MOTO ENGINEERING CUP

2019

MOTO ENGINEERING CUP
University

Campeonato Interautonómico de Velocidad

Technical Regulations.

Ref.01.2019

Index

SECTION B: GENERAL TECHNICAL REGULATIONS

ARTICLE 1: TECHNICAL REQUIREMENTS OF THE MOTORCYCLE AND RESTRICTIONS

B.1.1 Introduction

The bikes presented to compete in Moto Engineering Cup must be self-made prototypes.

B.1.1.1 The design and manufacture of the presented prototypes must comply with the Rules imposed by these Regulations, to participate in the scoring Phases of Competition.

B.1.1.2 The prototypes must maintain all the specifications required in the Technical Regulations for all tests of each event.

B.1.1.3 Any failure to comply with the technical requirements and restrictions should be corrected and re-inspected before the bike can participate in any test during the events.

B.1.1.4 The rules reflected in this Section B of the Regulations equally affects both the Category "Petrol" and the Category "Electric" of the Competition, except for the articles where are indicated special requirements for a specific Category.

B.1.2 Changes and repairs

Once the static and dynamic scrutineering of the Event (See Section E) have been passed and the motorcycle has been validated for the Moto Engineering Cup, any structural change without the supervision of the Technical Staff of the Organization will be strictly forbidden. Before making any structural modification shall make known to the Organization, which must give approval and recheck the prototype after the modification.

The changes allowed after the technical verifications that does not involve supervision by the Organization are:

a) Chain adjustment

b) Brake adjustment

c) Changes in the data recording

d) Tyre pressure adjustment

e) Refilling fluids

f) Set-up adjustments

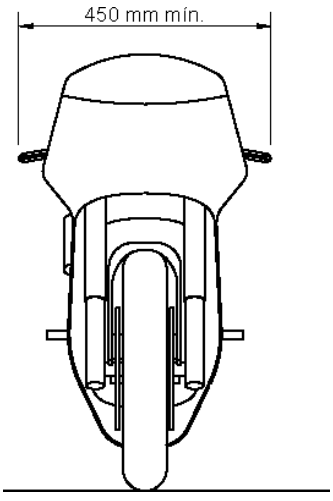
g) Engine set-up adjustments.

ARTICLE 2: GENERAL DESIGN REQUIREMENTS

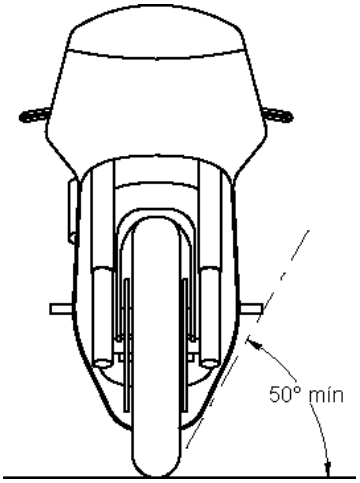
B.2.1 Dimensions

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

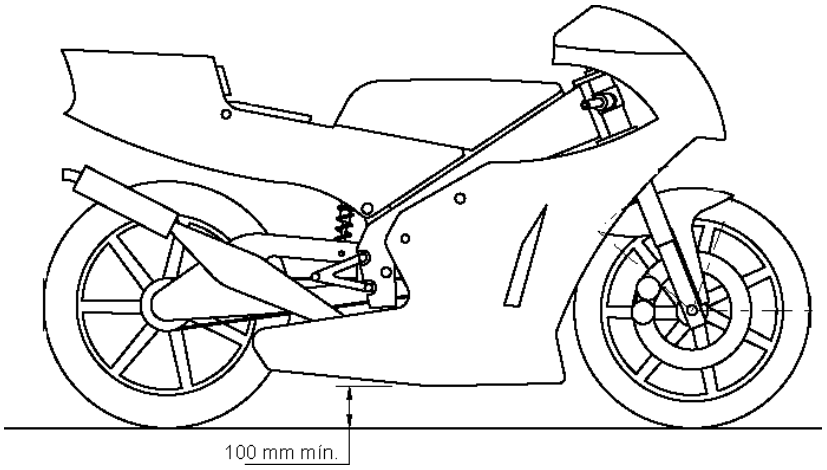
B.2.1.1 The minimum width between the ends of the semi-handlebars must be 450mm.



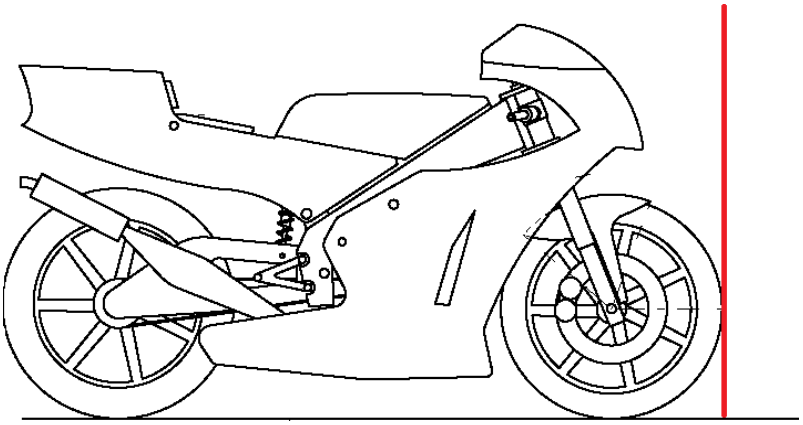
B.2.1.2 The minimum tilt angle of the motorcycle without any of its elements (except the tyres) touching the road surface must be 50º. This measurement will be made with an unloaded motorcycle (i.e. without the rider) but fully equipped, fluids included, and in working condition.



