

# **VI International Competition**

# **MotoStudent**

**2019 - 2020**



## **Competition Regulations**

Ref.10.2019



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## **VI International Competition MotoStudent**

### **SECTION A: ADMINISTRATIVE REGULATIONS**

## ARTICLE 1: INTRODUCTION TO MOTOSTUDENT COMPETITION

### A.1.1 MotoStudent Objectives

- A.1.1.1 Motostudent is an university challenge between student teams, that must design and develop a competition motorbike project (electric or petrol) which will be evaluated and tested in a Final Event to be held at the MotorLand Aragón facilities in Alcañiz (Teruel), Spain.

### A.1.2 Event Promoter

- A.1.2.1 The MotoStudent Competition, promoted by the Moto Engineering Foundation (hereinafter MEF) and TechnoPark MotorLand, both entities are part of the Competition Organization, responsible for its full development.
- A.1.2.2 The Organization has the right to adapt and modify the Competition Regulations as well as any other official document, committing itself to communicating to the participating teams with sufficient time for the proper development of the activities of the Competition.

### A.1.3 Competition categories

The MotoStudent Competition has two different categories:

- MotoStudent Petrol
- MotoStudent Electric

- A.1.3.1 The MotoStudent Petrol Category is characterized by using an internal combustion engine as the propulsion method. The regulations relating to the MotoStudent Petrol Category are defined throughout this Rules and Regulations in their corresponding sections.

A.1.3.2 The MotoStudent Electric Category is characterized by using a 100% electric system as a propulsion method. The regulations regarding the MotoStudent Electric Category are defined throughout this Rules and Regulations in their corresponding sections.

A.1.3.3 Each Category will be developed in parallel and independently with its evaluation and corresponding score, as well as the tests and milestones to be fulfilled throughout the Competition, including the Final Event.

#### A.1.4 Phases of the Competition

The projects and prototypes presented will be judged and assessed in a series of different tests, divided into two different phases, called MS1 Phase and MS2 Phase.

A.1.4.1 The different stages to which the projects will be submitted will be:

STAGE	SCORING
<b>Milestones</b>	No*
<b>Scrutineering</b>	No
<b>MS1 Phase: Project</b>	Yes
<b>MS2 Phase: Dynamic tests</b>	Yes

\* It can apply penalties on the global score.

A.1.4.2 All participating teams, in order to be evaluated, must have exceeded the minimum level required in each of the stages.

A.1.4.3 The requirements to be met in the different stages are detailed in the following parts of this Regulations:

Milestones: Section A, Article 6.

Scrutineering: Section E

MS1 Phase: Section F

MS2 Phase: Section G

#### A.1.5 Awards and scores

Based on the results of the different Phases, the Organization will give a series of awards.

A.1.5.1 The MS1 Phase specific awards are detailed in Art.F.5.3 of these Regulations.

A.1.5.2 The MS2 Phase specific awards are detailed in Article 9 of Section G of these Regulations.

A.1.5.3 In addition to the specific awards of each Phase, the following general prizes will be awarded:

- Best MotoStudent: Awarded to the team that obtains the maximum score in the sum of the results of the MS1 + MS2 Phases.
- Best Rookie team: Awarded to the newly incorporated team (representing a university not registered in any of the previous editions of MotoStudent) that obtains the maximum score in the sum of the results of the MS1 + MS2 Phases.

A.1.5.4 Summary of the Competition awards:

MotoStudent Petrol	MotoStudent Electric
<b>MS1 Phase</b>	
<b>Best MS1 Project</b>	<b>Best MS1 Project</b>
<b>Best Design Project</b>	<b>Best Design Project</b>
<b>Best Innovation</b>	<b>Best Innovation</b>
<b>MS2 Phase</b>	
<b>1st Classified</b>	<b>1st Classified</b>
<b>2nd Classified</b>	<b>2nd Classified</b>
<b>3rd Classified</b>	<b>3rd Classified</b>
<b>General Awards</b>	
<b>Best MotoStudent</b>	<b>Best MotoStudent</b>
<b>Best Rookie Team</b>	<b>Best Rookie Team</b>

A.1.5.5 The economic and material value of each prize will be published by the Organization to all registered teams.

A.1.5.6 In case of a tie of the score between two or more teams in the overall classification of the General Awards, the final classification position will be based on the score of each team in the MS1 Phase, with the team with the highest MS1 score remaining ahead.



#### A.1.6 Entries

MotoStudent accepts registrations from teams of students representing universities around the world.

A.1.6.1 The registration period starts on January 28, 2019 and ends on April 30, 2019. The registration process shall be formalized through the website of the Competition: [www.motostudent.com](http://www.motostudent.com).

A.1.6.2 The entry fee for a team amounts to €3,160 (VAT included). This fee covers the entry of the 7 compulsory team members. Each additional team member must pay an additional fee of €325 (VAT included).

A.1.6.3 For a team to be considered as registered, it must have paid the corresponding registration fees.

A.1.6.4 The number of available places for teams is limited in both categories. These vacancies will be covered by order of registration (including the payment of the registration fee). Teams that have not paid the registration fees will not be considered as registered, therefore it will not be possible to reserve their place for the Competition.

A.1.6.5 The payment of the registration fee includes:

- The rights to participate at the VI Edition of the MotoStudent International Competition as an official team, having therefore a certificate of being an official registered team member or tutor.

- The MotoStudent Kit that includes common compulsory parts for all teams that must be installed in the prototype. The shipping cost of the Kit is also included. There are not included the duties or special taxes of the destination countries, states or other areas.

- "Full Access" passes to restricted areas and the corresponding insurance during the Final Event in 2020, exclusively for registered team members:

- Access to briefings.
- Access to MS1 presentation rooms.
- Access to the Work Zone of Pit Lane and Pit Wall.
- Access to the track for the recognition of the teams prior to MS2 tests.
- Access to Technical Box (Scrutineering Area).
- Access to the Starting Grid before the races.

- Free access to the MS1 Awards Ceremony.
- Access to the MS2 Podiums.
- In general, access to the specific areas of the Competition that require the presence of participating students.
- Bracelets of registration, which will allow the manipulation of the prototype. The manipulation of the prototypes by people not officially registered in the Competition will not be allowed during the Final Event.
- Registered students will be included in the MotoStudent employment and training exchange, through which they will have access to specialized on-site or online training courses, as well as the opportunity to access exclusive job offers from the main companies in the sector.
- The right of access to services, supplies, discounts and opportunities offered by the Organization of the Competition and the collaborating companies.

A.1.6.6 The entry fees of the Competition are not refundable. If for any reason outside the Organization, the Competition has to be interrupted, canceled, or a variation in the scheduled terms has been determined (such as the dates of the Final Event), the Organization reserves the right not to return the amount of these registration fees.

#### **A.1.7 Official publications and Event information**

All official communications, Regulations, annexes, etc. will be published on the official website of the Competition: [www.motostudent.com](http://www.motostudent.com)

A.1.7.1 Teams are required to read and be familiar with all publications that the Organization makes.

A.1.7.2 The Organization may use the email system or other electronic means to send news and information about the Competition. To do this, each team will present two official email addresses to receive communications:

- Faculty advisor/s email address
- Team or team leader email address

A.1.7.3 Any official communication issued by the Organization will have the same officiality as the present Regulations of the Competition and, therefore, the teams will have the same compliance obligation.

#### **A.1.8 Official languages**

The Official languages of the Competition will be the following (in order of priority):

1<sup>st</sup> English

2<sup>nd</sup> Spanish

A.1.8.1 Official publications and documents will be published in English. The Organization will also be able to publish such documentation in Spanish, although it reserves the right not to do so if it deems it convenient.

A.1.8.2 The communications between the participating teams and the Organization must be made in one of the two official languages indicated at Art. A.1.8.

A.1.8.3 In the event of any conflict between the English version of the Regulations and its Spanish version, it will be the English version which will prevail. This rule will apply to any official document published by the Organization throughout the Competition.

#### **A.1.9 Official time**

The Official time of the Competition is considered to be the one in force in mainland Spain:

- Winter Schedule: CET (UTC+1)

- Summer Schedule: CEST (UTC+2)

### **ARTICLE 2: APPLICATION OF THE MOTOSTUDENT REGULATIONS**

#### **A.2.1 Ambiguities in the Regulations**

The possible ambiguities or questions about the meaning or intention of the Competition Regulations will only be resolved by the MotoStudent Organization.

## **A.2.2 Validity of the Regulations**

The Regulations of the MotoStudent Competition published on the website [www.motostudent.com](http://www.motostudent.com), including its possible future versions, are the only Regulations valid for the VI MotoStudent International Competition 2019-2020.

A.2.2.1 The Regulations from past editions (I, II, III, IV o V Edition) of the MotoStudent Competition will not be valid for the VI MotoStudent International Competition 2019-2020.

A.2.2.2 For any situation or sports infraction not included in this MotoStudent Regulations or in another official communication of the Organization, the RFME Sporting Regulations of the Spanish Speed Championship 2020 will regulate the procedure to be followed.

## **A.2.3 Compliance of the Regulations**

By taking part in the MotoStudent Competition, the team, the team members as individuals, the faculty advisors (tutors), riders and any other university staff member accept and must comply with all the rules imposed by the Organization both in the Competition Regulations and in subsequent official documents, as well as the rules of the sports complex where the Final Event will take place.

## **A.2.4 Penalties for non-compliance with Regulations**

The Organization has the right to sanction all those teams that do not comply with aspects of the Competition Regulations and established schedules, as well as those teams that demonstrate unsportsmanlike behavior, or may endanger persons and facilities.

A.2.4.1 The Organization shall establish sanctions according to the following criteria:

- Minor infraction: Penalty of 10 points in the test or phase to be evaluated.
- Serious infraction: Exclusion of the phase to evaluate. Depending on the seriousness of the fault, the Organization may even exclude the team from the Competition.
- Sports penalties in the MS2 Phase: to be determined by the Race Direction

- A.2.4.2 It is considered as minor infraction timely breach of the defined schedule, delivery of documentation (with the exception of deliverable milestones involving specific penalties), specific non-compliance of paddock and pit lane rules, or similar acts.
- A.2.4.3 It is considered as serious infraction repetitive breach of the cases set out in the Article A.2.4.2, disobedience to orders given by the Organization or Race Direction, unsportsmanlike or aggressive behavior, acts prejudicial to the people attending, etc...
- A.2.4.4 During dynamic tests of the MS2 Phase on the race track, the Race Direction may apply the relevant penalties for noncompliance with sports regulations. These penalties may be accompanied by score penalties.

## **A.2.5 Right to claims and impugnments**

Any team has the right to protest and suggest. The Organization will review any doubt, breach or penalty presented by the official method.

- A.2.5.1 Claim: A team can file a claim based on any disagreement with any action by the Organization, either in the scoring of the Competition or other official action that can be considered as causing damage to its team.
- A.2.5.2 Impugment: Any team may lodge a protest against another participating team if they observe any breach of the Competition Regulations or improper conduct.
- A.2.5.3 Every protest and/or complaint must be submitted to the Organization following the presentation format reflected in Annex 1 of Section J of these Regulations, stating the article of the Regulations which is considered to have been breached, with enough proof to be verified. The protests and complains prior to the Final Event may be sent scanned or digitally signed by email to [faq@motostudent.com](mailto:faq@motostudent.com), while protests and complaints during the Final Event must be submitted in writing to the Organization.
- A.2.5.4 In order to make a claim or an impugment, the applicant team must deposit 50 points on the score of the Phase or test to protest and also €800. If the Organization approves the resolution in favor of the applicant team, the 50 points and €800 will be given back to the applicant team, if not, and the protest is refused, the team will lose the 50 points and €800.
- A.2.5.5 Period of presentation: Claims or impugnments related to any aspect of the tests developed during the Final Event, must be submitted within a maximum of 30 minutes after the publication of the results of the test affected.

A.2.5.6 The Organization will be responsible for the final decision on the protest. This decision will be final and cannot be appealed.

A.2.5.7 Only in the purely sporting field it will be possible to request an appeal procedure: As it is stated in Article 119 of the RFME Sporting Regulations, any participant may appeal to penalties imposed or decisions taken by the Organizing Committee and the Race Direction to the Disciplinary Court of the RFME. Any appeal may be presented in writing, signed by the interested party and accompanied by a deposit of 800€. The right for appeal expires after fifteen days, including post terms, from the communication of the resolution.

A.2.5.8 As it is stated in the RFME Sporting Regulations, in its article 119, at the request of a team it is possible to lodge appeals to the FIM, through the RFME, being the only one to judge the opportunity of the formulated appeal, being able to refuse the process without being obliged to explain the causes and reasons that induce it. The right of appeal does not imply the suspension of the penalty or sanction; however, when RFME accedes to raise an appeal to the FIM, the appellant may obtain, prior to the appropriate request, that the appeal may lead to the temporary suspension of the decision, but in this case, it must submit, together with the appeal, the guarantee deposit stipulated by the FIM.

## **A.2.6 Right of confiscation**

The Organization reserves the right to confiscate or hold during the Final Event any prototype, component, tool or rider equipment at its discretion that considers non-complying with the Competition Regulations.

A.2.6.1 Any material confiscated by the Organization in the Final Event will be returned to its owner team at the end of the Final Event.

## **A.2.7 Changes to the Regulations of the Competition**

The MotoStudent Organization has the right to change the Competition Regulations, as well as the Official Calendar of the Competition, if it considers it necessary. Any change to the Regulations, will be added in Section I: Modifications glossary, and will be published on the official website.

A.2.7.1 The Organization Committee will announce the changes to the Regulations through the means considered as most appropriate to make the changes known. Regardless of the means used, the most updated Rules and Regulations document will always be the one published on the website of the Competition.

## ARTICLE 3: PARTICIPATION REQUIREMENTS

### A.3.1 Eligibility

The Competition has a purely academic objective, being a multidisciplinary project with a great importance in the areas of engineering, economics, marketing and project management. Although the project is based on the development and manufacture of a racing motorcycle prototype, it is not a conventional speed championship. Therefore, eligibility is limited to active university students (enrolled in a university in the academic years 2018-2019 and/or 2019-2020), or students of Vocational Training schools/colleges (including the latter within a team with the university as a holder) whose main activity is not training in the field of motor racing in any of its forms.

A.3.1.1 There is no limit in the number of teams set for each University. Each University may submit as many teams as they like for any category of the Competition.

A.3.1.2 Each registered team can only submit one project and one prototype.

### A.3.2 Liability Waiver

All participants, including students and tutors, must sign a liability waiver when entering the Competition. The rest of the people attending the Final Event with the teams will be considered as general public.



**Motorsport can be dangerous**

### A.3.3 Heads of the team: Faculty Advisor and Team Leader

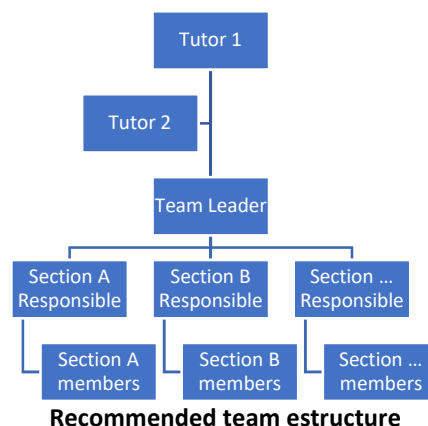
Each team must designate one or two faculty advisors, who will be recognized as "Tutors" of the team, as well as a delegate student enrolled in the team, who will be recognized as "Team Leader".

A.3.3.1 The Faculty Advisors should accompany the team during the Final Event and will be considered as the highest responsible person for the team. Should the Faculty Advisors not be able to attend the Final Event, the responsibility will be delegated to the Team Leader as the maximum responsible of the team.

A.3.3.2 Faculty Advisors may advise their teams on general engineering and theoretical aspects of their projects, but in no case may design any part of the prototype, or take part in the development of any document or presentation.

A.3.3.3 Faculty Advisors are not allowed to assemble or manufacture any component of the prototype.

A.3.3.4 The internal hierarchy of the teams is the responsibility of the internal organization of each team, but it is advisable to establish the following hierarchical order in the taking of decisions or actions:



A.3.3.5 At least one of the Faculty Advisors must be able to represent the University in administrative terms over the three semesters of the Competition.

A.3.3.6 The Team Leader will have the same rights and obligations as the rest of enrolled students, but he/she will act as a communication link with the Organization and representation of the team in the absence of the Faculty Advisors.

A.3.3.7 If there are any changes in the figure of the Faculty Advisors or Team Leader, for justified reasons, it should be communicated as soon as possible to the Organization to take into account the new positions.



#### **A.3.4 Participants**

Teams and team members registered in the Competition will be considered as "participants of the Competition" from the moment they enter until the end of the Final Event.

A.3.4.1 Each team will have at least 7 participants.

A.3.4.2 Every university team participating in MotoStudent must include in their team name the name of the University or College they belong to.

A.3.4.3 Each participating team will be associated with an identification bike number, between 1 and 99, excluding the 13. This number will be given at the election of each team, by order of Registration in the Competition. The numbers 1, 2 and 3 will be exclusively reserved for the teams representing the finalist universities in the first, second and third place respectively in the global ranking MS1 + MS2 of the V MotoStudent International Competition 2017-2018.

A.3.4.4 Students from Training Centers (enrolled in the Vocational Training Center in the 2018-2019 and/or 2019-2020 academic year) can also be part of the team. To do this, the team must present a proof of agreement agreed between the Training Center and the participating University.

A.3.4.5 The consideration of the Competition and its compatibility with the curriculum will be decision of each University. The represented University has no obligation of including MotoStudent Competition in its curriculum, not even as free-elective formation.

A.3.4.6 To participate at the Competition, in the academic aspect students must be enrolled in 2018-2019 and/or 2019-2020 courses, regardless of the percentage of subjects or credits passed.

A.3.4.7 All students must be over 18 years old at the beginning of the Final Event.

#### **A.3.5 Cancellations and replacements**

A.3.5.1 The substitution of team members will entail the payment of an administrative fee for management expenses, according to Art.A.3.7.

A.3.5.2 The entry fees of student are not reimbursable, even if they are cancelled.

- A.3.5.3 All the modifications on the participating students must be communicated to the Organization by the tutor or the team leader, through the email address of registrations ([registry@motostudent.com](mailto:registry@motostudent.com)) or through the means that the Organization provides for the management of members.

### **A.3.6 Insurances**

The registered universities must integrate the work carried out in the training curriculum so that the participation in the MotoStudent Competition is included in the activities covered by the school insurance.

- A.3.6.1 The Organization will have a private liability insurance that will cover all team members, as a guarantee against any accident that could occur during the Final Event at the facilities of the MotorLand Aragón Speed Circuit. Physical damage to team members, if they arise from their work in the box, will not be covered by this insurance. To do this, teams must ensure the coverage of their school insurance and, if not covered, hire one on their own.
- A.3.6.2 The Event will have the necessary medical and security means in terms of sporting requirements.
- A.3.6.3 The Organization is not liable for material or physical damage that may be caused during the development or handling of the prototype by each team.

### **A.3.7 Administrative procedures and fees**

The administrative procedures requested by the teams to the Organization of the Competition, and that are not part of the development of the milestones and activities of MotoStudent, will entail standard administrative fees for management expenses of € 20 (VAT included). Some examples of administrative procedures are:

- Issuance of certificates and other justification documents (excluding those issued generically by the Organization).
- Issuance of duplicates of documentation.
- Modification of team data: members, designation of tutors and team leader, team name and/or university, etc.
- Management of parcels, shipments, and storage of prototypes and other team elements for the MotoStudent Final Event.

## ARTICLE 4: MANUFACTURING THE MOTORBIKE

### A.4.1 Prototype manufacturing

The motorbikes taking part in MotoStudent must be created, designed and assembled by the students registered in the team without the direct involvement of professional engineers, race engineers, professional mechanics, etc. The team commits to this by signing the document in accordance with the Organization and the Regulations of the Competition.

### A.4.2 MotoStudent Kit

The Organization will provide all teams with a Kit including all parts that are compulsory to be installed in the prototypes. The technical regulations regarding this Kit are defined in sections B, C and D of this Regulations.

- A.4.2.1 The shipping cost of the MotoStudent Kit to the facilities indicated by the teams will be covered by the Organization. However, each team will be responsible for the taxes and duties derived from the import policies of the country, zone or region to which the Kits are sent.
- A.4.2.2 The teams must be informed previously to the sending of the Kits about tariff policies and logistical limits derived from the shipping destination to avoid retentions of the material, telling the Organization about special requirements in case of being necessary.
- A.4.2.3 It is possible that, depending on the country where the team is located, the shipment of any of the components included in the MotoStudent Kit is not allowed. In this case, the Organization will contact the team to find alternative solutions for the management of these components.
- A.4.2.4 The parts included in the MotoStudent Kit for both categories should only be used for the development of the prototypes for the VI MotoStudent Edition and their participation in it, being strictly forbidden to give them other applications outside of this one.

## ARTICLE 5: PARTICULARITIES FOR NON-EUROPEAN TEAMS

### A.5.1 Transport and import of the prototype

Shipments and imports of prototypes and material must comply with all relevant requirements regarding transportation, import and export established by Spanish laws and regulations.

A.5.1.1 Is recommended to manage the delivery and customs clearance as a temporary importation with a specialized company.

A.5.1.2 In no case the Organization or the management company of the Speed Circuit will be the recipient of the transport, nor will it manage the reception of the prototype.

A.5.1.3 The prototype must be sent in sufficient time to avoid delays that prevent the prototype from being available in time to compete in the Final Event.

A.5.1.4 The data for the shipment to the place of the Final Event will be:

- Addressee: Team or University name.
- Adress: MotorLand Aragón - Circuito de Velocidad, Ctra. TE-V-7033 km.1, 44600 Alcañiz – Teruel (Spain)
- Contact phone: Team contact phone

### A.5.2 Visa

The registration documents in the MotoStudent Competition and other participation accreditations of the team in the Competition can be used as justification or demonstration to issue the visa, in case of requiring it.

The Organization recommends non-EU teams to ensure all aspects of the visa and travel in general as soon as possible to avoid unexpected incidents.

All the information and doubts about the requirements to travel to Spain are included in the website of the Ministry of Foreign Affairs and Cooperation of the Government of Spain: [www.exteriores.gob.es](http://www.exteriores.gob.es)

A.5.2.1 The Organization will not grant any type of visa or invitation letter, nor will it intervene with any organism, embassy, or consulate to resolve any question regarding the visa of the members of each team.

## ARTICLE 6: COMPETITION CALENDAR

### A.6.1 Official deadlines and calendar

The MotoStudent International Competition takes place during three semesters over the period 2019-2020. During this period there are some milestones that all teams must meet to complement the final evaluation of the Competition. The following Calendar shows the main deadlines of the Competition:

Period	DATE Start End	2019												2020											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Team Registration	28/01/2019 30/04/2019																								
MS1 Delivery 1: Chapter A – Concept development	01/10/2019 31/10/2019																								
MSE Special Milestone 1: Electric Scheme	01/11/2019 30/11/2019																								
Admin Milestone 1: Team members	01/12/2019 31/12/2019																								
MSE Special Milestone 2: Battery Pack specs	01/02/2020 29/02/2020																								
MS1 Delivery 2: Chapter B – Product design	01/03/2020 31/03/2020																								
MSE Special Milestone 3: Battery Pack assembly	01/05/2020 31/05/2020																								
MS1 Delivery 3: Chapter D – Innovation	01/07/2020 31/07/2020																								
MS1 Delivery 4: Chapter E – Business Plan	01/07/2020 31/07/2020																								
MSE Special Milestone 4: Electric Powertrain Test	01/07/2020 31/08/2020																								
MS1 Delivery 5: Chapter C – Prototyping and testing	01/08/2020 31/08/2020																								
Admin Milestone 2: Data Accreditations	01/08/2020 31/08/2020																								
Admin Milestone 3: Rider Data	01/09/2020 15/09/2020																								
MS1 Delivery 6: MS1 presentations	01/09/2020 30/09/2020																								
Final Event	Autumn 2020																								

### A.6.2 Team Registration Period

The Team Registration period is open from 28/01/2019 to 30/04/2019.

### **A.6.3 Administrative Milestones**

The Milestones of an administrative nature indicated in the Competition Calendar of Art. A.6.1 are described below.

- A.6.3.1 Admin Milestone 1: Team members (From 01/12/2019 to 31/12/2019): Final data of the registered students and faculty advisors, functions in which the team is structured, documentation that accredits the academic registration of the students and a declaration of conformity signed by the Team Leader and the Faculty Advisors.
- A.6.3.2 Admin Milestone 2: Data for accreditations (From 01/08/2020 to 31/08/2020): Documentation and pictures for access passes during the Final Event.
- A.6.3.3 Admin Milestone 3: Rider data (From 01/09/2020 to 15/09/2020): Rider data to present (name, ID, racing career, number of license and other federative data).

### **A.6.4 MotoStudent Electric Category specific Milestones**

A series of specific milestones will be required for equipment of the MotoStudent Electric Category in order to guarantee the safety of the prototypes and compliance with the Technical Regulations. Detailed descriptions are found in Art.D.13.1.1.

