FAI Sporting Code

Fédération Aéronautique Internationale

Section 4 - Aeromodelling

FPV Racing Rules

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RIGHTS TO FAI INTERNATIONAL SPORTING EVENTS

All international sporting events organised wholly or partly under the rules of the Fédération Aéronautique Internationale (FAI) Sporting Code[1] are termed *FAI International Sporting Events*[2]. Under the FAI Statutes[3], FAI owns and controls all rights relating to FAI International Sporting Events. FAI Members[4]shall, within their national territories[5], enforce FAI ownership of FAI International Sporting Events and require them to be registered in the FAI Sporting Calendar[6].

Permission and authority to exploit any rights to any commercial activity at such events, including but not limited to advertising at or for such events, use of the event name or logo for merchandising purposes and use of any sound and/or image, whether recorded electronically or otherwise or transmitted in real time, must be sought by way of prior agreement with FAI. This includes specifically all rights to the use of any material, electronic or other, that forms part of any method or system for judging, scoring, performance evaluation or information utilised in any FAI International Sporting Event[7].

Each FAI Air Sport Commission[8] is authorised to negotiate prior agreements on behalf of FAI with FAI Members or other entities as appropriate, of the transfer of all or parts of the rights to any FAI International Sporting Event (except World Air Games events[9]) which is organised wholly or partly under the Sporting Code section[10] for which that Commission is responsible[11]. Any such transfer of rights shall be by "Organiser Agreement"[12] as specified in the current FAI Bylaws Chapter 1, para 1.2 "Rules for Transfer of Rights to FAI International Sporting Events".

Any person or legal entity which accepts the responsibility for organising an FAI Sporting Event, whether or not by written agreement, in doing so also accepts the proprietary rights of FAI as stated above. Where no formal transfer of rights has been established, FAI retains all rights to the event. Regardless of any agreement or transfer of rights, FAI shall have, free of charge for its own archival and/or promotional use, full access to any sound and/or visual images of any FAI Sporting Event, and always reserves itself the right to have any and all parts of any event recorded, filmed and/or photographed for such use, without charge.

1 FAI Statutes, Chapter 1, para. 1.6

2 FAI Sporting Code, General Section, Chapter 4, para 4.1.2

3 FAI Statutes, Chapter 1, para 1.8.1

4 FAI Statutes, Chapter 2, para 2.1.1; 2.4.2; 2.5.2; 2.7.2

5 FAI Bylaws, Chapter 1, para 1.2.1

6 FAI Statutes, Chapter 2, para 2.4.2.2.5

7 FAI Bylaws, Chapter 1, para 1.2.3

8 FAI Statutes, Chapter 5, para 5.1.1; 5.5; 5.6

9 FAI Sporting Code, General Section, Chapter 4, para 4.1.5

10 FAI Sporting Code, General Section, Chapter 1, para 1.2. andChapter 2, para 2.2

11 FAI Statutes, Chapter 5, para 5.6.3

12 FAI Bylaws, Chapter 1, para 1.2.2

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FPV RACING

FPV (First Person view) Racing consists of several multi-rotor model aircraft flying together through a closed racing circuit.

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

Each model is operated by a FPV pilot who is considered as the competitor. The FPV pilot is assisted by a helper called "FPV spotter".

The FPV pilot is equipped with a headset goggle (or with a screen) which allows him to pilot his model from the video picture of the onboard camera which is transmitted in real time on headset goggle (or on his screen).

1. GENERAL SPECIFICATIONS OF FPV RACING MODEL

Only multi-rotors corresponding to the following specifications are allowed.

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

A 1 % tolerance is relevant for inaccuracy of the measurement devices for size, weight and batteries tension.

Any automatic system to level back the model after a crash is forbidden.

In order to provide a good vision of races to the public and to facilitate the gatherer's job, the model will be equipped with a clearly distinctive mark, such as a custom canopy or a bright colour part on the frame.

1.1. Weight and size of the model

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

Distance between axis of the engines shall be less than 330 mm. This distance is measured on the diagonal of the engines axis.

