



*Fédération  
Aéronautique  
Internationale*

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# **2025 World Games Drone Racing Sporting Rules**

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## **FEDERATION AERONAUTIQUE INTERNATIONALE**

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The sporting rules are based on the F9U (Drone Racing) class rules as defined in the FAI Sporting Code - Section 4 Aeromodelling - Volume F9 Drone Sports., The present document will be updated, where appropriate, to comply with the last Volume F9 Drone Sports.

Drone Racing consists of several multi-rotor model aircraft flying together through a closed racing circuit.

**Note:** A multi-rotor is a rotary wing radio-controlled model aircraft equipped with at least three power driven propeller devices.

The generic term 'model' will be used in the present document.

Each model is operated by an FPV (First Person View) pilot who is considered as the competitor. The pilot must be equipped with a headset goggle that allows him/her to pilot from the video picture of the on-board camera which is transmitted in real time on his/her headset goggle.

The FPV pilot is assisted during the race by one and only one helper who stays next to him/her during the whole flight. The helper is mandatory. He/she may be another competitor.

The main task of the helper is to keep the model in visual line of sight. He/she must inform the FPV pilot of anything occurring that can affect his/her piloting, especially about safety. If the helper requests the FPV pilot to land or to cut off the motors, he/she must do it immediately. In case of emergency, the helper is authorized to shut off the transmitter in order to trigger the fail-safe device.

## 1. RACING CIRCUIT

The racing circuit will be outdoor.

The design will be approved by FAI, and will be made public and published about two months before the event. After publication, only minor changes of the design will be authorised when duly justified.

## 2. GENERAL SPECIFICATIONS FOR MODELS

The model must be equipped with a fail-safe device, the triggering of which stops the motors.

The following are strictly forbidden:

- Pre-programmed manoeuvring device.
- System for automatic positioning and/or path rectification in longitude, latitude or height.

**Note:** Software recovery modes such as "Flip over after crash" (also known as 'Turtle mode') or "Crash recovery" and automatic system which can be activated by the pilot in order to level back the model after a crash are permitted.

### 2.1. Weight and size

The total weight of the model including all equipment necessary for flight (including batteries) shall not exceed 1 kg.

The axes of all motors must fit within a 330 mm diameter circle.

### 2.2. Motorization

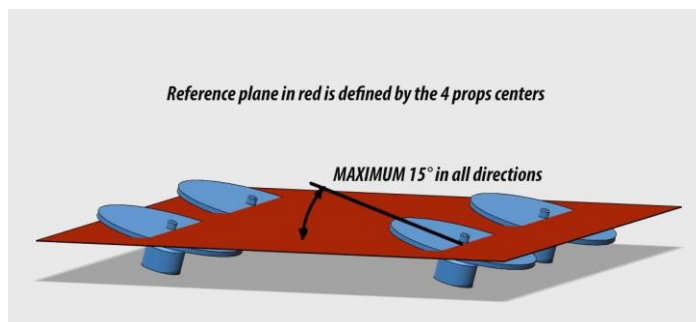
Only electric motors are allowed.

Battery pack up to 6 S is allowed.

The voltage for each cell must not exceed 4.25 V when fully charged. This means a maximum voltage of 17 V for a 4S battery pack, and 25.5 volts for a 6S battery pack.

The voltage measurement of the battery pack will be performed before each race.

The reference plane is defined with propellers centres. Each motor can be tilted up to 15° maximum angle in each direction.



### 2.3. Propellers

Maximum diameter: 6 inches (15.2 cm).

Full metal propellers are forbidden.

### 2.4. Radio control (RC) equipment

Any 2.4 GHz spread spectrum technology RC equipment may be used.

Use of a TBS Crossfire radio module 868 MHz / 915 MHz or any other 900 MHz module on the RC equipment is authorised.

In any case, the radio module must be set to 100 mW maximum.

**Note:** 433 MHz frequency is not authorised in China.

In order to limit risk of potential problems during the races with unwanted interference, the organiser may define restrictions for use of RC systems equipment outside the racing circuit.

In case of use of non-authorized RC equipment, penalty going up to disqualification from the event of the concerned competitor may arise (See 8.2).

### 2.5. Video system

Analog and digital video devices operated on 5.8 GHz band may be used for piloting.

**Note:** It is expected to use the Raceband (band R) corresponding to the following frequencies: 5658 MHz - 5695 MHz - 5732 MHz - 5769 MHz - 5806 MHz - 5843 MHz - 5880 MHz - 5917 MHz.