- A.6.4.1 MSE Special Milestone 1: Electric scheme (From 01/11/2019 to 30/11/2019): Aspects related to the electrical design of the prototype and complete electrical diagram.
- A.6.4.2 MSE Special Milestone 2: Battery pack specs (From 01/02/2020 to 29/02/2020): Design and electrical and mechanical configuration of the battery pack.
- A.6.4.3 MSE Special Milestone 3: Battery pack assembly (From 01/05/2020 to 31/05/2020): Description of the physical assembly of the battery pack.
- A.6.4.4 MSE Special Milestone 4: Electric powertrain test (From 01/07/2020 to 31/08/2020): Functional test description of the electric propulsion system.

#### **A.6.5 MS1 Project Deliveries**

Teams will deliver the different parts that will make up their MS1 Project.

A.6.5.1 MS1 Delivery 1: Chapter A – Concept development (From 01/10/2019 to 31/10/2019): See Art. F.2.2.

A.6.5.2 MS1 Delivery 2: Chapter B – Product design (From 01/03/2020 to 31/03/2020): See Art. F.2.3.

A.6.5.3 MS1 Delivery 3: Chapter D – Innovation (From 01/07/2020 to 31/07/2020): See Art. F.2.5.

A.6.5.4 MS1 Delivery 4: Chapter E - Business Plan (From 01/07/2020 to 31/07/2020): See Art. F.2.6.

A.6.5.5 MS1 Delivery 5: Chapter C – Prototyping and testing (From 01/08/2020 to 31/08/2020): See Art. F.2.4.

A.6.5.6 MS1 Delivery 6: MS1 presentations (From 01/09/2020 to 30/09/2020): See Article 4, section F of this Regulation.

#### **A.6.6 Final Event**

The Final Event will take place in Autumn 2020 at the MotorLand Aragón Speed Circuit. The specific date and time of tests and activities will be published by the Organization.

#### **A.6.7 Penalties for delays in official deadlines**

The deadlines stipulated in the Competition Calendar (see Art. A.6.1) must be met. In case of delay, penalties will be applied:

A.6.7.1 The delay in the delivery of each Admin Milestone will entail the following penalty: [1 MS1 point + 1 MS2 point] for each day of delay (Max 20 points → 10 MS1 + 10 MS2).

A.6.7.2 The delay in the delivery of each MSE Special Milestone will entail the following penalty: [1 MS1 point + 1 MS2 point] per day of delay (Max. 20 points → 10 MS1 + 10 MS2). Delivery of the MSE Special Milestones more than 10 days after the deadline may also entail the established in Art. D.13.1.2.

- A.6.7.3 The delay in the delivery of each MS1 Phase Milestone will entail 2 points of penalty in the corresponding chapter of the MS1 project (A, B, C, D or E) per day of delay (max 20 points). Deliveries after more than 10 days from the deadline will not be evaluated and will, therefore, be given 0 points.
- A.6.7.4 Penalties accumulated to the MS1 Phase in the delay of the Admin Milestones and/or MSE Special Milestones will be distributed over the scores given by the expert jury over the MS1 Deliveries (A, B, C, D and E chapters) in the proportion in which each part represents over the total of 400 points, as stated in Art.F.5.3.
- A.6.7.5 Penalties accumulated affecting the MS2 Phase in the delay of the milestones will be applied to the final score of the MS2 Phase.
- A.6.7.6 The minimum score in each of the parts or scoring events in the Competition can not be less than 0 points.

## **ARTICLE 7: COMUNICATION BETWEEN TEAMS AND ORGANIZATION**

### **A.7.1 Publication of questions: Frequently Asked Questions (FAQ)**

By sending a question to the Organization, teams accept that the Organization can partially or totally reproduce the question and the official response in the FAQ Database, available to all registered teams through the official platforms.

- A.7.1.1 FAQ Database will collect the common doubts regarding the MotoStudent Competition sent by the teams, and will be updated by the Organization
- A.7.1.2 Registered teams must read the updates of the FAQ Database, which will have the same officiality as the present Regulations.

### **A.7.2 Types of questions**

The Organization will answer all the questions that are not described in the Competition Regulations or in the FAQ Database.

- A.7.2.1 The Organization may not answer a question whose answer is clearly reflected in the Competition Rules, FAQ Registration or any other official document.



### **A.7.3 Consultation procedure**

All questions addressed to the Organization must be sent through the platform established by the Organization for that purpose and must comply with the following format:

- Full name of the person asking the question.
- Category (MotoStudent Electric / MotoStudent Petrol).
- Bike number.
- Team Name.
- Affected article/s of the Regulations or FAQ number affected.
- Question.

A.7.3.1 It is recommended to not attach any picture, drawing or file which exceeds 500KB in size.

A.7.3.2 The Organization will not answer queries whose response is clearly reflected in the Competition Regulations, FAQ Database or any other official document.

A.7.3.3 The Organization will not solve any doubts by telephone. All questions must be submitted and solved using the consultation procedure defined in this article.

### **A.7.4 Response time**

The Organization undertakes to answer all questions as soon as possible. Considering the fact that some questions may need more time to be answered due to the complexity or need for external consultation, the estimated maximum response time will be 15 natural days.

## **VI International Competition MotoStudent**

### **SECTION B: GENERAL TECHNICAL REGULATIONS**

## **ARTICLE 1: TECHNICAL REQUIREMENTS OF THE PROTOTYPE AND RESTRICTIONS**

### **B.1.1 Introduction to Technical Regulations**

The prototypes presented to compete in MotoStudent must be self-made.

- B.1.1.1 The design and manufacture of the presented prototypes must comply with the rules imposed by these Regulations in order to participate in the scoring phases of Competition.
- B.1.1.2 The prototypes must maintain all the specifications required in the Technical Regulations during all the tests of the Final Event. The Organization may review the correct compliance with the Regulations at any time during the Final Event.
- B.1.1.3 Any failure to comply with the technical requirements and restrictions should be corrected and re-inspected before the prototype can participate in any test during the Final Event.
- B.1.1.4 The rules reflected in this Section B of the Regulations equally affects both the "MotoStudent Petrol" and the "MotoStudent Electric" categories of the Competition, except for the articles where are indicated special requirements for a specific Category.

### **B.1.2 Changes and repairs**

Once the scrutineering (see Section E) have been passed and the prototype has been validated for the MotoStudent Competition, any change not explicitly permitted without the supervision of the Technical Staff of the Organization will be strictly forbidden. Before carrying out any modification, the Organization must be informed, which must approve it and re-inspect the prototype after it has been applied.

Changes allowed after the Scrutineering that do not involve supervision by the Organization are:

- Secondary transmission adjustment
- Brake system adjustment
- Changes and adjustments in the data recording systems
- Tire pressure adjustment
- Refilling fluids
- General set-up adjustments
- Engine set-up adjustments

Should a prototype need to be repaired, the repair must be approved by the Organization. Once it has been repaired, the Organization must give the approval to let the prototype return to the Competition after checking it.

### **B.1.3 Other Competitions**

The present General Technical Regulations have been created exclusively for the MotoStudent Competition, so prototypes manufactured according to the specifications indicated on these Regulations do not have to adhere to the requirements of other speed competitions outside MotoStudent. The Organization is not responsible for the use that the different teams can make with the prototypes presented at MotoStudent in other competitions.

### **B.1.4 MotoStudent Kit**

B.1.4.1 The MotoStudent Kit for the teams registered in the "MotoStudent Petrol" Category includes the following components:

- Internal combustion engine
- Engine management control unit
- 1 set of front and rear slick tires
- Brake calipers and pumps

B.1.4.2 The MotoStudent Kit for the teams registered in the "MotoStudent Electric" Category includes the following components:

- Electric motor
- Insulation Monitoring Device (IMD)
- 1 set of front and rear slick tires
- Brake calipers and pumps

B.1.4.3 The components included in the MotoStudent Kit will incorporate an identification mark. This marking must remain intact, since it will be reviewed by the Technical Staff of the Organization in the Final Event. In case of breakage or damage of these markings, the teams should contact the Organization to determine a solution.

B.1.4.4 It is not possible to cover with paint or stickers any identification mark of the components supplied by the Organization.

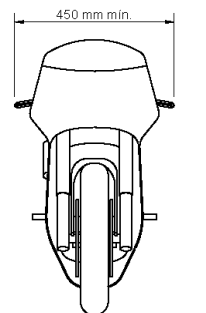
B.1.4.5 Any technical question regarding the components included in the MotoStudent Kit should be channelled through the Organization. Direct contact between the participating teams and the supplying companies for technical issues related to the MotoStudent Kit is prohibited.

## ARTICLE 2: GENERAL DESIGN REQUIREMENTS

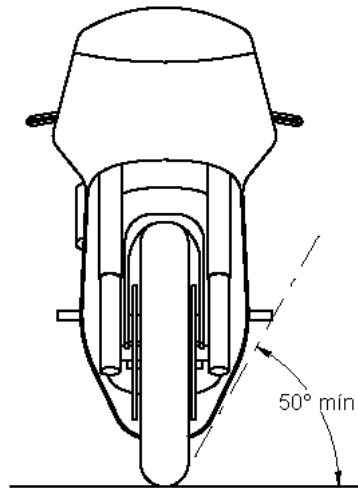
### B.2.1 Dimensions

The dimensions of the prototype are free, except for the following basic requirements.

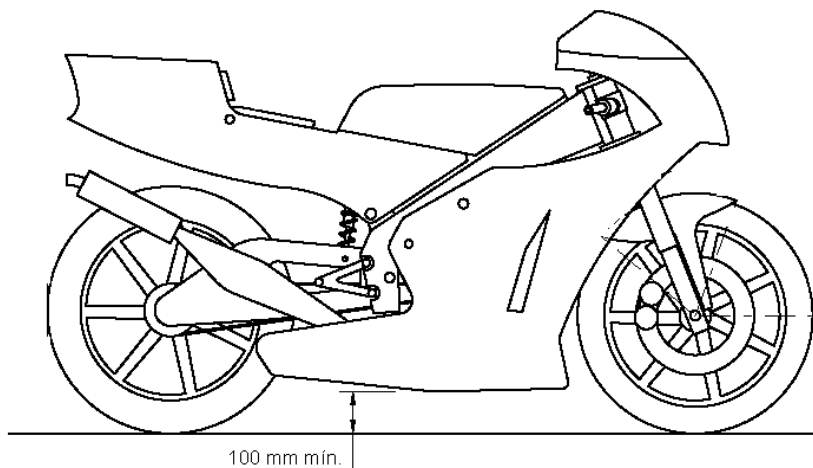
B.2.1.1 The minimum width between the ends of the semi-handlebars must be 450mm.



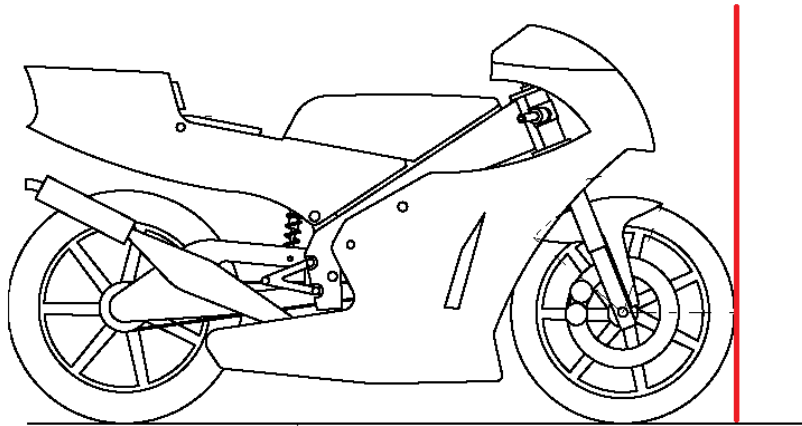
- B.2.1.2 The minimum tilt angle of the prototype without any of its elements (except the tires) touching the road surface must be  $50^\circ$ . This measurement will be made with an unloaded prototype (without the rider) but fully equipped, fluids included, for its correct operation.



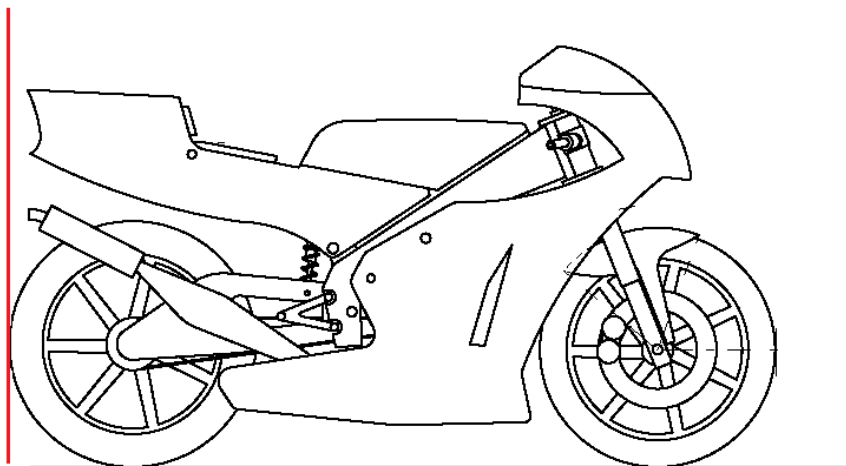
- B.2.1.3 The minimum distance between the prototype in upright position and the road surface must be of at least 100mm in rest situation. This measurement will be done with the prototype unloaded (without the rider), but with all the equipment and liquids for its operation.



B.2.1.4 Front limit: No element of the prototype shall protrude from the front vertical line drawn tangentially with respect to the external circumference of the front tire.

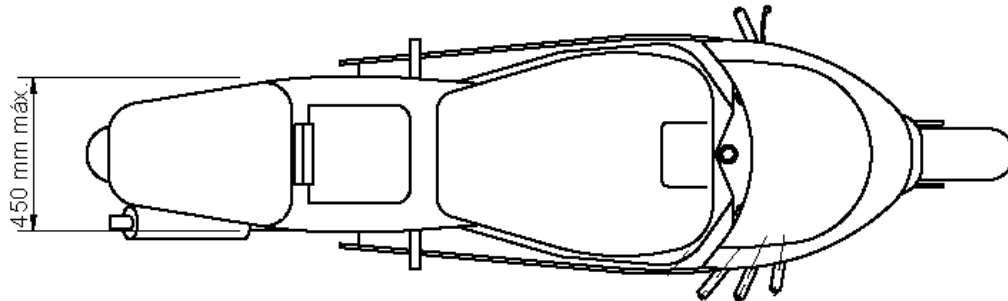


B.2.1.5 Rear limit: No element of the prototype shall protrude from the vertical line drawn tangentially with respect to the external circumference of the rear tire.

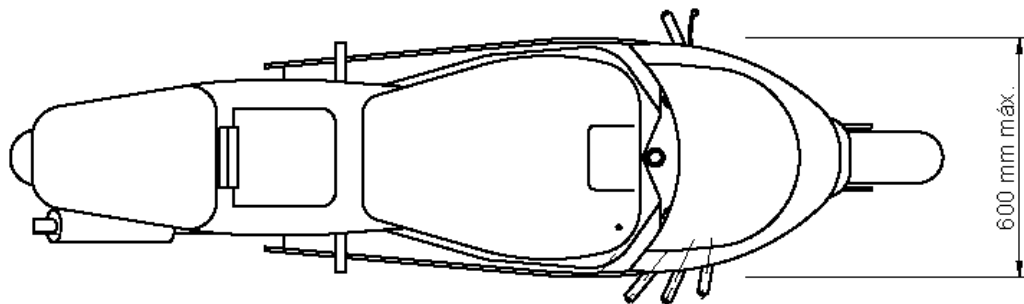


B.2.1.6 The tire tread shall have a minimum clearance of 15mm along its outer circumference to any part of the prototype in any position and with any geometry set-up.

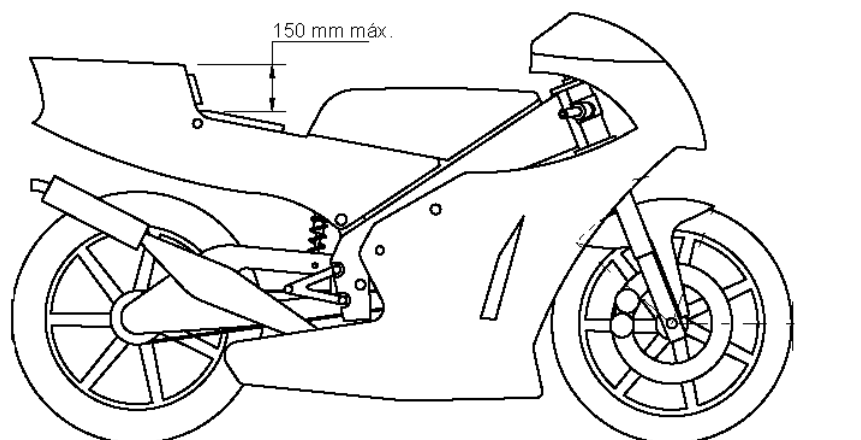
B.2.1.7 The maximum width of the saddle must not exceed 450mm. No other element of the prototype shall protrude from this width from the saddle to the rear except for the exhaust system for prototypes of the “MotoStudent Petrol” Category.



B.2.1.8 The maximum width of the fairing shall be 600mm.



B.2.1.9 The maximum height difference between the height of the saddle and the highest part of the tail shall be 150mm.





## **B.2.2 Weight**

- B.2.2.1 The total minimum weight of the prototype without the rider shall be 95kg for both categories, including all fluids that may be necessary for the correct operation of the prototype.
- B.2.2.2 The weight of the complete prototype shall not be below the minimum weight indicated in Art. B.2.2.1. at any time during the Final Event.
- B.2.2.3 The use of ballast to reach the minimum weight of the prototype is allowed. In case of using it, the ballast must be declared to the Technical Staff during scrutineering.
- B.2.2.4 In case of installation of mobile ballast, it must be properly fixed to the chassis so it cannot become detached from the prototype in case of shock or fall. It can be installed by zipties or screwed.

## **ARTICLE 3: FRAME**

### **B.3.1 Design**

The use of a commercial frame is not allowed, not even a modified unit. It must be a self-manufactured and self-designed frame prototype.

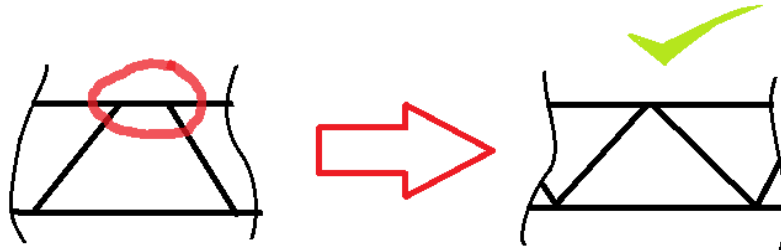
The main frame, the subframe and the swingarm are included in this article.

- B.3.1.1 There are no restrictions in the type of design or materials of the frame, swingarm or subframe, provided that the result complies with the rules imposed by these Regulations.
- B.3.1.2 In case of doubt about the safety of the frame design submitted, the Organization may request a safety justification report that includes analysis using the finite element method, simulations or other demonstration tests.
- B.3.1.3 Frame must be designed in such a way that all elements of the engine, fuel and combustion intake, and electrical and electronic control and safety systems are protected in case of a fall.

### B.3.2 Welding and unions

Welding of structural elements by any means is permitted, but the final structure must be consistent.

#### B.3.2.1 Structures of jalousie type must search the correct triangulation in the nodes of the structure.



Example of correct triangulation

### B.3.3 Crash protectors

#### B.3.3.1 It is mandatory to use protection caps made of nylon, fiber or materials of similar hardness, to protect the chassis and propulsion system laterally in case of fall.

#### B.3.3.2 The crash protectors may be installed both inside and outside the fairing, wheel axles, handlebars ends or other locations provided that they protect laterally the entire frame and propulsion system in case of crash.



Example of crash protector

## **ARTICLE 4: FAIRING**

### **B.4.1 General requirements**

- B.4.1.1 All edges and finishes of the fairing must be rounded. Minimum radius 1mm.
- B.4.1.2 The fairing cannot cover the rider sideways, except for the forearms (this exception is only applicable in minimum aerodynamic resistance position of the rider).
- B.4.1.3 There are no restrictions regarding the manufacturing material of the fairing.
- B.4.1.4 It is allowed to install wings if they do not exceed the maximum dimensions stated in this Regulations and are correctly fixed to the fairing. In case of wings, their minimum external radius will be 2.5 mm. Mobile wings or other mobile aerodynamic elements are not allowed. In case of doubt regarding track safety due to the use of wings or other aerodynamic elements, the decision of the Technical Staff of the Organization will be final.

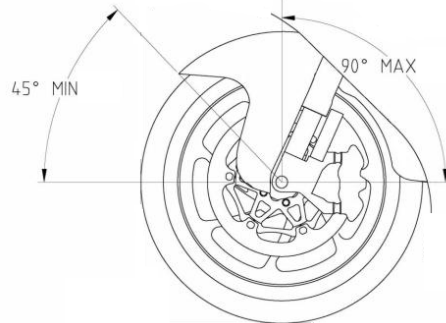
### **B.4.2 Lower fairing**

- B.4.2.1 The lower fairing must be manufactured to contain, in case of an incident, at least 2.5 litres of liquid.
- B.4.2.2 The lower fairing must include a hole with a diameter of 25mm located in the lowest part of the fairing. This hole must remain closed with a cap in dry conditions and must only be opened in case of rain. This cap must be wire-sealed to prevent its fall to track in case of closing failure.

### **B.4.3 Mudguards**

- B.4.3.1 The use of front and rear mudguards is compulsory.

B.4.3.2 Front mudguard cannot cover more than 135° of the wheel circumference measured from the rear part of the tire; the origin of the angle being on the horizontal line crossing the wheel shaft. Anchor points of the mudguards to the front fork, fork or brake discs covers may exceed this restriction.



B.4.3.3 The rear rim cannot be covered in more than 180°.

#### **B.4.4 Protection against trapping**

B.4.4.1 If by means of its design, the swingarm does not cover the inferior part of the chain or transmission belt, a guard must be fitted in such a way as to prevent trapping between the lower drive chain run and the final drive sprocket.

### **ARTICLE 5: HANDLEBARS AND FOOTRESTS**

#### **B.5.1 Handlebars and manual controls**

B.5.1.1 The use of handlebars or semi-handlebars made of light alloys, such as magnesium or titanium is not allowed.

B.5.1.2 The supports of the handlebar or semi-handlebar must be designed so as to minimise the risk of a fracture in case of a crash.

B.5.1.3 Minimum radius of 2 mm must be used at the parts that constitute the handlebars and their anchorages.

B.5.1.4 The throttle grip must include an auto return feature in order to make sure that the throttle will be shut down whenever the rider lets it go.

- B.5.1.5 The manual lever for clutch (in case of including it) is for free choice, provided the distance between the pivot point and the outer end do not exceed 200mm and edges and terminations are rounded.
- B.5.1.6 Installation of a front brake lever protection is mandatory. This protector must protect the lever from being accidentally activated in case of contact with another prototype. In addition to specific protections fixed to the handlebars, a fairing extension big enough to cover the brake lever (in front view) will also be accepted as protection.



**Examples of front brake lever protections**

- B.5.1.7 The electric ignition button must be located on the handlebar.

## **B.5.2 Footrests and their controls**

- B.5.2.1 The footrests can be fixed or “folding in case of crash” type. In case of folding type these must be fitted with a device that will make them return to their normal position as well as avoid any easy folding during the race. In rest position without the rider, footrests must be unfolded.
- B.5.2.2 The end of each footrest must present round ends, until a minimum spherical radius of 8mm.
- B.5.2.3 It is recommended the installation of a cap at the outer end of footrests, made of aluminum, plastic, teflon or any other equivalent material in terms of strength, permanently fixed.
- B.5.2.4 The footrests must be fitted with side protections to avoid the rider's boot to interfere with mobile elements such as the chain or the rear tire.
- B.5.2.5 The choice of rear brake pedal is free.

B.5.2.6 The choice of the gear shift pedal (in case of having one) is free.

## **ARTICLE 6: BRAKE SYSTEM**

The prototype must be fitted with a disc hydraulic-driven brake system both in the front and in the rear shaft.

The Organization will provide within the MotoStudent Kit the following parts of the brake system:

- Front caliper
- Rear caliper
- Front hand master cylinder
- Rear foot master cylinder

Information regarding these components will be provided to all participating teams.

### **B.6.1 Command and control**

B.6.1.1 Combined brake systems are not allowed. The front and rear systems must be completely independent of each other.

B.6.1.2 The braking system for the front wheel should be commanded by a hand lever installed next to the throttle grip on the right handlebar.

B.6.1.3 The braking system for the rear wheel must be commanded by foot by a cam system installed in the area of the right footrest.

### **B.6.2 Discs**

B.6.2.1 The brake discs are free-choice.

B.6.2.2 The brake discs must be made of steel alloys. The use of carbon or ceramic compound brake discs is strictly forbidden.

B.6.2.3 The use of discs with inner ventilation is forbidden.

