

FORMULA
STUDENT **EAST**

TECHNICAL RULES

WHO IS READY?

VERSION 1.0

RELEASE DATE: 3RD OF APRIL 2019

FURTHER DETAILS AT FSEAST.EU

#FSEAST #MAKESOMENOISE

T1. INTRODUCTION

Formula Student East® (hereafter “FS East®”) is a FSAE style Formula Student engineering competition held in Hungary, organised by the Association of Automotive Engineers (formerly Engineers for the Automotive Higher Education Association) since 2016. Formula Student East will allow to participate vehicles with conventional internal combustion engine (gasoline or ethanol fuelled) and electric powertrain. Furthermore Formula Student East welcomes the participation of driverless vehicles (both with internal combustion or electric powertrain).

The three categories will be evaluated separately:

- Internal Combustion Vehicles (hereafter CV)
- Electric Vehicles (hereafter EV)
- Driverless Vehicles (hereafter DV)

This document contains the FS East Technical Rules.

These specific rules are additions to the Formula Student Rules 2019 document (hereafter “Rules 2019”) published by [Formula Student Germany](#). In case of a conflict between the Rules 2019 and the 2019 FS East rules, the 2019 FS East rules supersede the Rules 2019.

T2. GENERAL VEHICLE REQUIREMENTS AND RESTRICTIONS

T2.1 VENTILATION OF ENCLOSED STRUCTURES

SPECIFIC FS EAST CHANGE OF FS RULES 2019 T2.2.2 FOR ELECTRIC VEHICLES

The rule is valid to any liquids in case of electric vehicles.

T2.2 IMPACT ATTENUATOR

T2.2.1 ANTI INTRUSION PLATE (AIP) TESTING

FS EAST CLARIFICATION OF FS RULES 2019 T3.19

A failure is defined if the IA plate is damaged in any way (e.g. broken) or the attachment points of AIP are destroyed.

T2.3 VEHICLE IDENTIFICATION

T2.3.1 TECHNICAL INSPECTION STICKER SPACE

SPECIFIC FS EAST CHANGE OF FS RULES 2019 IN1.3

The FS East technical inspection sticker will be placed on the nose of the car directly in front of the cockpit opening.

A space 100 mm tall x 125 mm wide must be made available for this sticker.

Vehicles that are being entered into multiple competitions in the FSAE series must allow sufficient space along the nose centerline for all inspection stickers.

T2.3.2 TRANSPONDERS

SPECIFIC FS EAST CHANGE OF FS RULES 2019 T12.3

Transponders will be provided by FS East. Only provided transponders will be accepted. The allowed mounting position and orientation will be published in the event handbook.

T2.4 DRIVER'S UNDERCLOTHING

SPECIFIC FS EAST ADDITION OF FS RULES 2019 T13.3.5

All drivers have to wear underwear (long pants and long sleeve t-shirt) certified to SFI 3.3 or FIA 8856-2000.

T2.5 TIRES

SPECIFIC FS EAST ADDITION TO FS RULES 2019 T2.5.4

Any treatment with any kind of traction enhancer is not allowed. Using a modified tire for any dynamic event will result in a DNF.

T2.6 INSPECTION HOLES

SPECIFIC FS EAST COMPLETION TO FS RULES 2019 T3.7.6

The Technical Inspectors may check the compliance of other tubes that have minimum dimensions specified. This may be done by the use of ultrasonic testing or by the drilling of additional inspection holes at the inspector's request. Inspection holes must be located so that the outside diameter can be measured ACROSS the inspection hole with a vernier caliper, i.e. there must be access for the vernier caliper to the inspection hole and to the outside of the tube one hundred eighty degrees (180°) from the inspection hole.

