



The eGrandPrix

## TECHNICAL RULES

2010 Race Season

These Technical Rules must be read in conjunction with the supplemental regulations specific for the venue and championship series. Both technical and supplemental form part of the rules for racing with TTXGP at every event.

Compliance with all rules is a condition of entry to TTXGP. E&OE.

[www.egrandprix.com](http://www.egrandprix.com)

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## **Introduction**

The technical concept is for motorcycles with two wheels, having traction on one or both wheels, to be powered without the use of carbon based fuels and having zero toxic/noxious emissions.

### **1. Special Notice**

In the event of any non-safety related dispute, the decision TTXGP is final in all circumstances. In all other cases, the Clerk of the Course has primacy. Clarification or amendments to the rules will be posted at [www.egrandprix.com](http://www.egrandprix.com). Notification of any changes will be sent out to all valid entrants. It is the responsibility of the entrant to ensure that they are in possession of all the latest rules and guidelines. TTXGP cannot be held responsible for any failure of receipt of the rules.

Each entrant must regularly check [www.egrandprix.com](http://www.egrandprix.com) where any supplementary regulations, final instructions or clarifications will be published.

## ***Class Requirements***

### **2. General TTXGP Class Requirements**

Electrically propelled machines. Powered solely by stored electricity (battery /accumulator).

### **3. Race Format**

As per the supplementary regulations issued for each event.

### **4. Charging the accumulator**

The vehicle's accumulators must be charged at the times and locations determined by the organiser of the meeting. Charging may only be done with the energy supply provided by the race organisers. The charging system must be separate from the machine and comply with all electrical safety requirements including thermal overload trip, fusing and be equipped with an earth leakage protection breaker.

### **5. Pit Stop**

Pit stops will be prescribed, if appropriate, in the supplementary regulations for each event.

## **6. Transponder timing**

All machines must have a Trannex 260 transponder fitted in addition to any additional requirements of the organiser / promoter.

## **7. Technical Control**

- a. As a condition of entry, a Technical Construction File must be submitted with the race entry, using the template provided (available on [www.egrandprix.com](http://www.egrandprix.com)). This must provide the basic information listed, as well as the design steps taken to a) ensure compliance with the TTXGP rules b) the relevant ACU Race Regulations and c) safety for rider, team, spectators, officials and marshals.
- b. The Technical Officer shall check both the machine and the rider for compliance with the technical specifications, as well as the employment of good engineering construction practice, the provision of adequate electrical insulation and weatherproofing.
- c. The rider must wear his clothing to Technical Control to demonstrate good fit etc.
- d. Crashed machines must be returned to the technical control area for examination after race or practice. In such circumstances it is the responsibility of the competitor to ensure his machine and clothing has been rechecked and approved before further use in the event.
- e. It is the responsibility of the rider to ensure that a machine used in competition is electrically, mechanically and structurally in a safe condition.

## **8. Conformity**

It is the duty of each competitor to show the Technical Stewards of the meeting that his/her vehicle fully complies with these rules and the rules governing the meeting in their entirety at all times.

## **9. General Prescription**

All motorcycles must comply in every respect with all the requirements for racing as specified in the relevant ACU Road Racing Rules Standing Regulations, unless specifically reported in this set of rules.

## **10. Number Plates**

The colour of the plate and the numbers must comply with the current Race Regulations for the TTXGP Class.

## **11. Footrests**

The use of feet forward designs is permitted. This must include a footbox that will support the vehicle when on its side and so that the rider's legs and feet are not trapped between the vehicle and another surface. The rider's foot, in front of the ankle joint, may be obscured by bodywork.

## **12. Streamlining**

The streamlining of solo machines must correspond to the following specifications. Feet forward configurations within the criteria listed below are permitted.

- a. Air foils or spoilers may only be fitted on solo machines when they are an integral part of the fairing or seat. They must not exceed the width of the fairing nor the height of the handlebar. Sharp edges must be rounded off with a minimum radius of 8mm.
- b. Any part of the streamlining which faces rearwards must be finished with rounded edges of 3.5mm min. radius.
- c. The rider must be completely visible from either side except for the rider's hands and forearms which *may* be obscured by bodywork. The front inclination where the number plate is fixed must not exceed an angle of 30 degrees to the rear of the vertical.
- d. The ground clearance when loaded must not be less than 100mm.
- e. No part of the bodywork may come in contact with the ground when driven at normal racing speeds.
- f. Bodywork must not exceed 1000mm in width at any point.
- g. Bodywork may not protrude further forward than 50mm in front of the front wheel
- h. Bodywork may not protrude further rearwards than 400mm beyond the rear wheel
- i. The maximum height of the back of the rider's streamlining bodywork must not be higher than the rider's helmeted head in "at speed" racing position.
- j. Bodywork in front of the rider must not be higher than the rider's shoulders in "at speed" racing position.

