

GUIDELINES 2021 FOR FIA E-RALLY REGULARITY CUP

IMPORTANT ARTICLES OF THE 2021 SPORTING REGULATIONS

Art. 3. Basic Characteristics of E-Rally Regularity

The purpose of E-Rallies is to promote the new technology of vehicles designed to conserve energy and to emit the smallest possible quantities of pollutants and greenhouse gases.

One of the main fields is the competitors' capability to respect accurately the time schedule of the whole event, as planned by the Organiser. This is expressed in the form of consecutive "ideal times" for the movement of the cars from one time control to the next time control. Any "early" or "late" arrival is penalised.

Another main field of competition, which is also very important for the final combined general classification, is the evaluation of the crew's capability to drive through all the "Regularity Stages" at a steady and exact obligatory speed (or speeds), respecting all the terms imposed for this purpose by the Supplementary Regulations and its Bulletins.

Another main field of competition, which is also very important for the final general classification, is the evaluation of the crew's capability to drive through the entire event at the best performance index, respecting all the terms imposed for this purpose by the Technical Regulations, the Guidelines, and the Supplementary Regulations and their Bulletins.

Performance must be measured for the entire event.

Art. 3.1. Characteristics of E-Rally Regularity (ERR)

All events must last a minimum of two (2) days. The minimum distance of the total itinerary must be 200 km and the maximum distance must be 400 km.

At least six Regularity Stages with a total minimum distance of 40% of the total itinerary will be included in the whole event.

There will be at least one secret regularity control during each kilometer of the Regularity Stages.

The maximum distance of the itinerary between two recharging points is 200 km, taking into consideration the terrain, the climate and the types of electric vehicles taking part.

Recharging must be done from the grid and not from an independent generator.

Any deliberate and proven deviation from the itinerary as it is indicated in the Road Book will be penalised.

The distances indicated in the Road Book are considered accurate and correct and no protest may be lodged against this accuracy.

Art.3.10 Parc Fermé

Every car has to enter the Parc Fermé immediately after administrative and technical checks. Location of the Parc Fermé is detailed in documents handed out by the Organiser.

All cars have to stay in the Parc Fermé until the start of the race.

If, for a compelling reason, a car has to leave the Parc Fermé before the start of the race, it has to be with the agreement or the Clerk of the Course.

A car that leaves the Parc Fermé without this agreement will be penalised, which may go as far as disqualification from the event.

During the overnight stay between the daily legs, the cars will remain in the Parc Fermé, which they will enter as soon as they finish a leg.

After a leg and in a regrouping, a crew has 15 minutes to leave the Parc Fermé.

A crew is allowed to enter the Parc Fermé for the next leg 15 minutes before the starting time indicated on the starting list posted on the official notice board.

In the Parc Fermé, the cars will remain locked and under the supervision of the Organisers.

Should any repairs be necessary for safety reasons, the Organisers must be notified by the CoC. The marshals will supervise the repair work, upon the completion of which, the car will once again be locked.

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After the arrival of the cars at the finish of the event, they will remain in the Parc Fermé under the supervision of the Organisers until the 30-minute time period for submitting protests has expired.
Only the Stewards are authorised to declare the Parc Fermé over and release the vehicles.

Art.13. Recharging/Refueling - Performance and eco-driving tests

Performance must be measured for the entire event.

Recharging will be done by the Organiser. If the Organiser provides recharging points, the provided units and plugs must be listed in the Supplementary Regulations. If the Organiser provides fuel for FCEVs, the provided fuel must be listed in the Supplementary Regulations.

Any recharging and/or refuelling outside the officially designated areas is strictly forbidden on pain of disqualification from the event. It applies only to the part of the course where the performance competition is performed. This is valid for all vehicles.

IMPORTANT ARTICLES OF THE 2021 TECHNICAL REGULATION

Art 2.2 Electrically powered series production vehicles for daily use

Electric vehicles that are intended for daily use on public roads. Rollbars, racing fire extinguishers and racing safety belts are not permitted.

No modifications are allowed. The cars must be strictly series production, including the software in their electronic control units. The competitor has to respect the model produced as it is described in the road licence or in the official documents published by the manufacturer such as selling lists, model options, and maintenance manuals.

All purpose vehicles are Commercial vehicles able to carry at least one third of their minimum weight as payload.

Art 3.6 Conformity with the regulations

It is the duty of each competitor to show to the scrutineers and to the Stewards of the event that his vehicle fully complies with these regulations governing the event in their entirety at all times during the event.

Art 4.1.3 Charging the traction battery

The vehicle's traction battery must be charged from the main at times and locations, and in time periods and charging modes determined by the organiser of the event in the supplementary regulations.