The maximum output power emission authorised on ground and in flight for any analogic and digital video transmitter is 25 mW. In addition, the video output must be centred on the different Raceband frequencies with a 30 MHz maximum bandwidth. Broadcast of an additional signal with the video transmitter is not authorised.

Any digital video device must be set to 25 Mbps maximum.

**Note:** In situation of video issues, the Competition Manager may impose the polarization to use on the VTX antennas.

A digital video recorder (DVR) will be provided by the organiser in order to permit to review races as necessary in case of doubt or complaint.

In order to limit risk of potential problems during the races with unwanted emission, the organiser may define restrictions for use of video transmitters outside the racing circuit.

In case of non-authorized activation of a video transmitter, penalty going up to disqualification from the event of the concerned competitor may arise (See 8.2).

### 2.6. LED light device

In order to provide for the public the best view of the models during the races and to facilitate the task of the judges, each model will be equipped with a LED light device including possibility to choose the colour so that each model in flight will have a different colour.

The following specifications must be respected:

- Minimum of 32 RGB LED light bulbs, or minimum length of 280 mm of RGB LED strips with obfuscated light source (such a COB LED). In either scenario, the LED light should be uniformly distributed across all the arms of the model, allowing it to be clearly visible from any angle.
- Required colours: Blue - Green - Red - Yellow - Cyan - Magenta.
- Capability to easily switch before the race to the colour assigned to the pilot concerned.

**Note:** In order to improve the understanding of the races by the public and simplify organisation, the colours will be allocated according to the order of the pilots in the race.

### 2.7. Identification mark

Each model shall carry the 3 (three) letters national identification mark followed by the FAI Sporting Licence ID number.

The letters and numbers must be readable (unaided) at arm's length, and appear at least once on each model.

## 3. NUMBER OF MODELS

Each competitor may use throughout the entire event a maximum of 3 (three) models.

A model can be used by only one competitor per event.

In case of an infringement to those rules, the concerned competitor(s) will be disqualified from the event (See 8.2).

Before the race, the competitor can change the model in the preparation area. Any technical problem after leaving the preparation area will be considered a race incident with no more possibility to change the model.

## **4. MODEL PROCESSING**

### **4.1. Model processing before the beginning of the competition**

A model processing will be done by the organiser prior to the official practice session.

Each competitor can register up to three models.

For the points which will be checked at the model processing, see the Processing Form in Annex 1. This form may be subject to changes.

The organizer will mark each registered model with an easily visible, difficult to falsify identification such as a sticker or a paint mark.

If one of the models registered is lost or destroyed due to causes not applicable to the competitor concerned, the competitor shall have the right to present a replacement model for registration and processing up to one hour before the official starting time of the first qualifying round.

During the competition, on request of the Competition Manager, or the Supervisor Judge, or the FAI Jury President, any model may be checked by the organizer after the race to ensure it fits the specifications.

A competitor whose model is not compliant may be disqualified from the event (See 8.28.2).

### **4.2. Model checking before the race**

Before each race, a pre-flight checking of the models will be done in the preparation area. Each pilot concerned by the race will have the possibility to check a spare model.

The video frequency and transmitter power emission will be checked before the start of the race after the models had been placed on the pods.

The pilots will have no more the possibility to replace their model by the checked spare model as long as the video frequency and transmitter power emission will have been positively done. Any technical problem after that will be considered a race incident with no possibility to change the model.

## **5. PRACTICE FLIGHTS**

An official practice session will be organised before the beginning of the qualifying rounds.

The official practice will be run according to the draw of the first qualifying round.

Flights on the racing circuit other than those authorized by the organiser are strictly forbidden. In case of a violation of that rule, penalty going up to disqualification from the event of the competitor concerned may arise (See 8.2).

## **6. CONTEST ORGANISATION**

The contest will be organized on the basis of three stages:

- Qualification stage (rounds to define the composition of the groups for the first elimination round).
- Elimination stage (to qualify for the final stage by successive elimination rounds).
- Final stage.

Each round for the qualification and elimination stages will be organized with 4 (four) competitors per group (subdivision of the round corresponding to the number of pilots normally flying at the same time in the same race).

### **6.1. Timekeeping**

Timekeeping will be done with an electronic timing system with appropriate redundancy in order to ensure complete and permanent reliability of the timekeeping.