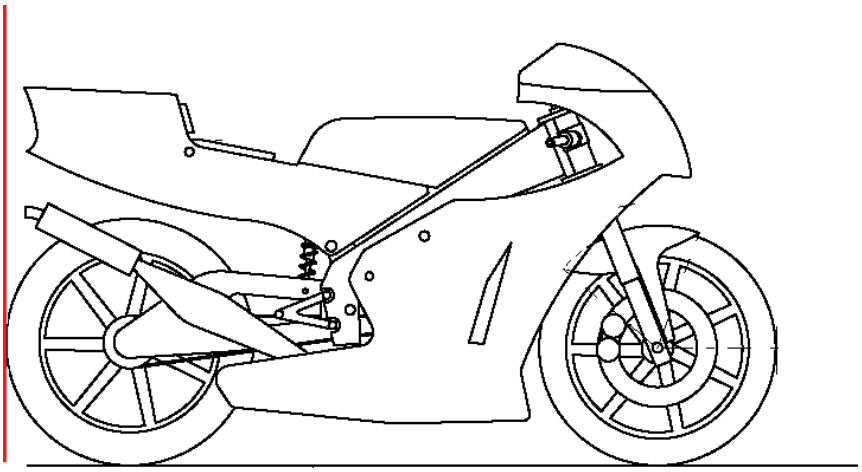
B.2.1.3 The minimum distance between the motorcycle in upright position and the road surface must be of at least 100mm in rest situation. This measurement will be done with the motorcycle unloaded (ie without the rider), but with all the equipment and liquids for its operation (including 1 liter of gasoline for motorcycles of the Category “Petrol”).



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

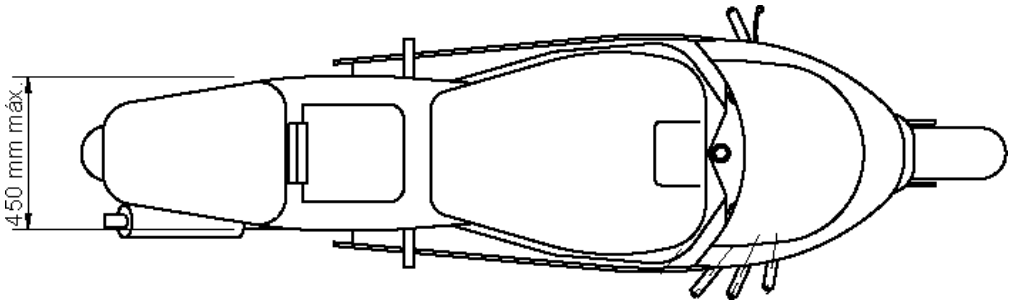


B.2.1.5 Rear limit: No element of the motorcycle shall protrude from the vertical line drawn tangentially with respect to the external circumference of the rear tyre.

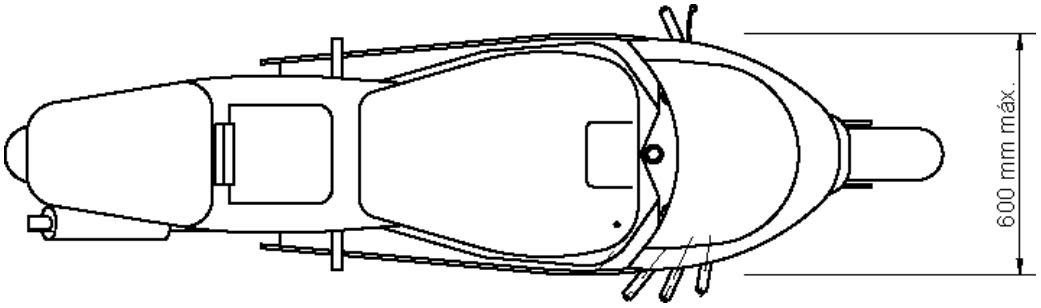


B.2.1.6 The tire tread shall have a minimum clearance of 15mm along its outer circumference to any part of the motorcycle, with the motorcycle in any position and with any geometry set-up.

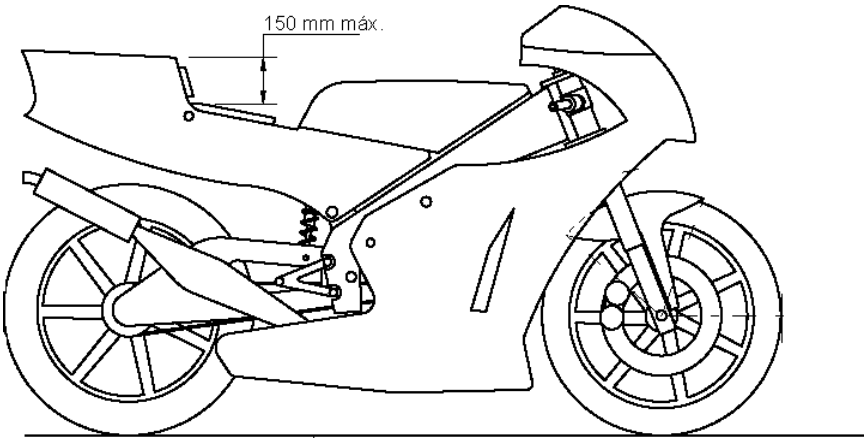
B.2.1.7 The minimum width of the saddle must not exceed 450mm. No other element of the motorcycle shall protrude from this width from the saddle to the rear except for the exhaust system for bikes of the Category “Petrol”.



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 motorcycle without the rider shall be 95kg for both categories, including all fluids that may be necessary for the correct operation of the bike. For bikes of the Category "Petrol" at least one liter of fuel must be included within this weight.

B.2.2.2 The weight of the complete motorcycle shall not be below the minimum weigh indicated in Art. B.2.2.1. at any time during the events.