During an event, battery charging from the main is mandatory for all vehicles regardless of their battery capacity, as and where required by the supplementary regulations.

Delayed arrival at the grid charging station will be at the expense of the participant.

Art 4.1.5 Use of outside energy sources

The use of any other source of energy in any form whatsoever with the aim of improving the performance of the vehicle is strictly prohibited. The cooling system must be driven only by the vehicle's official traction battery.

Exception: Solar cells that are part of the production car's bodywork are not considered an outside energy source.

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Art 4.2 Charging units

Any external accessory devices mounted along the connection cables between the vehicle and the charging column must be of the type approved by the manufacturer and indicated in the vehicle's user manual. Such devices will be sealed during scrutineering and must always be on board the car during the competition.

Devices not approved by the vehicle manufacturer are not allowed.

A penalty, which may go as far as exclusion from the event, will be imposed for charging a battery and using related connection cables that have not passed the scrutineering.

Art 4.3 Charging from the mains

For each vehicle designed for mains power charging, there must be an officially assigned mains power connection (socket) at the grid charging station. The socket and the plug of the charging unit cable of the vehicle must be marked during the event with the starting number of the vehicle.

The adapter and cables must be of the type approved by the vehicle manufacturer and referenced in the vehicle's user manual.

Devices not approved by the vehicle manufacturer are not permitted.

The charging energy obtained from the charging station (both in AC or in DC) must be measured in all events where an energy classification is established, and may be measured for races by the organiser using energy meter (Watt-hour meter) with a recommended resolution of 1 Wh. An official is required to monitor the charging station continuously. Where a vehicle's battery is charged by means of a socket other than the official assigned socket, or by means of a socket belonging to another competitor, the guilty competitor shall be penalised.

During an event, battery charging from the main is mandatory for all vehicles, as and where required by the supplementary regulations.

Art. 5.2 Additional modifications

No modification can be made to the vehicle which must remain compliant with the one produced by the manufacturer.

Any vehicle with modifications not foreseen and approved by the manufacturer should be excluded by the Stewards of the event.

Any additional instrumentation relating to navigation described under point 5.3 below is permitted.

Art. 5.3 Optional devices

The optional devices are those provided by the manufacturer. If a device is optional, it must be installed in accordance with the vehicle manufacturer's specifications.

Additional equipment is allowed to be installed on board the vehicle, but only if it relates to navigation and timekeeping systems. The additional instrumentation must be fixed properly and its electrical connections must be done professionally.

Art. 6.2 Energy performance index classification

Each manufacturer officially declares the vehicle data, including the capacity of the battery pack in kWh, autonomy and consumption value expressed in kWh/km or kWh/100 km. The consumption values have been measured by the vehicle manufacturer according the () Worldwide Harmonized Light Vehicles Test Procedure (WLTP) which is recognized and adopted in many countries and by many manufacturers.*

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A special list of electric vehicles in production and in regular sale will be made available by the FIA ENECC, containing all the data relating to the type of vehicle and the official consumption provided by the WLTP, or in any case by the vehicle manufacturer.

For vehicles not included in this list, the official data declared by the vehicle manufacturer must be provided during the registration for the event (*).

(*) The registration for the event must be approved by the organiser.

This will be the official data used during the event and published before the event itself. The registration for the event also involves, among other things, the acceptance of the data by competitors. For this reason, no claims or disputes regarding the established data will be accepted.

REMARK : For the purpose of an appropriate and further clarification, the values considered and used for the calculations of the rankings are:

- **Battery Capacity:** is the theoretical maximum capacity of the battery pack used, declared by the manufacturer and expressed in kWh. It is not the usable capacity declared by the manufacturer.

- **Vehicle Consumption:** is the consumption of the vehicle in the WLTP cycle which does not take into account the efficiency of the charging systems. Therefore, the WLTP Rated Consumption value is not considered.

COMPARATIVE CONSUMPTION INDEX IN ECO-RALLY YEAR 2021

Knowing the consumption values formalized, following the data contained by the appropriate list provided by FIA ENECC, we have the possibility to process them with the real values recorded during the Rally and to obtain new values that allow you to write a correct ranking.

In this way we will get a "Performance Index" or else "P Index" = "PI" instead of the CI (Consumption Index).

The starting values are those obtained from the CI values. In fact, the C.I. provided by the formula, it is nothing more than the consumption expressed in kWh/km. To obtain the value expressed in kWh/100 km, just multiply by 100.