For the qualifying stage, timekeeping for each model will be triggered when the model passes the gate equipped with the timekeeping sensor(s). After taking off from the start area, the model must go directly to the gate equipped with the timekeeping sensor(s).

For the elimination and final stages, timekeeping will be triggered at the start of the race when the start signal is sounded.

## 6.2. Procedure for the start of the race

The start of the race will be done as follows:

- After the models have been placed on the start area, the pilots will have two minutes maximum to be ready to start.
- After the pilots will have confirmed to be ready to the Starter, and in any case no later than the two minutes delay above, 'Pilots, arm your quads' will be clearly announced.
- About three seconds after this announcement and taking care of a similar time for all races, there will be a brief and intelligible sound signal for the start of the race without proceeding a countdown (such as 3, 2, 1) before the start signal.

The Starter must immediately stop the race and do a new start when he/she considers that there has been a technical problem with the start signal. Before the restart, the pilots will be given the opportunity to change the battery pack on their model.

Pilot(s) starting before the start signal (model not touching any point of its start area) will be disqualified from the race. The race will not be stopped in order to continue with the other pilots.

## 6.3. Qualification stage

Each competitor will be entitled to participate to 4 (four) qualification rounds.

Composition and flight order of the groups will be determined with a blind draw. The draw will be different for each qualifying round.

Every qualifying round will be run with 3 consecutive laps to complete and 3 minutes flight time allowed for that. When the competitor has completed 3 laps or when the flight time allowed is over, he/she must land the model.

Reflights will be flown at the end of the concerned round.

Races with less than 4 pilots, for example in case of withdrawal of a pilot, will be put at the end of the draw of the round, in order to allow a complete pilots race with pilot(s) that have been granted a reflight in that qualifying round.

If necessary, the last groups of each qualifying round may be rearranged by the Competition Manager and the Supervisor Judge in order to achieve as much as possible a minimum of 3 competitors per group.

The result of each competitor in a qualification round is the registered times for each valid lap completed (with a maximum of 3).

A ranking will be established at the end of the qualifying stage taking into account the average of the 3 fastest times registered to perform a valid lap in all the qualifying rounds. The competitors getting only 2 registered times are ranked by taking into account the average of their 2 times after those with 3 times, which in turn are ranked ahead those with only 1 registered time.

**Note:** *The fastest times may be done in the same qualifying round or in different ones.*

If necessary, an additional qualifying flight will be organized for the competitors having not a registered time at the end of the 4 qualifying rounds. The competitors who need an additional qualifying flight to achieve a time will be placed after those who are already placed in the ranking of the qualifying stage.

## 6.4. Elimination stage

All 32 competitors will be selected for the elimination stage.

All elimination rounds will be organised with 4 (four) pilots per group.

All races will be run with 3 consecutive laps to complete and 3 minutes flight time allowed for that. When the competitor has completed 3 laps or when the flight time allowed is over, he/she must land the model.

The placing for each race is determined by considering the registered time to complete 3 laps.

Those who do not finish their flight will be placed in the race considering the number of laps they did complete and the registered time in which those laps were completed. Disqualified competitor(s) will be placed at the end after the competitors getting a registered time or having not finished their first lap.

The two best placed in each race will be directly selected for the next round. In case of a tie for the second place, the placing in the ranking established at the end of the qualifying stage will be considered to define who is selected for the next round.

### Double elimination

Instead of direct elimination of the competitors placed third and fourth in each race of any elimination round, the double elimination sequence will be applied.

This sequence allows competitors eliminated in elimination rounds to continue to fly still getting possibility to access the final.

Competitors placed third and fourth in any race of the double elimination sequence are definitively eliminated.

### Organisation of the races

For the first elimination round, the composition of the groups for the races is defined considering the ranking established at the end of the qualifying stage.

The composition of the races for the first elimination round and the organisation of the rounds up to the final and are detailed in Annex 2.

## 6.5. Final stage

The two best placed in the last elimination round (one race) and the two best placed in the last round of the double elimination sequence (one race) are selected for the final stage to determine their final ranking from 1<sup>st</sup> to 4<sup>th</sup> place.

The final stage will be run with successive final races. The final is over as soon as a finalist competitor has won two final races. This competitor is the winner of the competition.

For the final ranking for 2<sup>nd</sup> to 4<sup>th</sup> places, points will be allocated as follows in each final race: 1 point for the first placed, 2 points for the second, 3 points for the third and 4 points for the fourth.

