

# FORMULA EAST

STUDENT

20<sup>TH</sup> TO 23<sup>RD</sup> JULY



elringklinger

handtmann  
Ideen mit Zukunft.

# TECHNICAL INSPECTION RULES

WHO IS READY?

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## 1. INTRODUCTION

Formula Student East® (hereafter “FS East®”) is a FSAE style Formula Student engineering competition in Hungary, organised by Engineers for the Automotive Higher Education Association from 2016.

Formula Student East will allow to participate vehicles with conventional combustion engine (gasoline or E85 fuelled) and electric powertrain vehicles, which will directly compete against each other.

This rules document contains the FS East Dynamic Events rules. These specific rules are an addition to the Rules 2017 document (hereafter “Rules 2017”), which was published by FS Germany. In case of a conflict between the Rules 2017 and the 2017 FS East rules, the 2017 FS East rules supersede the Rules 2017.

## 2. GENERAL VEHICLE REQUIREMENTS AND RESTRICTIONS

### 2.1 ALTERNATIVE FRAME RULES

FS East accepts entries complying with the Alternative Frame Rules (including accumulator container structure).

The Notice of intent must be sent to [afr@fseast.eu](mailto:afr@fseast.eu)

Teams must follow the FS Rules AF Rules section.

### 2.2 VENTILATION OF ENCLOSED STRUCTURES

#### SPECIFIC FS EAST CHANGE OF FS RULES 2017 CV 2.7.3 AND ADDITIONAL FS EAST RULE FOR ELECTRIC VEHICLES

Enclosed monocoque structures and belly pans must be vented to prevent accumulation of fuel. At least 2 holes, each of a minimum diameter of 25 mm, must be provided in the lowest part of the structure to prevent accumulation of volatile liquids and/or vapors. The rule is valid to any liquids in case of electric vehicles.

### 2.3 IMPACT ATTENUATOR

#### 2.3.1 IMPACT ATTENUATOR DESIGN

##### FS EAST CLARIFICATION OF FS RULES 2017 T2.18.

Additional to the FS Rules T2.18. requirements Impact Attenuators must have a closed front section.

#### 2.3.2 ANTI INTRUSION PLATE (AIP) TESTING

##### FS EAST CLARIFICATION OF FS RULES 2017 T2.18.4

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

### 2.5 VEHICLE IDENTIFICATION

#### 2.5.1 TECHNICAL INSPECTION STICKER SPACE

##### SPECIFIC FS EAST CHANGE OF FS RULES 2017 IN1.4

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.

#### 2.5.2 TRANSPONDERS

##### SPECIFIC FS EAST CHANGE OF FS RULES 2017 T11.3

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.



## 2.6 DRIVER'S UNDERCLOTHING

### **SPECIFIC FS EAST ADDITION OF FS RULES 2017 RULE T12.3.5**

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

## 2.7 TIRE AND RIM COMBINATION

### **SPECIFIC FS EAST CHANGE OF FS RULES 2017 RULE T1.5**

During technical inspection each team needs to present one set of tires for dry conditions and one set of tires for wet conditions. Tires on the same axle must have the same manufacturer, size and compound.

The tire type/rim type combination presented during Scrutineering must be the same for all dynamic events. The rims for dry tires and wet tires can be different.

## 2.8 TIRES

### **SPECIFIC FS EAST ADDITION TO FS RULES 2017 T1.5.4**

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

## 2.9 INSPECTION HOLES

To allow the verification of tubing wall thickness, 4.5 mm (0.18 inch) inspection holes must be drilled in a non-critical location of both the Main Hoop and the Front Hoop before technical inspection begins. In addition, 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.

## 2.10. GROUNDED LOW VOLTAGE SYSTEMS (<=60 VDC)

Specific FS East completion to FS Rules 2017 IC4.4.1 and EV3.7.1

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

## 2.11 EXTERNAL BATTERIES

The use of external batteries (e.g. for an external jump start) inside the Dynamic Area, except the Engine Test Area is not permitted.

## 2.12 QUICK JACK

Each team must present a quick jack to lift up the car by using the jacking point during Technical Inspection.

The quick jack must be able to lift up the car safely, so that the driven wheels are at least 10.2 cm (4 in) off the ground.

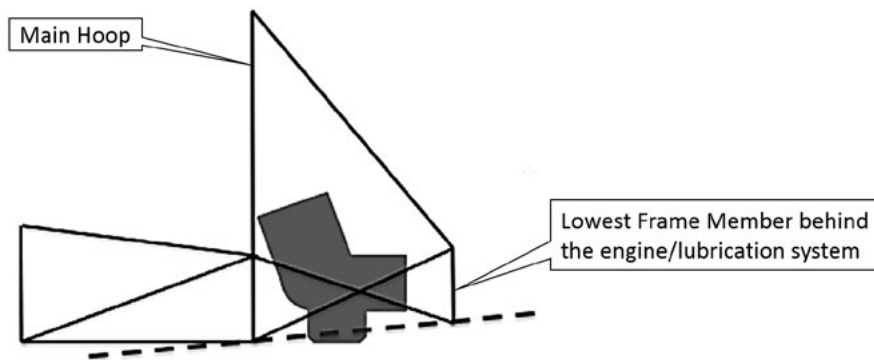
All-wheel driven cars must be able to lift up both axles at least 10.2 cm (4 in) off the ground.

