FAI Sporting Code

Fédération Aéronautique Internationale

Section 4 - Aeromodelling

Volume F9
Drone Sport

2024 Edition

Effective 1st January 2024

DRONE RACING WORLD CUP RULES

F9A (Provisional class) - DRONE SOCCER RULES

F9U (Provisional class) - DRONE RACING RULES

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RIGHTS TO FAI INTERNATIONAL SPORTING EVENTS

All international sporting events organized 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].

An event organiser who wishes to exploit rights to any commercial activity at such events shall seek prior agreement with FAI. The rights owned by FAI which may, by agreement, be transferred to event organisers include, but are not limited to advertising at or for FAI events, use of the event name or logo for merchandising purposes and use of any sound, image, program and/or data, whether recorded electronically or otherwise or transmitted in real time. This includes specifically all rights to the use of any material, electronic or other, including software 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] may negotiate agreements, with FAI Members or other entities authorized by the appropriate FAI Member, for the transfer of all or parts of the rights to any FAI International Sporting Event (except World Air Games events[9]) in the discipline[10], for which it is responsible[11] or waive the rights. Any such agreement or waiver, after approval by the appropriate Air Sport Commission President, shall be signed by FAI Officers[12].

Any person or legal entity that accepts 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 transfer of rights has been agreed in writing, FAI shall retain 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. The FAI also reserves the right to arrange at its own expense for any and all parts of any event to be recorded.

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1 ..... FAI Statutes, ... Chapter 1, ... para. 1.6

2 ..... FAI Sporting Code, Gen. 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 and 2.7.2

5 ..... FAI By-Laws, ... Chapter 1, ... para 1.2.1

6 ..... FAI Statutes, ... Chapter 2, ... para 2.4.2.2.5

7 ..... FAI By-Laws, ... Chapter 1, ... paras 1.2.2 to 1.2.5

8 ..... FAI Statutes, ... Chapter 5, ... paras 5.1.1, 5.2, 5.2.3 and 5..2.3.3

9 ..... FAI Sporting Code, Gen. Section, ... Chapter 4, ... para 4.1.5

10 ..... FAI Sporting Code, Gen. Section, ... Chapter 2, ... para 2.2.

11 ..... FAI Statutes, ... Chapter 5, ... para 5.2.3.3.7

12 ..... FAI Statutes, ... Chapter 6, ... para 6.1.2.1.3

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VOLUME F9 DRONE SPORT

SECTION 4C - MODEL AIRCRAFT - F9 - DRONE SPORT

THIS 2024 EDITION INCLUDES THE FOLLOWING AMENDMENTS MADE TO THE 2023 VOLUME

These amendments are marked by a double line in the right margin of this edition

Paragraph	Date of change	Brief description of change	Change incorporated by
	Changes effective 1st January 2024	***Simple corrections of typing errors or incorrect English wordings are not marked by a double line in the right margin and are not included in the following table.***	Bruno Delor S/C Chairman
B. F9A rules		Rewording of the preamble describing what Drone Soccer is.	
B.1. Drone ball general specifications		Clarification of the software recovery modes permitted. Mention that the checking of a drone ball to ensure it fits the specifications may be done to any time during the event.	
B.1.1. Weight and size		Requirement for the protective frame to be plastic or composite material, but not from metal. Removal of the -2 cm tolerance for the diameter of the drone ball spherical protective frame with mention for each subclass of the diameter of the circle in which the protective frame must fit.	
B.1.2. Motorization		Mention that the voltage measurement of the battery pack may be done before each set, and not only before the beginning of the match.	
B.1.5. LED light devices		Clarification and specifications for the LED light devices to be installed on the drone balls.	
B.1.6. Scorer drone ball (Striker)		Introduction of the possibility to request to attach a ribbon at the bottom of the scorer drone ball.	
B.2.2. Flying zone - Protection cage		Redrafting to better take into consideration for the flying zone the two diameters of drone balls. Introduction of specifications for the protection cage.	
B.3. Goal rings		Rewording to better take into consideration the two diameters of drone balls.	
B.4. Players		Precisions regarding the number and role of the active players. Restriction of the team to the players (coach no mote taken into account for the team). 2 players autorised in the team in additon to the number of active players defined.	
B.8.2 Start of a set		Clarification of an early start (drone ball leaving the ground before the start signal).	
B.8.4. Scoring		Replacement of the match referee by the scoring referee scoring referee to decide if the goal may be scored. Clarification how to proceed after a stiker scores a goal.	
B.8.6 Set and match result		Clarification that a team which wins two sets is the winner of the match.	
B.9.2. Warning		Adding of unintentional contact during a set of a flying drone ball on a done ball which is on ground.	
B.9.3. Yellow card		Adding of intentional contact during a set of a flying drone ball on a done ball which is on ground.	
B.12.2. Referees		Assistant referrees changed as scoring referees. Mandatory appointment of scoring referees, and match referees appointed where appropriate.	
B.12.2.2. Match referee		Replacement of “main referee” by “match referee”.	
B.12.2.3. Goal referee		Replacement of “assistant referee” by “scoring referee”. Replacement of “main referee” by “match referee”.	
C. F9U rules		Name of the class changed to ‘Drone Racing’ (Removal of ‘RC Multi-rotor’).	
C.1. General specifications for models		Clarification of the software recovery modes permitted.	
C.1.2. Motorization		Removal of the rule for the specific case of a tri-copter.	
C.1.3. Number of models		Clarification regarding the number of models which may be used during the entire event.	
C.1.5. Video system		Requirement that the video receiver system provided by the organiser must be compliant with analogic and digital video transmitters considering analogic and digital video devices may be used together in any event. Modification of the video transmitter requirements.	
C.1.6. LED light device (Optional)		Introduction of specifications for the LED light unit instead to require the orgganiser to define a list of authorised LED light devices.	
C.1.7. Identification mark		Requirement fot the letters and numbers to be readable (unaided) at arm's length instead a 6 mm height which is difficult to check.	
C.4. Model registration and processing		Adding of a paint mark as a possible identification for the registered models.	