The ranking of the finalists concerned will be done taking into account their sum of points in all the final races, the finalist with the lower sum of points being placed 2<sup>nd</sup>, and so on.

In case of a tie, the placing in the last final race will be considered to split the tie for the concerned finalists.

## 6.6. Final classification

The final classification of the 32 competitors will be established as described in the following table.

Place	Scenario B with double elimination sequence applied
1	1 <sup>st</sup> in final
2	2 <sup>nd</sup> in final
3	3 <sup>rd</sup> in final
4	4 <sup>th</sup> in final
5	3 <sup>rd</sup> in race 29
6	4 <sup>th</sup> in race 29
7	3 <sup>rd</sup> in race 27
8	4 <sup>th</sup> in race 27
9 to 12	3 <sup>rd</sup> and 4 <sup>th</sup> in races 25 and 26 with final placing according to provisional ranking after qualifying stage
13 to 16	3 <sup>rd</sup> and 4 <sup>th</sup> in races 21 and 22 with final placing according to provisional ranking after qualifying stage
17 to 24	3 <sup>rd</sup> and 4 <sup>th</sup> in races 17 to 20 with final placing according to provisional ranking after qualifying stage
25 to 32	3 <sup>rd</sup> and 4 <sup>th</sup> in races 9 to 12 with final placing according to provisional ranking after qualifying stage

## 7. FLIGHT OCCURRENCES

### 7.1. Obstacle damaged or destroyed during the race

When an obstacle is accidentally damaged or destroyed during a race, the pilots will be informed by the Starter as soon as possible of the incident and how to proceed.

In the case where it concerns an obstacle to be crossed (air gate, tunnel,...), the decision may be to continue to cross the obstacle, or to give permission to bypass it, or to stop the race. When bypassing of the concerned obstacle is authorized, pilots must do their best not to take advantage of the situation.



In case it concerns an obstacle to be avoided, the race will continue except if it is decided differently considering for example that safety is impacted. When race continues, pilots must do their best to follow the track and not to take advantage of the situation.

## **7.2. Faults and penalties**

In the case a pilot does not fly on the expected way (does not cross a obstacle, misses a pylon or flag, does a circuit cut ...) the corresponding circuit lap will not be validated. The pilot may try to execute immediately and on a safe manner a manoeuvre to correct the mistake.

If the pilot corrects its mistake, the lap will be validated.

If during this manoeuvre the pilot has a collision with another model, the pilot will be disqualified for the race.

## **7.3. Crash**

If a model cannot go on after a crash, it must stay on the ground with motors cut off until the end of the race.

The pilot must clearly indicate that he/she stopped the race by removing his/her headset goggle.

The pilot and the helper must then stay quiet in their position until the race is finished for all pilots.

## **7.4. Safety issue**

A pilot can be requested to stop to fly if it is considered the model no longer meets acceptable safety standards. It could be for example the case when a model is damaged after a collision or after a crash, or when the battery is dangling.

In case of a serious safety issue, the Starter may decide to stop the race and disqualify the pilot(s) eventually responsible of the safety issue. A restart of the race will be done for the pilots who had not been disqualified and were still in the air when the safety issue occurred.

# **8. DISQUALIFICATION**

## **8.1. Disqualification from the race**

A pilot may be disqualified from a race in the following circumstances:

- Start before the start signal (See 6.2).
- Collision with another model when executing a manoeuvre to correct a mistake (See 7.2).
- Circuit exit (crossing of the safety line).
- Flying after having removed even temporarily his/her headset goggle.
- Celebratory manoeuvre, especially after the pilot finishes.
- Hazardous piloting or safety issue.

The disqualification is decided by the Starter or, where applicable, by the Pilot Judge assigned to the concerned pilot.

When a pilot is disqualified, he/she must land as soon as he/she has been informed. In any case, the result of the pilot for the race will not be validated.

Pilot(s) disqualified will be placed for the race after the other pilots. In case more than one pilot is disqualified from the race, the pilots concerned will be placed taking into account the qualification stage ranking.

If a pilot disqualified from a race is considered not being sufficiently cooperative to land, the concerned pilot may be disqualified from the event.

## **8.2. Disqualification from the event**

A disqualification from the event is decided by the Competition Manager with the consent of the FAI Jury.

A competitor who is disqualified from the event is placed at the end of the ranking with a 'DISQ' mention.

Disqualification from the event may be considered in the following situations:

- Use of an equipment that does not conform to the rules.
- Deliberate very dangerous and/or unsporting behaviour.

