear impact collisions by structure built according to T3.15 (with exception of the first point under T3.15.1) and must follow T3.16 when having bolted attachments.	CV1.3.2		

The intake manifold must be securely attached to the engine block or cylinder head with brackets and mechanical fasteners.

84 The threaded fasteners used to secure the intake manifold are considered critical fasteners and must comply with T10. CV1.3.3

Min M4, grade 8.8  
OEM type M3, grade 8.8

85 Intake systems with significant mass or cantilever from the cylinder head must be supported to prevent stress to the intake system. Supports to the engine must be rigid. Supports to the chassis must incorporate isolation to allow for engine movement and chassis torsion. CV1.3.4

The vehicle must be equipped with a throttle body. The throttle body may be of any size or design.

86 The throttle must be actuated mechanically by a foot pedal, i.e. via a cable or a rod system, see CV1.5, or by an ETC system, see CV1.6. CV1.4

The throttle system mechanism must be protected from debris ingress to prevent jamming.

**THROTTLE**

87 The throttle actuation system must use at least two return springs located at the throttle body, so that the failure of any one of the two springs will not prevent the throttle returning to the idle position. CV1.5

Each return spring must be capable of returning the throttle to the idle position with the other disconnected.

Springs in the Throttle Position Sensor (TPS) are not acceptable as return springs.

Throttle cables must be located at least 50mm from any exhaust system component and out of the exhaust stream.

88 Throttle cables or rods must have smooth operation and must not have the possibility of binding or sticking. They must be protected from being bent or kinked by the driver's foot during operation or when entering the vehicle. CV1.5

A positive pedal stop must be incorporated on the accelerator pedal to prevent over-stressing the throttle cable or actuation system.

**Electronic Throttle Control**

Rule only applies if ETC is used.

89 The ETC system must be equipped with at least the following sensors: CV1.6

- Accelerator Pedal Position Sensors (APPSs) as defined in T11.8.
- Two Throttle Position Sensors (TPSs) to measure the throttle position

90 When power is removed, the electronic throttle must immediately close at least to idle position 5%. An interval of one second is allowed for the throttle to close to idle, failure to achieve this within the required interval must result in immediate disabling of power to ignition, fuel injectors and fuel pump. This action must remain active until the TPS signals indicate the throttle has returned to idle position 5% for at least one second. CV1.6.5

91 The electronic throttle must use at least two sources of energy capable of returning the throttle to the closed position. One of the sources may be the device that normally actuates the throttle, e.g. a DC motor, but the other device(s) must be a return spring that can return the throttle to the idle position in the event of a loss of actuator power. CV1.6.7

**RESTRICTOR**

- Gasoline fueled vehicles - 20mm
- E 85 fueled vehicles - 19mm
- For naturally aspirated engines, the sequence must be: throttle body, restrictor, and engine, see figure 17
- For turbocharged or supercharged engines, the sequence must be: restrictor, compressor, throttle body, engine, see figure 18

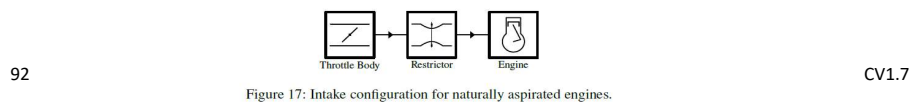


Figure 17: Intake configuration for naturally aspirated engines.

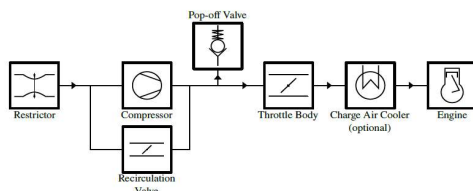



Figure 18: Intake configuration for turbocharged or supercharged engines.