Paragraph	Date of change	Brief description of change	Change incorporated by
C.5. Practice flights		Removal of the last sentence relative to a practice session flown before the first race of the competitors considering this is not recommendable and no more applied.	
C.6. Event organisation		Maximum 4 competitors per race mandatory instead to be recommended. Races with 3 laps to complete and 3 minutes flight time defined as the standard way to proceed for the entire event.	
C.6.1. Timekeeping		Laps which are not finished will no more be considered and contribute to a result, placing or tie-breakers. Timekeeping triggering more precisely detailed.	
C.6.2. Procedure for the start of the race		Allocation of 2 minutes maximum to be ready to start after the models have been placed on the start area. Rewording of the last sentence concerning the situation of pilot(s) starting before the start signal.	
C.6.3. Qualification stage		Rewording of both options for the qualification stage taking into account that races are based on 3 laps to complete and 3 minutes flight time.	
C.6.4. Elimination stage		Competitors who do not finish their flight ranked in the race considering their number of laps completed and the corresponding registered time.	
C.6.6. Additional rounds optional sequence		Rewording taking into account that races are based on 3 laps to complete and 3 minutes flight time.	
C.7.3. Disqualification from the race		Removal in order to include a new paragraph C.9. Disqualification. Consequent renumbering of the paragraphs C.7.4 and C.7.5.	
C.7.3. Crash *(ex C.7.4)*		Deletion of the first sentence which is considered ambiguous and not necessary.	
C.8. Reflights		Deletion of the note which is no longer relevant.	
C.9. Disqualification		Inclusion of a new paragraph to resume cases for disqualification from the race mentioned before in C.7.3 and for disqualification from the event.	
Annex C.1 Racing circuit		Introduction of a note not to recommend small gates/obstacles.	

Four-Year Rolling Amendments for Reference			
Paragraph	**Date of change**	**Brief description of change**	**Change incorporated by**
A. Drone Racing World Cup rules	Changes effective 1st January 2023		Bruno Delor S/C Chairman
A.2.2. Masters World Cup Series		CIAM being now entirely responsible of Drone Sports, CIAM Bureau is the appropriate body to select the Masters events.	
A.3. Participants		Change to allow more flexibility for participation in Masters events.	
A.5. Classification		Correction to be coherent with the change introduced in the 2022 edition.	
A.9. Responsibilities of the event organiser		CIAM form is no more the reference for registration of the events which is now done with the AMS.	
A.10. World Cup Board		Clarification of the wording.	
B. F9A rules			
B.1. Drone ball general specifications		Rermoval of the 1 % tolerance for inaccuracy of the measurements devices.	
B1.2. Motorization		For F9A-B subclass, 3S extended to 4S.	
B1.4. Radio control (RC) equipment		Clarification of the wording.	
B.1.5. LED light device		Clarification of the wording.	
B.3.1. Shape and dimensions		Simplification for F9A-B to improve accessibility of this subclass.	
B.3.4. Detection sensor		To allow sensor technology development and to coincide with B.8.4.	
B.4.1. Active players		Clarification of the team captain role during the active play.	
B.8.4 Scoring		Clarification in order to facilitate the scoring of a goal.	
B.8.5. Safety occurrence		Clarification of the situation of a drone ball no more in situation to fly in safe condition.	

Paragraph	Date of change	Brief description of change	Change incorporated by
B.9. Penalties	Changes effective 1st January 2023	Introduction of the possibilities to stage the penalty shots(s) at the end of the set.	Bruno Delor S/C Chairman
B.9.3. Yellow card & B.9.4. Red card		Change in order to punish a player instead the complete team.	
B.11. Disqualification from the event		Clarification of the wording.	
B.12.1. Event director		Clarification of the wording.	
B.12.3. Jury		Correction for a FAI event and coverage of an event not included in the FAI Contest Calendar.	
C. F9U rules			
C.1. General specifications for models		Rermoval of the 1% tolerance for inaccuracy of the measurements devices.	
C.1.2. Motorization		Removal of the note considering with the experience it does not look necessary to consider a maximum amount of energy which may be used for the race.	
C.1.4. Radio control (RC) equipment		Simplification of the wording (not necessary to refer to the CIAM General Rules).	
C.1.5. Video system		Clarification of the wording for the DVR to avoid restriction for the choice of a recording equipment by the organiser. Mention of the possibility to allow analog and digital video devices in the same race. Specification for the digital video devices of a maximum 25 mW power emission and 25 Mbps. Simplification of the wording (not necessary to refer to the CIAM General Rules).	
C.1.6. LED light device (Optional)		Mention of the possibility for the organiser to define a list of authorised LED light devices with removal of recommended specifications.	
C.3. Number of models		Limitation of the possibility to change a model for a race.	
C.4. Model registration and processing		Limitation of the possibility to register an additional model. Clarification of the wording.	
C.5. Practice flights		Limitation to one one mandatory practice/warm up.	
C.6 Event organisation		Removal of the reference to reflights for elimination and final stages.	
C.6.1. Timekeeping		Mention in that paragraph of all provisions concerning timekeeping.	
C.6.2 Procedure for the start of the race		Limitation of the situations in which the start must be stopped.	
C.6.3 Qualification stage		Clarification of the wording.	
C.6.5. Final stage		Replacement of the actual optional way to proceed which is too much sophisticated and difficult to understand.	
C.6.6. Additional rounds optional sequence		Clarification of the wording due in particular to the introduction of a race director.	
C.7.2. Faults and penalties		Simplification of the the wording and removal of the possibility of a reflight for a pilot whose model had been collided into.	
C.7.3. Disqualification from the race		Clarification of the wording.	
C.7.4. Crash		Clarification of the wording.	
C.7.5. Safety occurrence		Consideration of serious safety issue circumstances. Clarification of the wording.	
C.8. Reflights		Individual reflights restricted to the qualification stage.	
C.9.1. Jury		Correction for a FAI event and coverage of an event not included in the FAI Contest Calendar.	
C.9.2. Officials to run the event		Addition of a race director.	
C.9.3 Judges		Removal of the obligation of judges assigned to the pilots. Clarification of the wording.	
C.10. Interruption of the event		Clarification due to the introduction of a race director.	
C.11. Competitors information		Clarification of the wording.	