B.6.2.4 Brake discs must be installed on front and rear rims.

B.6.2.5 Installation of brake disc spacers between the rim and the disc is permitted.

### **B.6.3 Brake callipers**

The use of the brake callipers provided by the Organization, both for the front and the rear shaft, is compulsory.

B.6.3.1 The rear brake caliper must be installed with at least one anchoring element directly fixed to the swingarm.

B.6.3.2 It is allowed to mount the rear caliper over a non-fixed support system placed by the rear wheel axle, provided that the system has at least one direct fixing for the swingarm, as indicated in Art. B.6.3.1.

B.6.3.3 The front and rear brake pads are free-choice.

B.6.3.4 The pins of the front and rear brake pads can be changed. Quick change systems are allowed.

B.6.3.5 No supplementary cooling pipes on the calliper are allowed.

B.6.3.6 The modification of the body of the brake calipers provided by the Organization is forbidden. The realization of recesses or chamfers is not allowed. Therefore, teams must choose or adapt anchorages for proper installation of the supplied callipers.

### **B.6.4 Brake pumps**

The use of the brake pumps provided by the Organization, both for the front and the rear shaft, is compulsory.

B.6.4.1 The brake hoses included with the pumps supplied can be modified or replaced.

B.6.4.2 The activation lever for the front brake pump cannot be replaced or modified.

### **B.6.5 Brake ducts**

B.6.5.1 The brake hoses are free-choice.

B.6.5.2 The passage of the hoses for the front brake calliper must be made ahead the lower steering plate.

B.6.5.3 Quick connectors on the brake hoses are allowed.

### **B.6.6 ABS System**

The use of an anti-block system (ABS) is not allowed.

### **B.6.7 Brake fluid**

The hydraulic fluid of the brake system is free-choice.

## **ARTICLE 7: SUSPENSION SYSTEM**

Suspension systems are free configuration, except for the rules set forth below.

### **B.7.1 General aspects**

B.7.1.1 All active or semi-active suspension systems and/or electronic controls of any type for the suspension, including those that control the height adjustment are forbidden.

B.7.1.2 The settings of the suspension can only be made manually and by means of mechanic/hydraulic adjustments.

B.7.1.3 The Organization shall not accept the participation of a prototype which suspension system is determined to be dangerous for the participation in track tests.



### **B.7.2 Front suspension**

- B.7.2.1 Front suspension system of any kind are permitted: conventional fork, inverted fork, telelever, duolever, front swingarm, etc. Both commercial and self-designed / modified systems are allowed.
- B.7.2.2 The front suspension assembly may have mechanical or hydraulic adjustment systems, such as spring preload, compression, extension or rebound regulation.

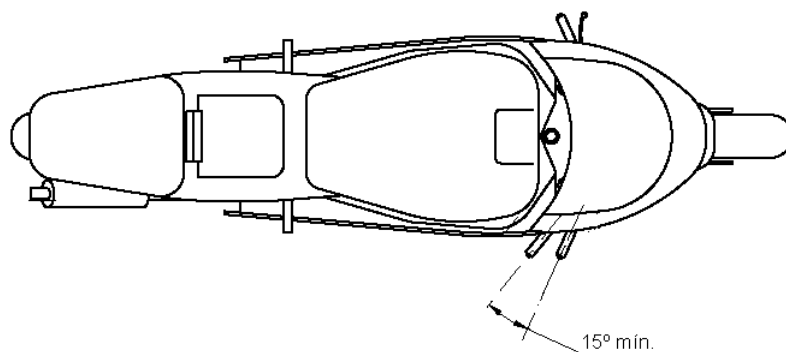
### **B.7.3 Rear suspension**

- B.7.3.1 Rear suspension system of any kind are permitted. Both commercial and self-designed / modified systems are allowed.
- B.7.3.2 The rear suspension assembly may have mechanical or hydraulic adjustment systems, such as spring preload regulation, compression, extension or rebound regulation.

## **ARTICLE 8: STEERING SYSTEM**

### **B.8.1 Restrictions and geometry**

- B.8.1.1 The minimum turning angle of the steering must be  $15^\circ$  measured on either side of the longitudinal axis of the prototype.



- B.8.1.2 The turning angle must be limited with stoppers on both sides. These stoppers should be made of nylon, aluminum or materials of similar hardness. Neither the chassis, or any other part of the prototype may act as a steering stopper.
- B.8.1.3 There must not be any element interfering in a tolerance of 30mm around the handles of the handlebars and actuators, all along the steering stroke. The aim is to avoid damage to the hands and fingers of the rider in case of a crash.

## **B.8.2 Steering dampers**

- B.8.2.1 The use of steering dampers is allowed.
- B.8.2.2 The settings of the steering dampers can only be made manually and by means of mechanic/hydraulic adjustments.
- B.8.2.3 The steering damper cannot act as a device that limits the turning angle.

## **ARTICLE 9: RIMS AND TIRES**

### **B.9.1 Rims**

Rims will be freely chosen by each team.

- B.9.1.1 The sizes of the rims (considering areas enabled for the tires fitment) must be:
- Front rim: 2.5" x 17"
  - Rear rim: 3.5" x 17"
- B.9.1.2 Rims made of composites (like carbon fiber or reinforced glass fiber) are forbidden. Rims must be made of steel, aluminium or magnesium.
- B.9.1.3 The use of nylon protectors at the ends of the shafts for possible crashes is allowed. These protectors must be rounded, with a diameter that is equal or larger than the used shaft.
- B.9.1.4 The ends of the wheel shafts cannot protrude more than 30mm from their housing. Possible nylon protectors are not considered in this measure (see Art. B.9.1.3).

## **B.9.2 Tires**

Only those tires supplied by the Official Tire Supplier of the respective competition year can be used at MotoStudent. The Organization will supply a set (front and rear) of dry-condition slicks to each team within the MotoStudent Kit.

The technical information regarding the official tire set will be sent to all teams participating in the Competition.

B.9.2.1 Should the team wish to have more tires, both for dry and wet conditions; they will be able to purchase them through the Organization. The tire mounting during the Final Event will be limited to 1 additional set to the supplied initially.

B.9.2.2 The use of tire warmers is allowed.

## **ARTICLE 10: ELECTRONIC SYSTEMS**

### **B.10.1 Riding assistance electronic systems**

B.10.1.1 It is forbidden to use electronic control or assistance systems that provide for a clear riding advantage, such as traction control, ABS, anti-wheelie systems, etc..

### **B.10.2 Rider information systems**

B.10.2.1 The information systems and alerts in the dashboard for the rider are freely configurable.

### **B.10.3 Data recording systems**

Data recording systems are permitted. These systems can acquire data relative to motor/engine parameters, motorcycle dynamics and rider behaviour.

B.10.3.1 The use of all types of sensors is allowed, provided that its installation does not affect any rule of these Technical Regulations.

B.10.3.2 The live reading systems of telemetry are prohibited. The data acquisition may only be read at the stops in box. Direct download of data is allowed using a wired connection or a wireless one (e.g. bluetooth or wifi) as long as the connection and data download is only made during stops in box.

B.10.3.3 All components and wiring of the data acquisition system must be properly fixed and placed in safe areas.

#### **B.10.4 Transponder**

Prior to performing the MS2 tests during the Final Event, the Organization will supply a transponder to all the teams to be installed on the prototype.

B.10.4.1 To receive the transponder, at the time of the delivery the team must leave a deposit of € 50 to the Organization, which will be returned if there is no damage or accident by misuse at the end of the Event.

B.10.4.2 The transponder must be properly fixed using zipties on the left suspension bottle of the front fork, focused towards the outside of the prototype, and in an easily accessible area. In case the design of the prototype does not allow this placement, the Technical Staff of the Organization will indicate to the team the correct location.

#### **B.10.5 On-board cameras**

For the use of on-board cameras during the tests, teams must request permission previously to the Competition Organization.

B.10.5.1 The installation of on-board cameras during MS2 tests must be approved by both the Technical Staff of the Organization and by the Race Direction.

B.10.5.2 The installation of on-board cameras will only be possible during the dynamic tests 1, 2 and 3 of the MS2 Phase. On-board cameras are not allowed to be installed during practice sessions and races.

B.10.5.3 In case of installing on-board cameras for the tests described in Art. B.10.5.2, the Technical Staff of the Organization must verify and authorize beforehand the correct installation.

### B.10.6 Rear Safety Light

All motorcycles must have a functioning red light mounted at the rear of the machine for rain or low visibility conditions. The team must ensure that the light is switched on any time the motorcycle is on the track or being ridden in the pit-line whenever a rain tyre is fitted on the motorcycle. All lights must comply with the following:

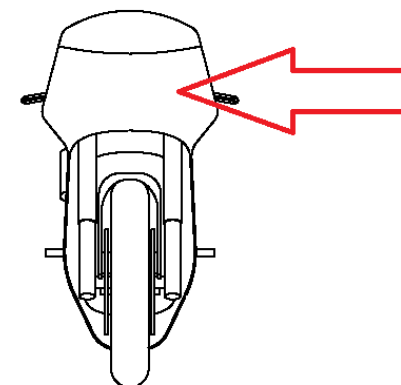
- a) Lighting direction must be parallel to the motorcycle running direction, and be clearly visible from the rear at least 15 degrees to both left and right sides of the machine centre line.
- b) The rear light must be mounted near the end of the seat/rear fairing and approximately on the machine centre line, in a position approved by the Organization. In case of dispute over the mounting position or visibility, the decision of the Organization will be final.
- c) Power output/luminosity equivalent to approximately: 10 – 15W (incandescent), 0.6 – 5 W (LED).
- d) The output must be continuous - no flashing safety light whilst on track, flashing is allowed in the pit lane when pit limiter is active.
- e) Safety light power supply may be separated from the motorcycle.
- f) The Organization has the right to refuse any light system not satisfying this safety purpose.

## ARTICLE 11: IDENTIFICATION, ADVERTISING AND COMPETITION NUMBERS

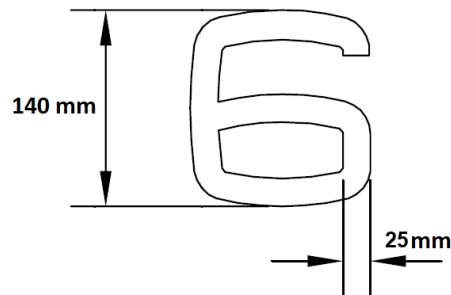
### B.11.1 Bike Numbers

Each prototype must include 3 identifying bike numbers on its fairing, according to the bike number assigned to each team as stated in Art. A.3.4.3.

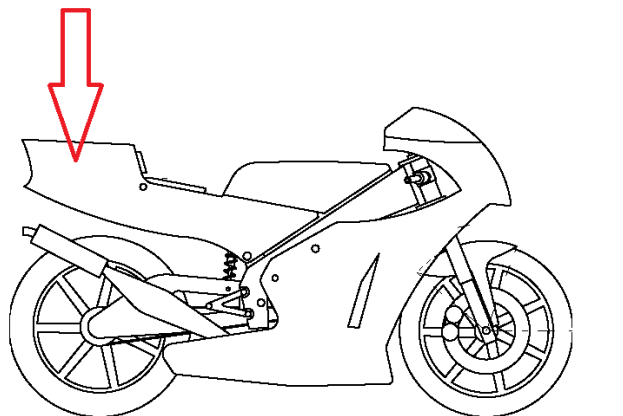
B.11.1.1 The front number must be placed on the front part of the fairing. It may be located in the central part or lopsided, provided that it is perfectly readable.



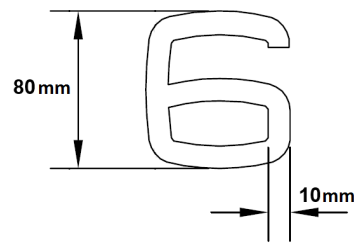
B.11.1.2 In the front number, the minimum dimension of each character must be 140mm in height and the minimum stroke width of each character must be 25mm. The minimum distance between characters must be 10mm.



B.11.1.3 A bike number must be placed on either side, to be precise, on the rear side of the fairing (tail).



B.11.1.4 In the side numbers, the minimum dimension of each character must be 80mm in height and the minimum stroke width of each character must be 10mm. The minimum distance between characters must be 5mm.



B.11.1.5 The numbers must be totally black color. No combination of colors is allowed.

B.11.1.6 The font used for bike numbers is free, as long as the Technical Staff of the Organization considers it readable. The inclusion of graphics or logos in the number is not allowed.

B.11.1.7 The background behind the numbers should be a continuous homogeneous white area, and shall cover an area encompassing at least 25 mm around the numbers.

## B.11.2 Identification

B.11.2.1 The name of the represented university, its logo or its initials must appear on all prototypes, occupying an area with a minimum height and width of 100mm.

B.11.2.2 There must be a space on the right external side (considering riding direction) of the frame for the scrutineering stickers. The stickers must be visible with the fairing mounted. The Organization will place 3 rectangular labels with a maximum size of 3 x 3 cm.



Examples of scrutineering stickers

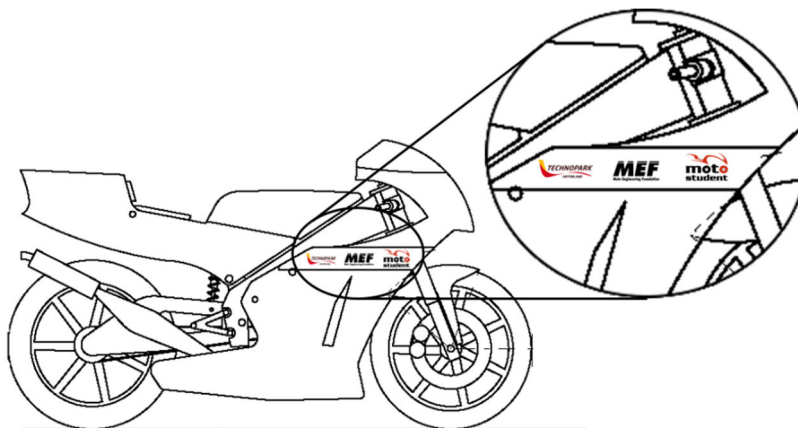
B.11.2.3 Every prototype must have an identifying number engraved in the frame. The said number/code will be provided by the Organization and engraved by the

team on the left side of the prototype. The engraved identifying number must be perfectly visible with the fairing fitted.

### B.11.3 Competition Logos and Advertising

B.11.3.1 In the final design of the prototype, all participating teams must include in the upper part of the side fairing a strip which must meet the following specifications:

- The strip should be white.
- The MotoStudent, MEF and TechnoPark MotorLand logos must be included on the strip in the original colors. The design of these logos will be previously provided by the Organization to all teams.
- This strip must cross from the rear of the side fairing to the front. The minimum height of this white strip will be 70mm and the length will be defined by the chosen design of fairing. The tilt angle is free, although it is recommended to position it as horizontally as possible.
- The logos should be arranged in symmetrical order on both sides, in the order of the guiding figure shown below. From the front to the rear must follow the order MotoStudent - MEF - TechnoPark MotorLand on both sides.
- The minimum width of the logos will be 50mm.



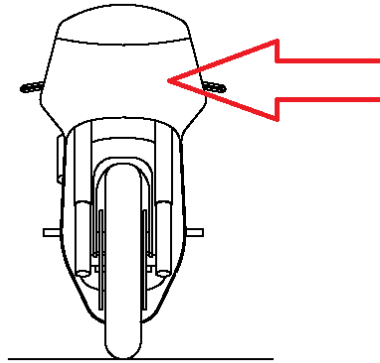
**White stripe with compulsory logos**

B.11.3.2 Apart from the stripe indicated in Art.B.11.3.1, three spaces should be available to include stickers that will be fixed by the Organization during the Final Event.

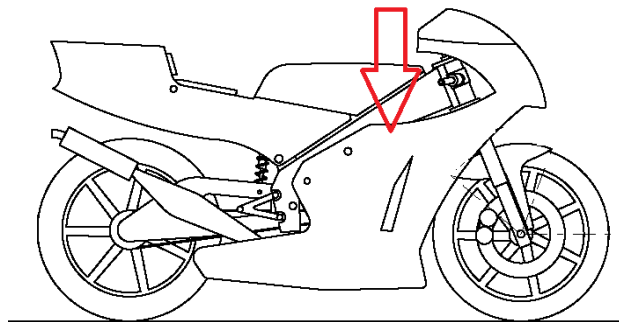


These stickers will have a maximum area of 150mm wide x 100mm high and will be provided by the Organization. Its location will be:

- A sticker in the front part of the fairing, near the front number, under the windscreen.



- A sticker on each side of the fairing at the top front zone.



B.11.3.3 In case of not following the spaces stated in this article for the Organization stickers, the Organization will decide to place them where it considers more convenient, without caring if it is placed under any existing logo, promotional sticker or fairing element, without giving the chance to the team to appeal or change them.

B.11.3.4 Is strictly forbidden to include advertising of alcoholic drinks or tobacco on the prototype or any other corporate environment of the team.

B.11.3.5 Is strictly forbidden to include advertising or other messages that violate human dignity (violence, intolerance, xenophobia, racism, etc.), or that may offend the sensibilities of some people, both on the prototype as in any other corporate environment of the team. Likewise, the Organization reserves the right to review and analyze the advertising content and ban it if it is considered appropriate.

## ARTICLE 12: RIDER EQUIPMENT

### B.12.1 Helmet

B.12.1.1 The rider must wear a FIM RACING HOMOLOGATED helmet. More information available at <http://www.frhp.org>

B.12.1.2 The use of disposable screen covers is allowed (tear-off).

B.12.1.3 The screen must be made of a shatterproof material.

B.12.1.4 The helmet must be well fastened and adjusted during the MS2 tests.

### B.12.2 Safety clothing

B.12.2.1 The rider must be fitted with a whole one-piece suit, preferably made of leather or other great resistance material, which cover full torso and extremities, and provides special protection of elbows and knees.



B.12.2.2 The use of suit with backbone protector is recommended.

B.12.2.3 The use of boots of leather or similar material protection is mandatory.

B.12.2.4 The use of leather gloves with fingers protection is mandatory.

B.12.2.5 The use of underwear homologated for competition is recommended.

## **VI International Competition MotoStudent**

### **SECTION C: SPECIFIC TECHNICAL REGULATIONS FOR THE CATEGORY "MOTOSTUDENT PETROL"**

## **ARTICLE 1: ENGINE**

The Organization will supply an internal combustion engine which will be common for the teams entered in the “MotoStudent Petrol” Category.

### **C.1.1 Sealing**

The use of the engine provided by the Organization is compulsory. The engine provided by the Organization will be sealed and it is strictly forbidden to manipulate it. Any broken or damaged seal shall be reason to declare a technical nonconformity.

C.1.1.1 In case of breakdown or malfunction of any internal part to which the team is not allowed to access, the team shall inform the Organization, who shall take the convenient steps.

### **C.1.2 Engine technical specifications**

Technical information about the engine will be sent by the Organization to all the teams registered in the Competition.

C.1.2.1 The engine supplied by the Organization will have a displacement between 240cc and 340cc.

C.1.2.2 The engine supplied by the Organization shall have an internal liquid cooling system.

### **C.1.3 Crankcase, cylinder head and engine block**

C.1.3.1 External and internal modifications of the engine assembly are not allowed.

C.1.3.2 Modifications in the engine block are not allowed, not even in its anchorages. The frame supports for the engine should be designed according to its original geometry.

C.1.3.3 Modifications in the original cooling ducts of the engine are not allowed. The external cooling system should be developed according to the original cooling ducts of the engine.

- C.1.3.4 Modifications in the intake and exhaust housing of the engine are not allowed. Intake and exhaust systems should be developed according to the original geometry and dimensions of the engine.
- C.1.3.5 The installation of protective engine covers or cases is allowed, provided that their installation does not involve the structural modification of the engine, being able to use the original screw housings of the engine covers or carter as anchoring. In no case shall the protective cases cover the Organization seals or labels, nor any identifying reference engraved on the engine.
- C.1.3.6 The original oil pump integrated in the engine block cannot be modified.
- C.1.3.7 The original water pump integrated in the engine block cannot be modified.

#### **C.1.4 Modifications**

- C.1.4.1 Any change or modification on the engine that is not specified in these Regulations is not allowed.
- C.1.4.2 In case of a dispute about these changes, the decision of the Organization will be final.

## **ARTICLE 2: AIR INTAKE SYSTEM**

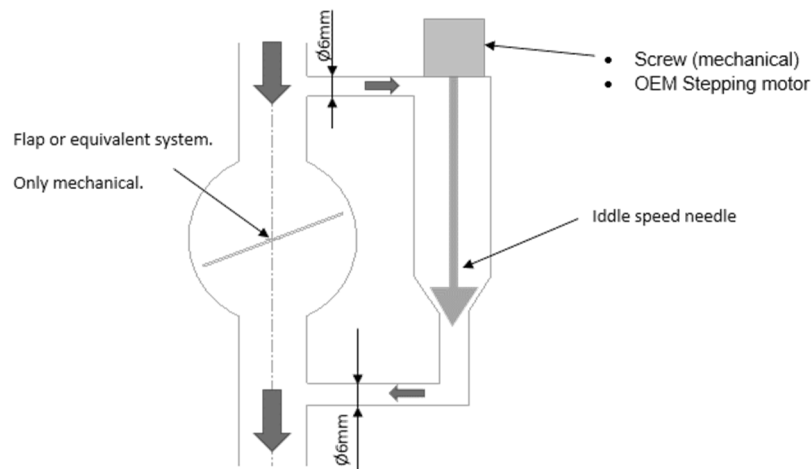
### **C.2.1 Intake pipes**

The composition, dimension and position of the air intake pipes are free, provided that they comply with the dimensional requirements of the general dimensions of the prototype.

- C.2.1.1 It is not allowed to install mobile devices in the intake system before the intake valves of the combustion chamber, except for the carburettor or the injector-throttle body.
- C.2.1.2 The presence of an air-fuel mix and recycled engine gases is only allowed in the intake pipes. The additional injection of other elements, such as ethanol, methanol, water, etc. is not allowed.

## C.2.2 Intake flap

C.2.2.1 Only one flap or an equivalent mechanical system is allowed, to be activated only by mechanical means (e.g. cable) handled by the rider. **A bypass could be implemented for controlling the idle speed of the engine. It could be commanded both mechanical or electronic, using the original stepping motor supplied with the KTM throttle body and directly connected to the KTM ECU. The maximum diameter of the inlet and outlet of the bypass would be 6mm.** No other mobile elements are allowed in the intake pipe.



C.2.2.2 No interruption of the mechanical connection between the activation of the rider and the throttle flap is allowed.

## C.2.3 Overpressure systems

The use of "turbo" systems to increase the gas pressure in the intake is forbidden. It is only allowed to make use of the aerodynamics of the vehicle movement by means of air intakes.

## C.2.4 Airbox and air filtering

The design of the airbox is free.

C.2.4.1 The air intake filter element is free-choice.

### **C.2.5 Recycling of gases**

It is allowed the recycling of breather gases of the engine.

- C.2.5.1 The installation of a closed gas recycling system that directs the excess gases from the engine block to the intake system is allowed. These engine breathing lines can pass through a filtration and oil capture tank.
- C.2.5.2 In case that the recycling system indicated in Art.C.2.5.1 is not installed, a breathing duct must be installed to discharge the remains of oil in a tank of at least 200cc, specifically installed for this function.
- C.2.5.3 Under no circumstances shall the breather gases without previous oil residues filtration be discharged directly on the track or on any part of the prototype not indicated in this article.

## **ARTICLE 3: FUEL SUPPLY SYSTEM**

### **C.3.1 Fuel tank**

- C.3.1.1 Fuel tanks, regardless their design or manufacturing material, should be filled with mousse type flame retardant foam (preferably Explosafe or similar foam).



**Example of flame retardant foam**

- C.3.1.2 It is mandatory to install a breathing duct in the fuel tank to prevent possible overpressures. This duct should be provided with a retention valve that allows the free circulation of air (fuel gases) but blocks the circulation of liquids (fuel), to avoid spills of gasoline in case of an accident. The exit of the breathing tubes



must be done in a recovery container specific for this use, which must have a minimum capacity of 250cc.

- C.3.1.3 In case of "non-metallic" fuel tanks (made of carbon fiber, aramid fiber, fiberglass, polymeric materials, etc.) the installation of a second additional internal deposit of rubber or resin is mandatory. If the non-metallic tanks have FIM approval (demonstrable with the corresponding FIM label), the installation of this internal bladder is not mandatory. The purpose of this inner safety bladder is to prevent spillage of fuel to the outside in the event of tank breakage.
- C.3.1.4 The **lowest part of the fuel tank** ~~exit of fuel from the tank~~ must be above the height of the engine intake valves.
- C.3.1.5 The fuel tank cap must be fitted with a threaded opening/closing system. Lockable caps are forbidden.
- C.3.1.6 The fuel tank cap must ensure a watertight seal, which prevents the possibility of fuel leaks in the event of a fall.

### C.3.2 Fuel pipes

All fuel pipes going from the tank to the carburettor or to the injection system must be fitted with at least one self-closing valve (quick connector), so that if the tank becomes detached from the motorcycle it will be the connector that gets disconnected and no other connections of the pipe. The strength needed to open the connector must be, maximum, 50% of the strength needed to loosen any other connection or breakage of the pipe material.



