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## **Formula SAE Italy 2021**

**Information & Rules 2020 are valid for 2021 edition**

### **AD ADMINISTRATIVE REGULATIONS**

#### **AD.1 THE FORMULA SAE SERIES**

The 16<sup>th</sup> edition of the Formula SAE Italy 2021 will take place at the "Riccardo Paletti" Circuit in Varano de' Melegari (PR) on July 14-18, 2021.

**Formula SAE Italy will follow the “[2021 FSAE Rules](#)”, with the exceptions and additions listed below and use the FSAE scoring methods.**

#### **AD.1.2 Official Announcements and Competition Information**

Formula SAE Italy news will be provided to students in following forms of media:

- Emails to registered team leaders
- Press releases published on-line on Formula-ATA website

#### **AD.3 INDIVIDUAL PARTICIPATION REQUIREMENTS**

##### **AD.3.4 Society Membership**

Team members must be members of at least one of the following societies: (1) SAE International, (2) SAE Australasia, (3) SAE Brazil, (4) IMechE, (5) VDI, or (6) JSAE.

Furthermore, in case of teams coming from nations which have FISITA member Association they can choose to subscribe to their national association.

**Proof of membership, such as membership card, is required at the competition.**

#### **AD.5 TEAM ADVISORS AND OFFICERS**

##### **AD.5.1 Faculty Advisor**

AD.5.1.4 Faculty Advisor must be present at the event for all the time. In case the Faculty Advisor will be not able to attend, the organizers will accept only a staff representative of the University.

AD.5.1.5 The Faculty Advisor will have to communicate his/her absence and/or any other changes by sending official letter with University head paper by **June 18<sup>th</sup>, 2021**.

##### **AD.5.2 Electrical System Officer (EV only)**

AD.5.2.1 Every participating team must appoint one to four ESO for the event



AD.5.2.4 ESO is not required for Class 3. In case no ESO is appointed, then team is not allowed having any accumulator container at the event site.

### **AD.5.3 Electric System Advisor (EV only)**

AD.5.3.8 ESA is not required for Class 3.

## **GR.7 VEHICLE ELIGIBILITY**

### **GR.7.2.1 Competition Year**

The period beginning at the event of the Formula SAE series where the vehicle first competes and continuing until the start of the corresponding event held approximately 12 months later.

The vehicle first competes as soon as it begins the technical inspection process or participates at any static event valid for class 1.

### **GR.7.2.5 First Year Vehicles: Class Driverless**

Vehicles which will attend the 2021 edition built after 2012 are classified as "first year vehicle". Also U.K. platforms are allowed.

### **GR.7.2.6 Design review category: Class 3**

GR.7.2.6.1 Teams that participate in the "Design review category" will be admitted to the Design, Presentation and Cost events.

GR.7.2.6.2 A static presentation of the car, or part of it, can be conducted in order to better explain the project.

GR.7.2.6.3 A separate classification will be reserved for this category.

GR.7.2.3.4 Design, Presentation and Cost events follow the rules as per Class 1. In particular the Cost Report must contain an estimation of the cost of the actual car.

GR.7.2.3.5 Class 3 electric vehicles are not allowed to activate tractive system at the event site.



## AD.6 COMPETITION REGISTRATION

### AD.6.2 Registration Details

AD.6.2.1 Registration for Formula SAE Italy 2021 is made into two phases: early registration for reserved slots and main registration for all teams.

#### Reserved early registration slots

As 3rd classified team in the **Design for Future: Dream your 2025 FSAE Italy Car - Car Design Contest**, the team **TUfast e-Technology (Technical University of Munich)** has the right to participate to the early registration of 2021 event.

Further **two** *early registration* slots will be granted for North and South America, Australia and rest of the world (non-European EFTA) teams.

The early registration will open on **February 8, 2021 at 10:00 AM CET (GMT + 1)** and will close on **February 9, 2021 at 1:00 PM CET (GMT + 1)**.

After *early registration* closure, no slot will be granted for these teams.

Slots that are not allocated for *early registration* will become available for all teams during *main registration* period.

Registration must be completed on-line via the electronic form that will be available on the event website in each registration period. The registration will be confirmed only when the due amount will be credited on the ANFIA bank account.

Formula SAE Italy 2021 will grant 3 registration slots to 2022 event to the first 3 Class 1C, 1D & 1E winner teams of this year event and 2 slots to the first 2 Class 3 winner teams.

#### Entries per University - FSAE-I Competition - Registering IC, EV and DV teams

For the purposes of registering and competing, a school IC, EV and DV teams are considered separate and independent entities. A university may register both an IC, EV and DV team in the same competition.

The Formula SAE Italy 2021 will admit 66 teams in Class 1 and 4 teams in Class 3 with following criteria:

- Class 1C - IC Engine 35 (11 AVAILABLE SLOTS LEFT)
- Class 1D – Driverless 7 (NO AVAILABLE SLOT LEFT. Teams can register and enter the waiting list)
- Class 1E - Electric Propulsion System 24 (2 AVAILABLE SLOTS LEFT)
- Class 3 both IC, Electric and Driverless 4 (2 AVAILABLE SLOTS LEFT)



## Registration Dates

Early registration for the Formula SAE Italy 2021 will open on **February 8, 2021 at 10 AM CET (GMT+1)** and will close on **February 9, 2021 at 1:00 PM CET (GMT+1)**.

Main registration for the Formula SAE Italy competition will open on **February 10, 2021 at 10:00 AM CET (GMT+1)** and will close on **March 10, 2021 at 1:00 PM CET (GMT+1)**.