# **9. REFLIGHTS**

Possibility of an individual reflight will only be considered for the qualification stage.

The reflights will be organised at the end of the qualifying round concerned, or as part of any race that have fewer than the required number of competitors.

For any competitor being granted a reflight, the original flight for which the competitor has been granted the reflight is then definitively cancelled.

For the rest of the competition (elimination stage, final stage and additional rounds sequence), individual reflights will not be awarded. In those situations, a video issue or collision with another model will be considered as a race incident with no reflight possibility.

## **10. OFFICIALS**

### **10.1. FAI Jury**

The FAI Jury is in charge to deal with protests, to ensure that the event is run in compliance with the present sporting rules document, to establish a report of the event to FAI and to take care that the final results will be sent to the FAI

The FAI Jury is nominated by the FAI and will include three persons of different nationalities, one them being appointed President.

One jury member may be nominated from the competitors. In that situation, an alternate jury member will also be nominated to serve on the jury when considering any protest involving the competitor jury member.

### **10.2. Supervisor Judge - Pilot Judges**

In each race, each pilot will be scored by a Pilot Judge. Each Pilot Judge will have a video device allowing to follow the flight of his/her assigned pilot, sharing the same picture as the pilot.

The Pilot Judge will monitor that the pilot follows the circuit and crosses every gate and obstacle correctly. He/she will notify the competitor or the helper only when the competitor has finished its race or have been disqualified. The other notifications will be addressed when the race is finished.

**Note:** *Recordings provided by the competitor concerned, or other competitors or third parties may be considered. In any case, the recording provided by the organiser will prevail.*

A Supervisor Judge will be also appointed.

### **10.3. Other officials**

The officials necessary to run the event other than the Competition Manager, the FAI Jury, the Starter, the Supervisor and Pilot Judges will be appointed by the organiser.

## **11. INTERRUPTION OF THE CONTEST**

The event should be interrupted or the start delayed by the Competition Manager in the following circumstances:

- Wind continuously stronger than 9 m/s measured at 2 m above the ground near the preparation area for at least one (1) minute.
- Due to atmospheric conditions (rain, stormy condition,...) in which it would be dangerous to continue to fly.
- Other exceptional circumstances such as for example incident affecting safety or requiring access for emergency services.

When an interruption occurs during an official flight, this flight is cancelled.

If the event cannot go on, the final ranking will be the last available provisional ranking.

**- ANNEX 1 - Processing form**

**Competitor FAMILY and First name:** .....

**Country:** ..... **FAI Sporting Licence ID Number:** .....

**Radio control (RC) equipment**

Reference of the 2.4 GHz RC equipment: .....

Reference of the 2.4 GHz radio module: .....

Where appropriate, reference of the 900 MHz radio module: .....

Radio module power emission 100 mW max.

**Video device**

Video transmitter	Analog	Digital	Reference of the FPV video device
<i>Model A</i>	<input type="checkbox"/>	<input type="checkbox"/>	.....
<i>Model B</i>	<input type="checkbox"/>	<input type="checkbox"/>	.....
<i>Model C</i>	<input type="checkbox"/>	<input type="checkbox"/>	.....

Video transmitter power emission 25 mW max.

Video output centered on the Raceband frequencies (30 MHz max. bandwidth)

For digital device, bandwidth 25 Mbps max.

In case analog camera is used, NTSC video encoding

Reference of the headset google: .....

**Battery pack**

4S (maximum 17 V)  Reference: .....

6S (maximum 25.5 V)  Reference: .....

Other  Reference: .....

**LED light device**

Compliance with the specifications (RGB LED light bulbs or strips)

Checking of the mandatory colours (Blue-Green-Pink-Purple-Red-Yellow)

**Number of models processed** (3 maximum): .....

**Weight** (1 kg maximum including batteries and all on-board devices)

*Model A:* ..... *Model B:* ..... *Model C:* .....