- k. Mirrors, if fitted, must be shatterproof and fold back without damage when the vehicle is on one side. The mirrors must retain their normal configuration when vehicle is upright.
- l. No movable or fixed aerodynamic devices are permitted. (Note see also a. above).
- m. It must be possible for the unloaded machine to be inclined to an angle of 30 degrees from the vertical without any part, other than the tyre, coming into contact with the ground.

Any design should take into account the characteristics of the course, corners and gradients. A diagram is provided for clarification on [www.egrandprix.com](http://www.egrandprix.com)

### **13. Machine Weight**

Motorcycle minimum weight is 100 kg and up to 300 kg. The machine will be weighed in race ready mode.

### **14. Dimensions**

The maximum length must not exceed the 3m and the maximum width must not exceed 1m.

### **15. Transmission**

Powered traction from more than one wheel is permitted.

### **16. Chassis Number**

A unique number must be embossed visibly on an easily accessible part of the chassis. In addition, a label made from durable material must be affixed in an easily accessible location and must permanently display the name of the manufacturer, the make of the vehicle and its chassis number.

### **17. IEC Publications (Guidelines)**

If no specific rule exists in these Technical Rules, the relevant IEC Standard (International Electro-technical Commission Standard) or Report has to be observed:

- a. IEC 60529 Degrees of protection provided by enclosures (IP Code).
- b. IEC 60783 Wiring and connectors for the road vehicles. This report is applicable to cabling and connectors used in battery electric road vehicles.
- c. IEC 60784 Instruments for electric road vehicles. This report is applicable to the instrumentation of electric road vehicles, excluding those items

- which are used as instrumentation in vehicles with internal combustion engines.
- d. IEC 60785 Rotating machines for electric road vehicles. This report is applicable to rotating electrical machines [traction motors and auxiliary motors] of electric road vehicles including hybrids, which are fed from the main traction batteries).
  - e. IEC 60786 Controllers for electric road vehicles. This report is applicable to the equipment on electric vehicles that control the rate of energy transfer between the traction battery or batteries and the motor or motors).

### **18. Accumulator (storage battery)**

The accumulator is defined as any equipment used for the intermediate storage of electrical energy supplied by the charging unit. Any on-board accumulator is considered as an integral part of the vehicle's accumulator. All on-board electrical equipment, unless consisting of items originally powered by dry batteries, small accumulators or their own solar cells, must receive its energy supply from the vehicle's official accumulators.

**IMPORTANT:** As a condition of entry, a Material Data Safety Sheet must be supplied with the race entry for the machine, including all relevant details as to the accumulator chemistry, human and environmental hazards, handling and specific fire risks and precautions.

### **19. Energy recovery**

It is permitted to recover energy generated by the momentum of the vehicle. For example by regenerative braking.

### **20. Use of outside energy sources**

The use of any carbon based source of energy in any form whatsoever with the aim of improving the performance of the vehicle is strictly prohibited. This includes the energy used to drive the vehicle's cooling system. Carbon based lubricants are not prohibited.

### **21. Propulsion system failure**

The vehicle must be able to freewheel in the event that the propulsion system has stopped (i.e. Fuel/Charge exhausted or system failure)

### **Electrical safety**

In no part of the vehicle's electrical equipment may there be voltages of more than 500 volt referred to chassis and system ground respectively (system ground

is the ground of the electrical equipment). Between system ground and chassis or body of the vehicle no more than 50 volts are allowed.

The voltage is limited to 500 volt between two points. In cases where the voltage of the power circuit exceeds 42 volt, this power circuit must be separated from the onboard circuit by an adequate insulator.

Symbols warning of 'High Voltage' must be displayed on or near the electrical equipment protective covers; the symbol must comprise a black flash of lighting inside a yellow triangle with a black border. The sides of the triangle must measure at least 12 cm or as large as reasonably practical.

The power circuit consists of all those parts of the electrical equipment which are used for moving the motorcycle. The on-board circuit consists of all those parts of the electrical equipment which are used for signalling, lighting or communication.

All parts of the electrical equipment must be protected to the equivalent of IP 44 type protection (dust proof and splash proof). However, it is recommended that IP 55 type protection be used (fully dust – and splash proof).

### **23. General circuit breaker – 'Emergency Stop'**

Two emergency stops are required as a stop has to be easily accessible both to the rider and to marshals.

When seated in a normal riding position, the rider must be capable of interrupting all electrical transmission between the accumulators and the energy consumers by means of a spark-proof general circuit breaker situated in front of him. This breaker must be located in such a way that it can be also operated from outside the vehicle. This breaker must be clearly identified as such. The use of a lanyard attached to the rider to operate this breaker as an alternative to a button is permitted.