Paragraph	Date of change	Brief description of change	Change incorporated by
A. Drone Racing World Cup rules	Changes effective 1st March 2022		Bruno Delor S/C Chairman
A.5. Classification		Sum of the best 3 (instead 4) event results considered for the World Cup competitors' score.	

Paragraph	Date of change	Brief description of change	Change incorporated by
B. F9A rules	Changes effective 1st January 2021		Bruno Delor S/C Chairman
B.1.1. Weight and size		Subclass F9A-B: Weight of the drone ball increased to 300 g (instead 200 g actually).	

Paragraph	Date of change	Brief description of change	Change incorporated by
B. F9A rules	Changes effective 1st January 2020		Bruno Delor S/C Chairman
B.1.1. Weight and size		Introduction of two subclasses: F9A-A (400 mm diameter) and F9A-B (200 mm diameter). For 400 mm drone balls (F9A-A subclass), maximal weight increased to 1.2 kg considering weight of the drone balls actually available on the market. For 200 mm drone balls (F9A-B subclass), maximal weight of 200 g.	
B.1.2. Motorization		Possibility of a maximum 6S battery pack in subclass F9A-A, and 3S in subclass F9A-B. Voltage of each cell of the battery pack limited to 4.25 V (safety reason).	
B.1.3. Propellers		For subclass F9A-B, 3 inches as maximum diameter of the propellers.	
B.1.5. LED light device		Mention of the number of LEDs recommended for the F9A-B subclass.	
B.2.2. Flying zone		For subclass F9A-B, possibility to consider smaller dimensions for the flying zone with 6 m x 3 m minimum.	
B.3.1. Shape and dimensions		For subclass F9A-B, possibility to consider a smaller internal diameter of the goal ring.	
B.9.1. Penalty shot		Mention how a penalty shot must be executed.	
C. F9U rules			
C.1.2. Motorization		Voltage of each cell of the battery pack limited to 4.25 V (safety reaon).	
C.1.3. Propellers		Removal of the sentence: 'Any propeller protection device is forbidden'. Based on safety consideration, there is no reason to prohibit such a protection device.	
C.1.4. Radio control (RC) equipment		Limitation of the 868 MHz / 915 MHz modules output power.	
C.6. Event organisation		Clarification of the possibility to organize the event with only one stage based a fixed number of rounds when the total number of competitors is low. Clarification concerning number of pilots per group.	
C.6.2. Procedure for the start of the race		Clarification of the wording considering sentence 'Pilots, arm your quads', may be announced by the starter or automatically.	
C.6.3. Qualification stage		Clarification how to proceed for the draw of the qualifying rounds. Fastest time to complete a required number of laps qualification method not recommended when only three qualifying rounds or less are scheduled.	
C.6.4. Elimination stage		Clarification how to proceed for the 1st eliminitation round when the number of competitors is lower than the number of competitors required for the considered scenario.	
C.6.5. Final stage		When the double elimination sequence is not applied, possibility to consider 3 final flights with allocation of points instead a single final flight. When the double elimination sequence is applied, clarification on how to proceed for the final stage.	
C.6.6. Additional rounds optional sequence		Flexibility given to the organiser for the additional rounds with possibility to have successive eliminating rounds as proceeded for the elimination stage, or a fixed number of rounds for all concerned competitors.	
Annexes C.2 to C.4		Modification of the composition of the races for the 1st elimination round. Clarification how to proceed for the final classification when the optional additional rounds sequence is applied.	

Paragraph	Date of change	Brief description of change	Change incorporated by
B. F9A rules	Changes effective 1st May 2019	Introduction of the F9A provisional class (Drone Soccer) rules (Chapter B). Consequently, chapter B has been renumbered C and Annexes 1 to 4 have been renumbered C.1 to C.4.	Bruno Delor S/C Chairman
	Changes effective 1st January 2019	'Volume F3 Radio Control Drone Racing' renamed 'Volume F9 Drone Sport. Class F3U renumbered F9U (name unchanged).	Bruno Delor S/C Chairman
A. Drone Racing World Cup rules		Replacement of 'F3U' by 'F9U'. Replacement of 'contest' by 'event'. Adaptation of the World Cup rules to take in account the new World Cup format with Challenger and Masters World Cup Series. About requirement of competitors from at least two different countries for points allocation in a World Cup event, mention that every time zone will be considered as equivalent to a country for a country which extends over more than three time zones.	
B. F9U rules		Replacement of 'F3U' by 'F9U'. Mention that the necessary information must be available at least one month before the event (instead well before the event).	
B.1.1. Weight and size		Clarification of the wording for the size specification.	
B.1.2. Motorization		Possibility to use 6S batteries with increase to 25.5 volts of the maximum voltage of the battery.	
B.1.4. Radio Control (RC) equipment		Mention that the organiser may define a list of authorized equipments and of the possible penalty in case of use of non-authorized RC equipment.	
B.1.5. Video system		Recommendation of a digital video recorder (DVR). Mention that the video system must be set with 25 mW maximum power emission. Mention of the possible penalty in case of non-authorized activation of a video transmitter.	
B.1.6. LED light device (Optional)		'Unit' replaced by 'device'. Mention of recommended specifications for the optional LED light device.	
B.1.7. Identification marks		Removal of possibility to mention the National FAI Licence number instead the FAI ID number (from 2022). Mention that the identification mark must be in a clearly visible position.	
B.2. Racing circuit		Rewording of the specifications.	
B.3. Number of models		Clarification of the wording.	
B.4. Model registration and processing		Clarification of the wording.	
B.6. Event organisation (Introduction part)		Recommendation of 4 pilots maximum per group, except for qualifying and/or optional additional rounds which may be run with 6 pilots per group.	
B.6.1. Timekeeping		Requirement of an electronic timing system (instead manual timekeeping) with an appropriate redundancy.	
B.6.2. Procedure for the start of the race		Clarification about the start procedure and the role of the starter.	
B.6.3. Qualification stage		Flexibility given to the organiser for the choice of the qualification method.	
B.6.4. Elimination stage		Removal of the scenarios D and E with 6 pilots per group. Replacement of the double chance optional sequence by the double elimination optional sequence giving possibility to reach the final.	
B.6.5. Second Chance flight (Optional sequence)		Removal of this paragraph considering the new double elimination optional sequence is a part of the elimination stage (B.6.4). Consequently, sub-paragraph B.6.7 relative to additional rounds sequence is renumbered B.6.6.	
B.6.6. Additional rounds optional sequence		Clarification of the additional rounds sequence modalities.	
B.6.7 Final classification		Mention in this new sub-paragraph of the cross-references to the final classification tables included in annexes 2 to 4.	
B.7.1. Obstacle damaged or destroyed during the race		Mention in this new sub-paragraph how to proceed when an obstacle is damaged or destroyed during the race.	