Example of self-closing quick connector

### C.3.3 Injection system

- C.3.3.1 Replacement or modification of the original fuel supply system of the supplied engine is allowed. Either carburetion or injection systems are allowed.
- C.3.3.2 The fuel injector must be installed before the admission valves of the cylinder. Direct injection into the combustion chamber is not allowed.
- C.3.3.3 It is allowed to install only one injector.

C.3.3.4 The installation of a unique fuel pump is allowed. There are no restrictions on the type of pump to be installed.

#### **C.3.4 Fuel cooling**

The artificial cooling of the fuel is not allowed. Only the aerodynamic design may be used for cooling the fuel system.

#### **C.3.5 Fuel pressure**

The fuel pressure must not be over 5 bar in any part of the supply circuit.

C.3.5.1 The refueling operation must be done from a non-pressurized recipient.

C.3.5.2 It is forbidden to artificially pressurize the fuel tank.

### **ARTICLE 4: FUEL AND LUBRICANTS**

#### **C.4.1 Fuel**

The fuel set for the Competition must be unleaded 98 octanes (or less). During the Final Event, only the Official Fuel distributed by the Organization may be used.

The technical information and sales prices of the Official Fuel will be published by the Organization to all teams.

C.4.1.1 Any alteration of the fuel with additives or any other treatment is forbidden.

C.4.1.2 At any time during the Final Event, the Organization may require samples of fuel. In case of not using the Official Fuel, the team can be disqualified from the test in process or even from the Competition.

C.4.1.3 It should be taken into account that the composition of the fuel will comply with the chemical requirements established in the European Union. Non-EU countries may find different chemical composition of lubricants, so it is recommended to take this factor into account when setting up and adjusting the prototype.

#### **C.4.2 Engine lubricating oil**

The lubricating oil to be used is free-choice.

C.4.2.1 The installation of radiators to cool the oil is not allowed.

### **ARTICLE 5: COOLING SYSTEM**

#### **C.5.1 Cooling systems**

C.5.1.1 The design and manufacturing of the external cooling system is free.

C.5.1.2 The number, position, size and composition of the cooling liquid radiators are free-choice, provided that they comply with the dimensional requirements of the general dimensions of the prototype.

#### **C.5.2 Cooling fluids**

C.5.2.1 Only distilled water may be used as cooling fluid.

C.5.2.2 The use of additives in the distilled water is forbidden.

### **ARTICLE 6: EXHAUST SYSTEM**

#### **C.6.1 Exhaust system design**

C.6.1.1 The exhaust system design is free, provided that it complies with the general dimensional requirements of the prototype and the noise regulations.

C.6.1.2 No mobile parts are allowed in the exhausts starting from the exhaust valves of the engine (i.e. additional valves, deflectors, etc.).

### **C.6.2 Noise**

The maximum noise level allowed for the exhaust is 105 dB/A measured statically at 5,000 RPM.

## **ARTICLE 7: TRANSMISSION SYSTEM**

### **C.7.1 Clutch**

The original clutch type should be maintained.

C.7.1.1 Clutch disks can be replaced.

C.7.1.2 Clutch springs can be replaced.

C.7.1.3 Clutch basket can be replaced.

C.7.1.4 The installation of clutch systems with limited slip (anti-skid or anti-bounce type) is allowed.

### **C.7.2 Gearbox**

The original gearbox is integrated in the supplied engine and shares the lubrication system with the engine itself.

C.7.2.1 The original gearbox cannot be replaced or modified.

C.7.2.2 External quickshift type systems are allowed.

### C.7.3 Secondary transmission

- C.7.3.1 Only secondary transmission systems by chain are allowed.
- C.7.3.2 The original output pinion of the gearbox included in the engine can be replaced. The variation of geometry and number of teeth is allowed.
- C.7.3.3 The rear wheel sprocket and the chain are free-choice.

## ARTICLE 8: ELECTRIC INSTALLATION

### C.8.1 ECU

The Electronic Control Unit (ECU) of the engine must be the original corresponding to the supplied engine.

- C.8.1.1 Physical modification of the ECU is not allowed, even in the outer casing.
- C.8.1.2 The electronic engine management map must be the original from the manufacturer. Remapping of the engine map is not allowed.
- C.8.1.3 The identification labels with the ECU reference numbers cannot be withdrawn, as well as any marking or sealing from the Organization.
- C.8.1.4 At any time during the Final Event, the Organization may request the ECU of any participating team, supplying another replacement unit that the team must install to carry out the different sessions and tests of the MS2 Phase. This substitution of ECUs can be done by direct assignment or randomly, as many times as the Organization deems appropriate.
- C.8.1.5 It is allowed to install additional electronic devices that parameterize or modify the signals received by the original ECU, and also injection and ignition signals with the only propose of tuning the intake and exhaust systems designed.
- C.8.1.6 Under no circumstances may the signal from the sensors integrated in the engine be distorted to exceed the engine speed limit (rpm) set by the

manufacturer (10.500 rpm). The limit of revolutions may be verified by the Technical Staff of the Organization at any time during the Final Event.

## **C.8.2 Battery**

It is compulsory to install a battery with an operating voltage of between 8V and 18V.

## **C.8.3 Electric installation**

C.8.3.1 The configuration of the electric installation by the teams is free.

C.8.3.2 The use of commercial installations is allowed.

C.8.3.3 The type of cable, the design and the wiring are for free configuration, provided that they are properly insulated.

C.8.3.4 The connector type is free. Teams should bear in mind that the electric functioning of the prototype must also be guaranteed in wet conditions.

C.8.3.5 The use of commercial components is allowed (coil, batteries, regulators, connectors, etc.).

C.8.3.6 All prototypes must fit a safety stop button on the left-hand side of the handlebar. This button must be highlighted in red to be easily locatable in case of emergency. The stop button should stop the engine when it is activated.

C.8.3.7 The use of a single ignition coil is allowed.

C.8.3.8 The electrical installation must be perfectly integrated into the whole of the prototype. It is forbidden leaving distances larger than 15cm of wires unfixed.

C.8.3.9 The length of the cable must be the proper one, so that it is forbidden to coil the excess cable length.

C.8.3.10 It is recommended to remove the electrical installation as much as possible from the hot spots of the engine, as well as cooling and exhaust systems. Under no circumstances may electrical cables and components be in direct contact with parts of the prototype that reach high temperatures.

#### **C.8.4 Start system**

- C.8.4.1 The cancellation of the electric start system integrated in the Official Engine is forbidden.
- C.8.4.2 In the event of a fault in the electric starter motor, during the start procedure of the race session will not be allowed to start the engine with external starters. Only in the event of a breakdown will it be possible to start the prototype by pushing.

## **VI International Competition MotoStudent**

### **SECTION D: SPECIFIC TECHNICAL REGULATIONS FOR THE CATEGORY “MOTOSTUDENT ELECTRIC”**



## ARTICLE 1: DEFINITIONS AND GENERAL ASPECTS

### D.1.1 High Voltage - HV, Low Voltage - LV, Volts Direct Current – VDC.

Any circuit with a potential difference above 40 VDC, will be part of the High Voltage (HV) system of the prototype. Below this voltage, it will be considered as part of the Low Voltage (LV) system.

D.1.1.1 The maximum permitted voltage of the HV system shall be 126 VDC.

D.1.1.2 The use of software elements to control the maximum voltage is allowed.

### D.1.2 High Voltage System – HVS

The High Voltage System (HVS) is made-up of all the electric pieces that form part of the motor, controller, accumulator or any other electric part connected to them. The HVS shall be a High Voltage (HV) system according to the specifications of Art. D.1.1 of these Regulations.

D.1.2.1 The HVS must be electrically separated from the prototype chassis or ground.

D.1.2.2 The accumulator of the HVS is defined as any cell, battery or supercapacitor (or a group of them), able to store electric energy for the electric propulsion system.

D.1.2.3 The HVS must have a controller device fitted in between the motor and the accumulator, so that there cannot be a direct connection between the motor and the accumulator.

D.1.2.4 It is compulsory to place clearly visible labels indicating danger on housings or areas near the components working with High Voltage (HV). These labels must include the text "HIGH VOLTAGE".



D.1.2.5 The dashboard must be fitted with a display showing the voltage between terminals in the HVS at any given time. The voltage of the HVS may be measured by the Technical Staff of the Organization in order to check whether or not the value shown on the display corresponds to the real voltage value of the HVS.

### **D.1.3 Ground Low Voltage System – GLVS**

The Ground Low Voltage System (GLVS) is made-up of any circuit or electrical part of the prototype (chassis) and hence is not part of the HVS.

D.1.3.1 The GLVS must be a LV system, with a voltage below 40 VDC.

### **D.1.4 Insulation between HVS and GLVS**

D.1.4.1 The HVS and the GLVS shall be galvanically separated.

D.1.4.2 Should a DC/DC converter be used; it will have to comply with this specification.

## **ARTICLE 2: ELECTRIC MOTOR AND POWER DEMAND**

The Organization will provide a common electric motor for the teams registered at the MotoStudent Electric Category.

### **D.2.1 Sealing**

The use of the motor provided by the Organization is compulsory. The Organization will provide a sealed motor and it is absolutely forbidden to manipulate it. Any broken or damaged seal will be reason for technical non-conformity.

In case of breakdown or malfunction of any internal part, the access to which is forbidden, please contact the Organization to let them take the appropriate measures.

### **D.2.2 Electric motor technical specifications**

The technical information about the electric motor will be published by the Organization to all the teams registered in the Competition.

- D.2.2.1 The motor supplied by the Organization cannot be modified structurally, not even in its anchors, outer casings or cooling / ventilation system.

### **D.2.3 Energy regeneration**

Energy regeneration is allowed using the motor as a generator during braking.

### **D.2.4 Throttle potentiometer**

It is compulsory to include a throttle potentiometer which is controlled from the right-side handlebar of the prototype. The signal of the potentiometer shall be used to configure the demand of torque or speed from the motor.

- D.2.4.1 It is allowed to configure the motor brake with the same potentiometer, mapping it in a range below the acceleration range.

## **ARTICLE 3: ENERGY STORAGE**

### **D.3.1 Permitted storage systems**

Any type of battery may be used as energy storage system, except for molten salt batteries (thermal batteries) and fuel cells.

- D.3.1.1 The use of supercapacitors is allowed.

- D.3.1.2 The voltage supplied by the batteries shall be a maximum of 126 VDC, as described in Art. D.1.1.

- D.3.1.3 The connection diagram used (cells in series and in parallel) must be submitted to the Organization.

### **D.3.2 Battery container**

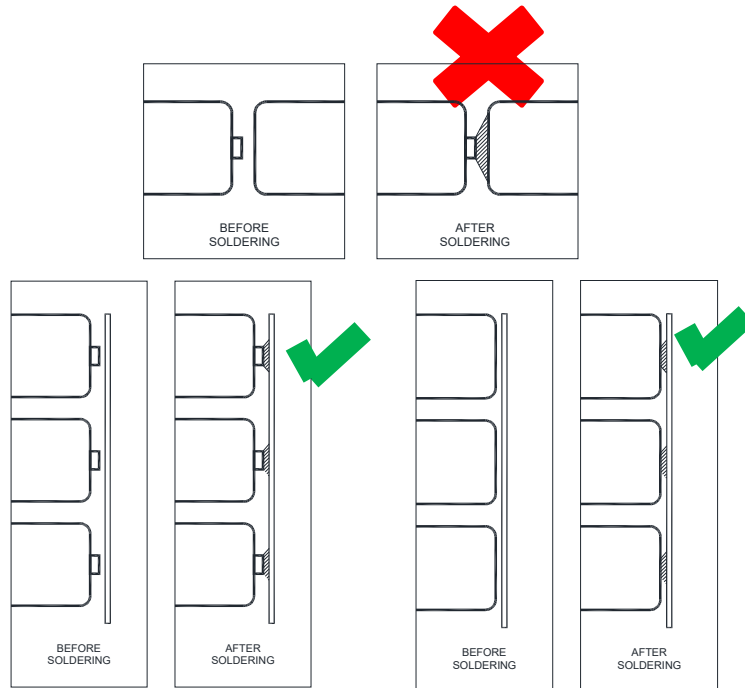
All battery cells and supercapacitors that are part of the accumulator must be installed inside a battery container or case.

- D.3.2.1 The use of several battery containers is allowed. Each one of them must comply with the same prescriptions established for a single battery container.
- D.3.2.2 If the battery container is not easily accessible, the Organization may request pictures of its layout and assembly at any time.
- D.3.2.3 A detailed description of the accumulation system shall be submitted before proceeding with its assembly. Also, it will be obligatory the submission of pictures of the different phases of the assembly of the accumulator, showing all the parts installed. Failure to comply with either of these two requirements may result in the exclusion of the prototype for the MS2 Phase of the Competition (see Art.D.13.1.1).

### **D.3.3 Electrical configuration of the accumulator**

- D.3.3.1 If the container is made of an electricity conducting material, the terminals of the cells or supercapacitors must be correctly protected and insulated with an electrically insulating material.
- D.3.3.2 If the container is made of an electrically conductive material (metals, carbon fiber, etc.), the body of the cells cannot be directly in contact with the inner wall of the crankcase and an insulation material must be placed between them. Prismatic cells with a rigid insulating housing are excluded from this requirement.
- D.3.3.3 Each container must include at least one fuse inside whose rated current must be below the cutting limit of the contactor.
- D.3.3.4 Each container must include, at least, a normally open (NO-type) line contactor, installed in the positive terminal of the accumulator.
- D.3.3.5 The closing of the line contactor, and consequently the presence of High Voltage (HV) at the exit of the accumulator, must be signalled by means of a red-light signal located on the dashboard, according to the standards given in Art. D.10.1.1.

D.3.3.6 It is not allowed the direct connection between cell terminals by means of welding or soldering. Indirect welding or soldering is permitted through a conductive material (plates, plates, cables, fusible wire). The welding or soldering of the BMS conductors to the terminals is allowed. In the case of "pouch" type cells, direct welding between their plates is allowed, if they are available.



#### D.3.4 Mechanical configuration of the accumulator

D.3.4.1 The battery containers must be built with a mechanically resistant material and be installed correctly anchored to the frame.

D.3.4.2 The battery container may be part of the frame of the prototype, provided that it complies with the appropriate stiffness and resistance conditions.

D.3.4.3 The battery containers that are not part of the frame must be protected against side impacts by the prototype frame.

D.3.4.4 The cells must be duly protected and fixed to avoid any relative movement (horizontally and vertically) inside the container.

D.3.4.5 The only communication holes allowed between the inside and the outside of the container are those needed to pass duly insulated conducting cables and those that serve for cooling and ventilation.

- D.3.4.6 Ventilation openings cannot cover a complete side of the container.
- D.3.4.7 Ventilation openings must include some type of filtering element in order to avoid the entry of dust, particles and liquids into the container.
- D.3.4.8 Should a container be completely and tightly sealed, it must include an escape valve to prevent the gas concentration from reaching critical pressure.
- D.3.4.9 The use or adaptation of commercially available containers or cases is allowed, provided that they comply with the characteristics established in this article.

### **D.3.5 Battery Management System – BMS**

- D.3.5.1 The installation of a battery management system (BMS) is compulsory
- D.3.5.2 The BMS must read the voltage of each cell in order to keep the cells within the voltage limits established by the manufacturer.
- D.3.5.3 The BMS must read the temperature of the cells in their hottest point by means of a compatible temperature sensor. It will be compulsory to read the temperature of at least 4 installed cells, with at least two of them being those corresponding to areas where higher temperatures are expected to be reached.
- D.3.5.4 Should a cell balancing passive system be used (non-compulsory), resistances used must be capable of dissipating the energy corresponding to the balancing, in such a way that during the balancing period, the temperature indicated by the manufacturer of the resistor (or the BMS) is not overpassed, and does not affect the battery cells or printed circuits nearby.
- D.3.5.5 To improve the balancing speed, it is allowed to activate the artificial cooling of the battery container during the balancing process.
- D.3.5.6 The BMS system must deactivate the vehicle traction if the voltage of one of the cells is discharged to the critical minimum voltage or if the critical maximum temperature of the cell is exceeded, according to the values indicated by the manufacturer. This deactivation is compulsory and must happen at the same time as the contactor of the battery accumulator opens. (See diagram in Art. D.6.1.2).
- D.3.5.7 In addition to the conditions set-out in Art. D.3.5.6, it is allowed to progressively limit the electric power delivered to the motor until being equal to zero in the critical voltage point of the cell or the maximum temperature of the cell.

- D.3.5.8 The BMS must also deactivate the recharge system when the maximum voltage or temperature levels of the cell are reached. This deactivation may be progressive and/or prompt.

## **ARTICLE 4: CONTROLLER**

### **D.4.1 Motor controller or motor variator**

The motor controller or motor variator is the hardware device that controls the speed and torque of an electric motor.

The controller is part of the HVS and can be part of the GLVS.

- D.4.1.1 It is allowed to use any type of commercially available controller.
- D.4.1.2 It is allowed to develop the controller or to adapt any commercially available device.
- D.4.1.3 The hardware components shall be compatible with the working voltage and current values.
- D.4.1.4 The controller must comply with all the prescriptions that may apply to it in these Technical Regulations.

### **D.4.2 Control software**

The configuration of the control software of the motor is free. Both commercially available and own developed software tools may be used for this purpose.

- D.4.2.1 The management map for the propulsion system is freely configurable.
- D.4.2.2 The implementation of different management maps is allowed.

## ARTICLE 5: GENERAL ASPECTS OF THE HIGH VOLTAGE SYSTEM (HVS)

### D.5.1 Separation of the HVS and the GLVS

D.5.1.1 The HVS and the GLVS must be physically separated.

D.5.1.2 There cannot be any contact between the HVS and the frame of the prototype or any metallic part that is exposed to the outside.

D.5.1.3 If any part or piece of the HVS and the GLVS must be together inside a container, they must respect the minimum separation distance according to the table below, except in the exceptional cases described in Art. D.5.1.4 and Art. D.5.1.5:

HVS Voltage	Separation distance
< 100 VDC	10 mm
≥ 100 VDC	20 mm

D.5.1.4 Distances indicated in Art. D.5.1.3 shall not apply if the components of the HVS and the GLVS are separated by a humidity insulating barrier with a temperature resistance degree of 150 °C or higher.

D.5.1.5 If some parts or pieces of the HVS and the GLVS should be installed in the same PCB board, they shall be placed in clearly differentiated areas, marked as such on the board. They shall be separated by at least 6.4 mm over the surface, 3.2 mm through the air and 2 mm if they are under coating (these distances may not be respected in cases of optocouplers with a rated voltage equal or higher than the voltage of the HVS).

### D.5.2 Positioning of the HVS

All components of the HVS must be located inside a reinforced structure that ensures their integrity in case of a crash.

D.5.2.1 The frame of the prototype may be considered as a protective structure of the HVS, provided that the design and the construction fully protect the system in case of a crash, provided that the requirements indicated in Art. D.3.4 is met.



### **D.5.3 Grounding**

All metal parts of the prototype that may be able to conduct electricity because they are located less than 100 mm from the HVS or the GLVS must be grounded to the prototype.

### **D.5.4 Insulation and cabling**

All components of the HVS must be duly insulated and protected against direct contact.

D.5.4.1 The protection of the HVS must be granted, so that it becomes impossible to access the HVS connections with a cylindrical probe of 100 mm in length and 6 mm in diameter.

D.5.4.2 The HVS connections must be encapsulated in insulating components.

D.5.4.3 The cables or conductors pertaining to the HVS must be orange and non-flammable grade UL-94 V0, FAR25 or equivalent.

### **D.5.5 Precharge circuit**

It is mandatory to install a precharge circuit before the closing of the accumulator contactor.

D.5.5.1 The minimum precharge level must reach 90% of the real voltage of the accumulator, and / or 10 V of maximum voltage difference between terminals.

D.5.5.2 When the disconnection circuit described in Art.D.6.1 opens, the precharge circuit must open as well, so that any new activation manoeuvre of the disconnection circuit always leads to the previous precharging manoeuvre.

### **D.5.6 HVS activation warning**

A red warning light that will remain on while the HVS is active shall be installed, while the contactor of the accumulator is closed.

## ARTICLE 6: DISCONNECTION SYSTEMS AND CIRCUITS

### D.6.1 HVS disconnection circuit

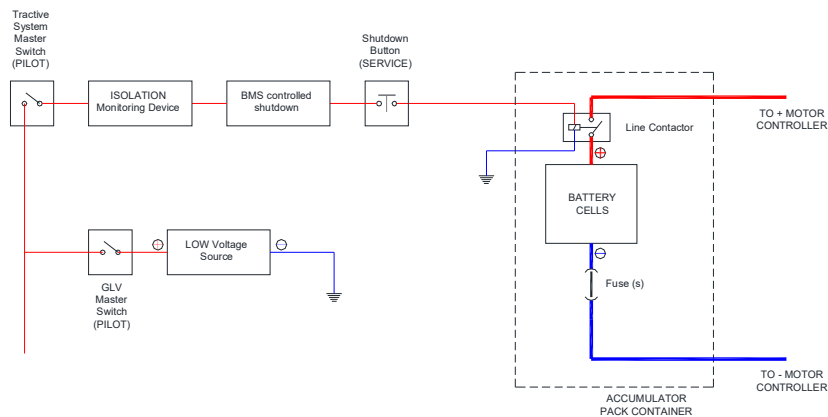
The disconnection circuit manages the opening and closing of the line contactor.

D.6.1.1 The disconnection circuit will consist of, at least:

- A Tractive System Master Switch (TSMS).
- An emergency shut-down button.
- An insulation monitoring device (IMD).
- The disconnection system managed by the BMS.

D.6.1.2 The disconnection system must follow one of the systems described below:

- Disconnection system with contactor directly controlled by the disconnection circuit:



**Diagram 1: Contactor directly controlled by the disconnection circuit**



### **D.6.3 Type of switches**

D.6.3.1 The emergency shut-down button(s) must be red mushroom-type push-rotary (press to open and turn to close) buttons.



**Example of emergency button**

D.6.3.2 The TSMS must be rotary-type.

### **D.6.4 Deactivation of the DC/DC converter**

D.6.4.1 Should a DC/DC converter be used as LV energy source, the complete disconnection of the converter must be ensured to avoid self-consumption.

### **D.6.5 Insulation Monitoring Device (IMD)**

The Organization will provide an insulation monitoring device (IMD) BENDER included in the MotoStudent Kit to ensure a proper electrical isolation between the HVS and the chassis of the prototype.

D.6.5.1 The installation of this insulation monitoring device is mandatory.

D.6.5.2 The proper working of the Insulation Monitoring Device will be checked during the Static Scrutineering, as indicated in Art. E.5.1 of these Regulations.

## **ARTICLE 7: FUSES**

### **D.7.1 HV Fuses**

The circuit on the HV side must be protected by at least one fuse, according to the conditions stated in Art. D.3.3.3.

D.7.1.1 The rated current of the fuse shall be lower than the calculated shortcut current, and higher than the maximum service current.

D.7.1.2 If several cell strings are mounted in parallel, each of these strings must be protected with an own independent fuse.

D.7.1.3 The fuse or fuses must be installed inside the battery container or case.

### **D.7.2 GLVS fuses**

All circuits on the GLV side must have a fuse to protect the conductor and the device it is supplying, avoiding their maximum permitted current to be reached.

## **ARTICLE 8: ACCUMULATOR RECHARGING**

### **D.8.1 Chargers**

D.8.1.1 All types of chargers with a rated power minor or equal to 22 kW are permitted (maximum 32 rated amps in three-phase network side configuration).

D.8.1.2 Serial or parallel configurations of different chargers are permitted provided that the total sum of the unit powers of the chargers does not exceed the power indicated in Art. D.8.1.1.

D.8.1.3 The charger must be fitted with a respective ground conductor which must be duly connected to the case of the charger.

### **D.8.2 Mains connection**

The mains connection can be single-phase (230 VAC, 50 Hz) or three-phase (400 VAC, 50 Hz).

D.8.2.1 The connection of the ground conductor to the socket base is compulsory.

### **D.8.3 Connection to the prototype**

The connection between charger and prototype must comply with specific minimum safety conditions.

D.8.3.1 The charging connector located on the prototype must be fitted with an automatic or manual shut-down system.

D.8.3.2 The conductors of the recharging connector present on the prototype must be inaccessible when the connector is closed.

D.8.3.3 The charging connector of the prototype must have a tightness degree of IP-65 when closed.

D.8.3.4 The charging connector must be located in a protected area of the prototype to prevent damages due to possible crashes, contacts or impacts.

### **D.8.4 Charging process**

The charging process of the accumulators must be carried out in a safe way.

D.8.4.1 During the recharging process of the prototype during the Final Event it will be compulsory to have at least one team member present, who is familiar with every detail of the recharging process.

D.8.4.2 The team member in charge of the recharging process must be prepared to face any kind of action during the process (manual disconnection, deactivation, etc.) in order to insulate the prototype from the mains in case of any contingency.