The general circuit must also include a second general circuit breaker which should be located behind the rider, and be positioned taking into account that the bike may be on one side following an incident. This must be operated by a red button, and identified with a yellow disc of at least 8 cm in diameter reading 'Emergency' in red or black letters.

The options suggested below are acceptable, as are other solutions that meet the stated requirements. Teams will be required to demonstrate the operation of the Emergency Stops during technical inspection.

1. A low voltage switch (e.g. push button) as a control for a contactor relay in which the contactor can be mounted down near the motor and keep the power voltages and currents away from the rider and top side of the bike.
2. A relay with an integrated “breaker” switch, which requires running the full battery voltage to wherever this breaker is mounted.

Operation of the general circuit breaker must also isolate any pre-charge resistors, if installed.

In order to prevent contact melting of the general circuit breaker its ampere square seconds characteristics, representing heat energy dissipated on the breaker contacts during switching, must be sufficient to guarantee proper operation of the circuit breaker, even under surge current conditions, in particular those occurring during the connection of the accumulator to the power plug.

Low power accumulators provided for low voltage circuits, e.g. auxiliary circuits, do not have to be isolated by the general circuit breaker – Emergency Stop provided that they are completely isolated from the main power accumulators.

#### **24. Power Indicator**

When the vehicle is in a powered on state, there must be a clear visual indicator showing on the rear of the bike. This must be a flashing red light mounted on the rear bodywork and be visible from at least 10m away, from the side or rear. The light must flash between 1 – 2 times / second on a 50% duty cycle.

#### **25. Fuses (over-current trip switches)**

An over-current trip is a device which automatically interrupts the electrical current in which it is installed if the level of this current exceeds a defined limit value for a specific period of time.

Fuses and circuit breakers (but never the motor circuit breaker) count as over current trips. Extra fast electronic circuit fuses and fast fuses are appropriate. The fuses must be in an easily accessible location and as close as possible to the accumulator at both polarities.

All electrical cables inside the motorcycle must be protected by means of over currents trips rated according to the diameter of the individual conductors. Over-current trips must under no circumstances replace the general circuit breaker (Emergency Stop Button).

## **26. General electric safety**

It must be ensured that the components used cannot cause injury under any circumstances, either during normal operation or in foreseeable cases of malfunction. It must be ensured that the components used for protecting persons or objects can reliably fulfil their function for an appropriate length of time.

## **27. Insulation resistance**

Every part of the electrical equipment must have a minimum insulation resistance between all live components and earth.

- a. For equipment with up to 300 volt to earth, the insulation resistance must reach the following value: 250 k Ohms.
- b. For equipment with more than 300 volt to earth, the insulation resistance must reach the following value: 500 k Ohms.

The measurement of the insulation resistance must be carried out using a dc Voltage of at least 100 volts.

## **28. Dielectric strength**

All electrical equipment of the vehicle conducting electrically must fulfil the following conditions:

With regard to the dielectric strength, a distinction must be made between materials with light, normal or reinforced insulation.

Normal insulation is insulation which can withstand a test voltage of at least 2000 volt at 50 hertz for a period of one minute. It must only be used for electrical circuits with a nominal voltage not exceeding 500 volt.

Reinforced insulation is insulation which can withstand a test voltage of at least 4000 volt at 50 hertz for a period of one minute. It must only be used for components with a nominal voltage not exceeding 1000 volt.

Light insulation must not be used (except for the on board circuit). All electrically live parts must be protected against accidental contact. Insulating material not having sufficient mechanical resistance, i.e. paint coating, enamel, oxides, fibre coatings (soaked or not) or insulating tapes are not accepted.

All electrically conducting non live parts must be connected with the motorcycle ground.

### **29. Capacitors**

Voltage across capacitors belonging to the power circuit should fall below 65 volt within 5 seconds after the general circuit breaker is opened or the over current trips of the accumulator are blown.

### **30. Accumulator fastening**

The accumulator must be installed securely inside the vehicle and be protected against short-circuits and leakage. The accumulator must be attached to the body using metal clamps with an insulating covering.

The fixing method must be designed in such a way that neither the accumulator nor the fastening device itself nor its anchorage points can come loose, even when subjected to a crash. A solid partitioning bulkhead must separate the location of accumulator from the rider. Each accumulator box must include an air intake with its exit.

The accumulator installation must ensure that in the event of accumulator cell leakage or explosion that the contents are kept away from the rider and do not interfere in any way with the rider's vision or the safe handling of the machine.

### **31. Horn**

All vehicles must be fitted with an acoustic horn, capable of generating 90 dB(A) when activated.

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