The teams which confirmed their participation for 2021 following the cancellation of the 2020 event will not have to pay for this registration.

They will appear on the website registered team list under the “confirmed” status and will not have to register any more. For all the other teams, the procedure will be the same as last year, with the filling in of the electronic form on the Formula ATA website at the opening date at the countdown end.

Main registration is based on first come, first serve basis. The list of admitted teams will be published on the website as soon as all the eventual double registrations will be cleaned up. All the updates will be available immediately after this action.

### AD.6.3 Registration Fees

AD.6.3.1 Teams will have 48 hours, starting from registration time, to send us the proof of the bank transfer, certifying the payment date and time:

Class 1C, 1D, 1E: € 1.415,00 + 22% VAT = **€1.726,30**

Class 3: € 1.015,00 + 22% VAT = **€1.238,30**

AD.6.3.2 Registration fees are not refundable and are not transferred to a subsequent year's competition, unless for COVID-19 reasons. In case the statics events will be rescheduled in digital format, part of the paid fee will be refunded.

### AD.6.4 Waitlist

AD.6.4.1 Waiting list will not be published on the website, teams will be informed by e-mail about their possible admission to the main registration list.

New deadlines will be set for each team when it will be included in the official list.

AD.6.4.3 The team will then have 48 hours to accept or reject its slot and to make the payment and send the proof of it.

### AD.6.5 Withdrawals

Registered teams that won't be able to attend the competition are requested to officially withdraw not later than **June 4<sup>th</sup>, 2021**, by notifying the following e-mail:

- **formula.sae@ata.it** for 1C teams
- **formula.ei@ata.it** for 1D, 1E & Class 3



#### **AD.6.6 Italy Visas**

Teams requiring visas to enter Italy are advised to complete the [list of team members](#) with their passports numbers, the arrival and departure dates and send it to the above mentioned email addresses by **June 1<sup>st</sup>, 2021**.

**Late requests will be not considered.**

ANFIA will provide your team an official invitation letter, which can be used for your VISA application.

Teams that need VISA are advised to apply for it as soon as possible and to refer to the Italian VISA rules to determine the VISA requirements and applications.

ANFIA will not send personal letters or contact directly the Italian Embassies or Consulates for your team participation in the event. VISA information about required documentation can be found on the Italian Ministry of Foreign Affairs and International Cooperation's website at <http://vistoperitalia.esteri.it/home/en>.

#### **AD.6.7 Vehicle Shipping**

Vehicle shipments by commercial carrier must comply with the laws and regulations of nations from which, and to which, the car is being sent. Teams are advised to consult with their shipping company or freight forwarder to be sure their shipment fully complies with all relevant customs import/export and aviation shipping requirements.

Shipments must be sent with the sending team or university listed as the receiving party. Neither the competition organizers nor the competition site (Riccardo Paletti Circuit) can be listed as the receiving party.

Stick labels on crates/containers which must have the below receiving address permanently and clearly marked:

#### **Receiving address**

***University and/or team name***

**Car number: 000**

**c/o Formula SAE Italy 2021**

**Autodromo Riccardo Paletti**

**Strada per Fosio 1**

**44030 Varano de' Melegari (PR) – Italy**

**Shipping documents** All shipping documents and custom clearances must be completed and supplied by the University and/or Team.

**Damage** Damage to the shipment is the sole responsibility of the University/Team. Be aware that the crates/containers will be stored outdoor without any shelter.



**Team contact** Please communicate to organization names and mobile numbers of at least two persons, which likely are the Team Leader and the Faculty Advisor, to be contacted in case of problems.

### **Delivery and collections dates**

- Delivery: Monday 12<sup>th</sup> or Tuesday 13<sup>th</sup>, 2021 from 9:00 AM to max 6:00 PM;
- Collection: **the maximum date to pick up your car will be:** Monday 19<sup>th</sup>, or Tuesday 20<sup>th</sup>, 2021 from 9:00 AM to max 6:00 PM.

Forklift service for loading and unloading cars will be only available on these dates. Out of these days, its availability and use are not guaranteed and, in case, team should bear the cost.

Crates/containers must have a low access for fork lift maneuver. Crating and uncrating is the sole responsibility of the team.

### **AD.6.8 Car Number**

When choosing your car number, please consider the numbering listed here below:

#### **Combustion cars**

- From 1 to 59
- From 70 to 99

#### **Driverless cars**

- From 700 to 759
- From 770 to 799

#### **Electric cars**

- From 100 to 159
- From 170 to 199

#### **Class 3 teams**

- From 300 to 399

Take note that it could be already taken by another team. The acceptance order will follow the registered team list published in the Formula ATA web site.

In that case, you will receive an e-mail message asking for a new choice.



## **AD.6.9 Fuel Supply**

AD.6.9.1 The fuels provided at Formula SAE Italy 2021 are expected to be 98 octane gasoline and E-85. No other fuel will be supplied.

AD.6.9.2 Fuel specifications will follow the standard specification for fuel for automotive spark-ignition engines.

AD.6.9.3 Fuel choice must be communicated per Fuel System Data form available on <http://formula-ata.it/docs> by **March 5<sup>th</sup>, 2021**

## **AD.6.10 Electric Supply**

AD.6.10.1 Electric vehicle teams must communicate per Electric System Data form available on <http://formula-ata.it/docs> by **March 5<sup>th</sup>, 2021** main information about their electrical system and charger.

## **AD.6.11 Lists of team members**

**Preliminary & Final Lists:** Once a team have been registered for the competition, every team member has to upload within **March 5<sup>th</sup>, 2021** its own personal data. All changes, cancellations, additions can be made to the preliminary list till **May 4<sup>th</sup>, 2021** when the final list will be due. After **May 11<sup>th</sup>, 2021** no modifications will be accepted.