T2.7 LOW VOLTAGE SYSTEMS (<=60 VDC)

SPECIFIC FS EAST COMPLETION TO FS RULES 2019 T11.7.2

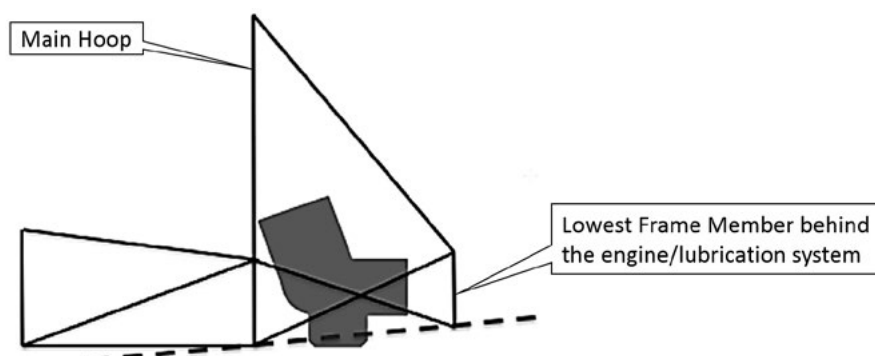
If the battery is situated out of the frame, it must be protected from any collisions.

T3. SPECIAL REQUIREMENTS AND RESTRICTIONS FOR INTERNAL COMBUSTION ENGINE VEHICLES

T3.1 ENGINE LUBRICATION SYSTEM

SPECIFIC CLARIFICATION OF FS RULES 2019 T7.4.1

The lowest point of the engine lubrication system must be no lower than the line between the lowest point of the main roll hoop and the lowest frame rail behind the engine and/or lubrication system. If the engine oil pump or any other part of the lubrication system is lower than this line, it must be protected by a sufficient skid plate, or frame tubes installed longitudinally under affected part of the engine lubrication system.



The engine lubrication system must be protected from surface contact in any situation while in operation on track, especially in case of a suspension failure. The skid plate itself can not be mounted to parts of the engine.

T3.2 ELECTRONIC THROTTLE CONTROL (ETC)

T3.2.1 THROTTLE POSITION SENSOR - TPS

SPECIFIC FS EAST ADDITION TO FS RULES 2019 RULE CV1.6

Teams must always use the highest measured TPS value as valid TP signal. If three sensors are used, then in case of a sensor failure the wrong sensor must be dedicated as “incorrect” and it is not allowed to use it later in the solution. (CV1.6.9 is valid for the remaining two faultless sensors.)

T3.2.2. ACCELERATOR PEDAL SENSOR - APPS

SPECIFIC FS EAST ADDITION TO FS RULES 2019 RULE T11.8

Teams must always use the lowest measured APPS value as valid APP signal. If three sensors are used, then in case of a sensor failure the wrong sensor must be dedicated as “incorrect” and it is not allowed to use it later in the solution. (T11.8.8 is valid for the remaining two faultless sensors.)

T4.SPECIAL REQUIREMENTS AND RESTRICTIONS FOR ELECTRIC VEHICLES

T4.1 CLARIFICATION ON ACCUMULATOR MANAGEMENT SYSTEM(S)

SPECIFIC FS EAST ADDITION TO FS RULES 2019 RULE EV5.8

The AMS must keep the accumulator cells within their safe operation limits with respect to charge and discharge currents according to the manufacturer's data sheet.

The AMS must be able to read and display all cell voltages, e.g. by connecting a laptop to the AMS. This must be demonstrated during E-Scrutineering.

The AMS readings must be within +/- 15 mV from the actual cell voltage. This will be checked during E-Scrutineering.

T4.2 DEVICE TO BE USED FOR CHECKING CELL TEMPERATURE

SPECIFIC FS EAST ADDITION TO FS RULES 2019 RULE EV5.8.5.

FS East will not install a monitoring device for temperature monitoring.

T4.3 CURRENT LIMIT VIOLATIONS

SPECIFIC FS EAST ADDITION TO FS RULES 2019 RULE EV2.2

The datalogger will be checked against the maximum accumulator charge and discharge currents stated in the ESF, as well as the values stated in the FSG rules.