B.2.2.3 During the final scrutineering, the chosen motorcycles will be weighed in the same conditions as they finished the race, and the weight limit shall be measured in this condition. Nothing can be added to the motorcycle. This includes all fluids.

B.2.2.4 The riders might be called-in to weigh their motorcycles during the dynamic tests. The riders must attend to this call in any case.

B.2.2.5 The use of ballast to reach the minimum weight is allowed. The ballast must be declared to the technical officials during the scrutineering.

B.2.2.6 Mobile ballast must be properly fixed to the chassis, so it cannot become detached from the bike in case of shock or fall. It can be installed by zipties or screwed

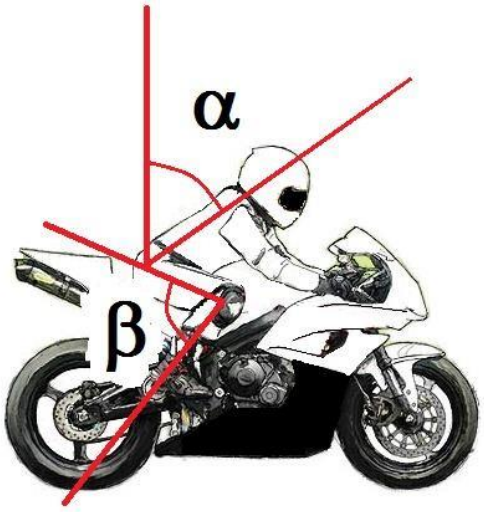
B.2.3 Ergonomics

The design of the motorcycle must be within the ergonomic limits for a rider of an average size and weight.

B.2.3.1 It is allowed to install adjustable steering elements to improve ergonomics and comfort for the rider.

B.2.3.2 The elements and symbols reflected in the instrument panel and controls, as well as indicators in the display must be perfectly legible in the normal riding position.

B.2.3.3 Taking the percentile of sizes P95 (comprising 95% of the population), the position of riding of a standard sports motorcycle, in normal driving (not in a position of maximum speed) position, is comprised by the following angles:



Ergonomics position angles

Where:

- α: Angle between the Vertical and the rider's back. Angles between 19 and 40 degrees are recommended for a sports motorcycle.
- β: Knee flexion angle. Angles between 65 and 77 degrees are recommended for a sports motorcycle.

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 new, self-manufactured and self-designed frame prototype.

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

B.3.1.1 There are no restrictions in the type of design 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.

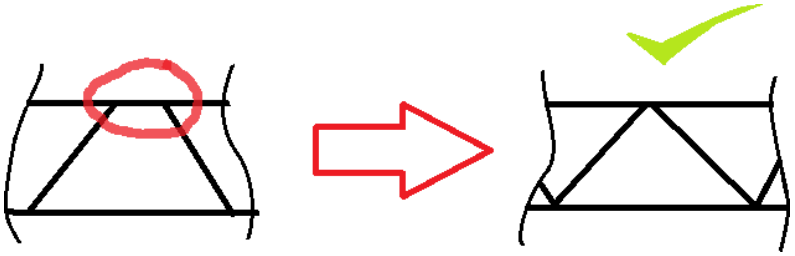
B.3.2 Materiales

It is not allowed to manufacture the frame with titanium or titanium alloys. Regarding the rest of materials there are no restrictions.

B.3.3 Welding and unions

Welding of structural elements by any means is permitted, but must be a consistent structure

B.3.3.1 Structures of jalousie type must search the correct triangulation in the nodes of the structure.

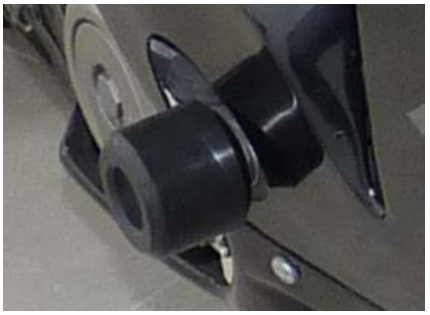


Example of correct triangulation

B.3.4 Crash protectors

B.3.4.1 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.3.4.2 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.



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 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.4.2 Lower fairing

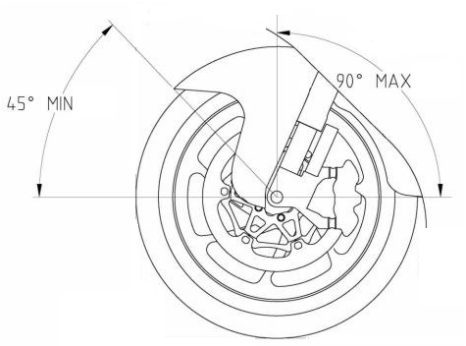
B.4.2.1 The lower fairing must be manufactured to contain, in case of an incident in the engine, at least half of the total oil and/or the engine's cooling fluid (minimum 2.5 litres). In prototypes of the Category ”Electric” this rule applies only to those prototypes that have any system incorporating fluids (such as cooling or transmission. Suspension or brake systems are not considered).

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 tap in dry conditions and must only be opened in case of rain. This empty tap must be wire-sealed to prevent loss of caps or the fall of these to track on failure of closing

B.4.3 Mudguards

B.4.3.1 The use of mudguards is not compulsory

B.4.3.2 In case of installing a front mudguard, it cannot cover more than 135º of the wheel circumference measured from the rear part of the tyre; the origin of the angle being on the horizontal line crossing the wheel shaft.



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

B.4.4 Protection against trapping

B.4.4.1 If by 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: STEERING: HANDLEBAR 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 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 is free, provided the distance between the pivot point and the outer end 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 motorcycle. In addition to specific protections fixed to the handlebars, a fairing extension sufficient 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 type. In case of folding type 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.

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 tap at the outer end of footrests, made of aluminium, 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 tyre.

B.5.2.5 The rear brake pedal choice of is free.