D.8.4.3 A fire extinguisher for electric fire (extinguishing agent CO<sub>2</sub> or similar) must be located at a distance of less than 2m from the prototype during the recharging manoeuvre.

D.8.4.4 The BMS must be fitted with a recharge control device, as described in Art. D.3.5.

## **ARTICLE 9: GENERAL INSTALLATION AND WIRING**

### **D.9.1 General insulation**

- D.9.1.1 All conducting wires and connectors must be covered with insulating material, except for direct ground connections.
- D.9.1.2 The areas, elements and systems with a high electric risk must be correctly protected against possible contact and manipulations. It is recommended to install rigid insulating housings for a higher protection.

### **D.9.2 Dimensioning**

- D.9.2.1 All conducting wires and connectors must be correctly dimensioned according to the requested current levels.

### **D.9.3 Protection against humidity**

- D.9.3.1 The components of the propulsion system shall be highly protected against humidity. The recommended protection degree is IP-65.

### **D.9.4 Wiring**

- D.9.4.1 The wire length must be exact, and therefore it is not allowed to roll excessive wire lengths.
- D.9.4.2 The passage of the electric installation through possible hot points must be avoided as far as possible.
- D.9.4.3 The electric installation must be perfectly well integrated into the prototype assembly, and the distance between wire fixing points shall not be longer than 15 cm.
- D.9.4.4 Any possible interference between the electric installation and any mechanic system of the prototype must be taken into account and avoided, in any possible geometry range (during the complete route of the steering, suspensions, etc.).

## ARTICLE 10: CONTROL AND CONTROL DEVICES

### D.10.1 Dashboard

The dashboard shall be perfectly visible for the rider in riding position.

D.10.1.1 The dashboard must include a red warning light that must be lit when the HVS is activated, as indicated in Art. D.5.6.

D.10.1.2 The dashboard must have a display showing the voltage between HVS terminals at all times, as established in Art. D.1.2.5.

### D.10.2 Control devices

The rider must be able to activate, reactivate or reset the electric propulsion system completely, without the help of other people and without the need to get off the prototype, from the standard riding position.

### D.10.3 Emergency shut-down button

This article affects the emergency shut-down button(s) described in Art. D.6.1 of these Regulations.

D.10.3.1 The emergency shut-down button must be installed in a place in which it is protected against a crash or accidental contact by the rider, but at the same time accessible and recognisable for the sport marshals.

D.10.3.2 The emergency shut-down button must not be installed on any quick-removable component, such as the fairing. It should be installed preferably on supports that are fixed to the frame.

D.10.3.3 If the emergency shut-down button is installed on the side of the prototype there must be two buttons, one on either side.

D.10.3.4 The installed emergency shut-down button or buttons must be red and "press to open and rotate to close", as described in Art. D.6.3.1.



## **ARTICLE 11: TRANSMISSION SYSTEM**

### **D.11.1 Types of transmission**

The configuration of the transmission system used for the “MotoStudent Electric” Category is free.

D.11.1.1 Any type of primary transmission system is allowed: gearbox, CVT variator, etc.

D.11.1.2 Direct transmission between the output shaft of the motor and the rear wheel is allowed.

D.11.1.3 There are no limitations on the installation of clutch elements between components of the transmission system.

### **D.11.2 Secondary transmission**

D.11.2.1 There is no limitation regarding the type of secondary transmission used: chains, belt, etc.

D.11.2.2 Any element of the transmission that might imply a trapping risk for the rider must be covered with a rigid housing.

## **ARTICLE 12: COOLING SYSTEM**

### **D.12.1 Overview of the cooling systems**

D.12.1.1 The design of the cooling system for the different components is freely configurable.

D.12.1.2 The cooling of components is allowed both by air and by liquid cooling systems.

### **D.12.2 Air cooling systems**

D.12.2.1 The cooling by means of aerodynamic air conduction is permitted.

D.12.2.2 Forced-air cooling by means of fans or other methods of air impulsion or extraction is allowed.

### **D.12.3 Liquid cooling systems**

D.12.3.1 Only distilled water may be used as cooling liquid.

D.12.3.2 The use of additives in the distilled water is forbidden.

D.12.3.3 The number, location, size and composition of the cooling liquid radiators are free, provided that they comply with the dimensional requirements of the overall dimensions of the prototype.

D.12.3.4 The installation of a liquid cooling system for the motor, by means of external cases is allowed. These cases can not modify the motor and must be easily removable. It is forbidden that the cases cover totally or partially any of the seals and/or stickers from the Organization.

## **ARTICLE 13: DOCUMENTATION OF THE PROTOTYPE**

### **D.13.1 Documents to be submitted**

The Organization will require to the teams of the MotoStudent Electric Category, throughout the Competition, to submit documentation about the electric propulsion system. The Organization will establish a series of mandatory documentation deliveries, reflected in the Official Competition Calendar indicated in Art. A.6.1, in which information will be requested regarding the electric propulsion system.

D.13.1.1 The specific milestones for the teams of the MotoStudent Electric Category will be:

- MSE Special Milestone 1: Electric scheme (From 01/11/2019 to 30/11/2019): Complete electric scheme (HVS, LVS, BMS, cells electric scheme), including all active and passive parts.
- MSE Special Milestone 2: Battery pack specs (From 01/02/2020 to 29/02/2020): General description of the energy accumulator, including 3D design of the container, cells, mechanical protections, list of electrical components (identification of all elements of the electrical diagram: commercial names, measures and location in the prototype). Connection diagram used in the accumulator (series and parallel cells), total number of cells and rated and maximum voltages of the complete accumulator. Data sheet of the cells or supercapacitors used.
- MSE Special Milestone 3: Battery pack assembly (From 01/05/2020 to 31/05/2020): Presentation of the assembly of the batteries container with diagrams and pictures of its assembly and wiring. Pictures of the definite set assembled.
- MSE Special Milestone 4: Electric powertrain test (From 01/07/2020 to 31/08/2020): Video of the electric powertrain in operation, with the final components that will be installed on the prototype (although it is still in the testing phase).

D.13.1.2 Failure to submit the documentation requested by the Organization (or submitting it more than 10 natural days after the deadline) might result in the non-compliance of the Static Scrutineering, and therefore, the exclusion of the teams from the MS1 and MS2 Phases.

D.13.1.3 For safety reasons, the Technical Staff of the Organization may require technical information additional to that described in this article if it considers it for the inspection of one or more specific prototypes.

## **VI International Competition MotoStudent**

### **SECTION E: SCRUTINEERING**

## ARTICLE 1: OBJECTIVE AND METHODOLOGY

### E.1.1 Objective

The objective of the scrutineering is to check that the prototypes that have been presented to the Competition by the participating teams comply with the specifications in terms of performance and safety as established in the Technical Regulations (Sections B, C and D), as well as checking that the chosen rider is eligible to take part in the MS2 Phase of the Competition.

- E.1.1.1 The scrutineering will not score towards the MotoStudent Competition, but it may entail the exclusion if any deviation from the Regulations is detected or if the prototype is not considered as safe enough to take part in the tests.
- E.1.1.2 The scrutineering will be carried out by federative licensed scrutineers and qualified Technical Staff of the Organization.
- E.1.1.3 In case of dispute over the non-compliance of the rules stated in the Technical Regulations, or the safety of the prototype on track, the decision of the Technical Staff of the Organization will be final.

### E.1.2 Responsibility of the teams

Teams are responsible for making sure that their prototype complies with all the rules established in the Competition Technical Regulations.

- E.1.2.1 When presenting the prototype for Scrutineering, the team acknowledges that they have made sure that the prototype complies with the Regulations established by the Organization.

### E.1.3 Procedure

The Scrutineering consists of three stages:

- Administrative Check.
- Static Scrutineering.
- Dynamic Safety Check.

## ARTICLE 2: ADMINISTRATIVE CHECK

### E.2.1 Process

Teams, at the beginning of the Final Event, must perform the Administrative Check, in which the Organization will confirm the registration of the team and the total fulfillment of the federative requirements of the rider. Once these aspects have been approved, the corresponding Administrative Check sticker will be placed on the prototype, and the team will be able to proceed to the next scrutineering stage.



Administrative Check sticker example

- E.2.1.1 The Administrative Check will be carried out in the Paddock General Office.
- E.2.1.2 Teams will not be able to access the Static Scrutineering without having passed the Administrative Check.
- E.2.1.3 In case the rider attends to the Final Event later than the team, the team will also have to pass the Administrative Check, having the rider to complete the signature and confirmation when he/she arrives to the Event.

## ARTICLE 3: STATIC SCRUTINEERING – GENERAL TECHNICAL CHECKS

### E.3.1 Process

The Static Scrutineering consists on a series of checks on the prototype to verify its compliance with the Competition Technical Regulations and its safety. Rider clothing will be also verified in order to check if it is appropriate to take part in the MS2 Phase.

- E.3.1.1 Scrutineering checks described in this article affect the prototypes presented for both the "MotoStudent Petrol" and "MotoStudent Electric" Categories.

### E.3.2 Development

The prototype and the rider clothing will be checked by the Technical Staff following all the rules described in the Competition Technical Regulations.

- E.3.2.1 Teams can have as many spare parts (any part or component of the prototype) as they consider. These spare parts must be presented to the Organization together with the prototype in order to verify them.
- E.3.2.2 The Static Scrutineering will be carried out in the Technical Control Area.
- E.3.2.3 The prototype must be presented under appropriate conditions to participate in the MS2 Phase, strictly complying with all the rules indicated in the Competition Technical Regulations.
- E.3.2.4 Using components not verified by the Organization during the Static Scrutineering will entail the immediate exclusion of the team from the Competition.
- E.3.2.5 Only 2 Team Members can access the Technical Control Area during Static Scrutineering. These members will be the responsible of transporting the prototype and some kind of support that allows it to be presented in static position for its examination.

### E.3.3 Structure check bench

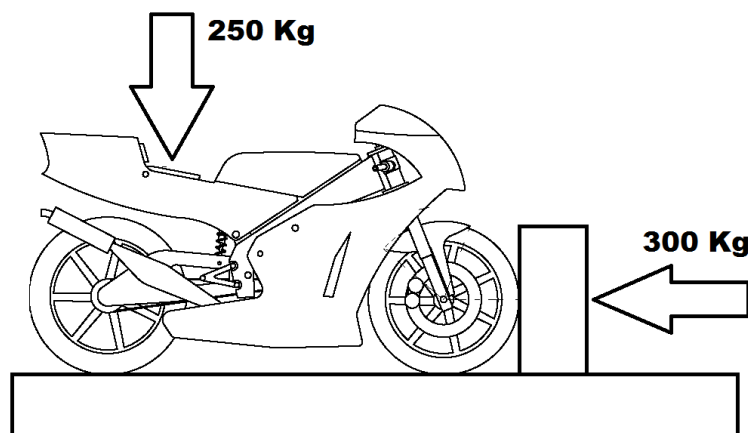
If the Organization considers it necessary, the prototype can be subjected to horizontal and vertical forces on the check bench in order to verify the rigidity of the frame, the correct assembly and behaviour of suspensions.

E.3.3.1 The following forces will be applied on the prototype:

- Progressive horizontal load on the front wheel: 300 kg
- Progressive vertical load on the saddle: 250 kg

E.3.3.2 These loads will be applied alternately and progressively, verifying that in compression situation there is no interference between elements, as well as that all the systems that integrate the structure of the prototype work properly. When removing the force, the scrutineers will verify that the original geometry has not undergone deformations, nor that no crack has appeared in the structural components or joining elements. In order for the prototype to be considered fit in this test, must comply with the provisions described.

E.3.3.3 Graphic description of the test:



**Forces Diagram**



### E.3.4 Brake check

The correct behaviour of the front and rear brakes is going to be checked on a roller brake tester.



Brake check

E.3.4.1 In order for the prototype to be considered as apt at this check, it shall provide brake strength values above the following figures:

- Front shaft: 0.30 kN
- Rear shaft: 0.25 kN

E.3.4.2 In order for the prototype to be able to meet the braking values, it is recommended to carry out the brake check with the brake pads and brake discs with a slight pre-working. Certain disc assemblies and pads newly installed may give efficiency problems due to coatings, adaptations between surfaces, etc.

### E.3.5 Approval

E.3.5.1 If the prototype passes the Static Scrutineering, it will be marked with the respective sticker and allowed to access the Dynamic Safety Check.



Example of approval sticker

## **ARTICLE 4: STATIC SCRUTINEERING - SPECIFIC TECHNICAL CHECKS OF THE “MOTOSTUDENT PETROL” CATEGORY**

This article affects only the prototypes presented for the "MotoStudent Petrol" Category of the Competition, using an internal combustion engine. The checks described below will be carried out during the Static Scrutineering.

### **E.4.1 Exhaust noise check**

The exhaust noise will be measured.

- E.4.1.1 The maximum permitted exhaust noise is stated in Art. C.6.2. of the Technical Regulations.
- E.4.1.2 The noise will be measured at approx. 50 cm from the exhaust exit, in the flow direction of exhaust gas, in a place with no walls or obstacles within 3m around the exhaust exit.

## **ARTICLE 5: STATIC SCRUTINEERING - SPECIFIC TECHNICAL CHECKS OF THE “MOTOSTUDENT ELECTRIC” CATEGORY**

This article affects only the prototypes presented for the "MotoStudent Electric" Category of the Competition. The checks described below will be carried out during the Static Scrutineering.

### **E.5.1 Insulation Monitoring Device Check**

A check will be carried out in order to verify the correct working of the insulation monitoring device (IMD) defined in Art. D.6.5 of these Regulations.

- E.5.1.1 During the check, a 50 k $\Omega$  resistance will be placed between the HV side and the frame in order to verify the correct electric insulation.
- E.5.1.2 In order for a prototype to pass the check, the disconnection circuit should open not later than 30 seconds after the resistance has been connected to the prototype.

### **E.5.2 Insulation Measurement Check**

A check will be carried out in order to verify the correct insulation between HVS and GLV.

E.5.2.1 During the test, the insulation between HVS and GLVS will be measured.

E.5.2.2 In order for a prototype to pass the check and take part in the Competition, the value measured between both systems must be equal or higher than 100 kΩ.

### **E.5.3 Disconnection Circuit Check**

A check will be carried out in order to verify the correct working of the disconnection circuit.

E.5.3.1 The correct working of the Main Switch and of the Emergency Shut-Down Button will be checked. Shutting down any of them must open the contactors of the battery accumulator.

E.5.3.2 When shutting down these switches, the voltage shown on the display of the dashboard must be zero.

### **E.5.4 Rain Check**

The Organization may carry out a rain check to verify the correct insulation of the electric propulsion system in rainy conditions.

E.5.4.1 The prototype must have passed the Insulation Monitoring Device Check, Insulation Measurement Check and the Disconnection Circuit Check in order to access the Rain Check.

E.5.4.2 During this check, the prototype must be connected, with the drive wheel raised without contact on the ground (on a stand) and in a "non-ready-to-ride" situation.

E.5.4.3 Water will be projected simulating the effect of fine rain over the prototype in different directions for a minimum period of 60 seconds. Under no circumstances will high pressure jets be projected towards the prototype.

E.5.4.4 The check shall be approved if the IMD has not act during the minimum 60 seconds of spray or during the next 60 seconds after the spray has ended. The minimum total duration of the check will therefore be 120 sec.

- E.5.4.5 The Technical Staff will also verify that there is no accumulation of water in areas at risk for the electrical system.
- E.5.4.6 It is recommended to carry appropriated means to dry the prototype after the check.

## **ARTICLE 6: DYNAMIC SAFETY CHECK**

### **E.6.1 Process**

The Dynamic Safety Check stage consists of a series of on-track verifications on the prototypes made by professional riders of the Organization. The verifications described in this article affect the prototypes presented for both the "MotoStudent Petrol" and the "MotoStudent Electric" Categories.

### **E.6.2 Procedure**

An Official Rider from the Organization will carry out a series of dynamic tests on the track to check the correct working of the prototype.

In order for the prototype to be approved for the participation in MotoStudent it shall comply with the following:

- E.6.2.1 The prototype must start up and move under its own power.
- E.6.2.2 The prototype must brake correctly both when riding softly and sportively.
- E.6.2.3 The prototype must be able to carry out a series of turns at different speeds.
- E.6.2.4 The Official Rider will determine if the prototype meets the basic safety requirements to participate in the Competition.

### **E.6.3 Lap around the track**

Once checked the different aspects, the Official Rider of the Organization may make a complete lap around the Speed Racing Track in order to check the on-track behaviour of the prototype.

### **E.6.4 Approval**

E.6.4.1 If the prototype passes the Dynamic Safety Check, it will be marked with the respective sticker and the team will be able to take part in the MS2 Phase.



Example of approval sticker

## **ARTICLE 7: RECTIFICATION IN CASE OF PROBLEMS**

### **E.7.1 Rectification time**

E.7.1.1 If the prototype is considered as "not approved" after any of the Scrutineering stages, the Organization will provide a time period to allow the team to rectify the failures detected by the Organization in their own box. After this period of time the prototype shall be presented again at the scrutineering to verify whether it complies with the Regulations.

E.7.1.2 If after the closing of the schedule established for each stage of Scrutineering the prototype has not been considered as "approved", the team will be automatically eliminated from the MS2 Phase, but may continue participating in the MS1 Phase. No prototype will be accepted in MS2 Phase without having passed the Scrutineering stages within the established timetables.

## **VI International Competition MotoStudent**

### **SECTION F: MS1 REGULATIONS**

## ARTICLE 1: OBJECTIVES

The MS1 Phase indicates the evolution of the MotoStudent project for each team along the Competition development. The participant teams must show to the Jury and Organization the complete process of the prototype design and development, and a theoretical project of a racing team creation.

This phase will give to the participant students the opportunity to apply the knowledge acquired during their education in a “real” business project, showing the aspects and difficulties that a business project can entail, and how must be performed the process to launch a product into the market.

### F.1.1 Project MS1 Scenario

To perform the MS1 Project, the teams must work on the assumption of a racing team creation that will participate in the MotoStudent World Series fictitious championship, with the prototype carried out in the VI Edition of the MotoStudent International Competition.

F.1.1.1 MotoStudent World Series will involve the following 6 races:

Location	Date
New York (USA)	June, 2020
Buenos Aires (Argentina)	June, 2020
Beijing (China)	July, 2020
Bombay (India)	July, 2020
Rome (Italy)	September, 2020
MotorLand Aragón - Alcañiz (Spain)	October, 2020

### F.1.2 Overviews of the MS1 Project

The MS1 Project must include the design, development and manufacture of the prototype (racing motorcycle) developed by the team for its participation in the VI Edition of the MotoStudent International Competition and for the supposed scenario MotoStudent World Series, described in Art. F.1.1.

## ARTICLE 2: PROJECT STRUCTURING

### F.2.1 Project Chapters

The basic Design and Development process is organized and structured to take into account all the necessary aspects that make the prototype to comply with the needs for which it has been devised. Therefore, the obligatory chapters to be included in the MS1 Project are defined below.

F.2.1.1 The MS1 Project must include the following chapters:

- A.- Concept development
- B.- Product design
- C.- Prototyping and testing
- D.- Innovation
- E.- Business plan

### F.2.2 Chapter A: Concept development

The first stage shall consider the MS1 Project scenario and the targets intended to be achieved. This chapter has to answer to two fundamental aspects:

- How the prototype has to perform?
- Which are the design constraints and requirements to comply with?

F.2.2.1 As guideline, for the definition of Chapter A: "Concept development", at least the following design conditions must be taken into account:

- Competition Regulations, gives the technical requirements.
- Team Know-how.
- Team resources (human resources, SW & HW tools, available assets...)
- Components and systems pre-dimensioning methodologies.
- Geometrical and dimensional restrictions and rider integration.



F.2.2.2 The purpose of the stage is to verify whether an idea is technically feasible. Taking into account all design inputs (refer to Art. F.2.2.1), teams must take several decisions in order to define team and prototype concepts with which they compete subsequently: organization chart, personnel, modes of use, geometry, materials, structural elements, commercial components; not getting into constructive details beyond those strictly needed to define a design basis that will comply with the function and the requirements. A QFD matrix is recommended as an example of helping technique.

F.2.2.3 At this stage the analysis of the different design alternatives for the functional systems that conform the prototype must be carried out (refer to Art. F.2.2.4). It will be assessed that solutions developed internally by the teams have been taken into account.

F.2.2.4 Functional generic systems that conform the prototype:

- Structure
- Powertrain
- Suspension
- Wheels
- Brakes
- Aerodynamics
- Others

F.2.2.5 In Chapter A, it is recommended to identify and control some parameters in order to monitor along the Project development whether the initial design targets are being met or not. Some recommended examples for these parameters are: raised position of the center of gravity (CoG), minimum prototype weight, ergonomics dimensions, performance, etc.

F.2.2.6 The minimum sections to be included in Chapter A of the Project shall be:

- A.1. A trade off of the different functional systems: chassis, suspensions, transmissions, etc.
- A.2. A document with the load cases to be used in the structural calculations.
- A.3. A FMEA (Failure Mode and Effects Analysis) of the design and the technical risks assessments.
- A.4. A “Make or Buy” decision for the main systems.
- A.5. A list of applicable requirements to the complete prototype, and their degree of compliance at the end of this stage (i.e. minimum weight estimation and the % of compliance compared with the value given the Regulations).
- A.6. Requirement specifications that will apply to each of the main systems.
- A.7. A draft design model (3D/2D), and basic drawings showing geometric constraints, interfaces and basic geometry.
- A.8. A preliminary validation plan, where the strategy to be followed for the testing to be done to systems or components, or to the whole prototype, shall be reflected, in order to assess whether the design complies with the requirements or not. It can be focus, in a non-exclusive way, as follows:
  - Analogy validation (for non-critical components and providing justification).
  - Calculations validation (by calculation models due correlated or SW tools).
  - Bench test, for components or the complete prototype.
  - Track test, for the complete prototype.

### **F.2.3 Chapter B: Product design**

With the approach from Chapter A “Concept development”, the “Product design” stage should focus on the generation of the needed documentation to carry out the design.

F.2.3.1 The structural integrity of the prototype components under the loading defined in Chapter A that is going to be subjected to, is ensured in this Chapter.

F.2.3.2 The whole documentation needed to build the prototype shall be generated. This Chapter shall include, as a minimum, the following information:

- B.1. Detailed dynamic and static loads calculations.
- B.2. Structural calculations.
- B.3. Thermodynamics calculations.
- B.4. Performance calculations, including aerodynamics if needed.
- B.5. Manufacturing documentation: main dimensioned drawings and assemblies.
- B.6. Purchase description for commercial components.
- B.7. Final validation plan and prototyping, in order to ensure the right future integration of the components and their performance.

#### **F.2.4 Chapter C: Prototyping and testing**

Prototyping the model is the real manufacturing process based in the ideas shown in Chapters A and B of the MS1 Project. The team shall manufacture, purchase, assembly and test all the designed components in order to achieve an integrated and feasible motorcycle prototype.

F.2.4.1 “Chapter C: Prototyping and testing” of the MS1 Project shall reflect the degree of correlation between of the simulations, designs and calculations made in Chapters A and B with the real working conditions of the prototype.

F.2.4.2 Chapter C shall include a report with the description and results of the different tests made during the manufacturing, assembly and settings of the prototype. The tests to be done can be, as an example:

- Component bench testing in dedicated check benches.
- Complete vehicle testing in bench: check bench, wind tunnel, loading rigs, etc.
- Complete vehicle testing on a track: a report with the different tests on a track with rider.
- Previous testing of compulsory Scrutineering as published in Section E of this Regulation, which will take place on the Final Event.
- Previous testing of compulsory Dynamic Tests from MS2 Phase as published in Section G of this Regulation, which will take place on the Final Event.
- Changes justification between the initial project and the final prototype.

F.2.4.3 As a consequence of this process of manufacturing and testing, some prototype re-designs might happen. These shall be justified and documented during this stage.

F.2.4.4 The final target of this stage is to get into the track a competitive and fully functional prototype.

F.2.4.5 Regarding the indicated conditions, the minimum sections to be included in Chapter C: Prototyping and testing, must be:

C.1. Deviation description report: where all issues detected at the time of manufacturing the prototype that might cause minor design or performance changes described and estimated on the Chapters A and B of the MS1 Project shall be recorded. These changes shall be developed and justified.

C.2. Validation report: where the results of any test performed during the prototype development and manufacturing shall be shown, ensuring the compliance with all requirements reproduced in the Technical Regulations of the Competition.

## F.2.5 Chapter D: Innovation

The objective of this chapter is to evaluate the capacity of creativity and effort of the MotoStudent teams, and more especially from the formal aspect that the innovation represents. The final prototype must include an innovation in its development, so it must assume the technical feasibility of its manufacturing.

Innovating represents a challenge in itself, representing the act or process of introducing new ideas, devices or methods. It etymologically refers to the fact of "making new".