T4.4 DATA LOGGER DOWNLOAD

It is the responsibility of the team to ensure that the data logger data from each event is made available to the organizers by having it downloaded with an official one hour after the closing of the respective event latest. Failure to make the data available within the specified time period due to the teams fault will result in the team not being scored for the respective event.

T4.5 SPECIFIC FS EAST RULE FOR ATTACHMENT OF HV-COMPONENTS

The accumulator attachment to the major structure must follow T10 - Fasteners of FS Rules 2019. A usage of self-locking helicoil inserts is not applicable. This also applies to electric motors.

T5. TECHNICAL INSPECTION GENERAL REQUIREMENTS

T5.1 SES TEMPLATE

The official SES template of FS East is the FSG19 SES v1.0.1 document published by Formula Student Germany at www.formulastudent.de.

T5.2 INSPECTION & TESTING REQUIREMENT

Before passing all parts of technical inspection, the car may only be moved around on the event site with all detachable keys of the Master Switches removed.
Broken seals may only be replaced by a scrutineer, but rescrutineering may be required by the scrutineer.

T5.3 CAR WEIGHING

SPECIFIC FS EAST ADDITION TO FS RULES 2019 RULE IN8 AND IN12.2.5

If the car weight changes due to replacement of broken parts, the car must be presented for tech inspection and then re-weighed. It is the team's responsibility to have the car re-weighed before entering a dynamic event after changing parts.

T5.4 BRAKE TEST

SPECIFIC FS EAST ADDITION TO FS RULES 2019 RULE IN11

The brake system will be dynamically tested and must demonstrate the capability of locking all four (4) wheels at the same time and stopping the vehicle in a straight line at the end of an acceleration run specified by the brake inspectors.

T5.5 BOTS TEST

SPECIFIC FS EAST ADDITION TO FS RULES 2019 T6.2

In case the actuation of the BOTS during a failure of the brake system is not apparent and not documented (video, CAD cinematic, pictures) sufficiently, a brake failure will be simulated during scrutineering.
This will be tested by opening the brake bleeder nipple at the brake caliper at one of both brake circuits. If the brake circuit is opened, the brake pedal must actuate the BOTS in every situation (e.g. balance bar position).

T6.SPECIAL REQUIREMENTS AND RESTRICTIONS FOR INTERNAL COMBUSTION ENGINE VEHICLES

T6.1 INSPECTION OF ELECTRONIC THROTTLE CONTROL (ETC)

Internal combustion engine vehicles equipped with ETC will have two parts of technical inspection: mechanical inspection and electrical inspection.

The electrical inspection is the second part of the inspection, it is held in the engine test area and will focus on the operation of ETC.

T6.2 INSPECTION OF BSPD CIRCUIT

All combustion vehicles must have a BSPD circuit, see FS Rules 2019 T11.6

A template circuitry can be found on the FSG website:

https://www.formulastudent.de/fileadmin/user_upload/all/2019/important_docs/FSG19_BSPD_v0.3.zip

The inspection of BSPD circuit is held in the engine test area and will focus on its operation.

T7.SCRUTINEERING PROCEDURE

The following steps need to be passed during the scrutineering, according to classification of the car.

	EV	CV	DV
EV1 Scrutineering	X		X (EV only)
Mechanical Scrutineering	X	X	X
Accumulator Scrutineering	X		X (EV only)
EV2 Scrutineering	X		X (EV only)
ETC/BSPD Inspection		X	X (CV Only)
Autonomous System Test			X
Driver Egress & Safety Test	X	X	X
Tilt Test	X	X	X
Noise Test		X	X (CV only)
Rain Test	X		X (EV only)
Brake Test	X	X	x

T7.1. STATIC SCRUTINEERING EVENTS

T7.1.1 PRE-INSPECTION

There will be no Pre-Inspection on FS East 2019.

T7.1.2 EV 1 SCRUTINEERING (EV ONLY)

Electrical Scrutineering of the Low Voltage systems of the car. The accumulator must be outside of the car.