B.5.2.6 The choice of the gear shift pedal is free.

ARTICLE 6: BRAKE SYSTEM

The motorcycle must be fitted with a disc brake system both in the front and in the rear shaft.

The only allowed brake system components are the following:

- Front caliper:

  • J.Juan®: aluminum caliper, 4 pistons, 1.05 kg weight.

  • Caliper with similar weight, piston number and material. The Organization has the right to refuse to accept the usage of certain calipers during each event.

- Rear caliper:
-

  • J.Juan®: aluminum caliper, 2 pistons.

  • Caliper with similar piston number and material. The Organization has the right to refuse to accept the usage of certain calipers during each event.

- Front hand master cylinder:

  • J.Juan®: front hand master cylinder, 12.7mm of diameter. 0.43kg weight.

  • Front hand master cylinder with similar weight, piston number and material. The Organization has the right to refuse to accept the usage of certain calipers during each event.

- Rear foot master cylinder:

  • J.Juan®: rear foot master cylinder, 12.7mm of diameter.

  • Rear foot master cylinder with similar piston number and material. The Organization has the right to refuse to accept the usage of certain calipers during each event.

B.6.1 Comand 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.

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 tires.

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

B.6.3 Callipers

B.6.3.1 The rear brake caliper must be installed fixed to the swing arm and the minimum quality of the screw shall be 8.8 according to the EN ISO 898-1 standard

B.6.3.2 The support of the rear calliper can be fitted to the swing arm by means of welding, screws or helicoil.

B.6.3.3 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.

B.6.3.4 The front and rear brake pads are free.

B.6.3.5 The pins of the front and rear brake pads can be changed. Quick change systems are allowed.

B.6.3.6 No supplementary cooling pipes on the calliper are allowed.

B.6.3.7 In order to reduce the heat transfer to the brake fluids, it is allowed to add metallic plates to the brake callipers.

B.6.3.8 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

B.6.4.1 The activation lever for the front brake pump cannot be replaced or modified.

B.6.5 Brake ducts

B.6.5.1 The brake lines are free

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

B.6.5.3 Quick connectors may be used with the brake lines

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.

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 and the steering dampers 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 motorcycle 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.

B.7.2.2 Front suspension dampers may not mount external tanks or bottles or annexed to the main bottle, whether attached to the main body or communicated by tubes.

B.7.2.3 Pressurized front suspension dampers, with air/gas preload cartridge, are not allowed.

B.7.2.4 The front suspension assembly may have mechanical or hydraulic adjustment systems, such as spring preload, compression, extension or rebound regulation.

B.7.2.5 Any front suspension adjustment system must be integrated into the fork body itself. External control systems communicated by means of hoses, cables, etc. are not permitted.

B.7.3 Rear suspension

B.7.3.1 Rear suspension dampers must be of conventional type, without external or annexed tanks or bottles, whether attached to the main body or communicated by tubes.

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.

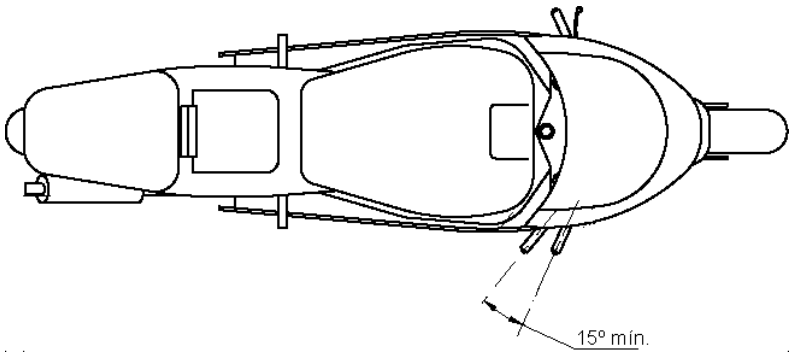
B.7.3.3 Any rear suspension adjustment system must be integrated into the shock absorber body itself. External control systems communicated by means of hoses, cables, etc. are not permitted.

B.7.3.4 The installation of rear shock absorbers of adjustable length is prohibited.

ARTICLE 8: STEERING SYSTEM

B.8.1 Restrictions and geometry

B.8.1.1 The minimum turning angle of the steering must be 15º measured on either side of the longitudinal axis of the motorcycle.



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 bike 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 fitting 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

The sizes of the rims will be:

Front rim: 2.5”x17”

Rear rim: 3.5”x17”

The only models allowed for Moto Engineering Cup 2019 are the following:

- OZ® AR-OZ alu forged wheel 2,5x17 and 3,5x17 (3631G002A00-01 and 3631G003A00-01). Aluminum alloy.

- Marchesini® M10RS Kompe Moto3. Aluminum alloy.

B.9.1.1 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.9.1.2 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.9.1.1).

B.9.1.3 The machining or adaptation of the rims supplied by the Organization is not allowed, not even in the shaft accommodation. The only modification allowed is the repainting.

B.9.2 Tires

Only those tyres supplied by the Official Tyre Supplier of the respective competition year can be used at Moto Engineering Cup.
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 tyres, both for dry and wet conditions; they will be able to purchase them in every event.

B.9.2.2 The use of tire warmers is allowed.

ARTICLE 10: ELECTRONIC SYSTEMS

B.10.1 Driving 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 Information systems for the rider

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

B.10.3 Data recording

Está permitido el uso de sistemas de adquisición de datos relativos a parámetros de motor, dinámica de la motocicleta y comportamiento del piloto.

B.10.3.1 The systems allowed to be used are commercial systems or systems adapted from other types of vehicles.

B.10.3.2 The free use of all types of sensors is allowed, provided that its installation does not affect any rule of these Technical Regulations.

B.10.3.3 The software used may be of a commercial type or self-created.