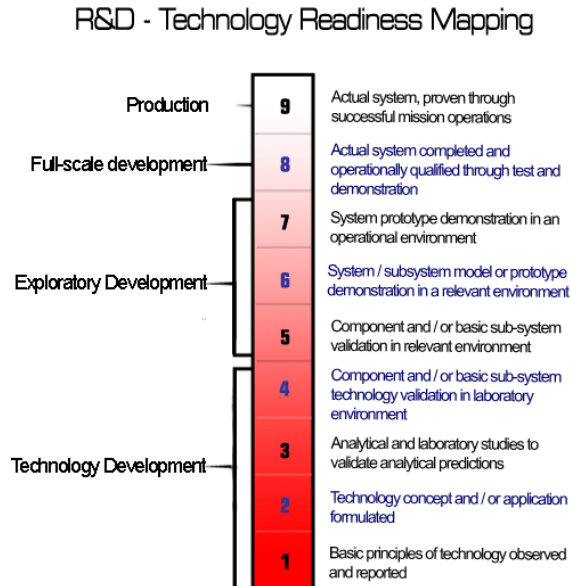
The innovative solutions adopted can be mainly of two types:

- Tactical: this innovation refers to a product or technical solution, and covers the final result, where an object constitutes the invention.
- Operational: this innovation refers to a process, where the importance is taken by the ordered sequence of elements used to obtain a different or better-quality result.

Therefore, the innovation presented can be a pure innovation in itself or a novel combination of known or existing resources, elements or components.

F.2.5.1 All prototype presented must incorporate an innovative solution.

F.2.5.2 In the same way, the developed innovation must contain a minimum degree of technological maturity. The levels of technology readiness can be measured by several methods, using the following scale allows to evaluate its maturity degree:



All innovative projects must achieve level 7, as they will be implemented in the real prototype and in real use conditions, but the starting level shall be analyzed, and the development effort (cost and time), dedicated to each case.

F.2.5.3 The innovation included in the prototype must comply with the instructions described in the Technical Regulations of the Competition.

F.2.5.4 The innovation project development must include, as minimum, the following sections:

- F.1. Preface or starting condition: the explanation of where and how the development idea arises and the need to apply this innovation in the market, identifying different strategic solutions proposed to the problem to solve.
- F.2. State of the Art and infringement risk: analyzing the viability or technological feasibility of the chosen innovation, and the possible situations of failure or error that could contain.
- F.3. Research process: following the previous analysis of innovation, needs and global market competitions, opportunities, social changes and the environment dynamics will be detected, thus contrasting the proposed solution with the market and existing technology knowledge, and detecting by this method the possible innovation gaps.

- F.4. Proof of concept: once the innovation and the target have been identified, the development and analysis of its phases will be described, detail design and prototyping of the innovation, as well as the valuations or test of the product.
- F.5. Drawings and simulations.
- F.6. Market viability: study of the possibility of introduction in the market of racing motorcycles, street bikes or in other related technological variants, from the point of view of technical development and manufacturing feasibility and acceptance or readiness to this new technology by potential customers.
- F.7. Conclusions.

## **F.2.6 Chapter E: Business plan**

The Business plan shall reproduce a report whereby the business model is developed to fulfil the MS1 Project scenario reflected in the Art.F.1.1.

It will be considered that, in order to participate in the fictitious MotoStudent World Series scenario, all teams must act as entities.

F.2.6.1 All figures shown in this report should refer to the real numbers that the team is facing up, not including taxes and fees. The official currency unit is the Euro (€) and the exchange rates to be applied must be the official rate change at the end of the year 2018.

F.2.6.2 The minimum sections to be developed in “Chapter E: Business Plan” of the MS1 Project will be:

E.1. Executive summary. Preliminary vision of the business where to show the profile and goals of the entity. Must include a number of key points:

- Entity information: Name, legal form, date of constitution, promoters, product or service...
- Entity goals: Mission and vision.
- Basic financial information on sources and funds obtained for the start-up of the entity.

E.2. Market analysis, environment and own capacities (SWOT analysis). The following aspects shall be included:

- External analysis:
  - General environment: political, economic, social, technological, legal and ecological factors that can influence the project.
  - Specific environment: analysis of the sector where the entity will operate in global terms (economic characteristics, growth rate and expected evolution, regulations, ease of entry and competitors, negotiating power of suppliers...).
- Internal analysis: internal factors that can affect the company, the team and the project, such as:
  - Personnel capabilities (HR, training, experience...)
  - Management capabilities
  - Technical capabilities
  - Commercial capabilities
  - Economical and financial capabilities
- SWOT analysis: listing the strengths and weaknesses (internal analysis) and opportunities and threats (external analysis) of the project.

E.3. Goals and strategic plans. Main objectives of the idea and the strategies to achieve them. Once established those, the Action Plans (tactical and operational planning that will make it possible to achieve the targets) must be specified.

E.4. Action Plans based on the established goals and strategies in the previous point:

- Marketing Plan: Marketing Mix, action plan, budget control and metrics definitions.
- Human Resources Plan: organization chart, personnel selection for each race, etc.
- Operations and Logistics Plan: productive process, "Make or Buy" analysis, infrastructures and transportation.

- Economic & Financial Plan: financial plan and cost structure, including the “Prototype Detailed Cost”, based on the following scheme:

PROTOTYPE DETAIL COST							
Item Nr.	Manufacturing Part Number	Part Name	Make / Buy	Manufacturer Name	Quantity	Unit Cost	Total Cost
001	01-FR-001-001	Frame	Make	TEAM	3	4050,82 €	12152,46 €
002	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...

- Item Nr: Numerical order of the part in the table.
- Manufacturing Part Number: An alphanumeric reference assigned by the team that identifies each part or element. The following format must be used:

System
Assembly
Subassembly
Part

00-AA-111-222

- System: The whole prototype will be broken down into the following 7 systems:
  - 01 – Structure
  - 02 – Powertrain
  - 03 – Suspension
  - 04 – Wheels
  - 05 – Brakes
  - 06 – Aerodynamics
  - 07 – Others
- Assembly: Level set immediately below systems.
- Subassembly: Level set immediately below assemblies.
- Part: The number of the part pertaining the subassembly. Numbering must be ascending.
- Part Name: Unique name for each part, subassembly or assembly.



- Make / Buy: Identification of whether the part, subassembly or assembly has been purchased from an external manufacturer or is self-designed and produced
- Manufacturer Name: Name of the part, subassembly or assembly manufacturer.
- Quantity: Amount of each item.
- Unit Cost: Coste of each element.
- Total Cost: Total cost of the element. It is the result of multiplying the unit cost by the quantity.

## **ARTICLE 3: DEADLINES AND SUBMISSION OF THE PROJECT**

### **F.3.1 Deadlines Calendar**

According to the Competition Calendar, defined in Art. A.6.1 of these Regulations, each chapter of the MS1 Project shall be submitted in digital format to the Organization at the established milestones.

F.3.1.1 These deliveries must be complete and definitive and will be evaluated in order to contribute to the final score.

F.3.1.2 The established milestones correspond to the delivery of the different chapters that integrate the MS1 Project, and should be sent to the Organization within the deadlines reflected in the Calendar of Art.A.6.1.

### **F.3.2 Documentation submission format**

F.3.2.1 Each chapter of the MS1 Project must be delivered in digital format within the established deadlines.

F.3.2.2 Each chapter of the MS1 Project may have a free number of pages, provided that the total final number of the complete MS1 Project does not exceed 200 pages (from page 200 onwards it will not be evaluated), including any type of annex, cover, index, drawings, etc. It is recommended to dedicate 60% of the total project pages to chapters A, B, C and D; and 40% to chapter E.

- F.3.2.3 The MS1 Project must be delivered in A4 format, in both cases digitally and in the printed hard copy given to the organization at the registration time of the team in the Final Event. A DIN A4 sheet will be considered one page, although it will also be considered as a single page a DIN A3 sheet, when its use is exclusively for the delivery of drawings.
- F.3.2.4 The pages of each chapter must be numbered, including sub-index, sub-pages or annexes. The numbering format should reflect the chapter to which each page corresponds, i.e. A1, A2, A3..., B1, B2, B3... For the main cover and general index, it will not be necessary to reflect this numbering, but the total limitation of 200 pages also applies to them and should be taken into account.
- F.3.2.5 Each one of the delivered chapters (A, B, C, D and E) must include its own sub-cover and sub-index.
- F.3.2.6 Together with the deliveries of the MS1 Project in PDF-format, teams could include CAD-files, videos and simulations they may seem fit. Any document or drawing in PDF-format, images or other aspects that may be contained within the parts of the MS1 Project shall not be accepted as an attachment.
- F.3.2.7 The format used must be the following:
- Indentation:
    - Left: 3cm
    - Right: 3cm
    - Upper: 2.5cm
    - Lower: 2.5cm
  - Line-spaced: 1.5
  - Paragraphs spacing
    - Previous: 0 points
    - Below: 6 points
  - Font type: Arial
  - Size: 11 (except titles and sub-titles)
- F.3.2.8 At the time of registration of the team in the Final Event, a printed copy of the complete MS1 Project must be submitted to the Organization. The given printed copy must include all chapters already submitted in digital format to the Organization as stated in the MS1 delivery dates of the Calendar.

### **F.3.3 Changes or modifications after delivery**

F.3.3.1 No change or modification will be allowed on the delivered documentation.

## **ARTICLE 4: PRESENTATION IN FRONT OF THE JURY**

For the evaluation of the MS1 Phase of the Competition, during the Final Event two presentations in front of the jury could be perform:

- MotoStudent Pitch
- MS1 Finals

### **F.4.1 MotoStudent Pitch**

The first presentation, nominated as "MotoStudent Pitch", will be compulsory for all teams and it will present a general introduction of the MS1 Project.

### **F.4.2 MS1 Finals**

The second presentation, nominated as "MS1 Finals", will reflect all sections of the MS1 Project in a more detailed way than in the "MotoStudent Pitch" presentation.

### **F.4.3 Presentation methodology**

F.4.3.1 The "MotoStudent Pitch" presentation will have a maximum time of 20 minutes (15' of exhibition + 5' for questions by the jury).

F.4.3.2 The "MS1 Finals" presentation will be with the prototype in front of the jury and will have a maximum time of 35 minutes (30' of exhibition + 5' for questions by the jury).

F.4.3.3 No confidentiality restrictions from the teams are allowed. If a team does not want to show any aspect of the prototype or project, the scoring of the corresponding chapter of the project and presentation will be zero.

F.4.3.4 Each exposition shall be made by a maximum of 3 students, while the rest of the team may stay on these as attendance, but no external public is allowed.

- F.4.3.5 The jury, if estimates as appropriate, could ask to specific listeners present at the presentation room to assess the degree of involvement of the team.
- F.4.3.6 The presenting students may use a digital presentation as support, to do so the Organization will provide a projector or screen.
- F.4.3.7 To do the exposition, the presenting students must carry their own laptop and VGA and HDMI wiring.
- F.4.3.8 Teams must carry by themselves to the presentation room their own digital presentation file stored in an USB external storage device.
- F.4.3.9 The digital presentation may include images and videos.
- F.4.3.10 During the presentation will be allowed to show parts or elements which the students consider as adequate for a better explanation, as well as using other means of dissemination as the digital presentation (i.e. leaflets, schemes, etc.).
- F.4.3.11 The tutors of each project may only attend as listeners, being explicitly prohibited their participation at any point of the presentation and of question time.

## **ARTICLE 5: ASSESSMENTS**

### **F.5.1 Evaluation**

- F.5.1.1 The MS1 Phase will be assessed by a professional expert Jury from the different areas of the Industry, Innovation, Automotive and MotorSport.
- F.5.1.2 The "MotoStudent Pitch" presentation will be mandatory for all participating teams.
- F.5.1.3 To the "MS1 Finals" presentations, at most, 9 teams will be chosen for each category:
- 3 teams with the highest score in the "Best Design" ranking
  - 3 teams with the highest score in the "Best Innovation" ranking
  - 3 teams with the highest score in the "Best MS1 Project" ranking

The previous scoring done by the expert jury (MS1 Project Deliveries) will be taken into account in order to get the classifications, as well as the penalties applied to the MS1 Project according to the Art. A.6.7 and the obtained score in the “MotoStudent Pitch”.

F.5.1.4 Teams must comply with the arrival order and the opening hours of the presentations. If not, a minor infraction will be applied to the final score.

## F.5.2 Scoring

The MS1 phase will be assessed based on a total of 500 achievable points, which will be distributed as follows:

MS1 Deliveries	Score
A. Concept development	50
B. Product design	75
C. Prototyping and testing	75
D. Innovation	100
E. Business plan	100
Final Event Presentations	Score
MotoStudent Pitch	60
MS1 Finals	40
<b>TOTAL</b>	<b>500</b>

F.5.2.1 The assessment by the jury will be final.

F.5.2.2 Only the selected teams of each category (up to 9, 3 from Design, 3 from Innovation and 3 from MS1 Project) will be able to score at the presentation “MS1 Finals”, so their maximum achievable scoring at the MS1 Phase will be 500 points. The rest of the unselected teams will score on a maximum of 460 points in that phase.

F.5.2.3 In the event of a tie, the Organization will apply the tie-breaker methodology that it considers and justifies.

F.5.2.4 If a team along the MS1 Phase does not score 200 points or over, the team will have to carry with a Handicap during the final race at the MS2 Phase, as established in Art. G.8.4.

### F.5.3 Awards

The MS1 Phase will grant, for each Category, the following awards:

Award		Part	MS1 Deliveries	MotoStudent Pitch	MS1 Finals	TOTAL
Best MS1 Project	Best Design	A	50	20	20	240
		B	75			
		C	75			
	Best Innovation	D	100	10	10	120
		E	100	30	10	140
TOTAL			400	60	40	500

F.5.3.1 The award for the “Best MS1 Project” will be awarded to the team, from each Category, that achieves the best overall score in the MS1 Phase.

F.5.3.2 The award for the “Best Design” will be awarded to the team, from each Category, that achieves the best score after adding the results of chapters A, B and C (A: Concept development, B: Product design, C: Prototyping and testing).

F.5.3.3 The award for the “Best Innovation” will be awarded for the team, from each category, that achieves the best score in “Chapter D: Innovation”.

F.5.3.4 The Organization reserves the right to add new awards throughout the development of the Competition.

## **VI International Competition MotoStudent**

### **SECTION G: MS2 REGULATIONS**

## **ARTICLE 1: GOALS AND CONDITIONS**

The MS2 Phase consists of a series of tests aimed at assessing the dynamic behaviour and the performance of the manufactured prototype.

### **G.1.1 Requirements**

To take part in MS2 Phase, the Organization imposes a series of requirements indicated below.

G.1.1.1 The prototypes must have passed the Scrutineering (Section E) to participate in the MS2 Phase, and must be presented in suitable conditions to take part in the dynamic tests. The Technical Staff of the Organization can check the conditions of the prototypes at all times.

### **G.1.2 MS2 Sports Committee**

The MS2 Phase will be controlled and managed by the MS2 Sports Committee, which will be formed, at least, by the following official positions:

- Competition General Manager
- Competition Sport Director
- Race Director
- Race Director Assistant
- Sporting Jury (Officials coordinators)
- Timekeeping Director
- Competition Technical Director
- Chief Scrutineer



## ARTICLE 2: RIDER

Each team must nominate a rider who will be in charge of riding the prototype during the MS2 Phase tests. In order to equalize advantages between teams, and since the goal of MotoStudent is to evaluate the prototype and the engineering work done by the teams, the Organization has taken the following considerations about the chosen rider:

### G.2.1 Rider eligibility

G.2.1.1 The rider is considered as a team member from the moment he/she is approved by the Organization, and he/she shall have the same rights and obligations as any other team member, except for the academic requirements, which are not applicable to him/her.

G.2.1.2 The rider does not need to pay any entry fee for the Competition.

G.2.1.3 The rider must be 18 years or older at the day of start of the 2020 Final Event.

G.2.1.4 The participation of riders who have raced since 2010 (included) in competitions recognized as FIM International of the following disciplines will not be allowed:

- Circuit Racing
- Motocross
- Enduro
- Rallies
- Track Racing

In this exception is included any rider who has participated as a Wild Card in any of these disciplines.

The participation in previous editions of MotoStudent is excepted in this article.

G.2.1.5 A student can federate or be federated, and participate as a rider. However, if he/she is not registered as a team member he/she will be able to ride the prototype, but not to manipulate it as mechanic or team member. If such student wants to become a rider and also to manipulate the prototype as a team member, he must be registered and pay the required fees to do so.

G.2.1.6 Each rider will be enrolled in a specific team, and may only participate with that team in the Category where he is exclusively registered. The same rider can not be shared between different teams, even those that represent the same university, even if they participate in different categories.

G.2.1.7 The rider is obliged to attend the briefing sessions prior to the tests of the MS2 Phase, as well as to meet with the Organization if required.

G.2.1.8 In case of retirement of the rider during the Final Event (either by medical leave or by other force majeure) it will not be possible to assign a substitute rider to complete the MS2 Phase.

## **G.2.2 Rider Federative requirements**

G.2.2.1 The rider must prove to be federated in order to take part in the Final Event. To do so, he/she must be covered by a Federative License of an Official Motorcycling Federation that allows its participation in a FIM International Competition such as MotoStudent. Moto track day insurances or other federation licenses that do not cover the characteristics of International FIM Competition will not be valid for participation in MotoStudent.

G.2.2.2 Riders participating in MotoStudent must comply the following documentation:

- Spanish riders:
  - Rider CE License (can be temporary for the Final Event)  
Or
  - FIM International License  
Or
  - Territorial License of the Aragonese Motorcycling Federation (FARAM)
- Non-Spanish riders
  - Rider CE License (can be temporary for the Final Event) + Rider Release Permission of their country Federation (Start Permission)  
Or
  - FIM International License + Rider Release Permission of their country Federation (Start Permission)

\* These federative requirements may vary according to the conditions imposed by the motorcycle federations involved (FIM, RFME y FARAM) for the 2020 season.

G.2.2.3 Teams can process temporary licenses for their riders online through any of the following federations:

- Aragonese Motorcycling Federation ([www.faram.es](http://www.faram.es)).
- Royal Spanish Motorcycling Federation ([www.rfme.com](http://www.rfme.com)).

### **G.2.3 Communication with the rider**

Radio or any other communication between the team and the rider during the MS2 Phase tests is forbidden.

G.2.3.1 The communication between the team and the rider is only allowed by means of a board shown on the Pit Wall and only during the Free Practice, Warm Up, Qualifying and Race sessions.

G.2.3.2 The information board must be light, with a maximum size of 1m in width and 1.5m in height.

G.2.3.3 The information board must be shown by only one team member, who must hold the board firmly in order to avoid the board from crashing onto the track.

G.2.3.4 The information board can only be shown when the rider passes the Finish Straight.

## **ARTICLE 3: SPORT BEHAVIOUR**

### **G.3.1 Weather conditions**

The Organization reserves the right to modify schedules and even assessment methods due to weather unforeseen events.

G.3.1.1 In case of rain the Organization may establish three different rain levels:

- Light
- Moderate
- Intense

- G.3.1.2 If the Organization establishes "light" rain: both MotoStudent Petrol and MotoStudent Electric Categories teams will be able to carry out the MS2 Phase tests, but it may become advisable to use wet weather tires.
- G.3.1.3 If the Organization establishes "moderate" rain: both MotoStudent Petrol and MotoStudent Electric Categories teams will be able to carry out the MS2 Phase tests, but will be compulsory to use wet weather tires.
- G.3.1.4 If the Organization establishes "intense" rain: it will not be possible to carry out the MS2 Phase tests for any category and all prototypes that are outside their respective Box must return to it immediately.
- G.3.1.5 In case of "intense" rain, the Organization will decide and notify the participants if a test is cancelled or postponed.
- G.3.1.6 For any other situation or unforeseen weather, the MS2 Sport Committee will decide and announce if there is any postponement or cancellation.

### **G.3.2 Access to the track**

Prototypes must access to the track through the exits enabled by the Organization for each test.

### **G.3.3 Behaviour on the track:**

- G.3.3.1 Any maneuver of a rider in the opposite direction of the race is strictly forbidden
- G.3.3.2 In the event of an accident or breakdown, the rider must immediately take his prototype off-track, in a place where it does not represent any danger to the normal development of the Competition and always out of the path of the rest of the riders.
- G.3.3.3 On the track, it is forbidden for anyone to approach a prototype stopped at the circuit, with the exception of the rider himself, the Race Director, his deputies, the marshals or Technical Staff.
- G.3.3.4 The Race Director may stop a prototype whose rider had committed an infraction. A black flag with the bike number will indicate to the rider that he/she must stop. If the rider does not stop after two laps, the Race Director will communicate the Team Leader to order his/her prototype to stop immediately. The reasons for this decision will be communicated to the Team Leader.

G.3.3.5 The Race Director or any marshal post (only at the request of the Race Director) may indicate a rider to leave the track if the prototype has mechanical problems that could put him/herself or others in danger. A black flag with an orange circle and the bike number would be shown to a rider in all marshal posts to stop immediately, without completing the lap.

#### **G.3.4 Behaviour at the Pit Lane**

G.3.4.1 The speed limit throughout the Pit Lane is set up to 60kmph

G.3.4.2 During the development of the competition, only people with the proper accreditation may be in the Pit Lane. The Organization will be able to evict from these zones all those persons whose stay is not duly justified.

G.3.4.3 In case of oil or any other liquid spillage from a prototype in the Pit Lane soil (work zone), it will not be allowed to start up that prototype before the affected area and prototype are completely cleaned.

G.3.4.4 To start the engine up and get to the track, in case the automatic start device of the engine does not work, two people may help the rider pushing the prototype up to the Pit Lane exit. Additional batteries are not allowed to start the prototype.

G.3.4.5 If a rider going out from his/her Box, has a problem in the prototype before the exit of the Pit Lane, can return to the Box with the engine/motor off through the work zone and accompanied by a Pit Lane marshal.

G.3.4.6 During pit stops only registered team members can manipulate the prototype. Failure to comply with this rule may result in the exclusion of the team.

G.3.4.7 During pit stops a maximum of 3 people (rider included) may manipulate the prototype. Any contact with the prototype will be considered as manipulation (even if the rider stays on it, although he/she does not intervene).

G.3.4.8 If the work is done inside the Box, the number of registered team members working on the prototype is not limited. During the race sessions, introducing the prototype inside the Box will mean the exclusion of the team from that session.

G.3.4.9 Oil or other liquids exchange and cleaning must be done over a recipient and inside the Box. After this operation the team must ensure that the area remains perfectly clean.

### **G.3.5 Signals with flags**

The following flag code will be used to alert the riders during the course of the MS2 Phase tests:

- Red flag: interruption of the session.
- Black flag: immediate stop of the indicated bike number. The rider will not be allowed to get back to the track.
- Black flag with orange circle: immediate stop of the indicated bike number due to a technical problem. The rider may get back provided the technical problem is solved.
- Yellow flag: imminent hazard onto track. Forbidden to overtake.
  - 1 flag: hazard out of the track.
  - 2 flags: hazard on the track.
- Yellow and red striped flag: the grip on that section of the track may be affected.
- White flag with a diagonal red cross: rain drops in that section of the track.
- Green Flag: track is clear. End of the overtaking prohibition.
- Blue Flag: shown to a slow rider who is going to be overtaken by a faster one/s. The slow rider must give way to the faster ones.

G.3.5.1 Any infraction or ignorance of the signals may be penalized.

### **G.3.6 Regulations priority order**

Any situation or infraction not contemplated in the MotoStudent Regulations, will be ruled by the RFME Sporting Regulations of 2020 speed competitions.

## ARTICLE 4: DYNAMIC TESTS

### G.4.1 Objectives and procedure

The dynamic tests consist of a series of exercises prepared to demonstrate and evaluate the behavior and performance of the prototypes.

G.4.1.1 MS2 dynamic tests described in this Section correspond to the two categories of the Competition: "MotoStudent Petrol" and "MotoStudent Electric". Each Category will have its own separate score.

G.4.1.2 The dynamic tests on the track will be carried out by the rider presented by the team.

G.4.1.3 The dimensions, speed, schedules, and measurement indicated in this article may vary and change in the Final Event, if the Organization so had to determine it for any reason.

G.4.1.4 The dynamic tests referred below as "Test 1: Brake Test", "Test 2: Gymkhana" and "Test 3: Acceleration" will be performed twice, taking the best score of the two as the valid for the team.

### G.4.2 Test 1: Brake Test

The brake test will consist in an evaluation of the distance needed to bring the prototype to a complete stop from a minimum speed of 80 km/h.

G.4.2.1 The start will be given by lowering a flag or similar signal by a sport marshal at the starting point.

G.4.2.2 The rider will have a maximum time of 10 seconds from the marshal signal to start the test. In case of not starting in this time the rider will be excluded from the test.

G.4.2.3 The test will be carried out on a straight with a total length of 350m.

G.4.2.4 The maximum track length available for the prototype to reach a speed equal or higher than 80 km/h is 200m. The Organization will fit the specific point with a speed measurement device to verify that the speed has been reached.

G.4.2.5 After passing the end mark of the acceleration straight (speed trap point), the rider will have to try to stop the prototype in the shortest possible distance.

G.4.2.6 The marshals will measure the point of the vertical tangent of the front tire (foremost part of the prototype).