## **AD.7.5 Onsite Working Safety**

AD7.5.1 Everyone in the dynamic area and everybody working on the vehicle must wear appropriate, closed-toed shoes.

AD7.5.2 Appropriate personal protective equipment must be used.

AD7.5.3 Any operation producing litter or debris, e.g. cutting of carbon fiber, should not be performed in the pits.

AD7.5.4 When jacking up the vehicle a safe and stable support device rated for the load must be used.





## **DR DOCUMENT REQUIREMENTS**

### **DR.1 DOCUMENTATION**

#### **DR.1.1 Requirements**

DR.1.1.1 The documents supporting each vehicle must be submitted by the deadlines posted on the Event Website or otherwise published by the organizers.

DR.1.1.3 Following document templates are located at <https://fsaeonline.com>

- Design Spec Sheet (DSS)
- Design Report (DR)

DR.1.1.4 Cost files are located at FSG Website Tool (<https://www.formulastudent.de/>).

DR.1.1.5 Please refer to the templates and forms which can be found on event website (<http://formula-ata.it/docs>):

- Structural Equivalency Spreadsheet (SES)
- Structural Equivalency Spreadsheet Approval (SESA)
- Structural Equivalency 3D Model (SE3D)
- Impact Attenuator Data (IAD)
- Electrical System Form (ESF)
- Fuel System Data (FSD)
- Electric System Data (ESD)
- Electrical Systems Officer Form (ESO/ASR)
- Electrical Systems Advisor Form (ESA)
- Business Plan Pitch Video (BPPV) must be submitted online on the Event Website

#### **DR.1.2 Definitions**

##### **DR.1.2.1 Submission Date**

- The date and time of upload to the website. Uploading time will be considered till 11:59 p.m. of the deadline date

##### **DR.1.2.2 Submission Deadline /Mandatory first submission date**

- The date and time by which the document must be uploaded or submitted

##### **DR.1.2.3 No Submissions Accepted After / Update allowed (with penalties) date**

- The last date and time that documents may be uploaded or submitted



#### DR.1.2.4 Late Submission

- Uploaded after the Submission Deadline and prior to No Submissions Accepted After
- Submitted largely incomplete prior to or after the Submission Deadline

#### DR.1.2.5 Not Submitted

- Not uploaded prior to No Submissions Accepted After
- Not in the specified form or format

#### DR.1.2.6 Amount Late

- The number of days between the Submission Deadline and the Submission Date.
- Any partial day is rounded up to a full day. Examples: submitting a few minutes late would be one day penalty; submitting 25 hours late would be two days penalty

#### DR.1.2.7 Reviewer

- A designated event official who is assigned to review and accept a Submission

DR.1.2.8 *PART IC – IC.4.3 ETC – Notice of Intent and IC.4.3 ETC - Failure Modes and Effects Analysis (FMEA)* are not required.

DR.1.2.9 *PART EV – EV11.2 Failure Modes and Effects Analysis* is not required for Class 1E vehicle.

## **DR.2 SUBMISSION DETAILS**

### **DR.2.1 Submission Location**

All documents shall be uploaded and filled in event documentation website (<http://formula-ata.it/docs>)

DR.2.1.1 Allowed formats are: pdf, doc, docx, xls, xlsx, odt, ods. It is allowed to upload a zip-archive containing files in mentioned formats. Submitting files in other formats will be considered as "Not submitted". Maximum file size is indicated on website.

Notice: Teams is not notified if a document is submitted incorrectly. Therefore, teams are advised to verify after upload that their documents can be downloaded and can be read for entire and that deadlines have been met.



DR.2.2.5 Submission Deadlines

Deadline / Mandatory First submission date	No submission accepted after/ Updates allowed with penalties	
February 8, 2021	-	<b>Early Registration</b> opens on February 8 at 10.00 AM CET (GMT +1). It closes on February 9, 2021 at 1.00 PM CET (GMT +1)
February 10, 2021	March 10, 2021	<b>Registration</b> opens on February 10 at 10.00 AM CET (GMT +1) It closes on March 10, 2021 at 1.00 PM CET (GMT +1)
February 18, 2021	March 1, 2021	ALL CLASSES – Camping booking form
	June 24, 2021	CLASS 1E/1D – Electrical Systems Officer and Electrical Systems Advisor Form
March 5, 2021	May 4, 2021	ALL CLASSES – Preliminary team member list
	July 1, 2021	CLASS 1E/1D – Electric System Data
	March 12, 2021	CLASS 1C – Fuel system data
March 24, 2021	March 24, 2021	ALL CLASSES – Acceptance of camping requests
March 26, 2021	April 23, 2021	ALL CLASSES – Structural Equivalency Spreadsheet (SES) or Structural Equivalency Spreadsheet Approval (SESA) and Structural Equivalency 3D Model (SE3D). <b>Teams using a monocoque chassis must submit the SES Autocertification, in addition to the SES deadline</b>
April 22, 2021	April 29, 2021	ALL CLASSES – Camping confirmation and payment
April 9, 2021	July 02, 2021	CLASS 1E/1D/3 – Electrical System Form
May 04, 2021	May 11, 2021	ALL CLASSES – Final team member list
May 7, 2021	June 4, 2021	CLASS 1C/1E/1D – Impact Attenuator Data
June 01, 2021	June 08, 2021	ALL CLASSES – Invitation letters for VISA
May 27, 2021	June 10, 2021	ALL CLASSES – Design Report & Design Spec Sheet
May 28, 2021	June 11, 2021	ALL CLASSES – Business Plan Pitch Video (BPPV)
June 04, 2021	June 04, 2021	ALL CLASSES – Team & camping withdrawal
June 11, 2021	June 11, 2021	ALL CLASSES – e-Cost Report, e-BOM
June 18, 2021	June 18, 2021	ALL CLASSES – Change of Faculty Advisor

\* First column indicates the mandatory date for the submission of the first version of documents. Second column indicates the date within the update of documents is allowed (WITH PENALTIES, following FSAE Italy DR 3 rule). Please, check the rules.



