



Superbike Technical Rules

SUPERBIKE TECHNICAL RULES

Everything that is not authorised and prescribed in this rule is strictly forbidden.

These regulations apply to SUPERSPORT MACHINES, run under Bermuda Charge rules. All motorcycles must comply in every respect with all the requirements for Road Racing as specified in the Technical Regulations.

REAR SAFETY LIGHT:

All motorcycles must have a Functioning Red Light mounted at the rear of the seat to be used during wet races or in low visibility conditions as declared by Clerk of Course.

The rear safety light must comply with the following;

- a) The lighting direction must be parallel to the centre line of the motorcycle (running direction) and must be clearly visible from the rear, at least 15 degrees to both the right and left sides of the centre line of the motorcycle.
- b) It must be safely mounted on the very end of the seat/rear bodywork and approximately on the centre line of the motorcycle. In case of dispute over the mounting position of or visibility of the Rear Safety Light, the decision of the Technical Steward or Scrutineer will be final.
- c) 10-15W The power output/luminosity must be equivalent to approximately (incandescent) or 3-5W (led).
- d) The light must be able to be switched on and off.

HANDLE BAR LEVERS: Motorcycles must be equipped with a brake lever protection, intended to protect the handlebar brake lever from being accidentally activated in case of collision with another motorcycle.

1. SUPERBIKES (ZERO-EMISSION) INTRODUCTION

- The technical concept is for motorcycles (two wheeled) to be powered without the use of carbon based fuels and have zero toxic/noxious emissions.

2. IMPORTANT NOTES

- Due to the experimental nature of the Zero-Emission Superbike event, special conditions apply:
 - The Clerk of the Course may on the advice of the Chief Technical Officer, disqualify any vehicle, or equipment, the construction or condition of which is deemed to be unsafe or inappropriate. It is the responsibility of the competitor and/or team to ensure a machine and equipment used in competition is mechanically and structurally in a safe condition and fit for the intended purpose.
 - The Organisers reserve the right to withhold credentials to any team, any vehicle or any competitor deemed to be unsafe or unfit (according to the stated rules and the spirit of the event i.e. to be competitive, safe, commercially sensitive) to take part in the Superbike category. This can be done at any time for any reason and is at the absolute discretion of the Race Management Team. This sanction will be exercised in extremis and only after every effort has been made to resolve the issue.
 - These rules are not exhaustive. These rules are subject to amendments and corrections and in that respect should be considered as strong guidance in reference to (1) above. Any amendments will be communicated to all teams by means of Bulletins or Final Instructions.
 - These rules form part of a larger regulatory framework.

3. RISK ASSESSMENT AND METHOD STATEMENT

- Each team applying for an entry must produce a Risk Assessment and Method Statement (RAMS) at the time of entry, via email to info@bermudacharge.com, to include all identified hazards and identified mitigations for their motorcycle design.

The RAMS must include:

- Risk Assessment with hazards identified during transport to and from Bermuda. This is to include plans for transport and disposal of equipment that has been damaged, overheated or has fire damage to the point it has been isolated for a cool down period.
- Notification plan to ensure Bermuda Customs are aware of any potential hazards during transport. Plan to include if motorcycles or element parts are to be classed as dangerous goods.

- Monitoring plan during hazardous activities (i.e. during charging and when batteries are at their most hazardous during and after use).
- For roadworthy electric powered machines, the manufacturer's guidelines for safe movement/storage are to be declared and submitted to the Promoter and Organisers.
- Teams immediate response plan/actions to smoke/fire.
- Subsequent monitoring plan of battery pack/bike that has been involved in an incident.
- Immediate post-race/qualifying monitoring plan
- Disposal plan to include disposal of minor parts to complete waste disposal of motorcycle (i.e. battery pack or complete bike). Plan to include consumable items and equipment being involved in an overheat/fire or being declared unsafe
- All teams must declare the chemistry of their battery units. This information will be used to ensure adequate provision exists for incident handling on the Bermuda Charge race course and Paddock area. All information received will only be used for the planning and management of an incident and all information will be treated with the utmost confidence.
- The RAMS that include consideration of all of the above is to be assessed by the Promoter and Organisers prior to the acceptance of an entry.