Paragraph	Date of change	Brief description of change	Change incorporated by
B.7.2. Faults and penalties	Changes effective 1st January 2019	Removal of the time penalties possibility considering it may be be introduced as a local rule when the indoor circuit justifies it.	Bruno Delor S/C Chairman
B.7.3. Disqualification from the race		Clarification of the wording.	
B.7.4. Crash		Mention that the pilot must clearly say when he/she stops to fly after a crash.	
B.7.5. Safety occurrence		Mention in this new sub-paragraph of possibility to request a pilot to the flight if it is considered the model no longer meets acceptable safety standards.	
B.8. Classification		Removal of this paragraph considering final classification information has been placed in sub-paragraph B.6.7.	
B.8. Reflights		Introduction of a new paragraph for reflights in order to better detail causes for reflights and organisation of the reflights for the different stages of the event. Consequently, sub-paragraphs B.7.4 Video issues and B.7.5 Reflight have been included in this new paragraph. Clarification of the wording.	
B.9.1. Officials needed to run the event		Rewording of some parts of the sub-paragraph.	
B.9.3. Judges		Flexibility given to the organiser concerning position of the judges and clarification of their role.	
B.10. Interruption of the event		Clarification of the circumstances for which the event should be interrupted or the start delayed.	
Annex 1		Rewording of the recommendations regarding racing circuit.	
Annexes 2 to 4		Introduction of templates for each scenario (A, B and C).	

RULE FREEZE FOR THIS VOLUME

Regarding the provisional statute of the F9A and F9U classes, the content of this Volume is not subject to Plenary Meeting approval, nor is it restricted by any rule freeze regulation.

It is under the direct control of CIAM Bureau and may be updated at any time during the year.

A. DRONE RACING WORLD CUP RULES

A.1. CLASS

The FAI provisional class F9U is recognised for the Drone Racing World Cup.

A.2. EVENTS

The Drone Racing World Cup is based on two series of events: Challenger and Masters.

All Drone Racing World Cup events will be considered as Second Category events as defined in FAI Sporting Code General Section.

Those events will be published on the FAI Calendar and must be run according to the FAI Sporting Code.

A.2.1. Challenger World Cup Series

Only Open International events may be considered for the Challenger World Cup Series.

The selection of the events for the Challenger World Cup Series is made by the Drone Sport Subcommittee Chairman. Wherever possible, the selection for a particular year will be made before the end of the preceding year. In duly justified cases, an event can be added after this date at the discretion of the Drone Sport Subcommittee Chairman.

A maximum of two events may be selected for any country on its own behalf unless the country extends over more than three time zones; in that case, one event may be selected within each time zone of the country with a maximum of four events for the country on its own behalf.

A country may choose to run a Challenger World Cup event at a venue in another country provided that the registration of the event on the FAI calendar is submitted by the organising country and the name of the organising country is included in the title of the event. Any country may host one event maximum on behalf of another organising country regardless of whether or not the host country extends over more than three time zones.

A.2.2. Masters World Cup Series

The selection of the events for the Masters World Cup Series will be made by the CIAM Bureau.

Wherever possible, the selection for a particular year as Masters World Cup event will be made before the end of the preceding year.

A.3. PARTICIPANTS

Any person holding a valid FAI Sporting Licence or FAI Drone Permission may participate in a World Cup event and so be eligible for the World Cup ranking.

Participation in the Masters World Cup events may be restricted to qualified competitors considering the current World Cup ranking. The current World Cup ranking will be based on a sliding 12 months period.

A.4. POINTS ALLOCATION

In any event, points for the World Cup will only be allocated if the competitors have flown from at least two different countries. For a country which extends over more than three time zones, every time zone will be considered as equivalent to a country.

Points allocated to each competitor depend of the placing in the event of the concerned competitor.

In the situation of a tie for any placing, the competitors with that placing will share the points which would have been awarded to the places covered had the tie been resolved (round up the score to the nearest whole number of points).

The points allocated to competitors will depend on the number (N) of competitors who have effectively flown in the event.

Points are allocated as follows to the competitors who have effectively flown in the event.

a) N > 40

Placing	1	2	3	4	5	6	.....	40 and after
Points	40	39	38	37	36	35	.....	1

b) N = 40 or N < 40

Placing	1	2	3	4	5	6	.....	N-1	N
Points	N	N-1	N-2	N-3	N-4	N-5	.....	2	1

In addition, bonus in points will be awarded for the best placed competitors.