### DR.2.3 Web Based Submission

Teams entering Formula SAE Italy 2021 must submit the documents online through <http://formula-ata.it/docs>.

The upload date and time on the website constitute the official record for deadline compliance.

Documents may be uploaded on the website from the time your account has been created until the "**Mandatory First Submission Date**" deadline. Submissions may be replaced with new uploads at any point during that period without penalty.

Unless for changes specifically requested by the reviewers, documents uploaded after the "**Mandatory First Submission Date**" and the "**Updates allowed (with penalties) date**" deadline are classified as late submissions and the appropriate penalties will be applied.

No submissions will be allowed after the "**Updates allowed (with penalties) date**" deadline, even if the document is required to access technical inspection (IAD, SES, ESF, FMEA and ESO/ESA). In this case, team may not be allowed to attend dynamic events.

### DR.2.4 Account Signup for Online Submission - FSAEI Event Only

After confirmation of team registration, organization will send website user credential to each team leader.

### DR.2.5 SES Submission

DR.2.5.1 Teams using a monocoque chassis must submit a SES Autocertification as one document, in addition to the SES deadline.

DR.2.5.2 The Structural Equivalency Spreadsheet (SES) must be checked and approved by:

- Validation/inspection organization (e.g. DEKRA, ...)
- Engineering firm for lightweight structures
- Engineering consultancy company
- Any other official competition

DR.2.5.3 If any changes to the original SES become necessary due to the approval process, the updated final SES must be uploaded again on the competition website.



### DR.3 Late Submission Penalties

DR.3.2.1 Late Submissions will receive a point penalty as shown in following table, subject to official discretion.

Penalty Group	Penalty Points per day	Maximum penalty points	Not Submitted
<b>Tech (SES, IAD, ESO/ESA, ESF)</b>	-10	-50	Removal of Team Entry – see FSAE rule DR.3.3
<b>Business Plan Pitch Video (BPPV)</b>	-10	-50	Removed from Presentation Event; <b>Score -100 points in Presentation Event</b>
<b>Cost (eBOM, Report)</b>	-10	-80	Removed from Cost Event <b>Score -100 points in Cost Event</b>
<b>Design (DR, DSS)</b>	-10	-100	Removed from Design Event <b>Score -100 points in Design Event</b>



## APPENDIX 1: PAYMENT DETAILS AND INVOICE

### PAYMENT DETAILS

- Team registration: teams will have 48 hours, from the shift to awaiting for payment status, to send us the proof of the bank transfer, certifying the payment date and time. Registrations to the Formula SAE Italy 2021 will be confirmed only when the due amount is credited on the ANFIA Service Srl bank account.
- Camping confirmation: teams will have to send the camping confirmation form and the evidence of payment within **April 22<sup>nd</sup>, 2021** to the respective email address.

### When making the payments, please consider these administrative regulations:

- 22% Italian VAT is **ONLY** required from European and non-European natural persons, who make the payment, i.e.: registration fee = **1.415,00€+ 22% VAT = 1.726,30€ total amount to be paid.**
- 22% Italian VAT is **NOT** required from European companies owing a VAT code and from non-European companies, who make the payment, i.e.: registration fee = **1.415,00€ total amount to be paid.**
- 22% Italian VAT is **ALWAYS** required from all Italian participants (natural persons/companies), except for the Public Administrations, i.e.: registration fee = **1.415,00€+ 22% VAT = 1.726,30€ total amount to be paid.**

### Payments method

- Bank transfer to: ANFIA Service Srl – **Bank name**: BPER Banca – Turin Branch - Corso Vittorio Emanuele II, 48/F - Torino – Italy - **IBAN n.:** IT07T0538701002000038545602 – **Swift code**: BPMOIT22.

**Please indicate on the bank transfer the following payment descriptions:**

- **Team name**
- **University name/company name**

**Payment must be received in full. ALL bank transfer charges must be covered by the payer.**

### INVOICE

It is mandatory to fill in all the fields for the invoice. Be sure to put the right heading:

- University name/company name,
- Department (if needed),
- Address, post code, town, country,
- VAT number,
- “Codice Fiscale” field is **ONLY FOR ITALY**,
- “Codice identificativo” field is **ONLY FOR ITALY**,
- Administration email address.

Particularly, in the field of “VAT number” please check to have a correct VAT NUMBER. Please do not insert any other data: i.e. tax identification number.

If you do not have got one, please write “Not in possession” in the field.

### For Italian teams only



Following the recent rule on the electronic invoicing extended to all Italian bodies owing a VAT code, please note that we need to receive the “codice identificativo” of your company, which is an alphanumerical 7 digits code.

Public Administration invoicing will remain unchanged.

For natural persons or associations with only a “codice fiscale” we need to receive an email address to send the invoice.



## APPENDIX 2: CAMPING

A camping site will be available for the event **from July 13<sup>th</sup>, at 3.00 PM to July 19<sup>th</sup>, 2021 at 2:00 PM.** It will be located next to the circuit in Varano de' Melegari.