**FUEL TANK**

93 The fuel tank must be located within the rollover protection envelope, see T1.1.15, except the fuel filler neck if it is 350mm above the ground. CV2.2.1

94 All parts of the fuel storage and supply system must lie within the surface envelope, see T1.1.17.. CV2.2.2



95	In side view no portion of the fuel system can project below the lower surface of the chassis.	CV.2.2.3
96	All parts of the fuel storage and supply system must be adequately protected against any heat sources and located at least 50mm from any exhaust system component.	CV2.2.4
97	All parts of the fuel system which can come in contact with the fuel must be rated for permanent contact with fuel. Check RESIN datasheet for carbon fiber fuel tanks.	CV2.2.5
98	The fuel tank is defined as the part of the fuel containment device that is in contact with the fuel. It may be made of a rigid material or a flexible material.	CV2.3.1
99	The fuel tank must be securely attached to the vehicle structure with mountings that allow some flexibility such that chassis flex cannot unintentionally load the fuel tank.	CV2.3.2
100	The fuel tank must not touch any part of the vehicle other than its mounting and parts of the fuel system at any time. FUEL LINES Fuel lines between fuel tank and fuel rail and return lines must have: <ul style="list-style-type: none"> <li>• Reinforced rubber fuel lines with an abrasion protection with a fuel hose clamp which has a full 360° wrap, a nut and bolt system for tightening and rolled edges to prevent the clamp cutting into the hose, or</li> </ul>	CV2.3.3
101		CV2.4.1
102	<ul style="list-style-type: none"> <li>• Metal braided hoses with crimped-on or reusable, threaded fittings.</li> </ul> Fuel lines must be securely attached to the vehicle and/or engine. The following requirements apply to LPI (low pressure injection <10 bar) fuel systems:	CV2.4.3
103	<ul style="list-style-type: none"> <li>• The fuel lines must comply with CV2.4.</li> <li>• The fuel rail must be securely attached to the engine cylinder block, cylinder head, or intake manifold with mechanical fasteners. The threaded fasteners used to secure the fuel rail are considered critical fasteners and must comply with T10.</li> <li>• The use of fuel rails made from plastic, carbon fiber or rapid prototyping flammable materials is prohibited. However, the use of unmodified Original Equipment Manufacturer (OEM) Fuel Rails manufactured from these materials is acceptable.</li> </ul>	CV2.5.1
104	<p>The following requirements apply to HPI and DI fuel systems:</p> <ul style="list-style-type: none"> <li>• All high pressure fuel lines must be stainless steel rigid line or Aeroquip FC807 smooth bore PTFE hose with stainless steel reinforcement and visible Nomex tracer yarn. Use of elastomeric seals is prohibited. Lines must be rigidly connected every 100mm by mechanical fasteners to structural engine components.</li> <li>• The fuel rail must be securely attached to the engine cylinder head with mechanical fasteners. The fastening method must be sufficient to hold the fuel rail in place with the maximum regulated pressure acting on the injector internals and neglecting any assistance from in-cylinder pressure acting on the injector tip. The threaded fasteners used to secure the fuel rail are considered critical fasteners and must comply with T10.</li> <li>• The fuel pump must be rigidly mounted to structural engine components.</li> <li>• A fuel pressure regulator must be fitted between the high and low pressure sides of the fuel system in parallel with the DI boost pump. The external regulator must be used even if the DI boost pump comes equipped with an internal regulator.</li> <li>• Prior to the tilt test specified in IN7, engines fitted with mechanically actuated fuel pumps must be run to fill and pressure the system downstream of the high pressure pump.</li> </ul> <p>The fuel tank must have a filler neck which:</p> <ul style="list-style-type: none"> <li>• has at least an inner diameter of 35mm at any point between the fuel tank and the top of the fuel filler cap.</li> <li>• is angled at no more than 30° from the vertical</li> <li>• is accompanied by a clear fuel resistant sight tube above the top of the fuel tank with a length of at least 125mm vertical height for reading the fuel level, see figure 19.</li> <li>• is made of material that is permanently rated for temperatures of at least 120 °C.</li> <li>• a clear filler neck tube may be used as a sight tube.</li> </ul>	CV2.5.2
105	<p>A permanent, non-moveable, clear and easily visible fuel level line must be located between 12mm and 25mm below the top of the visible portion of the sight tube. This line will be used as the fill line for the tilt test (IN7.1), and before and after the endurance test to measure the amount of fuel used during the endurance event.</p>	CV2.6
106	All fuel vent lines must be equipped with a check valve to prevent fuel leakage when the tank is inverted. All fuel vent lines must exit outside the bodywork.	CV2.6.3
107	Fuel type sticker near the fuel filler neck	CV2.8.2
108	GAS CYLINDERS/TANKS Proprietary manufactured, certified & labeled.	
109	Non-flammable gas, regulator directly on tank max. 10 bar (145 psi), securely mounted to chassis or engine, or in structural side pod, within the rollover envelope, not in cockpit, insulated from heat sources, appropriate lines & fittings for max. pressure of system. Positively retained, i.e. no tie-wraps.	T 9.1