1.2. Motorization

Only electric motors with a maximum voltage of 17.0 volts (4S) are allowed. The voltage measurement is done before the flight.

A maximum fixed tilt angle of 15° to the perpendicular of the horizontal flight line of the frame is allowed.

On a tri-copter, the inclination of an engine in flight is only allowed with the yaw order.

1.3. Propellers

Maximum diameter: 6 inches (15.2 cm).

Full metal propellers are forbidden.

Any propeller protection device is forbidden.

1.4. Other equipment

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

It is forbidden to use a preprogrammed maneuvering device. Any system for an automatic positioning and/or path rectification in longitude, latitude or height is forbidden.

1.5. Identification marks

Each model shall carry the national identification mark followed by the FAI Sporting Licence ID number (or National FAI licence. The letters must be at least 10 mm high and appear at least once on each model.

1.6. Frequencies

Frequencies used can only be those authorized in the country in which is organized the contest. Eventual associated emission power limitations should be respected.

This concerns the radio control system of the model as well as the video transmission device of the onboard camera.

Concerning radio control system, systems using 2.4 GHz spread spectrum technology+ can only be used.

Any competitor using a forbidden frequency shall be disqualified from the contest.

2. RACING CIRCUIT

2.1. Racing circuit size

The racing circuit must have a minimum developed size of:

- 250 m on an outside field
- 80 m for an indoor circuit or in woods (named 'short circuit').

It shall be within a 180 m x 100 m rectangle.

If the racing circuit includes passages which risk to generate problems for high frequency waves propagation (such as. trees or walls), the organizer will ensure that the video link has a sufficient quality for a safe piloting with a standard transmitter.

2.2. Safety

A safety line for delimitation of the flight area must be materialized.

The presence of any person on the flight area during a race is strictly forbidden.

The organizer must take care that the press can do a media cover of the contest while guaranteeing the safety of the concerned persons.

2.3. Racing circuit design

The organizer is encouraged to demonstrate creativity. He may take advantage of the specificities of his site. He must however respect the following rules.

The racing circuit must be designed in order to prevent accidental outputs of the racing area. In this context, any trajectory to get back to the safety line will be done in direction of a safe area without competitors or public. Furthermore, a 10 meters distance will be kept between any air gate or obstacle (air flag, …) and the safety line.

Each turn will be marked with a clearly visible flag.

It is strongly recommended to clearly mark on the ground the track. It is mandatory to mark each turn or obstacle.

2.4. Air gates

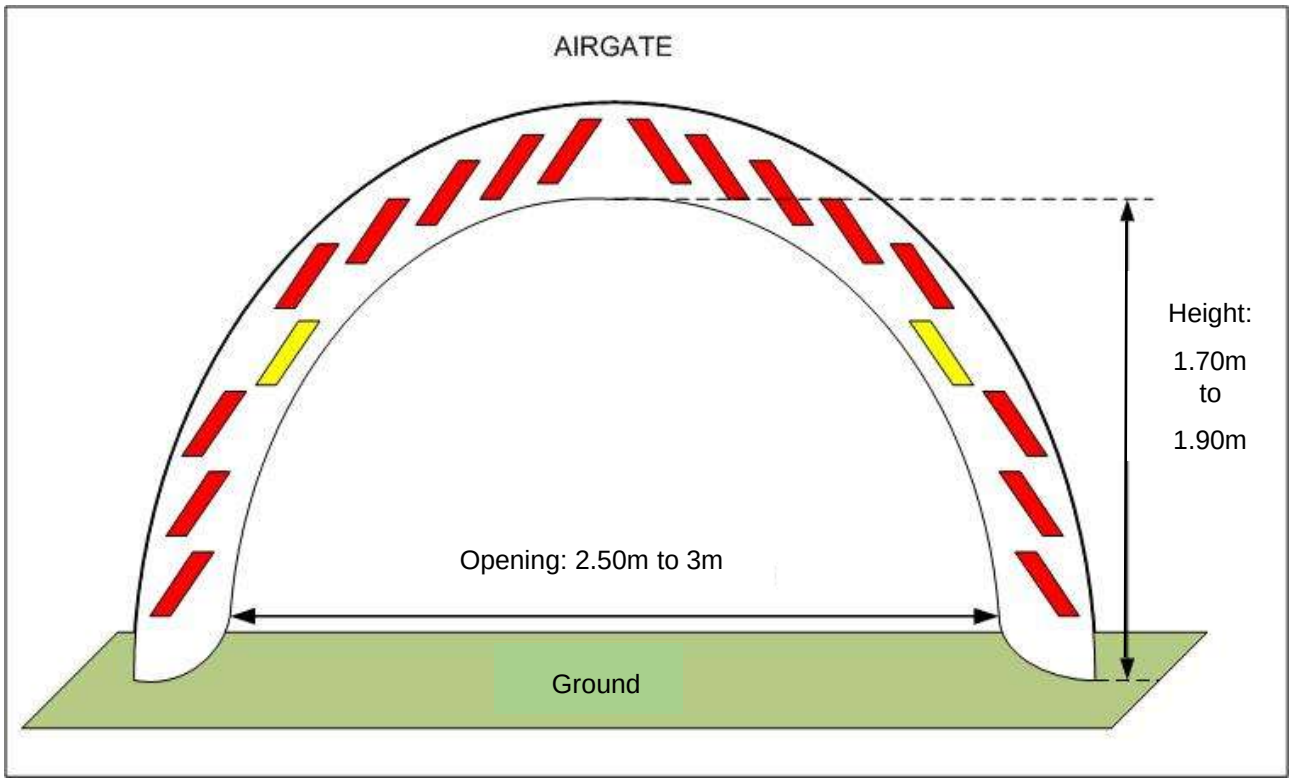
The racing circuit must include between 3 and 5 air gates with crossing dimensions of about:

- 3.0 m width and 1.9 m height maximum,
- 2.5 m width and 1.7 m height Minimum.

Air gates placed side to side count as one. The air gate must contrast with the background and be perfectly visible with standard FPV video device at a 30 meters distance.

The air gate must be preceded by a minimum 10 meters length straight line and shouldn’t be skewed more than 10° relative to its crossing axis. However, it may be placed in a turn with a minimum 15 m radius. In that case, the turn will be marked by flags in order to prevent cuts and sideways passage of the air gate.

STANDARD AIR GATE



2.5. Obstacles

In addition to the air gates, the racing circuit may contain obstacles to be crossed or avoided..

Each obstacle which have to be crossed will have minimal dimensions of 2 m wide and 1.8 m height. It can be placed on the ground or at a maximum height above the ground of 15 meters, and must be preceded by a minimum 10 meters length straight line on the crossing axis of the obstacle.

The racing circuit can also include obstacles which have to be avoided. These obstacles shall not be placed less than 10 meters from air gates or from obstacles which must be crossed. They should be made as much as possible of shock absorbing materials.

Any obstacle which have to be crossed or avoided must contrast with the background and be clearly visible with standard FPV devices at a 30 meters distance.

2.6. Start line

The start line will be perpendicular line to the axis of the initial racing circuit trajectory. This start line is not necessarily placed on the circuit track.

All models will be placed on this line, spaced of at least 1 meter.