TECHNICAL REGULATION FORMULAS FOR PERFORMANCE CALCULATION

As described in Article 6.2. of the Technical Regulation, in order to establish the true energy used during the event, the following formulas must be applied:

$$\text{TrEn} = (\text{NTE} + \text{REM}) - \text{FRE}$$

With the abbreviations:

TrEn True Energy used in the event

NTE Nominal Theoretical Energy [kWh]

The vehicles must start the event with a fully charged battery pack. This NTE energy value corresponds to the nominal capacity in kWh of the propulsion battery pack.

REM Recharged Energy from the Main

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FRE Final Remaining Energy at the end of the event

MOC Manufacturer Official Consumption

Consumption Index (C. I.)

In order to establish the consumption index the following formula must be applied:

$$C.I. = \frac{TrEn (*)}{km (**)}$$

() TrEn: Value expressed in kWh*

*(**) km: Total length of the itinerary (km). The total length of the itinerary as given in the Road Book and/or in the Supplementary Regulations in km.*

Calculation of the Performance Index (PI)

To establish the energy classification, the measured value of CI/100 km must be divided by the value MOC/100 km obtained from the official list produced by the FIA ENECC, referring to the specific type of vehicle. In this case, the value of the PI.

Manufacturer Official Consumption (MOC)

The calculation formula is as follows:

$$PI = \frac{CI / 100 \text{ km}}{MOC / 100 \text{ km}}$$

The lowest index value PI establishes the winner.

If the PI values are equal, the values can be extended beyond the third decimal place.

The vehicles must start the event with a fully charged battery pack, this value should be the nominal capacity in kWh of the propulsion battery pack. This data must be presented in an official list from the FIA ENECC and compared with the declaration form filled in and signed by the crew during administrative checks.

For FCEV vehicles which must start the event with a completely full fuel tank, NTE should be the equivalent energy in kWh of the necessary fuel for the complete replenishment of the tank at the end of the event.

EXAMPLES OF PI CALCULATION

As mentioned above, we start from the value of CI, which is equivalent to the consumption expressed in kWh/km. In some cases we have to transform it into kWh/100 km, multiplying the value x 100.

Example 1

The WLTP or the Manufacturer declares that this car consumes 15,6 kWh/100 km (= 156 Wh/km) and the vehicle during the rally has consumed for example 20 kWh/100 km (= 200 Wh/km), it gives a corrective index (Performance Index) PI of 1,282 (20 : 15,6 = 1,282).

Example 2

If the same model / type of vehicle has consumed 25 kWh/100 km, the PI will be 1,602 (25: 15,6 = 1,602)
If the vehicle had consumed 15,6 kWh, then the consumption index would be = 1 (15,6: 15,6) and so on.

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Example 3

In case of a parity value, the value of PI can be approximated beyond the third decimal place.

In all cases the lowest coefficient wins.

In this way, all electric vehicles can be compared with each other.

OBD SOCKETS

For the duration of the event, the OBD sockets must remain free for the connection of any FIA equipment. That is, instruments put by competitors cannot be connected to these sockets. The OBD port will be sealed during the first technical checks.

No additional instruments, sensors, probes or devices connected (by mechanical or wireless means) to the wheel or gearbox, are allowed.

It is forbidden to use additional devices for actual speed and average speed detections, using sensors connected to the wheels or to the kinematics of the transmission and or traction systems.

The connections are understood to be of any kind, like: by mechanical, by cables, by wiring, wireless, optical, optic fiber, and so on.

F.C.E.V. VEHICLES (CARS POWERED BY FUEL CELLS)

If we directly compare their energy consumption by converting hydrogen into kWh (1 kg of H = 33.393 kWh) as written in article 6.2., they are losers compared to pure electric cars.

A conversion factor that takes into account the efficiency of the Fuel-Cells should therefore be used.

In order to compare the consumption of FCEV vehicles with those of BEVs, a coefficient that has a value of 0.55 is introduced.

In this way, the equivalent energy value per 1 kg of Hydrogen is 18366 Wh, as write in the Art. 6.2.

So, to compare the energy consumption of vehicles with fuel cell, the consumption recorded during the rally will multiply by the value of 0,55. The equivalent energy value for 1 kg of hydrogen will be 18366 Wh.

Example: if during the rally the vehicle consumed a quantity of hydrogen equivalent to 100 kWh (equivalent to approximately 3 kg of hydrogen) the value to be considered for the general classification will be 55 kWh.

This value, expressed in kWh, can be used in the same way and with the same formulas that concern electric vehicles, as described above.

In this way, vehicles with fuel cell can be classified together with electric vehicles in an equal mode.

Art. 6.2 For FCEV vehicles which must start the event with a completely full fuel tank, NTE should be the equivalent energy in kWh of the necessary fuel for the complete replenishment of the tank at the end of the event.