	EXHAUST	
110	The exhaust outlet must be routed to the side or rear of the vehicle and so that the driver is not subjected to fumes at any speed considering the draft of the vehicle. The application of fibrous/absorbent material, e.g. "headerwrap", to the outside of an exhaust manifold or exhaust system is prohibited.	CV3.1.1
111	The exhaust outlet(s) must not extend more than 450mm behind the centerline of the rear axle and shall be no more than 600mm above the ground.	CV3.1.2
112	Any exhaust components (headers, mufflers, etc.) that protrude from the side of the body in front of the main hoop must be shielded to prevent contact by persons approaching the vehicle or a driver exiting the vehicle. The temperature of the outer surface must not be harmful to a person touching it.	CV3.1.3
	BRAKE LIGHT	
113	Only one RED brake light, clearly visible from the rear; on vehicle centerline; height between wheel centerline & driver's shoulders. Round, triangle, or rectangular on black background. 15 cm <sup>2</sup> minimum illuminated area. LED strips OK if elements closer than 20mm apart and total length > 150 mm.	T 6.3
	SHUTDOWN CIRCUIT	
114	The shutdown circuit directly controls all electrical power to the ignition, fuel injectors and all fuel pumps. It must act through a minimum of two mechanical relays. One relay for the fuel pump and at least one relay for injection and ignition. An LVMS according to T11.2 must completely disable	CV4.1
	<ul style="list-style-type: none"> <li>• [EV ONLY] power to the LVS</li> <li>• [CV ONLY] power from the Low Voltage (LV) battery and the alternator to the LVS</li> </ul>	
115	The LVMS must be mounted in the middle of a completely red circular area of 50mm diameter placed on a high contrast background.	T11.3
	The LVMS must be marked with "LV" and a symbol showing a red spark in a white edged blue triangle.	
	The LVMS must be removable in off state, which is in the vertical position and have a marker for the off and on positions.	
	Shutdown Buttons A system of three shutdown buttons must be installed on the vehicle.	
	Each shutdown button must be a push-pull or push-rotate mechanical emergency switch where pushing the button opens the shutdown circuit, see EV6.1 and CV4.1.	
	One button must be located on each side of the vehicle behind the driver's compartment at approximately the level of the driver's head. The minimum allowed diameter of the shutdown buttons on both sides of the vehicle is 40mm.	
116	The buttons must be easy reachable from outside the vehicle.	T11.4
	One shutdown button serves as a cockpit-mounted shutdown button and must	
	<ul style="list-style-type: none"> <li>• have a minimum diameter of 24mm</li> <li>• be located in easy reach of a belted-in driver</li> <li>• be alongside of the steering wheel and unobstructed by the steering wheel or any other part of the vehicle</li> </ul>	
	The international electrical symbol consisting of a red spark on a white-edged blue triangle must be affixed in close proximity to each shutdown button.	
	Shutdown buttons must be rigidly mounted to the vehicle and must not be removed during maintenance.	
	Inertia Switch	
117	An inertia switch must be part of the shutdown circuit, see CV4.1 and EV6.1, such that an impact will result in the shutdown circuit being opened. The inertia switch must latch until manually reset.	T11.5
	The device must be rigidly attached to the vehicle. It must be possible to demount the device so that its functionality may be tested by shaking it.	
	Brake System Plausibility Device - BSPD	
	A standalone non-programmable circuit, the BSPD, must open the shutdown circuit, see EV6.1 and CV4.1, when hard braking occurs, whilst	
118	<ul style="list-style-type: none"> <li>• [EV ONLY] 5kW power is delivered to the motors.</li> <li>• [CV ONLY] the throttle position is more than 25% over idle position.</li> </ul>	T11.6
	The shutdown circuit must remain open until power cycling the LVMS or the BSPD may reset itself if the opening condition is no longer present for <b>more than 10 s</b> .	
	The action of opening the shutdown circuit must occur if the implausibility is persistent for more than 500 ms.	