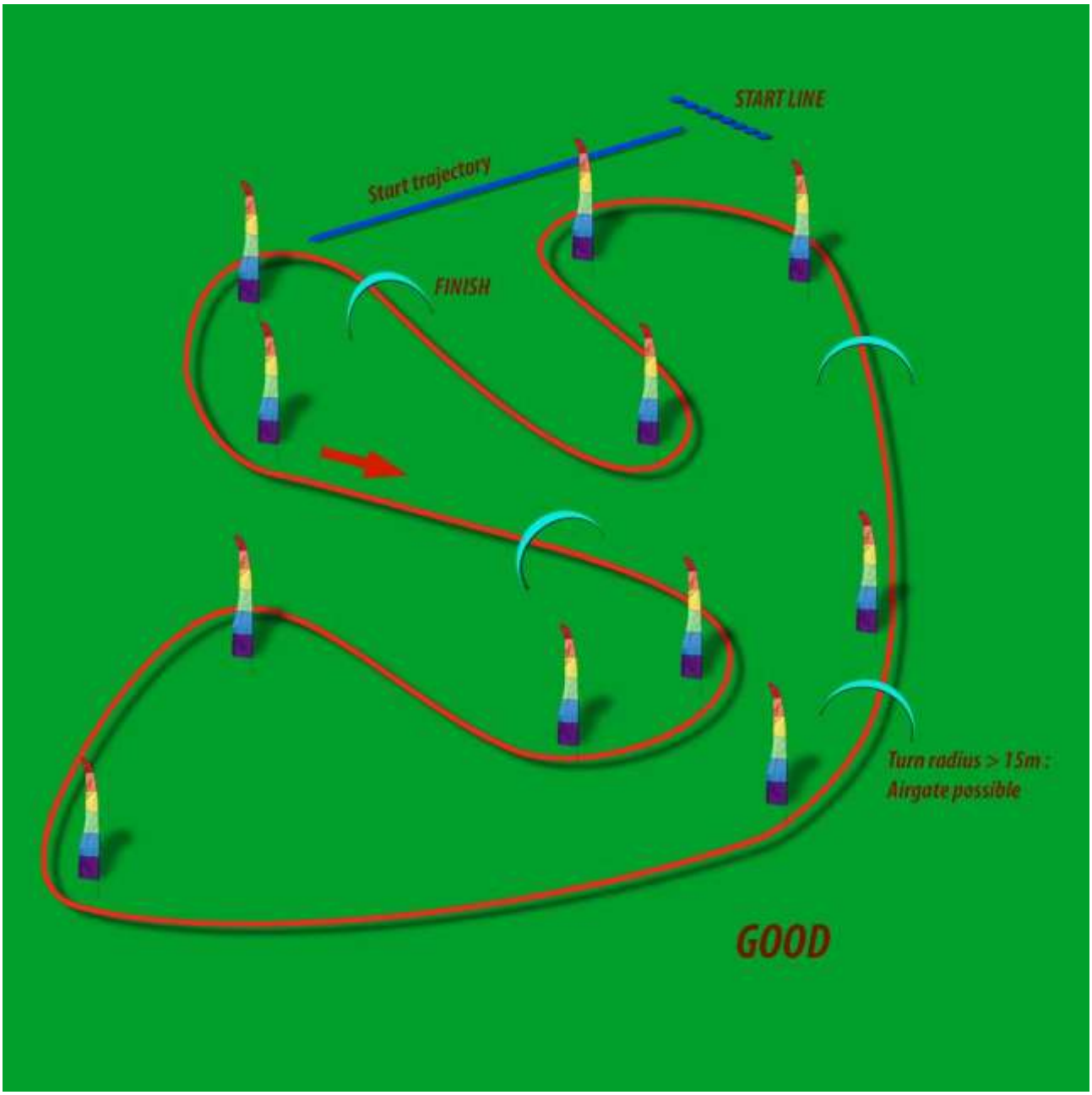
If the start line is not flat and on a concrete surface, each model can be placed on a stud.