For any Challenger World Cup event, bonus in points is awarded to the three best placed competitors as follows:

- 1st place = N/5 rounded up to the nearest whole number with a maximum of 8 points.
- 2nd place = N/8 rounded up to the nearest whole number with a maximum of 5 points.
- 3rd place = N/13 rounded up to the nearest whole number with a maximum of 3 points.

For a Masters World Cup event, bonus in points is awarded to the eight best placed competitors as follows:

- 1st place = N/2.5 rounded up to the nearest whole number with a maximum of 16 points.
- 2nd place = N/3 rounded up to the nearest whole number with a maximum of 14 points.
- 3rd place = N/3.5 rounded up to the nearest whole number with a maximum of 12 points.
- 4th place = N/4 rounded up to the nearest whole number with a maximum of 10 points.
- 5th place = N/5 rounded up to the nearest whole number with a maximum of 8 points.
- 6th place = N/7 rounded up to the nearest whole number with a maximum of 6 points.
- 7th place = N/10 rounded up to the nearest whole number with a maximum of 4 points.
- 8th place = N/20 rounded up to the nearest whole number with a maximum of 2 points.

A.5. CLASSIFICATION

The World Cup results are determined by considering the points obtained by each competitor in the World Cup events.

For each competitor, only one World Cup event result per organising country may be considered for the World Cup placing (greater number of points for any organising country in which the competitor has scored in two events). For a country which extends over more than three time zones, one event may be counted for this organising country within each time zone of the country.

The total World Cup score of the competitor is the sum of his/her best three event results (numbers of points) for all World Cup events (Challenger and Masters).

The winner of the World Cup is the competitor with the greatest total score for the concerned year, and so on for the placing.

In the situation of a tie for first, second or third place, placing will be determined by taking into account for the competitors in question, their best fourth result, then if necessary, their fifth best result, and so on. If this does not separate the tied competitors, then the placing will be determined by considering the sum of the points that they obtained in each of the three events considered for their World Cup score multiplied by the number of competitors who have flown in the event concerned; the winner is the one with the greatest total thus calculated.

A.6. AWARDS

The winner is awarded the title of World Cup winner for the concerned calendar year.

Medals, trophies, prizes, or certificates may also be awarded as available.

A.7. ORGANISATION

Administration, collection of the results, calculation of the placing and regular publication of the current World Cup positions are normally done by the Drone Sport Subcommittee Chairman.

A dedicated World Cup Coordinator may be nominated. Such a nomination is done by the CIAM

Bureau on proposition of the Drone Sport Subcommittee Chairman.

A.8. COMMUNICATION

The World Cup results and placing could be distributed to the news agencies and also be available, by payment of a subscription, to any interested bodies or individuals.

Final results of the World Cup must be sent also to the CIAM with the annual report to be done by the World Cup Coordinator.

A.9. RESPONSIBILITIES OF THE EVENT ORGANISER

The organiser NAC or the event organisers will request the inclusion in the World Cup at the registration of the event in the FAI application.

The selection of the events eligible for inclusion in the World Cup will be done from those proposals as specified in paragraph A.2.1.

Immediately after the event, the organiser must send the results in electronic form to the World Cup coordinator, at least within one month as required by the CIAM rules. Any failure to return results promptly will be reviewed when considering the events for inclusion in the World Cup for the following year.

A.10. WORLD CUP BOARD

According to CIAM General Rules Volume C.7.4, a Board of three persons shall be nominated by the Drone Sport Subcommittee Chairman to rule on any issue concerning the implementation of World Cup rules during a year. Any such issue must be submitted in writing to the Subcommittee Chairman and the Board. The World Cup Board is not entitled to deal with any kind of complaint or protest concerning a single event, which must be considered by the FAI Jury for that event.

B. F9A (PROVISIONAL CLASS) - DRONE SOCCER RULES

Drone soccer is a class which combines radio controlled drone flying with soccer.

Drone soccer is a team sport in which two teams play against each other to score in their opponent's goal ring with a dedicated drone ball.

The match between the two teams is subdivided into three periods of time, each period being considered as a set.

B.1. DRONE BALL GENERAL SPECIFICATIONS

The drone ball must be equipped with a fail-safe device, the activation 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 drone ball after a crash are permitted.*

Any drone ball may be checked by the organiser at any time during the event to ensure it fits the specifications.

B.1.1. Weight and size

A spherical protective frame shall surround the drone ball. All the components of the drone ball must be placed inside the spherical protective frame. Nothing should protrude from this frame.

The protective frame can be from plastic or composite materials, but not from metal.

a) Subclass F9A-A

The total weight of the drone ball including all equipment necessary for flight (including outer frame and batteries) shall not exceed 1.2 kg.

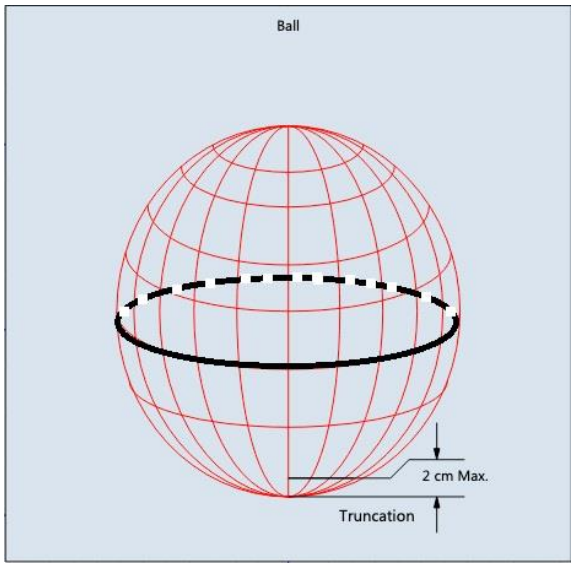
The diameter of the protective frame at the point where the circumference is measured (see image below) must be 40 cm +2 cm. So, the protective frame must fit within a 42 cm diameter circle.

b) Subclass F9A-B

The total weight of the drone ball including all equipment necessary for flight (including outer frame and batteries) shall not exceed 300 g.