Brake Over-Travel Switch - BOTS

119 A brake pedal over-travel switch must be installed on the vehicle as part of the shutdown circuit, as in EV6 or CV4.1. This switch must be installed so that in the event of a failure in at least one of the brake circuits the brake pedal over-travel will result in the shutdown circuit being opened. This must function for all possible brake pedal and brake balance settings without damaging any part of the vehicle. T6.2

Low Voltage Batteries

LV batteries must be securely attached to the chassis and located within the rollover protection envelope

Any wet-cell battery located in the cockpit must be enclosed in a non-conductive, water proof (according to IPX7 or higher, IEC 60529) and acid resistant container.

Completely closed LV battery cases must have an overpressure relief. Venting gases must be separated from the driver by a firewall.

Battery packs based on lithium chemistry **other than lithium iron phosphate (LiFePO4):**

- Must have a fire retardant casing, see T1.2.1.
  - Must include overcurrent protection that trips at or below the maximum specified discharge current of the cells.
  - Must include overtemperature protection of at least 30% of the cells, meeting EV5.8.3, that trips when any cell leaves the allowed temperature range according to the manufacturer's datasheet, but not more than 60 °C, for more than 1 s and disconnects the battery.
  - Must include voltage protection of all cells that trips when any cell leaves the allowed voltage range according to the manufacturer's datasheet for more than 500 ms and disconnects the battery.
  - It must be possible to display all cell voltages and measured temperatures, e.g. by connecting a laptop.
- 120 T11.7

APPROVAL STATUS		<a href="#">Dashboard</a>		
MECH 3	Approval (Control box) (DON'T CHANGE MANUALLY)		ONWAAR	
<b>MECH 4: WITH THE CAR JACKED UP</b>				
<b>STEERING</b>				
No.	Checkpoint	Rule No	Checkbox	Comments

STEERING:

All steerable wheels must have positive stops to prevent contact between wheels and other parts of the car

Steering wheel must be mechanically attached to front wheels (no steer-by-wire)

Steering wheel must be round, oval or near-oval with a quick release installed. No concave sections !

121 Max 250mm from front hoop and not above in any position

The max. play in the steering system is 7 degrees

Mechanical positive stop on the steering rack - check for collision on the uprights/caliper/etc.

Adjustable tie-rod ends must be constrained with a jam nut to prevent loosening.

122  
123

WHEELS AND SUSPENSION				
No.	Checkpoint	Rule No	Checkbox	Comments

124 All 4 wheels need to be checked if there is any play. If the suspension is mounted to the uprights with brackets the brackets need to be rigid

SUSPENSION:

All pick-up points must be secure and rigid

All moving suspension, steering or other components with sharp edges inside the cockpit must be covered with solid material

125 Adjustable tie-rod ends must be constrained with a jam nut to prevent loosening.

Suspension adjusting shims must be positive locked.

The vehicle must be equipped with fully operational front and rear suspension systems including shock absorbers and a usable wheel travel of at least 50mm and a minimum jounce of 25mm with driver seated.