4. PROCEDURE IN THE EVENT OF AN ELECTRIC BIKE FIRE

- a) ELECTRIC BIKE TEAMS TO ISOLATE THE HAZARD
Battery, battery pack or motorcycle to be moved to identified area in the emergency plan for each team.
- b) EVACUATE AND CONTROL THE IMMEDIATE AREA
In the first instance of fire, the priority is to remove persons from the hazardous area.
- c) RAISE THE ALARM IN THE IMMEDIATE AREA
Fire appliance and crew will be present on site.
- d) CALL 999 AND INFORM THE OPERATOR OF "ELECTRIC BIKE FIRE AT THE BERMUDA CHARGE Paddock"
At a safe distance await the arrival of the First Response Team or the Bermuda Fire and Rescue Service.

5. MACHINE ELIGIBILITY

- Two wheeled electrically propelled machines, powered solely by stored electricity (battery/accumulator). Scooters and mopeds (e.g. a step through frame) are not permitted in this category.

6. STREAMLINING

- The streamlining of machines must correspond to the following specifications.
- a) Air foils or spoilers may only be fitted 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. The use of aerodynamic Winglets are not permitted.
- b) Any part of the streamlining which faces rearwards must be finished with round edges of 3.5mm minimum radius.
- c) The competitor must be completely visible from either side, except for the competitor's hands and forearms which may be obscured by bodywork. The depth of the seat base can be as deep as the seat hump permitted on a motorcycle (150mm) and the competitor's hips may be obscured to that extent.
- d) The front inclination where the number plate is fixed must not exceed an angle of 30 degrees to the rear of vertical.
- e) The ground clearance when loaded must not be less than 100mm.
- f) No part of the bodywork may come into contact with the ground when driven at normal racing speeds.
- g) Bodywork must not exceed 1000mm in width at any point.
- h) Bodywork must not protrude more than 50mm in front of the front tyre.
- i) Bodywork must not protrude more than 200mm beyond the rear tyre.
- j) The maximum height of the back of the competitor's seat is 150mm. This will be measured from the lowest point of the rigid base of the seat to the uppermost part of the fairing behind the competitor.
- k) Bodywork in front of the competitor must not be higher than the competitor's shoulders.
- l) Total side area behind the competitor must be at least 20% greater than the total side area in front of the competitor.
- m) Mirrors, if fitted, must be shatterproof and fold back without damage when the vehicle is on one side. The mirrors must retain the normal configuration when the vehicle is upright.
- n) No movable or fixed aerodynamic devices are permitted. (See also a. above)
- o) The minimum width of the handlebars is 450mm.

5. INCLINATION

- It must be possible for a motorcycle, not being loaded, to be inclined to an angle of 40° from vertical, without any part of it other than the tyre coming into contact with the ground. In race conditions the motorcycle must be capable of affecting a standing start on an uphill slope with a gradient of 18%.

6. TRANSPONDER TIMING

- All machines must have a working transponder (model to be confirmed) fitted during competition and qualifying.

7. WEIGHT

- Motorcycle minimum weight is 100 kg and maximum weight is 300 kg. Weighed in race ready mode.

8. 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) IEC60785 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) IEC60786 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.

9. DIMENSIONS

- The maximum length must not exceed 3.0 metres and the maximum width must not exceed 1 metre.

10. CONFORMITY

- It is the duty of each competitor and/or team to prove to the Chief Technical Officer of the meeting that his/her motorcycle fully complies with these rules.

11. ACCUMULATOR (STORAGE BATTERY)

- The accumulator is defined as any equipment used for the intermediate storage of electrical energy supplied by the solar generator or 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 accumulator or their own solar cells, must receive its energy supply from the motorcycles official accumulator.

- IMPORTANT: You will be required to declare the chemistry of your battery. This information will be used to ensure adequate provision exists for incident handling on the race course.

12. OPERATING VOLTAGE

- The voltage is limited to 800 volts nominal between two points (i.e. higher charging voltages are permitted).

13. CHARGING THE ACCUMULATOR

- The motorcycle's accumulators must be charged at the times and locations determined by the organisers.

14. ENERGY RECOVERY

- It is permitted to recover energy generated by the kinetic energy of the vehicle.

15. 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 motorcycle is strictly prohibited. The cooling system must be driven only by the motorcycle's official accumulator.