The diameter of the protective frame at the point where the circumference is measured (see image below) must be 20 cm +2 cm. So, the protective frame must fit within a 22 cm diameter circle.

For both subclasses, the frame may be flat at the bottom of the drone ball allowing the drone ball to remain steady on the ground. The flat section cannot be more than 2 cm high (See image below).



Any individual open surface of the frame must be 150 cm^2 maximum.

Note: *The above requirement is to the drone with an inadequate protective framework surrounding it. Although a lighter drone ball can offer better flying performance, a too light protective frame can*

adversely affect the game due to the damage of the drone ball resulting from collisions with other drone balls.

B.1.2. Motorization

Only electric motors are allowed.

The drone ball may be equipped with a maximum of four electric motors.

Battery pack allowed up to 6S for F9A-A subclass, and 4S for F9A-B subclass.

The voltage for each cell must not exceed 4.25 V when fully charged. This means a maximum voltage of 8.5 V for a 2S battery pack, 12.75 V for a 3S, 17 V for a 4S, and 25.5 volts for a 6S.

The voltage measurement of the battery pack may be performed before the beginning of each set.

B.1.3. Propellers

Maximum diameter:

- 6 inches (15.2 cm) in F9A-A subclass.
- 3 inches (7.6 cm) in F9A-B subclass

Metal propellers are forbidden.

B.1.4. Radio control (RC) equipment

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

In order to limit risk of potential problems with unwanted interference during a match, the event director may define restrictions for use of RC systems equipment outside the playing field.

In case of use of non-authorized RC equipment, penalty going up to disqualification from the event of the concerned team may arise (See B.11).

B.1.5. LED light devices

In order the drone balls of each team could be clearly recognized during the match, red colour will be assigned to a team and blue colour to the other team. So, a LED strip must be installed on each drone ball, so it may be clearly visible from any angle.

Specifications for the LED strip:

- Minimum 40 individual LED elements for the 40 cm drone balls (F9A-A), and minimum 16 LEDs for the 20 cm drone balls (F9A-B).
- LED strip fixed on the circumference of the main frame which supports the motors,
- Capability to easily switch before the match to the colour assigned to the team concerned.

An additional LED light unit with a minimum of 6 LEDs will be installed on the rear part of each drone ball with capability to rapidly switch the colour.

The colour will be different for each drone ball to allow each active player to identify the position of his/her drone ball, and to permit differentiation of the different active players of the team.

Each team may choose their colours subject the colours are clearly distinguishable from one another, and not to consider the colour, red or blue, assigned to the team concerned. However, the colour for the drone ball of the Striker (scorer drone ball) will be blue for the red team, and red for the blue team.

B.1.6. Scorer drone ball (Striker)

In order to increase recognition of the drone ball of the Striker (scorer drone ball) of each team, the organiser may request the Striker of each team to attach to the bottom of their drone ball a ribbon or thin material “flag” that will hang from the bottom.

B.2. PLAYING FIELD

Drone soccer event may be organized indoor or outdoor.

The playing field is mainly composed of a flying zone and two pilots' areas (one for each team).

B.2.1. Surface

There are no precise specifications regarding the surface of an outdoor playing field, or the floor of an indoor arena or gymnasium.

The surface of an outdoor playing field must be sufficiently flat. In addition, an excessively hard surface, such as asphalt or concrete, should be avoided for the flying zone in order to minimize risk of damage to the drone ball when it touches the ground.

In case the surface of the flying zone is covered with a soft additional material, the organiser will take care a drone ball cannot sink in the coverage more than about one centimetre in order to avoid take-off problem. The organiser will also check that the 'spring effect' of the coverage will be limited.

B.2.2. Flying zone - Protection cage

The flying zone shall be a rectangle marked by continuous lines.

The flying zone must be protected with a cage. During the sets of a match, nobody may be inside the protection cage.

The following size for the flying zone and height of the protection cage are recommended:

- Subclass F9A-A: 14 meters for the longer side (A) and 7 meters for the shorter one (B) - 5 meters height (H) for the cage.
- Subclass F9A-B: 6 meters for the longer side (A) and 3 meters for the shorter one (B) - 3 meters height (H) for the cage.

If a different size is considered for the flying zone, the longer side of the flying zone must be twice the shorter one.

The flying zone is divided in two sides marked by a continuous centre line which joins the midpoints of the two longer sides. The centre of the flying zone (middle of the centre line) will be also marked.

Two areas for start and take-off of the drone balls (one for each team) will be marked inside the flying zone by continuous lines. Those areas will be positioned in the middle part of the baselines (shorter sides of the flying zone).

The length of the start area will be defined by taking in consideration the diameter of the drone balls for the subclass concerned, and the number of active players defined.

The width of the start area will be about 1.5 m for the subclass F9A-A, and no more than 1 m for the subclass F9A-B.