126 Wheel lug bolts and studs must be made of steel or titanium. The team must be able to show good engineering practice and providing adequate strength by calculations. Wheel lugbolts and studs must not be hollow.

127 Aluminum wheel nuts may be used, but they must be hard anodized and in pristine condition.

<b>WHEEL NUTS</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
128	If a single nut is used to retain the wheel, a device must be incorporated to retain the nut. This may not be another nut.			
129	Custom wheel nuts must show proof of good engineering practices, bought single nut systems must show proof of purchase			
130				
131				

<b>FASTENERS</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
	LOCKING:			
132	"The following fasteners have to be locked: (All high risk fasteners) <ul style="list-style-type: none"> <li>• Suspension</li> <li>• Steering</li> <li>• Accumulator</li> <li>• Drivers harness</li> <li>• Pedalbox</li> <li>• ETC</li> </ul> <p>All steering fasteners must be min. grade 8.8 with min. 2 threads exposed</p> <p>All suspension fasteners must be min. grade 8.8 with min. 2 threads exposed</p>			
133	All brake fastners must be min. grade 8.8 with min. 2 threads exposed.  Nylon Lock Nuts located near significant heat sources are PROHIBITED			
134	Accumulators fasteners must be min. grade 8.8 with min. 2 threads exposed			
135	All threaded critical fasteners must be at least 4mm metric grade 8:8 (OEM parts 3mm metric grade 8:8)			
136				

<b>FIREWALL</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
	Firewall must be made from fire resistant material			
	"Must seperate driver compartment from: <ul style="list-style-type: none"> <li>• [CV]: Engines &amp; fuel system</li> <li>• [EV]: TS components</li> <li>• Hydraulic and/or flammable fluid</li> <li>• LV batteries</li> </ul> <p>Up to a direct line of sight 100mm from the bottom of the drivers helmet</p> <p>[EV only]: Firewall sample must be present:  <ul style="list-style-type: none"> <li>• TS facing side must be &gt; 0.5mm</li> <li>• Driver facing side must be UL94-V0</li> <li>• Able to withstand 250N force with a screwdriver"</li></ul></p>			
137	Max 5mm gaps  "Heat isolation: <ul style="list-style-type: none"> <li>• Conduction isolation: No direct contact/8mm insulating material</li> <li>• Convection isolation: 25mm air gap</li> <li>• Radiation insulation: solid metal shield &gt; 0.4mm. Reflective foil only allowed when the firewall is &gt;8mm thick" <p>No part of the drivers harness can be placed behind the firewall</p> </li></ul>			
138				
139				

<b>BRAKES</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
	Brake pedal can withstand 2 kN --> test by braking as scrutineer			
	Dual hydraulic system & reservoirs. No plastic brake lines.			
140	All wheels must have brakes (test by pressing brake paddle en rotating hub)  No nylon locking nuts nearby the brake discs or calipers are allowed  Brake-over-travel-switch installed (test the brake pedal with the liquid overflow opened)			
141				
142				

<b>APPROVAL STATUS</b>				
No.	Checkpoint	Rule No	Checkbox	Comments
MECH 4	Approval (Control box) (DON'T CHANGE MANUALLY)		<a href="#">Dashboard</a> ONWAAR	
	<b>Check box if car is HYBRID</b>		ONWAAR	
	<b>HUBRID ONLY: BATTERY, ELECTRICAL MOTORS</b>			

HYBRID VEHICLE				
No.	Checkpoint	Rule No	Checkbox	Comments
143	HYBRID SYSTEM CHECKED			
144	Check assembly of the motor on wheel hub			
145	Low Voltage Batteries (see point 120 in checklist)	T11.7		
<b>TOTAL MECH APPROVAL</b>			<a href="#">Dashboard</a>	
	MECH 1		0	
	MECH 2			
	MECH 3: CV		0	
	MECH 3: EV		0	
	MECH 4:		0	
	HYBRID VEHICLE:			
			<a href="#">Dashboard</a>	
	CV CLASS	ONWAAR		
	EV CLASS	ONWAAR		

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