	<b>Model A</b>	<b>Model B</b>	<b>Model C</b>
<b>Test of the fail-safe device</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Identification mark</b> (minimum 6 mm high)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Size</b> (distance between axes less than 330 mm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Prop size</b> (not more than 6")	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Organiser marking of the model</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

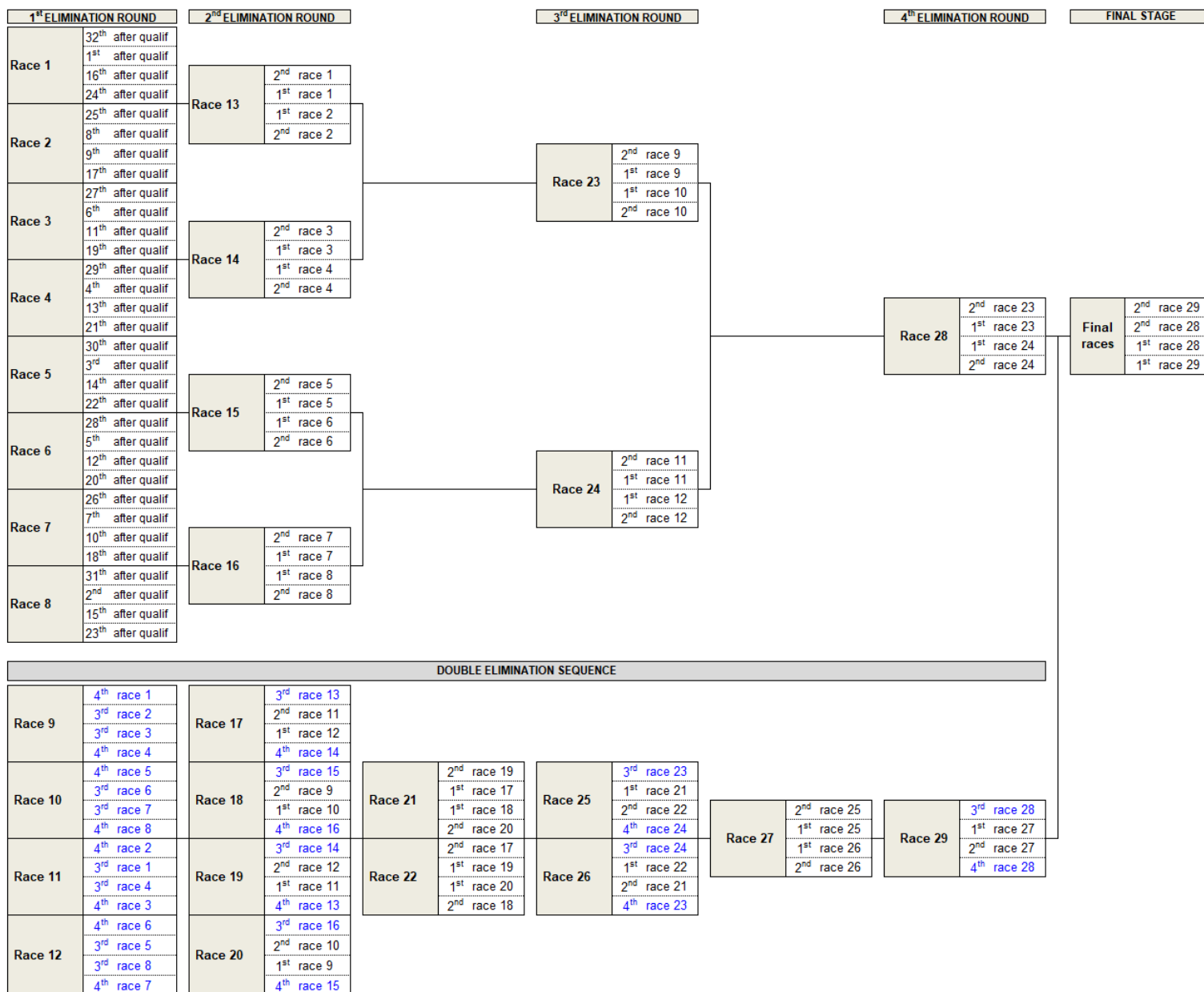
**Name of the controller:** .....

**Signature of the controller**

.....

## - ANNEX 2 - Organisation of the elimination stage

### 1- Organisation



2- Composition of the races for the 1<sup>st</sup> elimination round

Race 1	Placed 1	Placed 16	Placed 24	Placed 32
Race 2	Placed 8	Placed 9	Placed 17	Placed 25
Race 3	Placed 6	Placed 11	Placed 19	Placed 27
Race 4	Placed 4	Placed 13	Placed 21	Placed 29
Race 5	Placed 3	Placed 14	Placed 22	Placed 30
Race 6	Placed 5	Placed 12	Placed 20	Placed 28
Race 7	Placed 7	Placed 10	Placed 18	Placed 26
Race 8	Placed 2	Placed 15	Placed 23	Placed 31