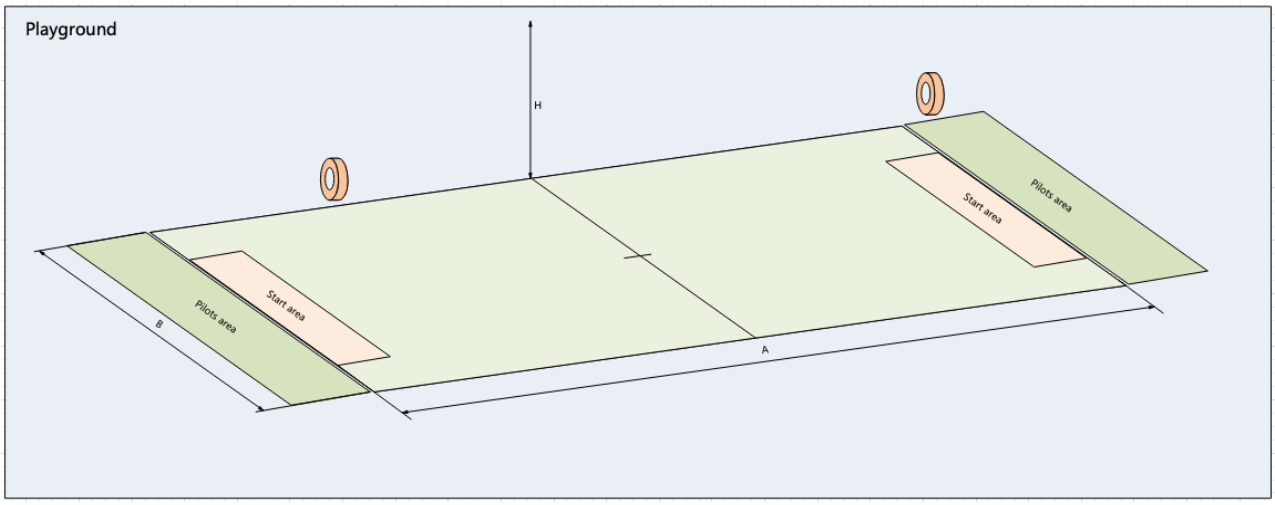
The location and size of the two start areas will be identical.

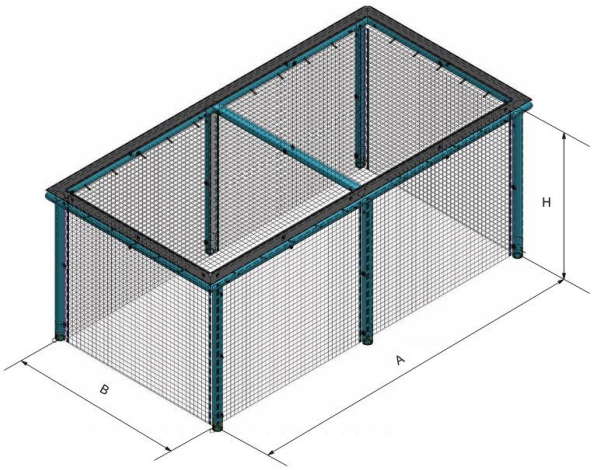
All marks on the ground shall be clearly visible using a colour distinguishable from the ground surface colour.

There shall be no obstacle(s) on the flying zone which may hinder the game.

Hard parts of the protection cage must be covered with a shock absorbing material to protect the drone balls.

When more than one playing field is used in a tournament, the size of the different playing fields and dimensions of the protection cage will be identical.





B.2.1. Pilot’s area

The pilot’s areas (one for each team) will be located outside the protection cage on its shorter sides as defined on the following image.

The location and size of the two pilot’s area in each side will be identical.

Each pilots' area will be marked.

During the sets of a match, only the players who are effectively flying (active players) may be in the pilot’s area.

B.3. GOAL RINGS

The flying zone will be equipped with two goal rings (one for each team).

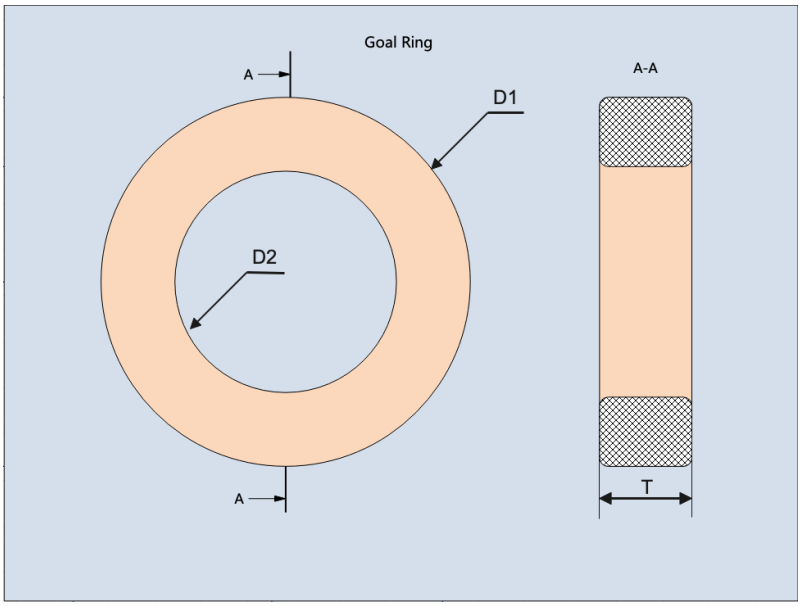
B.3.1. Shape and dimensions

The goal ring will be circular

The goal ring must be stable. The shape and dimensions of the goal rings must be identical for both teams competing.

The following dimensions are recommended:

- Subclass F9A-A: External diameter (D1) 100 cm - Internal diameter (D2) 60 cm - 20 cm maximum thickness (T)
- Subclass F9A-B: External diameter (D1) 70 cm - Internal diameter (D2) 40 cm - 10 cm maximum thickness (T)



For each subclass, when more than one playing field is used in a tournament, the goal rings of the different playing fields must be identical.

B.3.2. Position

The goal ring will be positioned at 1.5 m inside the baseline (shorter sides of the flying zone) for the subclass F9A-A, and 1 m for the subclass F9A-B.

The goal rings must face the centre of the flying zone and be parallel to each other. They will be fixed on the ceiling of the protection cage taking care to ensure a secure fixation to avoid oscillation of the goal ring and that they may fall down.

The location and positioning of the two goal rings will be the same in both sides of the playing field.