The camping check-in is foreseen on **July 13<sup>th</sup>, 2021 from 3.00 PM to 7:00 PM.** It is **MANDATORY** for all teams to comply with the timetable. In order to avoid a huge crowd gathered at the campsite entrance, the Team Leader only will be allowed to register the team.

Interested teams have to send ATA ([c.rossi@anfia.it](mailto:c.rossi@anfia.it)) the Camping Booking Form within **February 18<sup>th</sup>, 2021.**

Camping requests will be accepted in the order they will be received. The camping availability will be communicated to teams within **March 24<sup>th</sup>, 2021.**

The fee for 6 days is 70,00 € + 22% VAT = **85,40 €/person**

Within **April 22<sup>nd</sup>, 2021** teams must send the evidence of payment, together with the list of members and their passport/IC numbers.

We will accept only single payment for each team.

The **payment** can be made with bank transfer to:

ANFIA Service Srl

**Bank name:** BPER Banca – Turin Branch - Corso Vittorio Emanuele II, 48/F - Torino – Italy - **IBAN**  
**n.:** IT07T0538701002000038545602 – **Swift code:** BPMOIT22.

**Please indicate on the bank transfer the following payment descriptions:**

- **Team name**
- **University name**

**Payment must be received in full. ALL bank transfer charges must be covered by the payer.**

A refund of 50% of the overall amount of camping fee will be granted in case of team withdrawal, only if the communication is sent within **June 4<sup>th</sup>, 2021.**





## T General Technical Requirements

On this chapter Formula SAE Italy 2021 will follow the “[FS-Rules 2020 v1.0](#)”.

T 5.2.1 The vehicle must use a 6 or 7 point restraint harness meeting the following specifications:

- c. FIA specification currently in use (recommended 8853-2016, allowed 8853/98); please check in advance the validity of the belts set and the presence of readable labels.

### T 5.2.4 Use of HANS / FHR systems

The use of HANS \ FHR spec. FIA is highly recommended.

Please check compatibility of HANS/FHR homologation with the helmet standard

**Table for helmet and Hans/FHR compatibility**

	FHR 8858-2010	Tether (with end fitting) 8858-2010	Helmet anchorage 8858-2010	Helmet 8858-2010, 8859-2015, 8860- 2010 and 8860-2018
HANS 8858-2002	X	YES	YES	YES
Tether (w/ end fitting) 8858-2002	NO	X	If mecha- nically compatible	YES
Helmet anchorage 8858-2002	YES	If mecha- nically compatible	X	NO
Helmet 8858-2002 and 8860-2004	YES	YES	NO	X

### T.13.3.13 Driver Equipment – Helmet

Acceptable helmet standards are: full-face helmets with the following specifications:

- FIA 8860-2018
- FIA 8860-2010
- FIA 8860-2004
- FIA 8859-2015



- Snell SA 2010 + FIA 8858-2002;
- Snell SA 2010 + FIA 8858-2010;
- Snell SAH 2010 + FIA 8858-2010;
- Snell SA 2010
- Snell SAH 2010
- Snell SA 2015



## **CV Internal Combustion Engine Vehicles**

On this chapter Formula SAE Italy 2021 will follow the [“FS-Rules 2020 v1.0”](#).

CV 3.1.1 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. It is recommended to rotate the gases exit to the ground.



## **EV Electric Vehicles**

On this chapter Formula SAE Italy 2021 will follow the “[FS-Rules 2020 v1.0](#)” with the exceptions and additions listed below.

### **EV 4.6 Energy Meter**

EV 4.6.1 All electric vehicles must run with the Energy Meter provided by the organizer. Energy Meter measures TS voltage and TS current.

EV 4.6.7 Power and voltage limits will be checked by evaluating the Energy Meter data. Energy is calculated as the time integrated value of the measured voltage multiplied by the measured current logged by the Energy Meter.

EV 4.6.8 A violation is defined as using more than the specified maximum power OR exceeding the maximum voltage EITHER:

- a. Continuously for 100 ms or more
- b. After a moving average over 500 ms is applied

EV 4.6.9 Non availability of Energy Meter data due to the team’s fault, tampering, or attempting to tamper with the Energy Meter will be treated as a violation.

EV 4.6.10 Violations during the Acceleration, Skidpad, Autocross Events:

- a. Each violation will Disqualify (DQ) the best run of the team
- b. Multiple violations will DQ multiple runs, ex two violations DQ the two best runs

EV 4.6.11 Violations during the Endurance event:

- a. Each violation will receive a 60 second penalty

EV 4.6.12 Repeated violations may void Inspection Approval or receive additional penalties up to and including Disqualification.

EV 4.6.13 The respective data of each run in which a team has a violation and the resulting decision may be made public.

### **EV 6.3 Insulation Monitoring Device (IMD)**

EV 6.3.8 The indicator for “IMD” fault shall be mounted on non-removable bodywork.



## **DV Driverless**

On this chapter Formula SAE Italy 2021 will follow the "[FS-Rules 2020 v1.0](#)" with the exceptions and additions listed below.

(Please note that, in this case, rule numbers refer to "FS-Rules 2020 v1.0")

**DV 2.6 Autonomous System Form (ASF): No ASF is requested.**



## **IN Technical Inspections**

On this chapter Formula SAE Italy 2021 will follow the "[FS-Rules 2020 v1.0](#)" with the exceptions and additions listed below.

(Please note that, in this case, rule numbers refer to "FS-Rules 2020 v1.0")

### **IN 1.2 General rules**

IN.1.2.13 Presenting a vehicle for Technical Inspection constitutes a declaration by the team that they have determined by self-inspection that the vehicle complies with the Formula SAE Italy, Formula Electric Italy & Formula Driverless 2020 Rules.