### 3. SPECIAL REQUIREMENTS AND RESTRICTIONS FOR INTERNAL COMBUSTION ENGINE VEHICLES

#### 3.1 ENGINE LUBRICATION SYSTEM

##### SPECIFIC CLARIFICATION OF FS 2017 T 6.4.1

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.

#### 3.2 ELECTRONIC THROTTLE CONTROL (ETC)

##### 3.2.1 THROTTLE POSITION SENSOR - TPS

###### SPECIFIC FS EAST ADDITION TO FSG RULES 2017 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. (CV1.6.8 is valid for the remaining two faultless sensors.)

##### 3.2.2. ACCELERATOR PEDAL SENSOR - APPS

###### SPECIFIC FS EAST ADDITION TO FSG RULES 2017 RULE T10.2

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. (T10.2.9 is valid for the remaining two faultless sensors.)



## 4. SPECIAL REQUIREMENTS AND RESTRICTIONS FOR ELECTRIC VEHICLES

### 4.1 MAXIMUM PERMITTED VOLTAGE

#### **SPECIFIC FS EAST ADDITION TO FSG RULES 2017 RULE EV1.1.3**

The maximum permitted voltage that may occur between any two electrical connections at FS East is 600 VDC.

### 4.2 CLARIFICATION ON ACCUMULATOR MANAGEMENT SYSTEM(S)

#### **SPECIFIC FS EAST ADDITION TO FSG RULES 2017 RULE EV3.7**

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.

### 4.3 DEVICE TO BE USED FOR CHECKING COMPLIANCE TO FSG RULES 2017 RULE EV3.7.5

FS East may install a monitoring device for temperature monitoring.

### 4.4 CURRENT LIMIT VIOLATIONS

#### **SPECIFIC FS EAST ADDITION TO FSG RULES 2017 RULE EV2.2**

The energy meter data will be checked against the maximum accumulator charge and discharge currents stated in the ESF, as well as the values stated in the FSAE rules.

### 4.5 100MS-CONTINUITY VIOLATIONS

FS East will not punish 100ms-continuity violations for exceeding the power or voltage limits.

### 4.6 INTERLOCKS

#### **SPECIFIC FS EAST CHANGE OF FSG RULES 2017 EV4.5.14**

An interlock / pilot signal is always needed for EVERY tractive system connection unless the connection is made within a housing or the connection is current limited by appropriate current limiting resistors (see EV4.4.5).

### 4.7 GALVANIC SEPARATION IN ACCUMULATOR CONTAINERS

#### **4.7.1 CLARIFICATION ON FSG RULES 2017 RULE EV4.1.4**

The mentioning of galvanic separation in this rule is redundant to rule EV1.2.7 and should only encourage teams to check for compliance to EV1.2.7. Therefore no extra galvanic separation is needed.

### 4.8 SPECIFIC FS EAST RULE FOR ATTACHMENT OF HV-COMPONENTS

The accumulator attachment to the major structure must follow T9 of FSG Rules 2017.

A usage of self-locking helicoil inserts is not applicable. This also applies to electric motors.

## 5. TECHNICAL INSPECTION - GENERAL REQUIREMENTS

### 5.1 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.

Scrutineers will mark or seal various different approved parts (i.e. restrictor, insulation monitoring device, accumulator containers, energy meter, tires, rims etc.). The car can be disqualified from any dynamic event by using unmarked parts or substituting marked parts. Parts with broken seals are equivalent to being unmarked.

Broken seals may only be replaced by a scrutineer, but rescrutineering may be required by the scrutineer.

### 5.2 CAR WEIGHING

All cars will be weighed in ready to race condition. All fluids and coolant must be in the car. This weight will be the car's Official Technical Inspection weight. There will be a penalty if the car weight changes during Dynamic Competition.

The allowable weight tolerance is  $\pm 5.0$  kg. In the case of overweight or underweight in comparison to the Technical Inspection weight, the team will be penalized -20 (twenty) points for each kg (or portion of a kg) of additional or missing weight. This point penalty will be deducted from the Engineering Design Event score. (Each 0.1 to 1.0 kg = -20 points)

#### EXAMPLE:

If the car is 5.3 kg underweight: 5.3 kg minus the 5.0 kg tolerance = 0.3 kg equals -20 Points

If the car is 7.8 kg overweight: 7.8 kg minus the 5.0 kg tolerance = 2.8 kg equals -60 Points

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.

### 5.3 BRAKE TEST

#### SPECIFIC FS EAST COMPLETION OF 2016 FORMULA SAE® RULE T7.2

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.

## 6. SPECIAL REQUIREMENTS AND RESTRICTIONS FOR INTERNAL COMBUSTION ENGINE VEHICLES

For the combustion engine cars the technical inspection will start with the mechanical inspection in the pits.

### 6.1 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.



## 7. SPECIAL REQUIREMENTS AND RESTRICTIONS FOR ELECTRIC VEHICLES

For the electric vehicles the electrical inspection will be divided into two parts. The first part of the electrical inspection must be held in the pits before the mechanical inspection.

### 7.1 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 FSAE 2016 rule EV8.5



## CHANGELOG

Version	Date	Modification	Page
1.0.0	24th May, 2017	Initial release	-



Engineers for the Automotive  
Higher Education Association

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