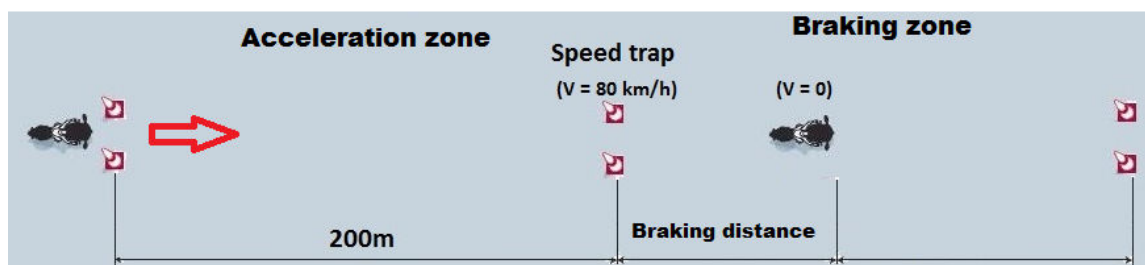
G.4.2.7 The distance between the point described in Art. G.4.2.6 and the speed trap will be considered as the braking distance for the assessment of the test result.

G.4.2.8 The score of the braking test will be assigned after recording the braking distance of all teams.

G.4.2.9 The score of the test will be assigned according to the classification of the distances obtained (from lowest to highest distance) based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	60	18 <sup>th</sup>	31	35 <sup>th</sup>	14
2 <sup>nd</sup>	55	19 <sup>th</sup>	30	36 <sup>th</sup>	13
3 <sup>rd</sup>	52	20 <sup>th</sup>	29	37 <sup>th</sup>	12
4 <sup>th</sup>	50	21 <sup>st</sup>	28	38 <sup>th</sup>	11
5 <sup>th</sup>	48	22 <sup>nd</sup>	27	39 <sup>th</sup>	10
6 <sup>th</sup>	46	23 <sup>rd</sup>	26	40 <sup>th</sup>	9
7 <sup>th</sup>	44	24 <sup>th</sup>	25	41 <sup>st</sup>	9
8 <sup>th</sup>	42	25 <sup>th</sup>	24	42 <sup>nd</sup>	8
9 <sup>th</sup>	40	26 <sup>th</sup>	23	43 <sup>rd</sup>	8
10 <sup>th</sup>	39	27 <sup>th</sup>	22	44 <sup>th</sup>	7
11 <sup>th</sup>	38	28 <sup>th</sup>	21	45 <sup>th</sup>	7
12 <sup>th</sup>	37	29 <sup>th</sup>	20	46 <sup>th</sup>	6
13 <sup>th</sup>	36	30 <sup>th</sup>	19	47 <sup>th</sup>	6
14 <sup>th</sup>	35	31 <sup>st</sup>	18	48 <sup>th</sup>	5
15 <sup>th</sup>	34	32 <sup>nd</sup>	17	49 <sup>th</sup>	5
16 <sup>th</sup>	33	33 <sup>rd</sup>	16	50 <sup>th</sup>	5
17 <sup>th</sup>	32	34 <sup>th</sup>	15	...	1

G.4.2.10 Graphic description of the test.



Graphic description of Test 1: Brake Test



G.4.2.11 If the speed at the speed trap is lower than 80 km/h, the following penalties will be applied, which will be added to the achieved braking distance.

Speed (km/h)	Penalty
79	+ 4 m
78	+ 6 m
77	+ 8 m
76	+ 10 m
75	+ 12 m
70-74	+ 20 m
<70	Null result

### G.4.3 Test 2: Gymkhana

The second test will consist of a small timed gymkhana

G.4.3.1 The start will be given by lowering a flag or similar signal by a sport marshal at the starting point.

G.4.3.2 The rider will have a maximum time of 10 seconds from the marshal signal to start the test. In case of not starting in this time the rider will be excluded from the test.

G.4.3.3 The time needed to cover the complete route will be recorded by means of cells at the start and finish points.

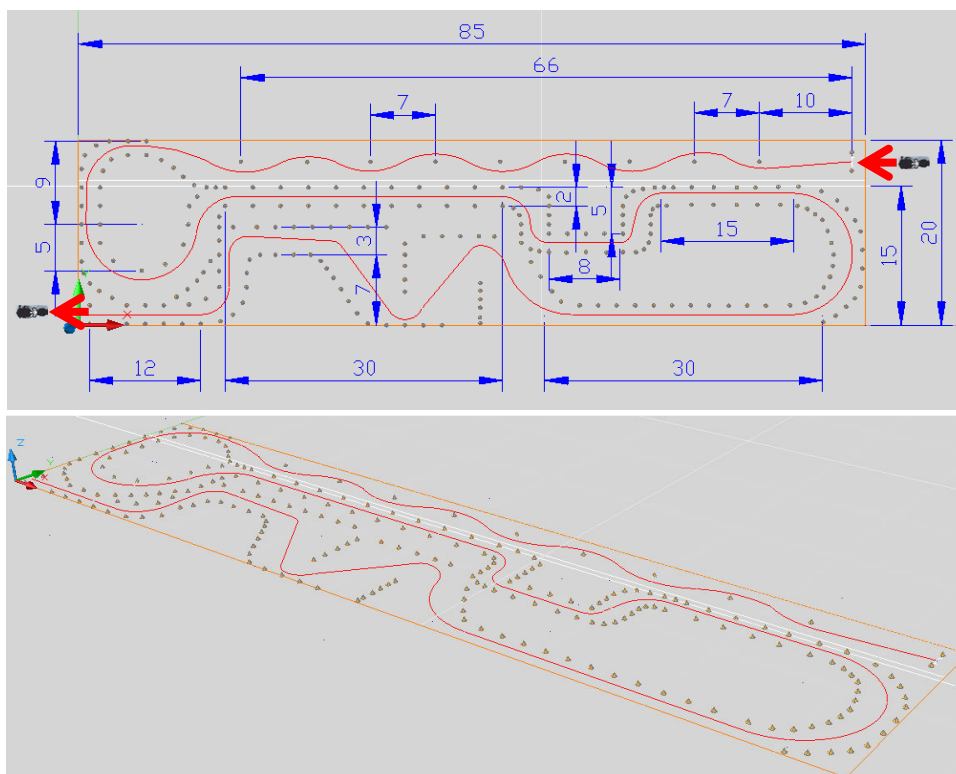
G.4.3.4 The table below shows the penalties for failures. They are time penalties that will be added to the total time of the test.

Failure	Penalty
Moving or pulling cones	+ 5 seconds / cone
Moving or pulling more than 5 cones	Null test
Not exceeding cones in the correct side	+ 10 seconds / cone
Not exceeding more than 3 cones in the correct side	Null test

G.4.3.5 The score of the test will be assigned according to the ranking of times obtained (from lowest to highest time) based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	100	18 <sup>th</sup>	46	35 <sup>th</sup>	21
2 <sup>nd</sup>	90	19 <sup>th</sup>	44	36 <sup>th</sup>	20
3 <sup>rd</sup>	85	20 <sup>th</sup>	42	37 <sup>th</sup>	19
4 <sup>th</sup>	80	21 <sup>st</sup>	40	38 <sup>th</sup>	18
5 <sup>th</sup>	75	22 <sup>nd</sup>	38	39 <sup>th</sup>	17
6 <sup>th</sup>	70	23 <sup>rd</sup>	36	40 <sup>th</sup>	16
7 <sup>th</sup>	68	24 <sup>th</sup>	34	41 <sup>st</sup>	15
8 <sup>th</sup>	66	25 <sup>th</sup>	32	42 <sup>nd</sup>	14
9 <sup>th</sup>	64	26 <sup>th</sup>	30	43 <sup>rd</sup>	13
10 <sup>th</sup>	62	27 <sup>th</sup>	29	44 <sup>th</sup>	12
11 <sup>th</sup>	60	28 <sup>th</sup>	28	45 <sup>th</sup>	11
12 <sup>th</sup>	58	29 <sup>th</sup>	27	46 <sup>th</sup>	10
13 <sup>th</sup>	56	30 <sup>th</sup>	26	47 <sup>th</sup>	9
14 <sup>th</sup>	54	31 <sup>st</sup>	25	48 <sup>th</sup>	8
15 <sup>th</sup>	52	32 <sup>nd</sup>	24	49 <sup>th</sup>	7
16 <sup>th</sup>	50	33 <sup>rd</sup>	23	50 <sup>th</sup>	6
17 <sup>th</sup>	48	34 <sup>th</sup>	22	...	5

G.4.3.6 Graphic description of the test:



Graphic description of Test 2: Gymkhana / \* Measures indicated in meters (m)

G.4.3.7 Dimensions and geometries indicated in the images in Art. G.4.3.6 are orientative, so they may suffer slight variations in the approach of the test during the Final Event.

#### G.4.4 Test 3: Acceleration

During this test, the maximum acceleration of each prototype from a complete stop on a 150m-long straight will be measured.

G.4.4.1 The start will be given by lowering a flag or similar signal.

G.4.4.2 The rider must try to complete the 150m of the track in the least possible time (maximum acceleration).

G.4.4.3 The time needed to complete the route from the start to the finish point will be recorded by Organization.

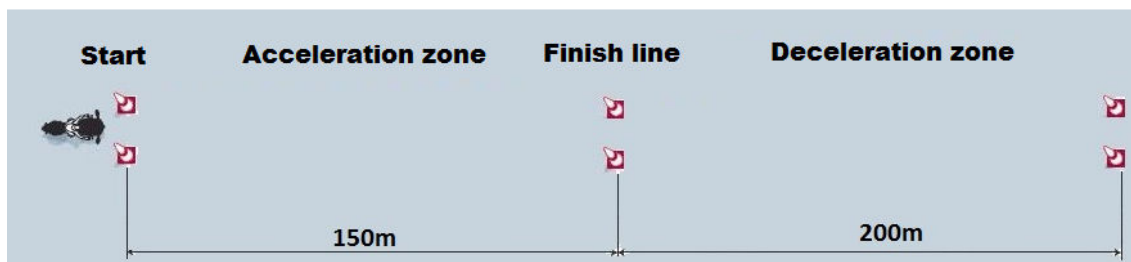
G.4.4.4 The rider will have a maximum time of 10 seconds from the marshal signal to start the test. In case of not starting in this time the rider will be excluded from the test.

G.4.4.5 The score of “Test 3: Acceleration” will be carried out once the times of all the teams have been collected.

G.4.4.6 The score of the test will be assigned according to the ranking of times obtained (from lowest to highest time) based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	60	18 <sup>th</sup>	31	35 <sup>th</sup>	14
2 <sup>nd</sup>	55	19 <sup>th</sup>	30	36 <sup>th</sup>	13
3 <sup>rd</sup>	52	20 <sup>th</sup>	29	37 <sup>th</sup>	12
4 <sup>th</sup>	50	21 <sup>st</sup>	28	38 <sup>th</sup>	11
5 <sup>th</sup>	48	22 <sup>nd</sup>	27	39 <sup>th</sup>	10
6 <sup>th</sup>	46	23 <sup>rd</sup>	26	40 <sup>th</sup>	9
7 <sup>th</sup>	44	24 <sup>th</sup>	25	41 <sup>st</sup>	9
8 <sup>th</sup>	42	25 <sup>th</sup>	24	42 <sup>nd</sup>	8
9 <sup>th</sup>	40	26 <sup>th</sup>	23	43 <sup>rd</sup>	8
10 <sup>th</sup>	39	27 <sup>th</sup>	22	44 <sup>th</sup>	7
11 <sup>th</sup>	38	28 <sup>th</sup>	21	45 <sup>th</sup>	7
12 <sup>th</sup>	37	29 <sup>th</sup>	20	46 <sup>th</sup>	6
13 <sup>th</sup>	36	30 <sup>th</sup>	19	47 <sup>th</sup>	6
14 <sup>th</sup>	35	31 <sup>st</sup>	18	48 <sup>th</sup>	5
15 <sup>th</sup>	34	32 <sup>nd</sup>	17	49 <sup>th</sup>	5
16 <sup>th</sup>	33	33 <sup>rd</sup>	16	50 <sup>th</sup>	5
17 <sup>th</sup>	32	34 <sup>th</sup>	15	...	1

#### G.4.4.7 Graphic description of the test.



Graphic description of Test 3: Acceleration

## ARTICLE 5: FREE PRACTICE SESSIONS

Free Practice sessions will be held in the FIM Grand Prix International layout of MotorLand Aragón, with a length of 5.077,65m. Such tracing is represented in Annex 2 of Section J of these Regulations.

### G.5.1 Development of the sessions

The teams will have 2 rounds of 20-minute free practice sessions on the racetrack, named "Free Practice 1" and "Free Practice 2". Two courses for the "MotoStudent Petrol" Category and other two for the "MotoStudent Electric" Category will take place independently.

G.5.1.1 After these 20 minutes a chequered flag will be shown at the finish line and no prototype will be allowed to access the track. The prototypes that are on the track and take the chequered flag must leave the track after the following lap.

G.5.1.2 In case the maximum number of prototypes capable of competing in any of the Categories exceeds the maximum allowed limit of prototypes on the track, the Organization will establish two groups for the performance of the Free Practice sessions.

G.5.1.3 During the "Free Practice 1" session, the test "Test 4: Vmax in Speed Trap" of the MS2 Phase will be developed and scored.

G.5.1.4 During the "Free Practice 2" session, the test "Test 5: Regularity" of the MS2 Phase will be developed and scored.

### G.5.2 Test 4: $V_{max}$ in Speed Trap

This test consists in achieving the maximum speed at a specific point of the racetrack during "Free Practice 1" session.

G.5.2.1 The Organization will place a speed measurement device at the Speed Trap point. The location of the Speed Trap will be communicated to the teams during the Final Event.

G.5.2.2 Any passage through the Speed Trap point during the entire "Free Practice 1" session, including laps without passing through the finish line (with entry and/or exit from Pit Lane), will be considered suitable for the result of this test.

G.5.2.3 Once the "Free Practice 1" session is over, the maximum speed registered by each team through the Speed Trap will be considered to create the test score. The final score of the test will be assigned according to the classification of the maximum speeds obtained (from highest to lowest speed) for each team, based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	30	18 <sup>th</sup>	10	35 <sup>th</sup>	7
2 <sup>nd</sup>	28	19 <sup>th</sup>	10	36 <sup>th</sup>	6
3 <sup>rd</sup>	26	20 <sup>th</sup>	10	37 <sup>th</sup>	6
4 <sup>th</sup>	24	21 <sup>st</sup>	9	38 <sup>th</sup>	6
5 <sup>th</sup>	22	22 <sup>nd</sup>	9	39 <sup>th</sup>	6
6 <sup>th</sup>	20	23 <sup>rd</sup>	9	40 <sup>th</sup>	6
7 <sup>th</sup>	19	24 <sup>th</sup>	9	41 <sup>st</sup>	5
8 <sup>th</sup>	18	25 <sup>th</sup>	9	42 <sup>nd</sup>	5
9 <sup>th</sup>	17	26 <sup>th</sup>	8	43 <sup>rd</sup>	5
10 <sup>th</sup>	16	27 <sup>th</sup>	8	44 <sup>th</sup>	5
11 <sup>th</sup>	15	28 <sup>th</sup>	8	45 <sup>th</sup>	5
12 <sup>th</sup>	14	29 <sup>th</sup>	8	46 <sup>th</sup>	4
13 <sup>th</sup>	13	30 <sup>th</sup>	8	47 <sup>th</sup>	4
14 <sup>th</sup>	12	31 <sup>st</sup>	7	48 <sup>th</sup>	4
15 <sup>th</sup>	11	32 <sup>nd</sup>	7	49 <sup>th</sup>	4
16 <sup>th</sup>	10	33 <sup>rd</sup>	7	50 <sup>th</sup>	4
17 <sup>th</sup>	10	34 <sup>th</sup>	7	...	1

### G.5.3 Test 5: Regularity

This test consists of achieving the greatest regularity of times in a given sector of the Circuit, taking as reference 3 different laps in the "Free Practice 2" session.

G.5.3.1 The time considered for the test score will be that of Sector 2 of the Speed Circuit. The details of the sector will be explained to the teams during the Final Event.

G.5.3.2 Any time measurement of Sector 2 during the entire "Free Practice 2" session, including laps without passing through the finish line (with entry and/or exit from Pit Lane), will be considered for the result of this test.

G.5.3.3 Once the "Free Practice 2" session is finished among the total time records for each team in Sector 2, the 3 most approximate time measurements will be taken. From these 3 measurements, the time difference between the fastest and the slowest measurement will be determined, which will be the value obtained by each team to apply the score.

G.5.3.4 The final score of the test will be applied according to the classification of the final time differences obtained by each team (from lowest to highest time) based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	30	18 <sup>th</sup>	10	35 <sup>th</sup>	7
2 <sup>nd</sup>	28	19 <sup>th</sup>	10	36 <sup>th</sup>	6
3 <sup>rd</sup>	26	20 <sup>th</sup>	10	37 <sup>th</sup>	6
4 <sup>th</sup>	24	21 <sup>st</sup>	9	38 <sup>th</sup>	6
5 <sup>th</sup>	22	22 <sup>nd</sup>	9	39 <sup>th</sup>	6
6 <sup>th</sup>	20	23 <sup>rd</sup>	9	40 <sup>th</sup>	6
7 <sup>th</sup>	19	24 <sup>th</sup>	9	41 <sup>st</sup>	5
8 <sup>th</sup>	18	25 <sup>th</sup>	9	42 <sup>nd</sup>	5
9 <sup>th</sup>	17	26 <sup>th</sup>	8	43 <sup>rd</sup>	5
10 <sup>th</sup>	16	27 <sup>th</sup>	8	44 <sup>th</sup>	5
11 <sup>th</sup>	15	28 <sup>th</sup>	8	45 <sup>th</sup>	5
12 <sup>th</sup>	14	29 <sup>th</sup>	8	46 <sup>th</sup>	4
13 <sup>th</sup>	13	30 <sup>th</sup>	8	47 <sup>th</sup>	4
14 <sup>th</sup>	12	31 <sup>st</sup>	7	48 <sup>th</sup>	4
15 <sup>th</sup>	11	32 <sup>nd</sup>	7	49 <sup>th</sup>	4
16 <sup>th</sup>	10	33 <sup>rd</sup>	7	50 <sup>th</sup>	4
17 <sup>th</sup>	10	34 <sup>th</sup>	7	...	1

G.5.3.5 Those measurements of Sector 2 that exceed 1 '20" will not be considered as valid for the score.

## **ARTICLE 6: WARM UP SESSION**

The Warm Up session will be held in the FIM Grand Prix International layout of MotorLand Aragón, with a length of 5,077.65m. That layout is represented in Annex 2 of Section J of these Regulations.

### **G.6.1 Session development**

Teams will have 1 round of 10 minutes of warm up in the circuit, prior to the Qualifying session. There will be independent rounds for each category.

G.6.1.1 After 10 minutes, the checkered flag will be shown on the finish line, and no prototype will be able to access the track. The prototypes that are on the track and pass through the checkered flag must leave the track on the next lap.

G.6.1.2 In case the maximum number of prototypes capable of competing in any of the categories exceeds the maximum allowed limit of prototypes on the track, the Organization will establish two groups for the development of the Warm Up sessions.

G.6.1.3 During the Warm Up session no scoring test will be performed for the MS2 Phase scoring.

## **ARTICLE 7: QUALIFYING SESSION**

The Qualifying session will be held in the FIM International Grand Prix layout of MotorLand Aragón, with a length of 5,077.65m. That layout is represented in Annex 2 of Section J of these Regulations.

### **G.7.1 Session development**

Teams will have a 20-minute timed practice session on the FIM International Grand Prix layout (see Annex 2 of section J). The "MotoStudent Petrol" qualifying session and the "MotoStudent Electric" qualifying session will take place independently.

G.7.1.1 After 20 minutes, the checkered flag will be shown on the finish line, and no prototype will be able to access the track. Prototypes that are on the track and pass through the checkered flag must leave the track on the next lap.

G.7.1.2 In case the maximum number of prototypes capable of competing in any of the categories exceeds the maximum allowed limit of prototypes on the track, the Organization will establish two groups for the Qualifying sessions.

G.7.1.3 The prototype that is making a timed lap at the end of the 20 minutes may complete the lap and the time taken on that lap will be considered as valid.

G.7.1.4 Lap times made by the prototypes in this session will be collected by the Organization, and will be those that define the classification for the starting grid in the final Race.

G.7.1.5 During the Qualifying session, the "Test 6: Pole Position" test of the MS2 Phase will be developed and scored.

## G.7.2 Test 6: Pole position

This test consists in obtaining the fastest lap time on the racetrack.

G.7.2.1 The times for this test will be recorded during the "Qualifying" session.

G.7.2.2 The test score will be awarded according to the classification of the lap times obtained (from lowest to highest time) based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	40	18 <sup>th</sup>	13	35 <sup>th</sup>	7
2 <sup>nd</sup>	36	19 <sup>th</sup>	13	36 <sup>th</sup>	6
3 <sup>rd</sup>	34	20 <sup>th</sup>	12	37 <sup>th</sup>	6
4 <sup>th</sup>	32	21 <sup>st</sup>	12	38 <sup>th</sup>	6
5 <sup>th</sup>	30	22 <sup>nd</sup>	11	39 <sup>th</sup>	5
6 <sup>th</sup>	28	23 <sup>rd</sup>	11	40 <sup>th</sup>	5
7 <sup>th</sup>	26	24 <sup>th</sup>	10	41 <sup>st</sup>	5
8 <sup>th</sup>	24	25 <sup>th</sup>	10	42 <sup>nd</sup>	4
9 <sup>th</sup>	22	26 <sup>th</sup>	10	43 <sup>rd</sup>	4
10 <sup>th</sup>	20	27 <sup>th</sup>	9	44 <sup>th</sup>	4
11 <sup>th</sup>	19	28 <sup>th</sup>	9	45 <sup>th</sup>	3
12 <sup>th</sup>	18	29 <sup>th</sup>	9	46 <sup>th</sup>	3
13 <sup>th</sup>	17	30 <sup>th</sup>	8	47 <sup>th</sup>	3
14 <sup>th</sup>	16	31 <sup>st</sup>	8	48 <sup>th</sup>	2
15 <sup>th</sup>	15	32 <sup>nd</sup>	8	49 <sup>th</sup>	2
16 <sup>th</sup>	14	33 <sup>rd</sup>	7	50 <sup>th</sup>	2
17 <sup>th</sup>	14	34 <sup>th</sup>	7	...	1



## ARTICLE 8: RACE

It will run independently:

- The final race of the Category "MotoStudent Petrol".
- The final race of the Category "MotoStudent Electric".

Both races will take place on FIM International Grand Prix Layout of MotorLand Aragón, with a length of 5.077,65m. Such tracing is represented in Annex 2 of Section J of this Regulations.

### G.8.1 Pre-qualifying for the race: Pre-Final session

The maximum number of prototypes allowed on the grid for the Race session (final race) is limited to 44 prototypes. Therefore, and only in the case of submitting to the MS2 Phase more prototypes of the maximum allowed limit, a preliminary qualifying will be carried out in a race format, consisting of two sessions called Pre-Final 1 and Pre-Final 2.

G.8.1.1 The Organization will communicate in the Final Event the composition and schedules for the teams corresponding to each Pre-Final session. The composition of each group will be determined by the time rankings, ordered from fastest to slowest, obtained by the teams in the "Qualifying" sessions. Teams classified in an odd position will participate in the Pre-Final 1 session, and those teams classified in an even position will participate in the Pre-Final 2 session.

G.8.1.2 The starting grid order for each Pre-Final session will be determined according to the time rankings, ordered from fastest to slowest, obtained by the teams in the "Qualifying" sessions.

G.8.1.3 The starting grid of the Pre-Final session will only be accessible to the rider and a unique Team Member, who will only be able to carry a rear stand. He/she will not be able to carry tools or tire warmers.

G.8.1.4 The Pre-Final session procedure will be configured as follows:

- Training lap from Pit Lane to starting grid.
- Countdown on the starting grid.
- Warm up lap to stop again on the grid.
- Pre-Final session in race format, with start from static.

G.8.1.5 Number of laps for each Pre-Final session will be as follows:

Category	Number of laps for the Pre-Final
MotoStudent Petrol	5
MotoStudent Electric	4

G.8.1.6 After the Pre-Final session, prototypes may be taken to Parc Fermé if the Organization considers it convenient to carry out the appropriate checks.

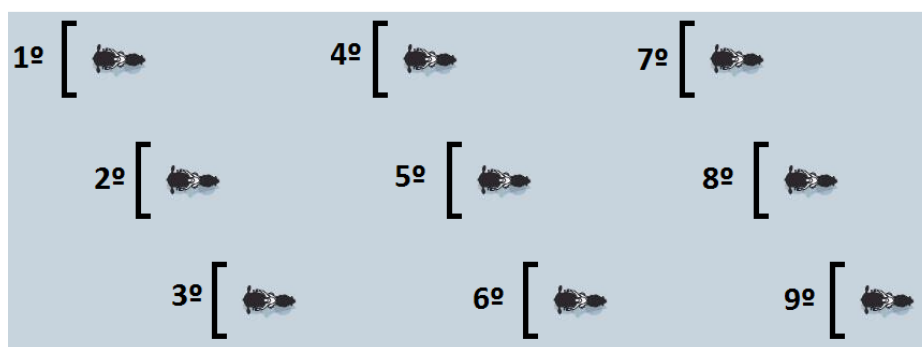
G.8.1.7 The Organization will establish a maximum number of 22 prototypes for each Pre-Final session, which will be the ones allowed to participate in the Race session (final race). That is, only the top 22 classified in each Pre-Final session will have access to participate in the Race session.