### **IN 1.6 Technical Inspection Authority**

Decisions of the Technical Inspectors and the Chief Technical Inspector concerning vehicle compliance are final and may not be appealed.

**IN 2 PRE-INSPECTION: No pre-inspection will be performed.**

**IN 3 [EV ONLY] ACCUMULATOR INSPECTION: No accumulator inspection will be performed.**



## **S Static Events**

On this chapter Formula SAE Italy 2021 will follow the [“2020 FSAE Rules”](#), with the exceptions and additions listed below.

### **S 1 BUSINESS PLAN PRESENTATION EVENT (BPP)**

On this chapter, Formula SAE Italy 2021 will follow chapter S 1 of [“FS-Rules 2020 v1.0”](#) with the exceptions and additions listed below.

(Please note that, in this case, rule numbers refer to “FSR 2020 v1.0”)

#### **S 1.2 Business Plan Presentation Procedure**

S 1.2.7 Data projectors or screens with VGA and HDMI (type A) input connectors will be provided for video signal transmission. Teams planning to use audio or other presentation equipment are responsible for bringing it themselves.

#### **S 1.4 Business Plan Presentation Scoring**

S 1.4.2 The judging at the competition will start with an initial judging, where all teams are judged by different judging groups. The top three are then judged by all business judges in the BPP finals.

S 1.4.3 The scoring of the BPP is based on the plenary decision of the judges.

S 1.4.4 The scoring for the non-finalist is calculated as followed:

$$BPP\_Score = 75 \left( \frac{P_{team}}{P_{max}} \right)$$

$P_{team}$  is the score awarded to the team

$P_{max}$  is the highest score awarded to any team, including the finalists

S 1.4.5 The scoring of the BPP finalists will vary in the range between the normalized scoring assigned to the best team who was not eligible for the final (4<sup>o</sup> position) and 75 points, and is scored immediately after the BPP finals by all judges.

### **S 2 COST AND MANUFACTURING EVENT**

On this chapter, Formula SAE Italy 2021 will follow chapter S 2 of [“FS-Rules 2020 v1.0”](#) with the exceptions and additions listed below.



## **S 2.10 Cost and Manufacturing Scoring**

S2.10.3-4-5 The Cost Event will host no finals

Once a team completed the BOM, DBOM and CBOM files on the FSG Website Tool, all the documents must be submitted here: <http://formula-ata.it/docs>, together with the offline ones.

## **S.4 DESIGN EVENT**

S.4.1.4 [DV Only] For DV teams an evaluation concerning the capability of the vehicle to drive autonomously will also be part of this event. Therefore, all systems that are required to drive autonomously will be investigated. This also includes a discussion about the hardware and the software used in the AS.

S.4.3.5 [DV ONLY] Autonomous Design Report (ADR)

S.4.3.5.1 The ADR will be used to sort the teams into appropriate design queues, based on the quality of its review.

S.4.3.5.2 The ADR should contain a description of the autonomous system with a review and derivation of the team's design objectives. Any information to scope, explain or highlight design features, concepts, methods or objectives to express the value and performance of the autonomous system to the judges shall be included at the team's discretion.

S.4.3.5.3 Evidence of information mentioned in the ADR should be brought to the competition and be available, on request, for review by the judges.

S.4.3.5.4 The ADR must not exceed five pages of content (text, which may include pictures and graphs).

S.4.3.5.5 Any portions of the ADR that exceed five pages of content will not be evaluated.

S.4.3.5.6 The ADR must be written as a scientific paper.

S.4.7.2 [DV Only] The design event starts with the submission of the DSS and the ADR and their review respectively.

S4.7.3 [DV ONLY] Teams need to show some simulation test data, where the judges can see how the algorithms work. During the final, there might be videos and data from the dynamic events. Based on the data, the movements and decisions of the vehicle are discussed. Therefore, the software and the algorithms of the vehicle are investigated in detail.

S.4.8.3 Design Judging Score Sheets are available at the FSAE Online website, except for DV Design Committee, which will judge following categories:





Chassis System
Powertrain
EE Integration / Safety
Actuators Design
Perception System
Localization & Mapping
Path Planning / Tracking
Validation, Simulation & Testing
Development Team Structure
Documentation (ADR)

S.4.9.1. Scoring may range from 0 to 150 points, at the discretion of the Chief Design Judge.

[DV Only] Scoring may range from 0 to 275 points, at the discretion of Chief Design Judge



## D - DYNAMIC EVENTS

On this chapter Formula SAE Italy 2021 will follow the [“2020 FSAE Rules”](#), with the exceptions and additions listed below.

### D.1.1 Dynamic Events and Maximum Scores

Acceleration 100 points  
Skid Pad 75 points  
Autocross 125 points  
Efficiency 100 points  
Endurance 275 points  
**Total 675 points**

### D.1.1 Dynamic Events and Maximum Scores [DV Only]

Acceleration 75 points  
Skid Pad 75 points  
Autocross 125 points  
Trackdrive 250 points  
**Total 525 points**

D.3.3.4 [DV ONLY] When driving autonomously, an ASR has to be present at the race control with the RES. Additionally, one single monitoring device (laptop, tablet, ...) may be brought (no complicated antenna construction or similar!).

D.3.11 [DV ONLY] Cones & Markings

D.3.11.1 [DV ONLY] Details of the cones used and more detailed track layout figures can be found in the competition handbook.