B.10.3.4 The live reading systems of telemetry are prohibited. The data acquisition may only be read at the stops in box.

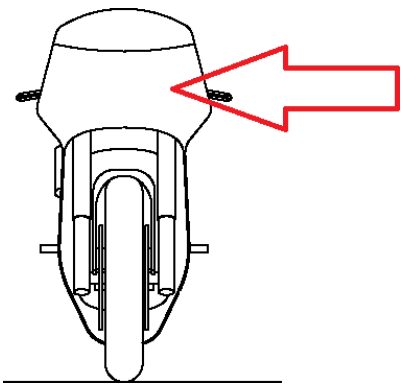
B.10.3.5 All components and wiring of the data acquisition system must be properly fixed and placed in safe areas.

ARTICLE 11: IDENTIFICATION, ADVERTISING AND COMPETITION NUMBERS

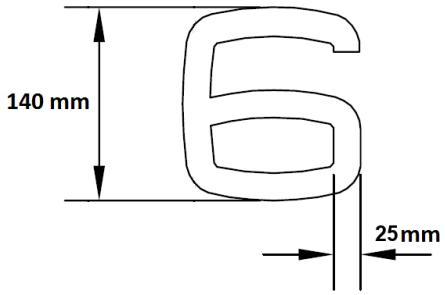
B.11.1 Numbers

Each motorcycle must carry 3 identifying competition numbers on the fairing.

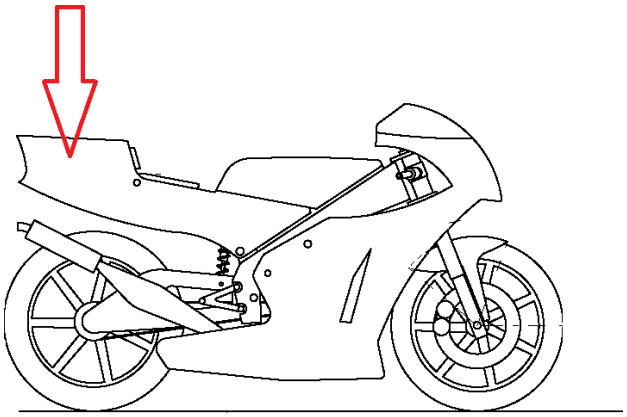
B.11.1.1 The front number must be placed on the front part of the fairing. It may be located in the central part or lopsided, provided that be perfectly legible.



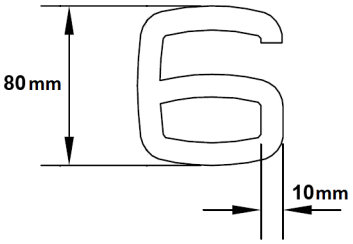
B.11.1.2 In the front number, the minimum dimension of each character must be 140mm in height and the minimum stroke width of each character must be 25mm. The minimum distance between characters must be 10mm.



B.11.1.3 A competition 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 typography used for dorsal numbers is free, as long as the Technical Staff of the Organization considers it legible. 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.11.1.8 The only numbers to be used are 1 to 99, excluding number 13.

B.11.1.9 Each team will be responsible for placing the competition number on the motorcycle.

B.11.2 Competition Logos and Advertising

B.11.2.1 It is allowed to carry any type of logotypes and advertisements as long as:

- Does not make difficult the reading of the Competition Number.
- Does not contain explicit advertising of tobacco or alcoholic drinks.
- Does not contain messages that violate human dignity (violence, xenophobia, racism, intolerance, etc.)

B.11.2.2 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 helmet that meets any of the following certifications or equivalent:

- Europe: ECE 22-05 ‘P’

- Japan: JIS T 8133: 2007 / JIS T 8133:2015

- USA SNELL M 2010 / SNELL M 2015

B.12.1.2 Helmet must be of integral type, for speed track use. The use of a "motocross" type helmet is prohibited.

B.12.1.3 The use of disposable screen covers is allowed (tear-off).

B.12.1.4 The screen must be made of a shatterproof material.

B.12.1.5 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 is mandatory with protections for fingers.

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

SECTION C: SPECIFIC TECHNICAL REGULATIONS FOR THE CATEGORY "PETROL"

ARTICLE 1: ENGINE

C.1.1 Engine

The use of the engine provided by the Organisation is compulsory. The engine provided by the Organisation 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 The only permitted engines for Moto Engineering Cup 2019 will be the following:

- KTM RC 250.
- Honda CBR250R.

C.1.1.2 Engines may not be sealed at the start of each event.

C.1.1.3 Access to the inside area of the engines is permitted to teams, in order to allow reparations in case of failure or damage.

C.1.1.4 Every piece of the engine (internal or external) must belong to the original model, and remain as in the original model during each event (unless it is specified on this rulebook or the Organization gives its approval). This includes technical scrutineering.

C.1.1.5 Other engine model's parts are not allowed (unless it is specified on this rulebook or the Organization gives its approval).

C.1.1.6 In case of permitting certain specific engine pieces to be replaced by others different from the original ones (due to reliability issues), the Organization will announce it to teams.

C.1.2 Scrutineering

C.1.2.1 No deliberate modification of the dimensions of any piece of the engine is permitted.

C.1.2.2 The Organization reserves the right to call any of the teams for scrutineering during or after each event to verify their engine (or other parts) if they consider so.

C.1.2.3 The Organization will be aware of the original dimensions of each part of the engine, via an opened engine template or via spec sheet, with the corresponding dimensions of every component of the engine.

C.1.2.4 In case of irregularities with regard to the standard dimensions of an engine element, the Organization will react as it considers. It may even mean the disqualifying of the corresponding team of the event.

C.1.3 Crankcase and engine block

C.1.3.1 Modifications in the crankcase are not allowed, not even in its covers.