G.8.1.8 The result of the Pre-Final session will only determine the classification to be able to access the Race session. The result of the Pre-Final session will not be scoring for the MS2 Phase. The teams that do not pass the Pre-Final session will keep the score obtained in the previous tests of the MS2 Phase in the general ranking of the Competition, although they can not score in "Test 7: Best Race Lap" and "Test 8: Race Result".

G.8.1.9 The Organization reserves the right to change the number of admitted prototypes to qualify in the Pre-Final session, communicating it with enough time to the teams and always in favor of the safety of the participating riders. In no case may the Organization take decisions contrary to the requirements of FIM Homologation of the Speed Circuit.

## G.8.2 Race session starting grid

The starting grid will have a formation of 3 prototypes per line, and all spaces from the starting line to the back will be filled.



- G.8.2.1 The starting order will be established according to the ranking of the fastest times obtained by each prototype in the Qualifying session, having done Pre-Final sessions or not.
- G.8.2.2 Only the rider, tutor/s and the registered students of each team will be able to access the starting grid. No other person can access if he is not a registered Team Member.
- G.8.2.3 It is allowed to introduce to the grid stands and basic hand tools necessary for pre-race assistance. Access to the grid is NOT allowed with any type of portable generator. Heaters may be used to maintain the tire temperature, but they can not be plugged in during grid formation.

### **G.8.3 Race development**

G.8.3.1 The race of the "MotoStudent Petrol" Category will be held for 9 laps (approximate distance of 45.7 Km).

G.8.3.2 The race procedure for the "MotoStudent Petrol" Category will be configured as follows:

- Formation lap from Pit Lane to starting grid.
- Countdown on the starting grid.
- Warm up lap to stop again on the starting grid.
- Race (9 laps) with start from static commanded by light.
- Victory lap and return to Parc Fermé.

G.8.3.3 The race of the "MotoStudent Electric" Category will be held for 6 laps (approximate distance of 30.5 Km).

G.8.3.4 The race procedure for the "MotoStudent Electric" Category will be configured as follows:

- Direct access from pit lane to starting grid (without formation lap).
- Countdown on the grid.
- Warm up lap to stop again on the starting grid.
- Race (6 laps) with start from static commanded by light.
- Victory lap and return to Parc Fermé through "National" layout (2,379.12m).

G.8.3.5 The maximum time set for the warm-up lap will be 4' 30" from the start command. After this time all the prototypes that are not placed in the corresponding position of the starting grid should leave the track immediately, being able to be picked by the assistance services to take the exit from Pit Lane later.

G.8.3.6 After the Race sessions, all prototypes must remain in Parc Fermé during the time that the Organization deems appropriate to carry out the appropriate checks.

G.8.3.7 During the Race session, the "Test 7: Best Race Lap" and "Test 8: Race Result" will be developed and scored.

#### **G.8.4 MS1 Handicaps**

The result of the teams in the MS1 Phase of the Competition may have direct influence on the application of handicap stops during the Race session.

G.8.4.1 If the total scoring of a team in the MS1 Phase is not equal or greater than 200 points, the team must make a MS1 Handicap stop during the Race session (final race) of the MS2 Phase.

G.8.4.2 The total time of passing through Pit Lane that must be met at least by each team in its MS1 Handicap, including the running through Pit Lane and the stop in front of the Box, is determined based on the total scoring obtained in the MS1 Phase:

Scoring intervals	Total time spent on Pit Lane
200 > MS1 Scoring ≥ 150	30"
150 > MS1 Scoring ≥ 100	45"
100 > MS1 Scoring ≥ 50	60"
50 > MS1 Scoring	75"

G.8.4.3 The affected teams must make their MS1 Handicap stop between lap 2 and lap 5 of the Race session.

G.8.4.4 In the performance of the MS1 Handicap, the rider must stop the prototype in the work zone of the Pit Lane, in front of the team Box. It is not allowed to stop the prototype in a different zone than the one corresponding to the team Box.

G.8.4.5 The stop time in front of the Box with the prototype static is not determined, as long as the total passage between the entry and exit of the Pit Lane is equal to or greater than that indicated in Art. G.8.4.2. However, at least it is mandatory to completely stop the prototype (0 Km/h) in the performance of the MS1 Handicap.

G.8.4.6 During the stop of the prototype in the Box for the execution of the MS1 Handicap, no Team Member can touch the prototype or the rider, although they can give directions without physical contact. In case there is a contact between any team member and the prototype or rider, the Organization will assume that it is a Pit Stop for assistance, and it will not be valid for the MS1 Handicap compliance, and must be done in another lap.

G.8.4.7 In case that a team does not comply with the established MS1 Handicap or does it wrongly, a penalty of 120" will be applied to the total race time, thus delaying its position in the final ranking of the session. A MS1 Handicap will be considered not correctly executed when the requirements indicated in this article are not met.

## G.8.5 Test 7: Best Race Lap

During the Race session the race fast lap test will be evaluated.

G.8.5.1 The Organization will record the best lap times of each team during the whole race.

G.8.5.2 The test score is assigned according to the classification of the lap times obtained (from lowest to highest time) based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	30	16 <sup>th</sup>	10	31 <sup>st</sup>	5
2 <sup>nd</sup>	28	17 <sup>th</sup>	10	32 <sup>nd</sup>	5
3 <sup>rd</sup>	26	18 <sup>th</sup>	9	33 <sup>rd</sup>	4
4 <sup>th</sup>	24	19 <sup>th</sup>	9	34 <sup>th</sup>	4
5 <sup>th</sup>	22	20 <sup>th</sup>	9	35 <sup>th</sup>	4
6 <sup>th</sup>	20	21 <sup>st</sup>	8	36 <sup>th</sup>	3
7 <sup>th</sup>	19	22 <sup>nd</sup>	8	37 <sup>th</sup>	3
8 <sup>th</sup>	18	23 <sup>rd</sup>	8	38 <sup>th</sup>	3
9 <sup>th</sup>	17	24 <sup>th</sup>	7	39 <sup>th</sup>	2
10 <sup>th</sup>	16	25 <sup>th</sup>	7	40 <sup>th</sup>	2
11 <sup>th</sup>	15	26 <sup>th</sup>	7	41 <sup>st</sup>	2
12 <sup>th</sup>	14	27 <sup>th</sup>	6	42 <sup>nd</sup>	1
13 <sup>th</sup>	13	28 <sup>th</sup>	6	43 <sup>rd</sup>	1
14 <sup>th</sup>	12	29 <sup>th</sup>	6	44 <sup>th</sup>	1
15 <sup>th</sup>	11	30 <sup>th</sup>	5	...	0

### G.8.6 Test 8: Race Result

The final race result (Race session) will determine the score of this test.

G.8.6.1 The test scores will be assigned according to the race classification based on the following criteria:

Rank	Score	Rank	Score	Rank	Score
1 <sup>st</sup>	150	16 <sup>th</sup>	65	31 <sup>st</sup>	20
2 <sup>nd</sup>	140	17 <sup>th</sup>	60	32 <sup>nd</sup>	18
3 <sup>rd</sup>	130	18 <sup>th</sup>	55	33 <sup>rd</sup>	16
4 <sup>th</sup>	125	19 <sup>th</sup>	50	34 <sup>th</sup>	14
5 <sup>th</sup>	120	20 <sup>th</sup>	45	35 <sup>th</sup>	12
6 <sup>th</sup>	115	21 <sup>st</sup>	40	36 <sup>th</sup>	10
7 <sup>th</sup>	110	22 <sup>nd</sup>	38	37 <sup>th</sup>	8
8 <sup>th</sup>	105	23 <sup>rd</sup>	36	38 <sup>th</sup>	7
9 <sup>th</sup>	100	24 <sup>th</sup>	34	39 <sup>th</sup>	6
10 <sup>th</sup>	95	25 <sup>th</sup>	32	40 <sup>th</sup>	5
11 <sup>th</sup>	90	26 <sup>th</sup>	30	41 <sup>st</sup>	4
12 <sup>th</sup>	85	27 <sup>th</sup>	28	42 <sup>nd</sup>	3
13 <sup>th</sup>	80	28 <sup>th</sup>	26	43 <sup>rd</sup>	2
14 <sup>th</sup>	75	29 <sup>th</sup>	24	44 <sup>th</sup>	1
15 <sup>th</sup>	70	30 <sup>th</sup>	22	...	0

## ARTICLE 9: MS2 PHASE RESULTS

### G.9.1 Scores

The distribution of sessions and scoring of the MS2 tests is summarized in the following table:

Session	Test	Scoring
<b>Round 1 / Round 2</b>	Test 1: Brake Test	60
	Test 2: Gymkhana	100
	Test 3: Acceleration	60
<b>Free Practice 1</b>	Test 4: $V_{max}$ in speed trap	30
<b>Free Practice 2</b>	Test 5: Regularity	30
<b>Warm Up</b>	-	-
<b>Qualifying</b>	Test 6: Pole Position	40
<b>Pre-Final*</b>	-	-
<b>Race</b>	Test 7: Best Race Lap	30
	Test 8: Race Result	150
<b>Total</b>		<b>500</b>

\*The Pre-Final session will be held only in the case that the presented prototypes exceed the maximum limit admitted for race configuration.

G.9.1.1 If for reasons outside the Organization like adverse conditions and other possible reasons, it should cancel one or more of the scoring tests, the MS2 Sports Committee reserves the right to change the assignment of scores, with previous notification to the participating teams.

G.9.1.2 In case of a tie of the scores between two or more teams in the overall classification of the MS2 Phase, the final classification position will be based on the score of each team in the MS1 Phase, with the team with the highest MS1 score remaining ahead.

### G.9.2 Awards

The top 3 teams of the MS2 Phase will be awarded with the following awards:

- 1st classified MS2
- 2nd classified MS2
- 3th classified MS2

## **VI International Competition MotoStudent**

### **SECTION H: FINAL EVENT**



## **ARTICLE 1: SCHEDULE**

### **H.1.1 Official Schedules during the Final Event**

The Organization will establish a series of schedules in which it will cite the teams to carry out the tests corresponding to the Scrutineering, MS1 Phase and MS2 Phase. These schedules will be published and sent to the teams prior to the Final Event.

H.1.1.1 Failure to comply with the schedules set by the Organization for the Final Event will result in the team being penalized in the corresponding test, or even the exclusion of said test if, for operational reasons, it is considered under justified causes.

H.1.1.2 In the MotoStudent Electric Category, a minimum of 40 minutes between tests will be guaranteed to facilitate battery recharges.

H.1.1.3 The Organization reserves the right to make any changes to the schedule in the tests presented.

## **ARTICLE 2: AREAS AND FACILITIES DURING THE FINAL EVENT**

The participating teams undertake to take care of the facilities where the Final Event will take place. Otherwise, the Organization will be entitled to apply sanctions or expel the offenders from the Competition.

### **H.2.1 Definition of areas**

Annex 3 indicates the orientative distribution of the different areas of the Final Event described below.

H.2.1.1 Start – Finish Straight: finish straight of the Grand Prix FIM International track of the MotorLand Aragon circuit. Apart from the start and finish point during the races, the straight will house dynamic test of the MS2 Phase of the Competition, as well as other parallel activities.

H.2.1.2 Pit Lane: route that connects the circuit layout with the team Boxes. This area is restricted only to students, tutors and riders enrolled in the Competition. Public access to Pit Lane is prohibited.

H.2.1.3 Pit Building: main building of the circuit. It has three floors:

- Ground floor: houses the team Boxes, as well as bathrooms and showers.
- 1st floor: houses the presentation rooms, restaurant, services, bathrooms, terraces and briefing room.
- 2nd floor: public terraces.

The floors are connected by stairs through the towers A, B, C, D, E and F. Tower E has an elevator for handicapped.

H.2.1.4 Public Terraces: distributed along the Pit Building, terraces are open to the public to watch the activities on track.

H.2.1.5 Team Boxes: working Boxes for teams.

H.2.1.6 Technical Control Area: Scrutineering area where the Organization will carry out the inspection of the participating prototypes (Static Scrutineering).

H.2.1.7 MotoStudent General Office: main office of the Competition Organization to attend registered teams.

H.2.1.8 Paddock General Office (PGO): Paddock offices where teams may be called by different organizational committees (MS1, MS2, Technical, Disciplinary, etc.) for issues related to complaints, irregularities, disciplinary applications, etc.

H.2.1.9 MotoStudent Shop: official shop of the Organization. Payments in the shop during the Final Event may be made by cash (€) or by credit card. Credit cards accepted are:



H.2.1.10 Tires Technical Service: service point for the supply and mounting of tires.

H.2.1.11 Fuel Area: facility to supply the Official Fuel.

H.2.1.12 Dynamic Area: Paddock area reserved for dynamic activities (Dynamic Safety Check, regulated practices area, ...).

H.2.1.13 Parc Fermé: closed park.

H.2.1.14 MotoStudent Arena: Paddock area where events like the MS1 Awards Ceremony, presentations and other activities will take place.

H.2.1.15 Fan Zone: commercial and show area.

H.2.1.16 Medical Center: medical attention center.

H.2.1.17 Working Vehicles Parking: area reserved for the working vehicles parking.

## **H.2.2 Installations of teams**

H.2.2.1 The Organization will enable and assign, free of charge, a work area (located inside a Box) to each team where they must carry out repairs and tuning of the prototype.

H.2.2.2 The Boxes have 230V power sockets with European model plug or 230V industrial socket and three-phase 400V sockets. They are also equipped with a TV socket with access to live timing, compressed air, water connections and bathroom.

H.2.2.3 Personal and transportation vehicles must be parked in the areas authorized for this purpose. Track and test areas can only be accessed by the Organization vehicles.

## **ARTICLE 3: PARTICIPANTS ACCREDITATION**

### **H.3.1 Accreditation**

When accessing the Final Event, the Organization will provide an accreditation pass and bracelet to each of the team members, rider, and tutor/s. This identification will serve as an indication to the Organization for the follow-up of the tests and interventions in the prototype.

H.3.1.1 The accreditation passes and bracelets will be placed to the registered team members at the time of entering the Final Event, and they must wear them until it finishes.

H.3.1.2 Passes and bracelets will only be given to officially registered members as part of the team. Any unregistered person accompanying the team will be considered a general public and, therefore, will not have the same privileges of access and activity as the registered students, detailed in Art. A.1.6.5.

## **ARTICLE 4: BEHAVIOR RULES**

### **H.4.1 Behavior of the participants during the Final Event**

To achieve a good coexistence during the Final Event the following actions are strictly prohibited:

- Cooking inside the Boxes and spaces not specifically allowed by the Organization.
- Sleeping inside the Boxes.
- Installing tents in spaces not specifically allowed by the Organization.
- Entry of pets in the Paddock.
- Smoking, lighting fires or depositing gas containers inside the Boxes.
- Parking an unauthorized vehicle inside the Paddock.
- The exchange of people and vehicles passes.
- Paint, drill, disassemble or misuse circuit facilities.

### **H.4.2 Authorized vehicles in Paddock**

H.4.2.1 The prototype can only be moved by its own means during the tests, for the rest of the movements through the Paddock it must be pushed or moved with the engine/motor stopped.

H.4.2.2 Vehicle traffic through the Paddock is restricted only to vehicles of the Organization and the following light vehicles:

- Vehicles without motor (scooters, bicycles ...).
- Personal mobility vehicles (motorized scooter, assisted bicycle, ...).
- Scooters.

H.4.2.3 The circulation of any vehicle on the Pit Lane (except for prototypes) is strictly forbidden, except for the access of non-motorized vehicles during the time allowed for the track inspection.

H.4.2.4 The circulation of the vehicles indicated in Art. H.4.2.2 shall be governed by the following rules:

- No more than two people can travel.
- Children under 14 years old will not be able to drive any vehicle.
- Reckless driving inside the paddock is prohibited.
- The circulation of vehicles will be prohibited during the hours of silence (23:00 - 07:00 hours).
- The use of helmet is mandatory.

#### **H.4.3 Prototype manipulation**

For safety reasons, the manipulation of the prototype must meet the following rules. Failure to comply with these rules may result in a penalty or even expulsion from the Competition.

H.4.3.1 Repairs and manipulations on the prototype during the Final Event can only be made inside the Box of each team.

H.4.3.2 The transfer of the prototype outside the circuit facilities during the Final Event is allowed (e.g. for practices in karting circuit).

### **ARTICLE 5: COMMUNICATION**

#### **H.5.1 Contact with the Organization during the Final Event**

The contact between the teams and the Organization during the Final Event must be carried out primarily through the MotoStudent General Office.

H.5.1.1 During the Final Event, any tutor, team leader or rider can be summoned by the Organization to report incidents. Teams must attend these appointments at the place indicated in a maximum period of 15 minutes from the corresponding notice.

## **H.5.2 Briefings**

During the Final Event, the Organization will hold several briefings to explain the development of the Competition to teams, tutors and riders.

- H.5.2.1 Team leaders, tutors or riders must attend the briefings to which they are summoned by the Organization. The non-attendance at these briefings without a justified cause will be penalized.

## **H.5.3 Communication of schedules and results**

The Organization will communicate the schedules of tests and results through different means.

- H.5.3.1 The Organization will publish on the bulletin board enabled in the Paddock the results obtained in each of the tests.
- H.5.3.2 The timing results of “Free Practice”, “Warm Up”, “Qualifying” and “Race” sessions will be broadcast live by the internal TV signal of the circuit. In addition to being broadcast by screens in common facilities, all Boxes and the Pit Wall will have TV sockets to access the live timing broadcast.
- H.5.3.3 The timing results of “Free Practice”, “Warm Up”, “Qualifying” and “Race” sessions will be broadcast live through the internet. The Organization will communicate to the teams the web platform to which they can access to follow live timing.
- H.5.3.4 The final results obtained in each test will be published on the web once the Competition is over.

## **VI International Competition MotoStudent**

### **SECTION I: MODIFICATIONS GLOSSARY**

## ARTICLE 1: REGULATIONS REVISIONS

### I.1.1 Objectives of Section I: Modifications glossary

This section indicates every update defined in the different revisions of the Competition Regulations for the MotoStudent International Competition 2019-2020.

I.1.1.1 The last revision of the Competition Regulations, updated by the Organization on the Official Website ([www.motostudent.com](http://www.motostudent.com)), and distributed to all the participating teams will prevail over any previous revisions.

I.1.1.2 Any modification introduced by each revision, in comparison with the last published revision, will be marked in red in the revision uploaded, at least for a month since its publication.

## ARTICLE 2: REVISION OF THE REGULATIONS REF 04.2019 (APRIL 2019)

### I.2.1 Changes in Section A

I.2.1.1 Article A.6.1 has been modified.

### I.2.2 Changes in Section C

I.2.2.1 Articles C.8.1.5 and C.8.1.6 have been added.

## ARTICLE 3: REVISION OF THE REGULATIONS REF 07.2019 (JULY 2019)

### I.3.1 Changes in Section B

I.3.1.1 Article B.1.4.1 has been modified.

### I.3.2 Changes in Section H

I.3.2.1 Article H.2.2.2 has been modified.

I.3.2.2 Article H.4.1 has been modified.



## **ARTICLE 4: REVISION OF THE REGULATIONS REF 10.2019 (OCTOBER 2019)**

### **I.4.1 Changes in Section B**

I.4.1.1 Article B.10.6 has been added.

### **I.4.2 Changes in Section C**

I.4.2.1 Article C.2.2.1 has been modified.

I.4.2.2 Article C.3.1.4 has been modified.

I.4.2.3 Article C.8.1.5 has been modified.

I.4.2.4 Article C.8.1.6 has been modified.

**EVERYTHING NOT PERMITTED AND SPECIFIED IN THESE REGULATIONS IS STRICTLY FORBIDDEN**

## **VI International Competition MotoStudent**

### **SECTION J: ANNEXES**

## ANNEX 1: CLAIMS AND IMPUGNMENTS MODEL

Mr/Ms \_\_\_\_\_ with personal ID-number \_\_\_\_\_, as  
Tutor/Team Leader of the team \_\_\_\_\_, representing University of  
\_\_\_\_\_ with bike number \_\_\_\_\_ participant in the MotoStudent  
\_\_\_\_\_ Category, hereby applies (*mark with X*):

☐ a **CLAIM** over the Organization of the VI MotoStudent International Competition:

☐ an **IMPUGNMENT** over team \_\_\_\_\_ with bike number \_\_\_\_\_:

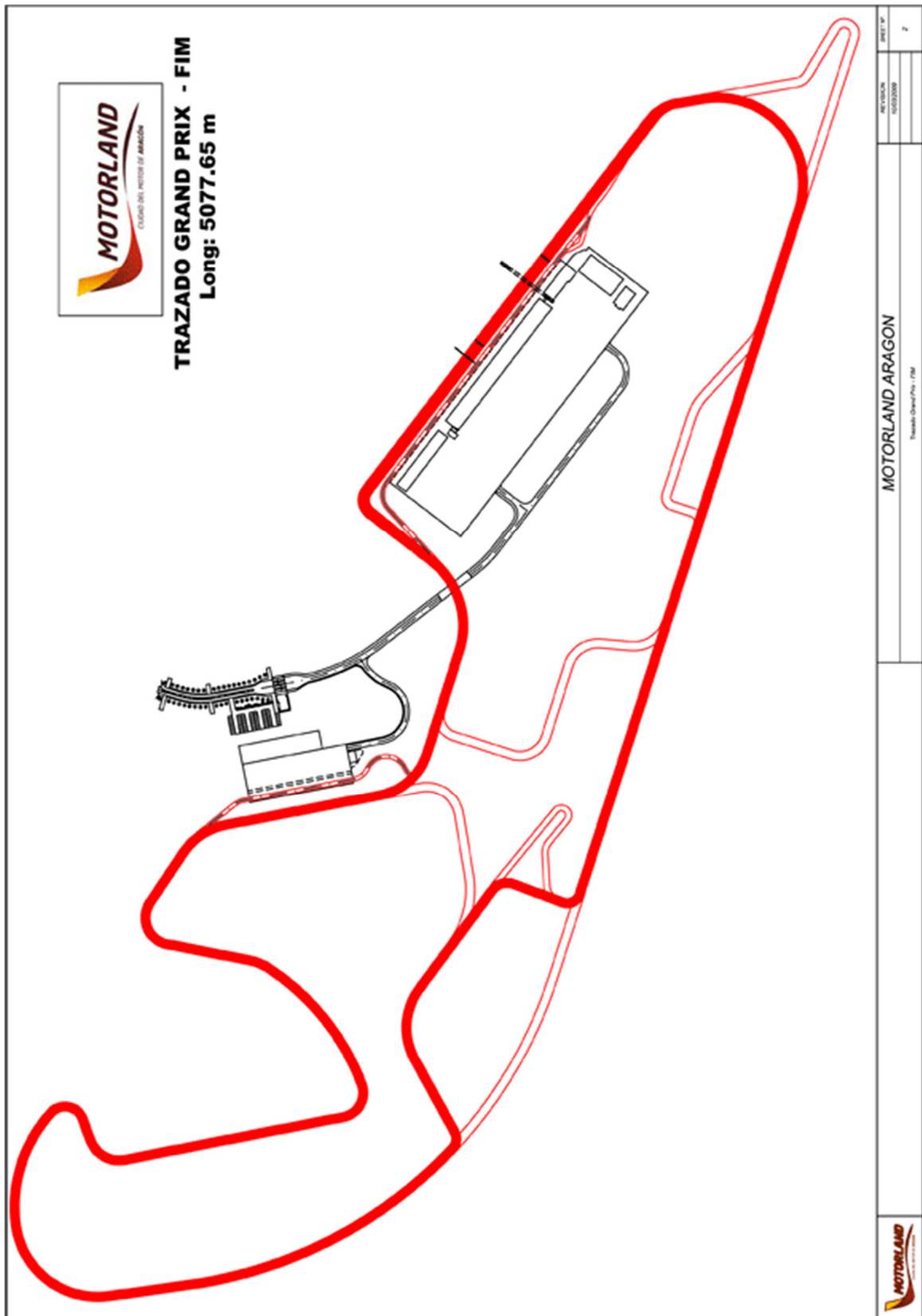
For that reason, it considers violated the Article \_\_\_\_\_ of the Competition Regulations where it stipulates:

Also provides the following evidences to be taken into account by the Organization when verifying this claim:

And for the record, signs this document in \_\_\_\_\_, on \_\_\_\_\_, \_\_\_\_\_ 20\_\_

Mr/Ms. \_\_\_\_\_

## ANNEX 2: TRACK LAYOUT



## ANNEX 3: ORIENTATIVE FINAL EVENT MAP