D.3.12 [DV ONLY] Start-up Procedure

D.3.12.1 No additional equipment (e.g. laptop, jack-up device, pressure tank, etc.) is allowed to start up the vehicle at the staging/starting line.

D.3.12.2 If the vehicle does not enter “AS Ready” state within 1 min after being staged, the team may be sent back to the preparation area by the officials.

D.3.12.3 The vehicle may only be staged with the steering system in straight position.

D.3.12.4 The vehicle may be pushed from the preparation area to the start line with activated LVS.

D.3.12.5 The EBS may be armed already in the preparation area.

D.3.13 [DV ONLY] Vehicle Break Downs and Usage of RES



D.3.13.1 Stalling the engine or deactivating the tractive system for any reason during a dynamic event will result in Did Not Finish (DNF) as the autonomous system is not allowed to restart the engine/reactivate the tractive system.

D.3.13.2 If a vehicle comes to standstill for any reason, it may have up to 30 s to attempt to continue to drive. If the vehicle doesn't restart within 30 s, it will be deactivated using the RES, deemed disabled and scored as DNF for the run.

D.3.13.3 The ASR or the officials may stop the vehicle using the RES in any of the following cases:

- Its behavior seems to be uncontrolled (e.g. driving off-course without visible intention to re-enter the track immediately).
- It is mechanically or electrically damaged.
- The average speed of the first three laps in trackdrive (after completing the third lap) is below 2,5 m/s or the average speed of any of the following laps is below 3,5 m/s.
- To ensure safe conditions on the track (e.g. persons or animals on the track). In this case the team will get a re-run.

D.3.13.4 If a vehicle breaks down or is stopped by the use of the RES it will be removed from the track, will not be allowed to re-enter the track and scored DNF.

D.3.13.5 If a traceable signal loss of the RES appears and doubtless proof can be brought by the team that it is was not self-inflicted, a re-run may be granted.

D.3.13.6 At the direction of the officials, team members may be instructed to retrieve broken-down vehicles. This recovery may only be done under the control of the officials.

D.3.14 [DV ONLY] Procedure After Completing a Dynamic Event

D.3.14.1 The vehicle must be collected by the ASR and an additional team member immediately after approval from the officials.

D.4.1.7 Red Flag - Come to an immediate safe controlled stop on the course. Pull to the side of the course as much as possible to keep the course open. Follow track marshals orders to safely deviate from possible obstacles on the track and reach the start area of the event.

**Restart procedure:** if the session is stopped, cars will stay in the starting area of the event and wait for instructions from the race control. Advice will be given to the teams to be ready to re-enter the course once the track has been cleared, 5 minutes in advance to the theoretical restart time. Once the car is allowed to re-enter, it has two minutes to restart, otherwise it will be deemed DNF

D.4.3 [DV ONLY] There will be no flag signs for DV in autonomous mode.

D.6.1.3 [DV ONLY] DV teams need to register at least one driver for manual brake test but may register up to three drivers for testing in manual mode.



#### D.6.5.2 [DV only] Autocross scoring

If a team's corrected elapsed time is below  $T_{max}$ , points based on the following formula are given:

$$AUTOCROSS\_SCORE_i = 115 \left( \frac{T_{max} - T_{team,i}}{T_{max} - T_{min}} \right)$$

$$AUTOCROSS\_SCORE_{total} = \max (AUTOCROSS\_SCORE_i, avg(AUTOCROSS\_SCORE_1 \dots AUTOCROSS\_SCORE_n))$$

$T_{team,i}$  is the team's time including penalties of run i

$T_{max}$  is the time for driving the lap with 4 m/s

$T_{min}$  is the fastest corrected elapsed time of all teams.

#### D.8.3.4

If a team's corrected elapsed time is below  $T_{max}$  and the run was not DNF or DQ, points based on the following formula are given:

$$TRACKDRIVE\_SCORE = 200 \left( \frac{T_{max}}{T_{team}} - 1 \right)$$

$T_{team}$  is the team's elapsed corrected time

$T_{max}$  is 2 times of the corrected elapsed time of the fastest vehicle over all runs

D8.4 NOT APPLICABLE

### D.9 ACCELERATION EVENT

#### D.9.2.5 [DV ONLY] Acceleration Procedure

D.9.2.5 .1 Each team has at least two runs. The final number of runs will be published before the start of the event.

D.9.2.5 .2 Staging - The foremost part of the vehicle is staged at 0:30m behind the starting line. Vehicles will accelerate from a standing start.

D.9.2.5 .3 Starting - A go-signal from RES is used to indicate the approval to begin, timing starts only after the vehicle crosses the starting line and stops after it crosses the finish line.



D.9.2.5 .4 After the finish line, the vehicle must come to a full stop within 50m inside the marked exit lane and enter the finish-state described in DV2.3.

D.9.2.5 .5 Starting order is based upon time of arrival. Teams on their first run will receive priority.

## **D.10 SKIDPAD EVENT**

D.10.2.5 [DV ONLY] Skidpad Procedure

D.10.2.5.1 Each team has at least two runs. The final number of runs will be published before the start of the event.

D.10.2.5.2 Starting order is based upon time of arrival. Teams on their first run will receive priority.

D.10.2.5.3 Staging - The foremost part of the vehicle is staged 15m in front of the timekeeping line.

D.10.2.5.4 Starting - A go-signal from RES is used to indicate the approval to begin.

D.10.2.5.5 The vehicle will enter perpendicular to the figure eight and will take one full lap on the right circle to establish the turn. The next lap will be on the right circle and will be timed. Immediately following the second lap, the vehicle will enter the left circle for the third lap. The fourth lap will be on the left circle and will be timed. Immediately upon finishing the fourth lap, the vehicle will exit the track.