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 the 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 of the engine.

C.1.4 Fuel supply system

C.1.4.1 The original fuel supply system of the provided engine can be replaced or changed. Either carburetion or injection systems are allowed.

C.1.4.2 The use of ceramic carburettors is forbidden.

C.1.4.3 Only one throttle control valve is allowed, which must be exclusively controlled by mechanical elements and shall only be handled by the rider.

C.1.4.4 The fuel injector must be installed before the admission valves of the cylinder. Direct injection into the combustion chamber is not allowed.

C.1.4.5 It is allowed to install only one injector.

C.1.4.6 The installation of a unique fuel pump is allowed. There are no restrictions on the type of pump to be installed.

C.1.5 Modifications

C.1.5.1 Any change or modification over the engine that is not specified in these Regulations is not allowed.

C.1.5.2 In case of a dispute about these changes, the decision of the Organization will be final.

ARTICLE 2: INTAKE

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 motorcycle.

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 injector.

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 is allowed, to be activated only by mechanical means (e.g. cable) handled by the rider. 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 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 motorcycle's movement by means of air intakes.

C.2.4 Airbox

The design of the airbox is free.

C.2.5 Air filter

The filter element of the intake air is free.

C.2.6 Recycling of gases

It is allowed to mount a tank between the cylinder head cover and the airbox, with the only function of collecting excess gases of the engine. No other function is allowed (such as the change of the created pressure) and only the engine vents may be connected between the cylinder head cover, the said tank and the airbox. It must be possible to check this tank and its connections at any time and therefore they must not be mounted hidden behind the frame making them difficult to check.

C.2.6.1 Any breather pipe for engine gases vent must either discharge into this reservoir, over the intake system or, failing that, over a suitable tank enabled for this purpose.

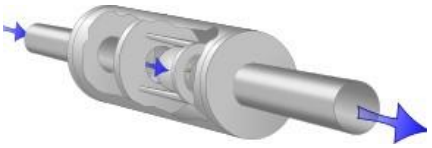
ARTICLE 3: TANK AND FUEL PIPES

C.3.1 Fuel tank

C.3.1.1 Fuel tanks, regardless their design or manufacturing material, should be filled with flame retardant foam (popularly known as explosafe / mousse).

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 discharge into a suitable tank with a minimum capacity of 200cc. This vent must be provided with a non-return valve.



Example of non-return valve

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 the outflow of fuel to the outside in case of rupture of the tank.

C.3.1.4 The 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.

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 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 Cooling

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

C.3.4 Pressure

The fuel pressure must not be over 5.0 bar in any part of the circuit.

C.3.4.1 The refueling operation must be done from a non-pressurized recipient.

C.3.4.2 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).

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 events, the Organization may require samples of fuel.

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 motorcycle.

C.4.2 Engine oil

The lubricating oil to be used is free.

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, provided that they comply with the dimensional requirements of the general dimensions of the motorcycle.

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

C.6.1.1 The exhaust system design is free, provided that it complies with the general dimensional requirements of the motorcycle 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. valves, deflectors, etc.).

C.6.2 Noise

The maximum noise level allowed for the exhaust is 115 dB/A measured statically at 5,500 RPM.

ARTICLE 7: CLUTCH AND TRANSMISSION

C.7.1 Clutch

The 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 Stock clutch can be modified with limited slip clutch systems.

C.7.2 Gearbox

The original gear box integrated in the original engine cannot be replaced or modified.

C.7.3 Secondary transmission

C.7.3.1 Only secondary transmission systems by chain are allowed.

C.7.3.2 The exit pinion of the box, the rear wheel rim and the chain are free.

C.7.3.3 Fast gear change systems (quickshift) are authorized.

C.7.4 Modifications

Any modification of the transmission system or the gearbox which is not mentioned in this section is not allowed.

ARTICLE 8: ELECTRIC INSTALLATION

C.8.1 ECU

The configuration of the Electronic Control Unit (ECU) of the engine is free.

C.8.1.1 Both commercial and own-design devices can be used.

C.8.1.2 The configuration of the electronic engine management map is free.

C.8.2 Battery

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

C.8.3 Electric installation

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

C.8.3.2 The use of other commercial installations is allowed.

C.8.3.3 The type of cable, the design and the wiring are free, 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 motorcycle 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 motorcycles must be fitted with 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 button must cut the electric supply of all components of the motorcycle.

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 motorbike, it is forbidden leaving distances larger than 15cm of wires unfixed to the chassis.

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.

C.8.4 Start system

C.8.4.1 The cancellation of the electric start system integrated in the original 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 be allowed to start the engine with external starters or also by pushing.

SECTION D: SPECIFIC TECHNICAL REGULATIONS FOR THE CATEGORY "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 vehicle. 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 110 VDC (fully charged batteries).

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 vehicle 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 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 vehicle (chassis) and hence is not part of the HVS.

D.1.3.1 The GLVS must be a LV system, i.e. 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

D.2.1 Sealing

The same regulation reflected in Art. C.1.2 “Scrutineering” is applied in Art. D.2.1.

D.2.2 Characteristics of the electric motor

D.2.2.1 The only permitted motors for Moto Engineering Cup 2019 are:

- Motenergy ME-MS 1718.
- Motenergy ME 1507.

D.2.2.2 Team’s motors must only have elements that belong, in origin, to one of the two specified in Art. D.2.2.1. This includes stator case, winding, magnets, rotor

plates and motor shaft.

D.2.2.3 The motor 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 motorbike. The signal of the potentiometer shall serve 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 110 VDC with fully charged accumulator, as described in Art. D.1.1.

D.3.1.3 The connection diagram used shall be submitted to the Organisation (cells in series and in parallel) if required.

D.3.2 Battery container

All battery cells and supercapacitors that form 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 Organisation may request pictures of the layout and the 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 picturess 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.