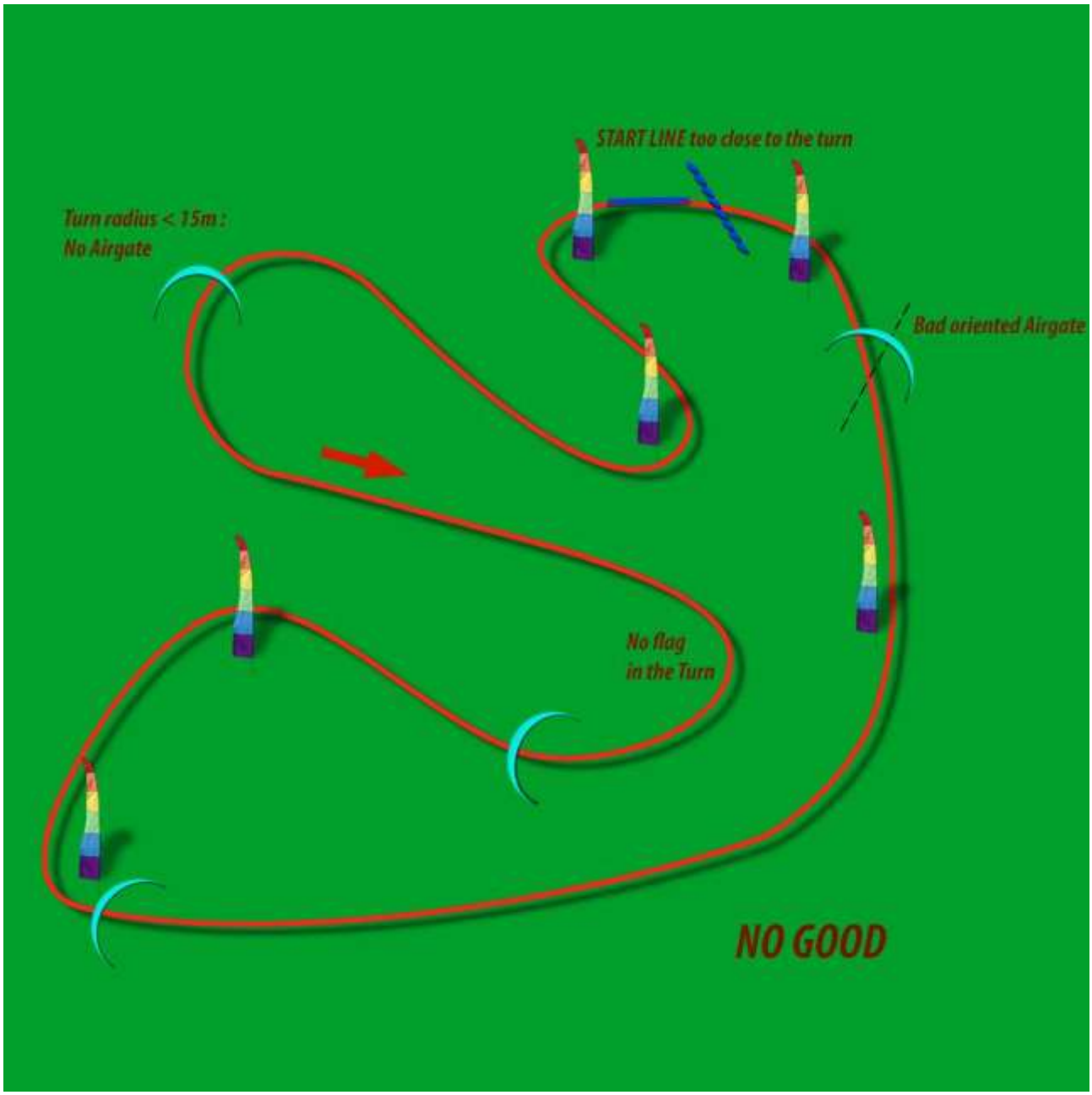
Any obstacle can be placed before a distance of 30 m after the start line. It is right to further a start in straight line.

2.7. Other points

The track of the racing circuit which is newly designed for a contest will be kept secret as much as possible until the contest day. Only technical indications (number of air gates, types of obstacle, technical level, speed or other technical specific information) can be disclosed.

At least one week before the contest, the organizer must inform about the video system that will be used for races and if specific devices will be installed on the models.


START LINE
Start trajectory
FINISH
Turn radius > 15m :
Airgate possible
GOOD



3. NUMBER OF MODELS

Each competitor can register and use 3 models for the entire contest.

The competitor can change its model before the start of a race as long as he hasn't left the preparation area, or between two rounds.

4. CONTEST ORGANIZATION

A contest is organized on the basis of three stages:

- Qualification stage (rounds for qualification for the 'eliminatory' stage).
- Eliminatory stage (rounds allowing to qualify for the "final" stage by successive elimination rounds).
- Final stage.

Each round for qualification or eliminatory stages is organized by groups (subdivision of the round corresponding to the number of competitors flying at the same time).

The number of competitors per group is defined by the organizer before each round. It can be different for each phase of the contest and for each round of the eliminatory stage. A minimum of 3 competitors per group is recommended. In case of reflights or withdrawals after the flight order has been published, the number of competitors in a group can be under the number defined by the organizer.