T7.1.3 ACCUMULATOR SCRUTINEERING (EV ONLY)

Electrical Scrutineering of the Accumulator and Charging systems of the car. Can be done independently from EV1.

Teams also have to present their safety equipments and high voltage rated tools.

T7.1.4 MECHANICAL SCRUTINEERING

Mechanical Scrutineering of the car.

EV only: the Accumulator Scrutineering have to be passed and the accumulator have to be mounted inside of the car.

T7.1.5 EV 2 SCRUTINEERING (EV ONLY)

Electrical Scrutineering of the High Voltage systems of the car. The car must be in ready-to-race condition, and every scrutineering stage mentioned before have to be passed to start the EV2 scrutineering

T7.1.6. AUTONOMOUS SYSTEMS SCRUTINEERING (DV ONLY)

Scrutineering of the Autonomous systems of the car. The car must be in ready-to-race condition, and every scrutineering stage mentioned before have to be passed to start the Autonomous Systems scrutineering.

T7.1.7 DRIVER EGRESS & SAFETY TEST

During the Driver Safety Test, each team have to present their safety equipment, and also demonstrate the driver emergency exit situation.

Teams are also must present every item listed in FS Rules IN2.2.1.

T7.2 EQUIPMENTS AT ELECTRIC VEHICLES INSPECTION

For the electrical inspection of the technical inspection each team must present the following equipment:

- accumulator charger to be used during the event
- all accumulator containers to be used during the event
- Accumulator Container Hand Cart
- Tools as listed in FS Rules 2019 rule IN3.2.1 and IN4.2.1

T7.3.READY-TO-RACE CONDITION

Before Drivers Safety Test, the car has to be in ready-to-race condition. No body part change or additional venting hole covering is allowed after this point.

T7.4 MAINTENANCE DURING SCRUTINEERING

If the team decides to fix a founded issue during the inspection, they have 15 total minutes maintenance time in the scrutineering pit, which is measured continuously. After 15 Minutes the team has to leave the area.

T8. SPECIAL REQUIREMENTS FOR DRIVERLESS VEHICLES

T8.1 DATA LOGGER CONNECTIONS

Driverless cars with electrical drive have to provide a CAN channel for the data logger. The specification of the bus parameters and the required CAN messages are described in the Data Logger Specification.

T8.2 DATA LOGGER AND RES CONNECTION

The Remote Emergency System (RES) and the data logger must share the same CAN bus.

T8.3 REMOTE EMERGENCY SYSTEM

The RES that has to be used for the competition is a GF2000i-codec/T53R98 combination from Gross-Funk GmbH.

T8.4 RE-RUN DEMANDS

System misbehavior and faulty logs caused by misuse of the CAN messages eliminates the demand for a re-run and may lead to a Did Not Finish (DNF).

T8.5 SPECIAL REQUIREMENTS FOR THE DV SCRUTINEERING

During the Driverless Scrutineering the EBS (Emergency Brake System) will be triggered multiple time. Every team should be able to reset their EBS in 5 minutes.

Reference design can be found [here](#).

T8.6 AUTONOMOUS SAFETY FORM

In addition to FS Rules 2019 DV 2.6.2 the Autonomous Safety Form also must contain the following chapters:

- Documentation of the Autonomous State Machine DV 2.4
- Documentation of the ASSI

T9 SPECIAL REQUIREMENTS FOR A5.6 VEHICLE STATUS VIDEO (VSV)

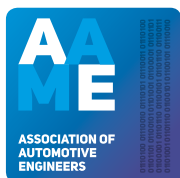
FS East will require Vehicle Status Video. If the team fail to meet the requirements presented in FSG Rules 2019, it is the FS East organizers own subjective decision to let the team compete on the event or not.

FORMULA STUDENT EAST



CHANGELOG

Version	Date	Modification	Page
1.0.0	3rd of April 2019	Initial release	-



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