

Formula Student Balkans



2023 Mechanical Inspection Sheet

Car No:

University:



APPROVED

VEHICLE WEIGHING (IN8)

No.	Checkpoint	Rule No	Checkbox	Comments
1	Car must be in ready-to-race condition	IN 8.1		
	Fuel tank must be full (CV only). Ask the teams to display fuel level			
	Water level must be in racing condition. Ask the team to display level			
	Oil level must be in racing condition. Ask the teams to display level			
2	Weigh the car	IN 8.1		
	Check if the scales are set correct			
	Place the car at the scale			
	Close the tent from the wind direction			
	Note the weight of the car on the sticker			
	Weight of the car:			
Notes				
	<i>If a team shows up while they still have to work on the car they must leave the queue. No maintenance will be done in the queue for the weighing inspection</i>			
APPROVAL STATUS				
WEIGHING	Approval (Control box) (DON'T CHANGE MANUALLY)			

DRIVER EGRESS T4.11

No.	Checkpoint	Rule No	Checkbox	Comments
1	Check if all drivers are present, indicated by driver band 1 up to and including 4-6.	T4.11		
2	Check if the driver for egress is ready, wearing all equipment: <ul style="list-style-type: none"> - Close face helmet - Balaclava - A fire resistant one piece suit - Fire resistant underwear (long pants and long sleeve t-shirt) - Fire resistant socks - Fire resistant shoes - Fire resistant gloves - Arm restraint 	T13.3		
3	Driver must be fully seated and strapped-in, including arm restraints. Hands must be placed in driving position.	T4.11		
4	One team member is allowed to be handed the steering wheel at the egress test.	T4.11		
5	Inform the teams that the stopwatch starts at your (the scrutineer) mark. Say: Ready, set, mark, and start the timer at mark	T4.11		
6	Stop the timer when the driver has both his feet on the ground.	T4.11		
	Each driver gets two attempts			
8	Repeat step 2 to 6 until all 4 to 6 drivers are done.			
9	All drivers have passed			
APPROVAL STATUS				
EGRESS	Approval (Control box) (DON'T CHANGE MANUALLY)			

TILT TEST IN7.1

No.	Checkpoint	Rule No	Checkbox	Comments
1	Tallest driver (indicated by the bracelet with number 1 on it) must be seated with full driver wearing all equipment: <ul style="list-style-type: none"> - Close face helmet - Balaclava - A fire resistant one piece suit - Fire resistant underwear (long pants and long sleeve t-shirt) - Fire resistant socks - Fire resistant shoes - Fire resistant gloves - Arm restraint 	T13.3 & IN 7.1.1		
2	When the driver is correctly seated, the car must be pushed on the tilt test device. At the correct position the driver must keep the brake pedal depressed.	IN7		
3	The car must be secured correctly to the tilt test device.			
4	Tilt the car towards 45 degrees.			
5	Check if the car is secure to the tilt test device.			
6	Tilt the car towards 60 degrees			
7	Check if the car is secure to the tilt test device.			
8	Leave the car be for one minute			
9	Check if the fuel level is decreasing, if so, see rule CV2.7.1			
10	Check for fluids at the brake callipers, Wheels, bodywork, around the fuel lines and tank, Catch cans and around the catch cans, radiators, and rear wheels			
11	Lower the car and disconnect the car			
12	Switch the car around and repeat step 2 up to and including 10			
13	No fluid leaks			
14	All four wheels are in contact with the tilt table	IN7.1.3		

APPROVAL STATUS

TILT	Approval (Control box) (DON'T CHANGE MANUALLY)			
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NOISE TEST

No.	Checkpoint	Rule No	Checkbox	Comments
1	Driver (indicated by the bracelet with number 1 on it) must be seated with full driver wearing all equipment: <ul style="list-style-type: none"> - Close face helmet - Balaclava - A fire resistant one piece suit - Fire resistant underwear (long pants and long sleeve t-shirt) - Fire resistant socks - Fire resistant shoes - Fire resistant gloves - Arm restraint 	T13.3		
2	Check if the team brought a laptop	IN 10.1.3		
3	Calculate engine speed	IN 10.1.2		Tested engine speed:
4	If passed check master switch by activation and deactivation, without the engine running to see if the car shutdown correctly.	IN 10.1.8		
5	Check cockpit mounted shutdown buttons	IN 10.1.8		
6	Place microphone free from obstructions at the exhaust outlet level, 0.5 m from the end of the exhaust outlet, at an angle of 45° with the outlet in the horizontal plane.	IN 10.1.4		
7	Where more than one exhaust outlet is present, the test will be repeated for each exhaust and the highest reading will be used.	IN 10.1.5		
8	Gearbox must be in neutral and the car must be jacked up.	IN 10.1.7		
9	Put in earplugs			
10	Let the team start the car			