D.10.2.5.6 The vehicle will exit at the intersection moving in the same direction as entered and must come to a full stop within 25m behind the timekeeping line, inside the marked exit lane and enter the finish-state described in DV2.3.

## **D.15 [DV ONLY] TRACKDRIVE AND EFFICIENCY EVENT**

### **D.15.1 Trackdrive Tracklayout**

D.15.1.1 The trackdrive layout is a closed loop circuit built to the following guidelines:

- Straights: No longer than 80m
- Constant Turns: up to 50m diameter
- Hairpin Turns: Minimum of 9m outside diameter (of the turn)
- Miscellaneous: Chicanes, multiple turns, decreasing radius turns, etc.
- The minimum track width is 3m

D.15.1.2 The length of one lap is approximately 200m to 500 m.



### D.15.2 Trackdrive Procedure

There will be a track walk prior to the trackdrive. During the track walk no equipment (e.g. antennas, sensors, cameras, etc) other than analog measurement devices (i.e. measurement wheel or measurement tape) is allowed.

D.15.2.1 Starting order may be defined by the officials, based on previous dynamic event results.

D.15.2.2 Before starting a run, each DV, with a fuel tank (CV), must be filled to the fuel level line at the fueling station. During fueling, once filled to the scribe line, no shaking or tilting of the tank, the fuel system or the entire vehicle is allowed.

D.15.2.3 There will be at least one run consisting of ten laps. The number of runs and the starting order procedure will be announced before the start of the event.

D.15.2.4 Staging - The vehicle is staged such that the front wheels are 6m in front of the starting line on the track.

D.15.2.5 Starting - A go-signal from RES is used to indicate the approval to begin. Timing starts after the vehicle crosses the starting line.

D.15.2.6 After ten laps the vehicle must come to a full stop within 30m behind the finish line on the track and enter the finish-state described in DV2.4.

D.15.2.7 There will be no last lap signal i.e. the vehicle should count laps itself.

D.15.2.8 The team must proceed directly to the fueling station (DV with internal combustion engine only).

### D.15.3 Trackdrive Scoring

D.15.3.1 If there is more than one run per vehicle, the run with the highest combined score of trackdrive and efficiency is scored for both events.

D.15.3.2 Each lap of the trackdrive event is individually timed. The corrected elapsed time is determined by adding any penalty times.

D.15.3.3 If a team's corrected elapsed time is below  $T_{max}$  and the run was not DNF or DQ, points based on the following formula are given:

$$TRACKDRIVE\ SCORE = 175 \cdot \left( \frac{T_{max}}{T_{team}} - 1 \right)$$

$T_{team}$  is the team's corrected elapsed time.

$T_{max}$  is 2 times of the corrected elapsed time of the fastest vehicle.



D.15.3.4 An additional ten points are awarded for every completed lap, independent of the corrected elapsed time. This is also applied for teams that do not finish the trackdrive i.e. get a DNF.

#### **D.15.4 Efficiency Scoring**

D.15.4.1 [EV ONLY]

D.15.4.1.1 Energy efficiency is measured during the endurance event.

D.15.4.1.2 The endurance energy is calculated as the time integrated value of the measured voltage multiplied by the measured current logged by the data logger. Regenerated energy is multiplied by 0.9 and subtracted from the used energy.

D.15.4.1.3 Only vehicles which score points in the endurance event will receive points for efficiency.

D.15.4.1.4 Teams whose corrected elapsed endurance time exceeds  $T_{max}$  receive zero points for efficiency.

D.15.4.2 [CV ONLY]

D.15.4.2.1 Efficiency is measured during the endurance event.

D.15.4.2.2 Only vehicles which score points in the endurance event will receive points for efficiency.

D.15.4.2.3 Teams whose fuel volume used during the endurance event exceeds 26 l=100km receive zero points for fuel efficiency.

D.15.4.2.4 Teams whose corrected elapsed endurance time exceeds  $T_{max}$  as defined in D7.7.4 receive zero points for efficiency.

D.15.4.2.5 Fuel pumps will be turned on and fuel valves will be opened to ensure complete refueling.

D.15.4.2.6 The measured fuel volume of vehicles using E 85 fuel is divided by 1.4 to be comparable to the vehicles using 98 RON.

D.15.4.3 [CV ONLY] The trackdrive energy is calculated based on following formula:

$$EN_{team} = V_{team} \cdot 3.55 \text{ kWh/l}$$

$V_{team}$  is the team's corrected used fuel volume.

D.15.4.4 The team's efficiency factor is calculated based on:

The efficiency factor is calculated based on the following formula:

$$EFFICIENCY \ FACTOR = \frac{T_{min} \cdot EN_{min}^2}{T_{team} \cdot EN_{team}^2}$$

$T_{team}$  is the team's uncorrected elapsed driving time.



$T_{min}$  is the fastest uncorrected elapsed driving time of all teams who are able to score points in efficiency.

$EN_{team}$  is the team's corrected used energy.

$EN_{min}$  is the lowest corrected used energy of all teams who are able to score points in efficiency.

D.15.4.5 Efficiency points are calculated using the following formula:

$$EFFICIENCY\ SCORE = 100 \cdot \frac{\frac{0.1}{E_{team}} - 1}{\frac{0.1}{E_{max}} - 1}$$

$E_{team}$  is the team's efficiency factor.

$E_{max}$  is the highest efficiency factor of all teams who are able to score points in efficiency.

D.15.4 Efficiency [DV only]

NOT APPLICABLE