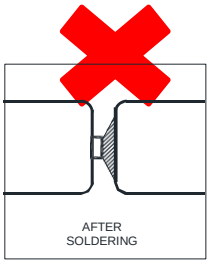
D.3.3.2 If the container is made of an electrically conductive material (metals, carbon fiber, etc.), the body of the cells cannot be directly in contact with the inner wall of the crankcase and an insulation material must be placed. Prismatic cells with a rigid insulating housing are excluded from this requirement.

D.3.3.3 Each container must include at least one fuse inside, the rated intensity of which must be below the cutting power of the contactor.

D.3.3.4 Each container must include, at least, a 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 signaled 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.



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 chassis.

D.3.4.2 The battery container may be part of the frame of the motorbike, 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 motorbike 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 pasive system be used (non-compulsory), resistances must be used 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 as the contactor of the battery accumulator open. (See diagram in Art. D.6.1.2).

D.3.5.7 In addition to the conditions set-out in Art. D.3.5.10, 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.

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 a synchronous 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 intensity 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 vehicle 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:

Tensión HVS	Distancia de separación
< 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 ºC 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 an accident.

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

D.5.3 Grounding

All metal parts of the vehicle 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 motorcycle.

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 non-flammable, grade UL-94V0, FAR25 or equivalent.

D.5.5 Precharge circuit

Es obligatoria la instalación de un circuito de precarga antes de que cierre el contactor del acumulador.

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 shall be installed that will remain on while the HVS is active, i.e. 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).

- A 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:

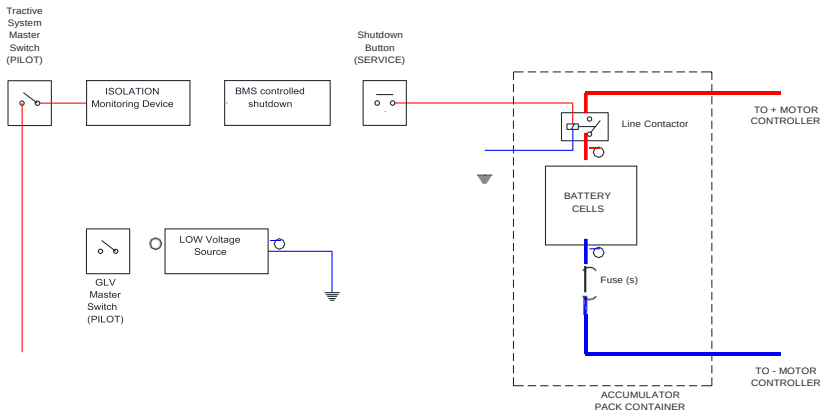


Diagram 1: Contactor directly controlled by the disconnection circuit

- Disconnection system with contactor directly controlled by the controller:

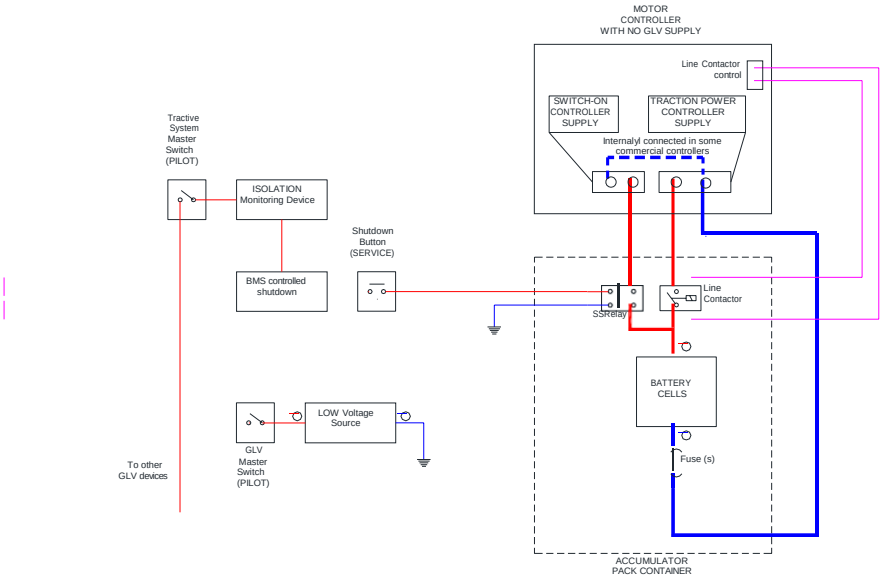


Diagram 2: Contactor directly controlled by the controller

D.6.1.3 Should the coil of the contactor of the battery accumulator be controlled directly by the motor controller (or any other device), the disconnection circuit has to ensure the shut-down of the controller (or the respective device) and consequently the shut-down of the contactor coil, its opening being guaranteed as described in diagram D.6.1.2.

D.6.1.4 Once the disconnection circuit is open (contactor open) as a consequence of the action of any of the designated devices (TSMS, Shut-down button, BMS or IMD), the system will remain in “not ready to ride” condition and the rider will have to reactivate it manually and voluntarily (e.g. restarting the controller), before the disconnection circuit closes again.

D.6.2 Disconnection of the GLVS

To make sure that the GLVS is able to turn on and off independently, a Grounded Low Voltage Master Switch must be installed.

D.6.3 Type of switches

D.6.3.1 The Emergency/Shut-down button(s) must be red mushroom-type push-rotary buttons.

Example of emergency button

D.6.3.2 The Tractive System Master Switch (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 inverter 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 safety check, 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 motorcycle

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

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

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

D.8.3.3 The charging connector of the motorcycle 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 motorcycle to prevent damages due to possible crashes, contacts or impacts.

D.8.4 Recharging process

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

D.8.4.1 During the recharging process of the motorcycle 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 vehicle from the network in case of any contingency.