11	Perform noise test when idle, max noise is 103 dB	CV3.2.2		
12	Perform noise test at calculated rpm, max noise is 110 dB.	CV3.2.1		
13	Ask team to remove inertia switch to test it by shaking	IN 10.1.8		
14	Let the team restart the car			
15	the intake system will be tested by closing off the inlet after which the engine must stall.	IN 10.1.9		
	For the noise test the teams are allowed to make repairs according to IN 1.5			
APPROVAL STATUS				
NOISE	Approval (Control box) (DON'T CHANGE MANUALLY)			
BRAKE TEST IN 11				
	<p>The goal of the brake test is for the teams to demonstrate that the car has sufficient braking capability by locking-up all four wheels. If the car is CV, the engine must be kept running.</p> <p>The car will be started by one scrutineer/marshal with a flag.</p> <p>The car will accelerate within the cone marked area. Until the stop area</p> <p>At the stop area 2 marshals/scrutineers will check if all four wheels locked-up during braking. This will be indicated by thumps up or thumps down.</p> <p>If all four wheels are locked during braking (and keeps the engine running for CV cars) , the car passes. If not, the car can reattempt the braking test.</p> <p>If the team does not pass the braking test within 3 attempts or 15 minutes, the team has to join the queue at the back.</p> <p>Modifications and repairs can be done according to IN 1.5</p> <p>The right compound tire has to be used for the track condition, according to D3.2</p>			
No.	Checkpoint	Rule No	Checkbox	Comments
1	<p>Driver (indicated by the bracelet with number 1 on it) must be seated with full driver wearing all equipment:</p> <ul style="list-style-type: none"> - Close face helmet - Balaclava - A fire resistant one piece suit - Fire resistant underwear (long pants and long sleeve t-shirt) - Fire resistant socks - Fire resistant shoes - Fire resistant gloves - Arm restraint 	T13.3		
2	Visual inspection of car for last safety check			
3	[EV only] Check ready to drive sound	IN 11.1.4		
4	[EV only] Check TSAL illumination	IN 11.1.3		
5	[EV only] Tractive system must be switched off after acceleration so that the car must use mechanical braking only to lock the wheels	IN 11.1.2		
6	Check if the brake light is sufficient	IN 11.1.3		
7	All four wheels locked during braking	IN 11.1.1		
8	[EV only] TSAL must be switched to green within 5 seconds after the vehicle has come to a complete stop.	IN 11.1.2		
9	[CV only] Engine must be kept running after full stop	IN 11.1.1		
APPROVAL STATUS				
BRAKE	Approval (Control box) (DON'T CHANGE MANUALLY)			

IN 8 VEHICLE WEIGHING

IN 8.1 Vehicle Weighing Procedure

- IN 8.1.1 All vehicles must be weighed in ready-to-race condition.
- IN 8.1.2 All fluids must be at their maximum fill level for weighing.

T 4.11 Driver Egress

- T 4.11.1 All drivers must be able to exit to the side of the vehicle in less than 5 s with the driver in the fully seated position, hands in the driving position on the connected steering wheel (in all possible steering positions) and wearing the required driver equipment as in T 13.3. The egress time will stop when the driver has both feet on the ground.

IN 7 TILT TEST

IN 7.1 Tilt Test Procedure

- IN 7.1.1 The tilt test will be conducted with the tallest driver fully strapped in normal driving position.
- IN 7.1.2 The tilt test will be conducted with all vehicle fluids at their maximum fill level.
- IN 7.1.3 The vehicle will be placed upon the tilt table and to an angle of 60°. There must be no fluid leaks and all wheels must remain in contact with the tilt table surface.

IN 10 [CV ONLY] NOISE TEST

IN 10.1 Noise Test Procedure

- IN 10.1.1 The sound level will be measured during a static test.
- IN 10.1.2 The vehicle must be compliant at all engine speeds up to the maximum test speed, see CV 3.2.1.
- IN 10.1.3 Teams must bring a laptop to indicate the engine speed measured by the Electronic Control Unit (ECU).
- IN 10.1.4 Measurements will be made with a free-field microphone placed free from obstructions at the exhaust outlet level, 0.5 m from the end of the exhaust outlet, at an angle of 45° with the outlet in the horizontal plane.
- IN 10.1.5 Where more than one exhaust outlet is present, the test will be repeated for each exhaust and the highest reading will be used.
- IN 10.1.6 If the exhaust has any form of active tuning or throttling device or system, it must be compliant with the rules in all positions. Manually adjustable tuning devices must require tools to change them and must not be moved or modified after the noise test is passed. The position of the device must be visible to the officials and manually operable by the officials during the noise test.
- IN 10.1.7 The test will be run with the gearbox in neutral. During this test the vehicle must be jacked up using the quick jack (see T 13.2).