The organizer will define before the beginning of the contest the number of competitors who will take part to the eliminatory stage, as well as in the final stage.

The number of competitors taking part to the eliminatory stage will be defined taking consideration of the duration of the contest and that a maximum of the competitors can reach this stage.

For each qualifying and eliminatory round, the composition of the groups and the flight order will be the result of a draw.

However, for the first eliminatory round, the organizer may use the ranking after the qualifying rounds to compose the groups in order to mix competitors of different levels. For example, for groups with 6 competitors:

- the first group can be composed of the competitors ranked 1, 7, 13, 19, 25 and 31 after the qualifying stage ;
- the second group, competitors ranked 2, 8, 14, 20, 26 and 32 ;
- etc.

For each round, the start of the races is done by the circle marshal. For the rounds which need a timekeeping, the stopwatch is triggered when the circle marshal announce the start of the race.

Reflights are systematically flown at the end of the concerned round.

4.1. Qualification stage

The number of qualifying rounds is defined by the organizer and must be between 2 to 4.

The number of circuit laps to realize in a qualifying race is 3 (5 for a 'short circuit').

At the end of the qualifying rounds, a ranking is made by taking in account the best time of each competitor during his qualifying flights.

In case of tie for the last place(s) of selection for the eliminatory stage, placing is made taking in account the 2nd best time, and so on; in case the times of the qualifying flights are not sufficient for the tie-breaking, a tie-break flight will be organized between the concerned competitors.

If the number of competitors defined for the eliminatory stage is not reached, a new qualifying round is organized for the competitors who haven't been able to set a qualifying time at that stage. This will be repeated until the appropriate number of competitors for the eliminatory stage is reached.

A first provisional ranking will be established after the qualifying stage. The ranking will be established:

- on the basis of the best time of each competitor taking only in account the initial qualifying rounds ;
- by ranking then those who need an additional qualifying flight to achieve a time to be selected for the eliminatory stage, and then those who need a second additional flight, and so on.

Competitors who didn't achieved any time during the qualifying stage will not be ranked.

4.2. Eliminatory stage

Eliminatory stage is normally composed of:

- 1/8th final round (8 groups),
- followed by a quarterfinal round (4 groups),
- and then by the semi-final round (2 groups).

If the total number of competitors is not sufficient, the eliminatory stage can begin directly at the quarterfinal round.

The number of circuit laps to realize in eliminatory stage rounds is defined by the organizer, taking in account the times achieved in the qualifying stage in order to get an average flight time for the races eliminatory stage comprised between 1 minute 30 seconds and 2 minutes par race.

The conditions for selection for the next eliminatory round must be defined before the start of the previous eliminatory round.

Example of selection conditions: *When the number of competitors per groups is 3 or 4, direct selection of the two first arrived in each race, and when the number is 5 or more of the three first arrived. In all cases, it can be imagined, in order to reach the number of competitors needed for the next eliminatory round, to complete this direct selection by selecting the appropriate number of competitors needed for the next eliminatory round on the basis of their best time in the initial qualifying flights.*

When in an eliminatory flight, none of the competitors of the group has been in situation to finish his flight (crash or other reason), a new flight is organized for this group. Similarly, if the flight doesn't permit to comply the required selection conditions for the next eliminatory round, a new flight will be organized to select for the next round the remaining competitors.

At the end of each eliminatory round, a new provisional ranking will be established from the previous provisional ranking. The competitors who have participated to the considered eliminatory round and who are selected for the next round will be ranked on top (with a placing based on the provisional ranking after qualifying phase), followed by those who are not selected for the next round (with a placing based on the provisional ranking after qualifying phase). Ranking of the other competitors will be based on the previous provisional ranking.

Semi-final round

In case of tie for the last place(s) to select for the final, a tie-break flight will be organized between the concerned competitors.

If the number of competitors required for the final is not reached, a new flight will be organized between the competitors who didn't achieve their flight during the semi-final round. This will be repeated until the required number of competitors for the final is reached.