D.8.4.3 A fire extinguisher for electric fire (extinguishing agent CO2 or similar) must be located at a distance of less than two meters from the motorcycle 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 CABLING

D.9.1 General insulation

D.9.1.1 All conducting cables 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 cables 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 IP65.

D.9.4 Wiring

D.9.4.1 The cable length must be exact, and therefore it is not allowed to roll excessive cable 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 motorcycle assembly, and the distance between cable 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 motorcycles 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 ELEMENTS

D.10.1 Dashboard

The dashboard shall be perfectly visible for the rider when 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 elements

D.10.2.1 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 motorcycle, from the standard riding position.

D.10.3 Shut-down button

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

D.10.3.1 The 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 track marshals.

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

D.10.3.3 If the installation of the shut-down button on the side of the motorcycle is under consideration, there must be two buttons, i.e. one on either side.

D.10.3.4 The installed shut-down button or buttons must have red colour.

ARTICLE 11: TRANSMISSION

D.11.1 Types of transmission

The configuration of the transmission system used for the “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 as regards the installation of clutch elements between components of the transmission system.

D.11.2 Secondary transmission

D.11.2.1 There is no limitation as regards 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

D.12.1 Overview of the cooling systems

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

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

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 general measurements of the motorcycle.

ARTICLE 13: DOCUMENTATION OF THE VEHICLE

D.13.1 Documents to be submitted

D.13.1.1 For safety reasons, the Technical Department 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.

SECTION E: SCRUTINEERING

ARTICLE 1: OBJECTIVE AND METHODOLOGY

E.1.1 Objective

The objective of the pre-event scrutineering is to check that the motorcycles that have been submitted to the Competition by the participating teams comply with the specifications in terms of performance and safety as established in the General Technical Regulations (Sections B, C and D).

E.1.1.1 The pre-event scrutineering will not score towards the Moto Engineering Cup 2019, but it may entail the exclusion if any deviation from the regulations is detected or if the motorbike is not considered as safe enough to take part in the tests.

E.1.1.2 The pre-event scrutineering will be carried out by Federative licenciate scrutineers and qualified Technical Staff of the Organisation.

E.1.1.3 In case of dispute over the non-compliance of the rules reflected in the Technical Regulations, or the safety of the bike on track, the decision of the Technical Staff of the Organization will be definitive.

E.1.2 Responsibility of the teams

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

E.1.2.1 When presenting the motorcycle for scrutineering, the team acknowledges that they have made sure that the motorcycle complies with the regulations established by the Organization.

E.1.3 Procedure

The scrutineering consists of a visual safety check, followed by a series of other checks explained below:

ARTICLE 2: VISUAL SAFETY CHECK

E.2.1 Application

The static scrutineering described in this article affect the motorcycles presented for both the category " Petrol" and the category "Electric".

E.2.2 Procedure

The motorcycle will be checked by the scrutineers according to all the rules reflected in the Technical Regulations.

E.2.2.1 The teams may have all spare elements (any component or part of the motorcycle) that they may seem fit. These spare parts must be presented to the Organization together with the prototype in order to have them verified.

E.2.2.2 The static checks will be carried out in the corresponding reserved area, previously defined and told to teams depending on the circuit.

E.2.2.3 The motorcycle must be presented ready to participate in the tests, so that, complying all the rules reflected in the Technical Regulations of the Competition.

E.2.2.4 The use of components that have not been checked by the Organization will entail the immediate exclusion from the competition

E.2.2.5 For the static checks, only 2 team members shall be present in the Technical Control Area. These team members will be in charge of transporting the motorcycle and any type of stand to present the bike in static position for its examination.

ARTICLE 3: SPECIFIC STATIC TECHNICAL CHECKS FOR BIKES OF THE CATEGORY "PETROL"

E.3.1 Exhaust noise

E.3.1.1 The maximum permitted exhaust noise is stated in Art. C.6.2 of the Technical Regulations.

E.3.1.2 The noise will be measured at approx. 50 cm from the exhaust exit, in the flow direction of exhaust gas, in a place which shall be as silent as possible, with no walls or obstacles within 3m around the exhaust exit.

ARTICLE 5: SPECIFIC STATIC TECHNICAL CHECKS FOR THE "ELECTRIC" CATEGORY

This article does only affect the prototypes participating in the Category "Electric" of the Competition.

E.5.1 Insulation Monitoring Device Test (IMDT)

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

E.5.1.1 During the test, a 50 kΩ resistance will be placed between the HV side and the chassis in order to check the correct electric insulation.

E.5.1.2 In order for a motorcycle to pass the test, the measuring system should open the disconnection circuit not later than 30 seconds after it has been connected to the prototype.

E.5.2 Insulation Measurement Test (IMT)

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

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

E.5.2.2 In order for a motorcycle to be considered as fit to take part in the Competition, the value measured between both systems must be equal or higher than 100 kΩ.

E.5.3 Disconnection Circuit Test

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

E.5.2.1 The correct working of the Main Switch and of the Shut-Down Button will be checked. Shutting down any of them must open the contactors of the battery accumulator.

E.5.2.2 When shutting down these switches, the voltage shown on the display of the dashboard must be zero.

E.5.4 Rain test

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

E.5.4.1 The motorbike must first be subjected to the Insulation Monitoring Device Test, Insulation Measurement Test and the Disconnection Circuit Test.

E.5.4.2 During this test, the motorbike 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 motorbike in different directions for a minimum period of 60 seconds. Under no circumstances will high pressure jets be projected onto the motorbike.

E.5.4.4 The test 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 test 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 appropiated means to dry the motorcycle after the test.

EVERYTHING NOT PERMITTED AND SPECIFIED IN THESE REGULATIONS IS STRICTLY FORBIDDEN