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

16. CHARGING FROM THE MAINS

- The motorcycle may be charged from a provided 120 volt single phase supply of 15 Amps minimum. The charging system must be separate from the motorcycle and comply with all electrical safety requirements including thermal overload trip, fusing and be equipped with an earth leakage protection breaker.

17. ELECTRICAL SAFETY

- In no part of the motorcycle'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 motorcycle no more than 50 volts are allowed.

- The voltage is limited to 500 volts between two points. In cases where the voltage of the power circuit exceeds 42 volt, this power circuit must be separated from the on-board 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 lightning inside a yellow triangle with a black border. The sides of the triangle must be as large as reasonably practical.

- The power circuit consists of all those parts of the electrical equipment that are used for moving the motorcycle. The on-board circuit consists of all those parts of the electrical equipment that 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).

18. GENERAL CIRCUIT BREAKER – 'EMERGENCY STOP'

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

- When seated in a normal riding position, the competitor 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 also be operated from outside the motorcycle. This breaker must be clearly identified as such. The use of a lanyard attached to the competitor to operate this breaker as an alternative to a button is permitted.

- The general circuit must also include a second general breaker which should be located behind the competitor, and be positioned taking into account that the machine may be on one side following an incident. This must be operated by a RED button and identified by a YELLOW disc of at least 8 cm in diameter reading "Emergency" in red 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.

a) A low voltage switch (e.g. push button) as a control for a contactor can be mounted down near the motor to keep the power voltages and currents away from the competitor and top side of the machine.

b) 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 they are completely isolated from the main power accumulators.

19. POWER INDICATOR

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

20. FUSES (OVER-CURRENT TRIP SWITCHES)

• An over-current trip is a device that 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 current trips rated according to the diameter of the individual conductors. Over-current trips must under no circumstances replace the circuit breaker (Emergency Stop Button).

21. 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.

22. INSULATION RESISTANCE

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

- For equipment with up to 300 volts to earth, the insulation resistance must reach the following value: 250k Ohms.
- For equipment with more than 300 volts to earth, the insulation resistance must reach the following value: 500k Ohms.
- The measurement of the insulation resistance must be carried out using a dc. voltage of at least 100 volt.

23. DIELECTRIC STRENGTH

- All electrical equipment of the motorcycle conducting electricity 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 that 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 that 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.

24. 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.

25. ACCUMULATOR FASTENING

- The accumulator must be installed securely inside the motorcycle 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 competitor. Each accumulator box must include an air intake with its exit.

26. HORN

- All vehicles must be fitted with an acoustic horn, capable of generating 90 dB(A) when activated. The competitor must activate this horn when Yellow Flags are displayed on the course.

27. BRAKES

- Motorcycles must be equipped with brake lever protection, intended to protect the handlebar brake lever from being accidentally activated in case of collision with another motorcycle.

28. WHEELS AND TYRES

- Wheels may be aluminium or Magnesium alloy; carbon fibre or carbon composite wheels are not permitted.
- Wheel rim diameters and width are free.
- All wheels must be fitted with short stem valves and approved valve caps.
- The use of titanium and light alloys is forbidden for wheel spindles (axles).
- Tyres V or Z rating must be used. Only tyres on general sale to the public as road legal fitments will be permitted. The depth of the tyre tread must be at least 2.5 mm, over the whole tyre tread (pattern) width, at pre-race control.
- The tyre must have an "E" mark and/or DOT (American Department of Transportation) approval and the DOT number must appear on the tyre sidewall.
- Only when a race or practice has been declared "wet" the use of a special tyre, commonly known as a "full wet" tyre, is allowed. These tyres do not need to carry the "DOT" or "E" mark and must be marked "NOT FOR HIGHWAY USE". Wet tyres must be a fully moulded tyre. No hand cutting is allowed on moulded tyres. The use of hand cut tyres is not allowed.

29. POST QUALIFYING AND RACE PROCEDURE

- Following any qualifying session or race all Zero-Emission Superbike machines shall be held in a designated 'cool down' area for a period of time of at least 30 minutes from the point the motorcycle is stopped (or as directed by the Technical Director following a team's specific risk assessment of their operations). This area will be a controlled area, where the team personnel are to be present until the bikes are deemed safe (i.e. no risk of fire exists). No team will be able to work on the machine unless this work is to make the machine safe.