Competitors who flew in the semi-final round and are not selected for the final will fly together a new flight to determinate their ranking (called "small final" flight).

4.3. Final stage

The number of circuit laps to realize for the final can be increased compared to the number retained for eliminatory flights but in any case can be more than twice this number. It is defined by the organizer in consultation with the finalists in order to ensure that autonomy of the batteries permit safe flights.

The number of circuit laps to realize for the 'small final' will be the same as the number of laps retained for the semi-final round.

Ranking after the final flight is made according to the finish order. Those who have not been able to finish their final flight (crash or other reason) will be ranked considering the provisional ranking after the qualifying stage.

It will the same for the ranking after the 'small final' flight.

However, if none of the participants of the final flight has been in situation to finish its flight, a new final flight will be organized for those who haven't been disqualified, with a number of circuit laps that can be reviewed by the organizer. This does not apply for the "small final'.

4.4. Faults in official flights

In case of an air gate or of an obstacle which have to be crossed is not crossed, then the competitor must execute a manoeuvre to cross again the air gate or the obstacle. If the competitor does not comply with that rule, the corresponding circuit lap is not validated by the judge.

In case of a circuit cut (for example during a turn), the competitor must execute soonest as possible a manoeuvre to come back in the circuit where he left it. . If the competitor does not comply with that rule, the corresponding circuit lap is not validated by the judge.

In case of a circuit exit (crossing of the safety line for delimitation the flight area), the competitor is disqualified. A disqualification can also be decided if it is considered that safety is concerned.

In case of an indoor circuit with numerous structural elements or in case of a circuit in woods for which to do a U-turn can be a problem for safety, penalties described above are replaced by time penalties:

- 10 seconds for not crossing an air gate or an obstacle which have to be crossed.
- 15 seconds for a circuit cut (for example during a turn).

In that case, all flights will be timed. In case of a circuit cut is considered as a voluntary cut to reach the finish line faster, the lap will not be validated by the judge.

Note: Both possibilities (time penalty and requirement of a manoeuvre) cannot be mixed.

When a model crashes, the competitor can go on again if he is in situation to do it. However, the judge in charge of the competitor can request to stop the flight if he considers that the model doesn't match anymore acceptable safety conditions. When the model cannot go on, it must stay on ground with engines cut off until the end of the race: then, the competitor cannot request a reflight unless he is not considered as responsible of the crash.

4.5. Video issues

When a competitor get a video problem which leads him to consider he is not able to continue his flight, a reflight can only be granted if it is proved that the problem is caused by an identifiable external cause. In case of the video devices are provided by the organizer, the same arrangements apply; the competitor cannot turn against the organizer.

In case of a failure of the video system which does not allow the judge to perform his task:

- In a qualifying flight, the flight is cancelled and the competitor is granted a reflight.
- In any flight in eliminatory rounds, the judge let finish the flight without reporting the problem and does his best to judge and validate the laps. When the result of the competitor permits him to be selected for the next eliminatory round (or for the final), the flight is then cancelled and the competitor is granted a reflight.
- In the final flight, the judge let finish the flight without reporting the problem and does his best to judge and validate the laps. I finally the competitor wins, the final flight is then re-run.

4.6. Reflight

Apart from the possibilities to get a reflight mentioned above, a reflight can be granted when the start of the model or when the flight cannot be done in normal conditions, because of an unexpected cause beyond of his control.

So, a reflight can be granted when the preparation of the model or when the flight cannot be made in the allotted time limit for safety reason, or is disrupted by an external interference.

It will be the same if, for a reason independent from the competitor's will, he has been forced to land on request of an official.

Failures of the model, or motorization or radio cannot be considered as reasons independent from the competitor's will.

Granting of such a reflight is the responsibility of the contest director.

A reflight leads automatically for the concerned competitor to the cancellation of the flight for which he has been granted a reflight.

4.7. Models registration and processing

Each competitor can register up to three models. The organizer will mark each registered model with an easily visible identification not falsifiable as much as possible (sticker, ...).

During registration, the specifications of the model may be checked by the organizer. It is then recommended to do a processing of the model on the following points:

- weight and size;
- motorization and propellers;
- fail-safe and associated device to cut off the engines;
- identification mark.