- IN 10.1.8 After passing the noise test the function of the master switch, the cockpit-mounted shutdown button and the inertia switch will be tested.
- IN 10.1.9 After passing IN 10.1.8 the air tightness of the intake system will be tested by closing off the inlet after which the engine must stall.

CV 3.2 Maximum Sound Level

- CV 3.2.1 The maximum sound level test speed for a given engine will be the engine speed that corresponds to an average piston speed of 15.25 m/s . The calculated speed will be rounded to the nearest 500 rpm. The maximum permitted sound level up to this calculated speed is 110 dB(C), fast weighting.
- CV 3.2.2 The idle test speed for a given engine will be up to the team and determined by their calibrated idle speed. If the idle speed varies then the vehicle will be tested across the range of idle speeds determined by the team. At idle the maximum permitted sound level is 103 dB(C), fast weighting.

T 13.2 Quick Jack

- T 13.2.1 Each team must have a removable device (called the quick jack) that lifts up the vehicle, so that all driven wheels are at least 100 mm off the ground and the vehicle is adequately supported. All non driven wheels must not touch anything else than the ground.
- T 13.2.2 The lifting of the vehicle with the quick jack must be possible by one person and not require actions other than positioning and operating the quick jack itself.
- T 13.2.3 In the lifted position the vehicle must stand securely and stable and the quick jack must be locked and secured. This must function without the support of a person or additional weights.
- T 13.2.4 The quick jack must have a red color.
- T 13.2.5 The university name must be written on the quick jack. The characters must be clearly visible and placed on a high contrast background.

IN 11 BRAKE TEST

IN 11.1 Brake Test Procedure

- IN 11.1.1 Lock all four wheels and stop the vehicle in a straight line at the end of an acceleration run specified by the officials without stalling the engine.
- IN 11.1.2 [EV ONLY] After accelerating, the tractive system must be switched off by the driver and the driver must brake using only the mechanical brakes. It is acceptable for the TSAL to switch to green shortly after the vehicle has come to a complete stop as the reduction of the system voltage may take up to 5 s.
- IN 11.1.3 The brake light and TSAL illumination will be checked and the officials will verify if the illumination is satisfactory for external observation.
- IN 11.1.4 [EV ONLY] The ready-to-drive sound will be checked and the officials will verify if the sound level is satisfactory.

IN 11.2 EBS Test

- IN 11.2.1 The EBS performance will be tested dynamically and must demonstrate the performance described in T 15.4.
- IN 11.2.2 The test will be performed in a straight line marked with cones similar to acceleration.
- IN 11.2.3 During the brake test, the vehicle must accelerate in autonomous mode up to at least 40 km/h within 20 m. From the point where the RES is triggered, the vehicle must come to a safe stop within a maximum distance of 10 m.
- IN 11.2.4 In case of wet track conditions, the stopping distance will be scaled by the officials dependent on the friction level of the track.
- IN 11.2.5 The EBS test is conducted after all other elements of IN 11 have been passed.

D3.2 Tires Allowed

- D3.2.1 Teams must run the tires allowed for each operating condition:

<u>Operating Condition</u>	<u>Tires allowed</u>
Dry	Dry
Damp	Dry or Wet
Wet	Wet

- D3.2.2 When the operating condition is damp, teams may change between dry tires and wet tires:
- Any time during the acceleration, skidpad, and autocross events.
 - Any time before taking the green flag to start endurance.
- D3.2.3 If an event had varied operating conditions, the minimum performance levels to score points may be adjusted if deemed appropriate by the officials.
- D3.2.4 Only one set of tires per type (dry/wet) may be used during all the dynamic events. The brake test, practice area, [DC ONLY] driverless autocross, [DC ONLY] trackdrive and the static events are excluded from this regulation.

IN 1.5 Modifications and Repairs

- IN 1.5.1 After technical inspection, the only modifications permitted to the vehicle are:
- Adjustment of belts, chains and clutches
 - Adjustment of the brake bias
 - Adjustment of the driver restraint system, head restraint, seat and pedal assembly
 - Substitution of the head restraint or seat insert for different drivers
 - Adjustment to engine operating parameters, e.g. fuel mixture and ignition timing
 - Adjustment of mirrors
 - Adjustment of the suspension where no part substitution, other than springs, sway bars and shims, is required

- Adjustment of tire pressure
- Adjustment of winglet angles, but not the position of the complete aerodynamic device in relation to the vehicle
- Replenishment of fluids
- Replacement of defective tires or brake pads. Replacement tires and brake pads must be identical in material/composition/size to those presented and approved at technical inspection.
- Changing wheels and tires for “wet” or “damp” conditions as allowed in D3.2 and D7.6
- Software calibration changes
- Recharging low voltage batteries
- Recharging TS accumulators
- Adjustments of AS sensors
- (De-)Coupling of actuators as allowed in T14.9