Random processing of models could be made after flights in any round. A competitor whose model wouldn't be compliant may be disqualified from the contest. This decision is the responsibility of the contest director.

4.8. Practice flights

Practice flights on the racing circuit other than those authorized by the organizer are strictly forbidden under threat of being disqualified from the contest.

A free practice session will be organized for the first round of qualifying flights.

Each group will be granted one or several practice flights of 3 minutes each. The number of practice flights is defined by the organizer and will be the same for each group.

After its last practice flight, the group stay on the racing circuit for its first qualifying flight; a 3 minutes break to change the batteries pack of the model or to change the model is given before the start of the qualifying flight.

Each competitor can do as many circuit laps as he wants during the practice time allowed to his group. Once the practice time is over, competitors still in flight can achieve their ongoing lap before landing.

In case of a crash, and when the model cannot go on, the model must stay on ground with engine cut off until the end of the practice session : the competitor cannot request another practice time except if the crash reason cannot be attributed to him.

5. HELPER

Each competitor FPV pilot is assisted by one and only one helper (FPV spotter) who stays next to him during the whole flight.

The first job of the helper is to keep the model in visual line of sight.

Besides that, the helper must inform the competitor of anything occurring that can perturb his piloting, especially about safety. If the helper requests the competitor to land or to cut off the engines, he has to do it immediately.

In case of emergency, the helper is authorized to shut off the transmitter in order to trigger the fail-safe device.

6. OFFICIALS

6.1. Officials needed to run the contest

The progress of a contest needs the following officials:

- Contest director in charge of preparation, organization and oversight of the contest. He especially has to ensure compliance to the applicable rules and safety during the whole contest.
- Circle marshal in charge to call competitors for racing, of the respect of models preparation conditions, for checking of the preparation and flight times, for oversight of the models during transfer to the take-off area and to give the start of each flight with an audible device (whistle, foghorn, …).
- Judges (one per competitor in flight) in charge to check the respect of the racing circuit by the competitor and to time (If not done by an automatic electronic device).
- Responsible for checking of the models weight and identification mark (number and height of lettering).
- Responsible for score sheet gathering.
- Responsible for results accounting.

According to the contest standing and the number of competitors, some tasks of officials may be assumed by a same person.

6.2. FAI Jury

In any FAI Open International contest, a FAI Jury must be nominated according to Sporting Code Volume ABR B.4.1 and B.4.3.

6.3. Judges

In each race, each FPV pilot competitor will be followed by a judge standing next to or behind him.

The judge will have available the video device allowing him to follow in real time the flight of his competitor. It is highly recommended that the judge and the competitor share the same VRX (video receptor).

The judge must inform the competitor loudly when an air gate or an obstacle is not considered to be crossed, or of a circuit cut, or. He will ensure that the competitor crosses back correctly the gate or the obstacle, or comes back to the point where the cut happened.

Note: The organizer can also provide one or several specific line judges in charge of informing the judges if a model crosses the safety line (exit of the circuit).

The judge can also pronounce a disqualification if he considers that the competitor flies too high avoiding the judge to appreciate the respect of the track.

The judge must request the competitor an immediate landing if he considers that the piloting is hazardous or if safety is involved. This leads to a disqualification of the competitor for the concerned flight.

A the end of the flight, the judge informs the competitor if the flight is considered as valid or if a disqualification has been pronounced ; in case of disqualification, the number of circuit laps done at the moment of the disqualification will be mentioned by the judge to competitor and registered.

7. INTERRUPTION OF THE CONTEST

The contest should be interrupted or the start delayed by the FAI Jury if the wind is continuously stronger than 9 m/s measured at two meters above the ground near the preparation area for at least one minute.

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

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

8. COMPETITORS INFORMATION

The organizer have to display on the site:

- FAI Jury composition;
- start list for every round;
- times achieved after each qualifying round;
- results of each eliminatory round;
- provisional rankings and final placing.

Note: A posting on Internet is also advised if conditions permit it, in order to give the possibility to those who are not on the site to follow the progress of the contest.