B.3.3. Material and structure

The material must be strong enough to minimize risk of damage or deformation that may affect the game, but sufficiently flexible to avoid damages on the drone balls.

One goal ring will be red and the other one blue in order to be compliant with the colours assigned to the teams. It is also possible to use lighting units on the goal rings to increase their visibility.

B.3.4. Goal detection sensor

For electronic scoring, a detection sensor may be installed on each goal ring provided this does not interfere with the scorer drone ball crossing the goal ring.

Note: *In case of electronic scoring being used, teams shall be informed about position of the goal detection sensors before the match begins.*

B.4. PLAYERS

B.4.1. Active players

Drone soccer is played with 3 to 5 active players in both subclasses. There will be the same number of active players for each team at the beginning of the match.

Note: *The number of active players must be defined by the organiser when announcement of the event is made.*

Every active player is flying a drone ball. One active player is designated as the Striker who is the only player who may score with his/her drone ball going through the opponents' goal ring. The other active players may act with their drone ball as a guide for the Striker and/or as a defender for their own goal.

Any active player may only control one drone ball. So, the number of drone balls in flight for each team cannot be higher than the authorised number of active players.

Substitution of an active player is only possible during a break between two sets and can only be considered from the players declared on the players' list for the concerned team.

For each match, one of the active players will be appointed team captain and as spokesperson to communicate with the match referee, and where applicable the scoring referees.

B.4.2. Player’s list

The total number of players authorized to be registered in a team will be the number of active players defined by the organiser plus 2 (two) additional players.

Note: *The other participants, such as coaches, helpers or supporters will not be considered as members of the team.*

The player’s list for each team must be submitted before the beginning of the event as required by the organiser, but in any case no later than 30 minutes before the first match.

The list may not be changed once the event begins.

Note: *Declaration of the Strikers and team captains will not be requested for submission of the player’s list, as they may change between sets and for each match.*

B.5. NUMBER OF DRONE BALLS

Each active player may have up to 2 (two) drone balls ready for a match. The spare drone ball cannot carry the battery pack when it is not used for flight.

The player may only change the drone ball or the battery pack during the break between two sets.

B.6. PRACTICE FLIGHTS

Practice sessions may be organized. The event director has the responsibility to define the conditions of the practice sessions which must be the same for all teams.

Flights 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 entire tem may arise (See B.11).

B.7. FORMAT OF THE EVENT

The organiser defines the format of the event. The format must be announced early as possible and no later than one month before the event.

There are two main formats that may be considered:

- Group stage followed by knockout and final stages.
- Successive rounds.

Note: *The event may be a single match, a competition or contest, a tournament, etc.*

B.7.1. Format with group stage followed by knockout and final stages

The event begins with a group stage followed by a knockout stage (round of 16, and/or quarter-finals, semi-finals), and then by the final stage with the play-off for the third place and the final.

In the group stage, every team plays a match against every other team in the group.

Note: *It is recommended to consider 3 to 5 teams for each group taking care of a similar number of teams for all groups wherever possible.*

The groups will be determined with a blind draw.

B.7.1.1 Group stage ranking

For each match, points will be awarded as follows:

- 3 points for a win.
- 1 point for each team in case of a tie between the two teams.
- 0 point for a defeat.

In each group, the two highest placed teams will be selected for the first knockout stage round.

The ranking of each team in their group will be determined by the following criteria:

a) Total number of points obtained in all matches of the group.

b) Goals difference in all matches of the group.

c) Greatest number of goals scored in all matches of the group.

If, on the basis of the above criteria, there is still a tie for the first or the second place in the group, a penalty shootout will be organized to break the tie between the concerned teams.

B.7.1.2 Knockout stage

The knockout stages are done with direct elimination of the teams who have lost their matches.

B.7.1.3 Scenarios for illustration

See below two examples of scenarios, one corresponding to a scenario for 24 teams and the other to a scenario for 16 teams.

a) Scenario for 24 teams

- Group stage: 8 groups (A to H) with 3 teams in each group. Each team plays 2 matches which means 3 matches for each group and so a total of 24 matches for the group stage.
- First knockout stage round (round of 16) - 8 matches (16 teams)
  - Winner A & Runner-up B = 1
  - Winner B & Runner-up A = 2
  - Winner C & Runner-up D = 3
  - Winner D & Runner-up C = 4
  - Winner E & Runner-up F = 5
  - Winner F & Runner-up E = 6
  - Winner G and Runner-up H = 7
  - Winner H and Runner-up G = 8
- Second knockout stage round (quarter-finals) - 4 matches (8 teams)
  - Winner 1 & Winner 3 = A

. Winner 2 & Winner 4 = B

. Winner 5 & Winner 7 = C

. Winner 6 & Winner 8 = D

- Third knockout stage round (semi-finals) - 2 matches (4 teams)

. Winner A & Winner C

. Winner B & Winner D

- Play-off for third place - 2 teams & 1 match: Semi-finals losers.
- Final - 2 teams & 1 match: Semi-finals winners.

40 matches in total: 24 for the group stage, 14 for knockout stage and 2 for the final stage.

b) Scenario for 16 teams

- Group stage: 4 groups (A to D) with 4 teams in each group. Each team plays 3 matches which means 6 matches for each group and so a total of 24 matches for the group stage.
- First knockout stage (quarter-finals) - 4 matches (8 teams)

. Winner A & Runner-up B = 1

. Winner B & Runner-up A = 2

. Winner C & Runner-up D = 3

. Winner D & Runner-up C = 4

- Second knockout stage (semi-finals) - 2 matches (4 teams)

. Winner 1 & Winner 3

. Winner 2 & Winner 4

- Play-off for third place - 2 teams & 1 match: Losers of the semi-finals.
- Final - 2 teams & 1 match: Winners of the semi-finals.

32 matches in total: 24 for the group stage, 6 for knockout stage and 2 for the final stage.

B.7.2. Format with successive rounds

This format may be run with direct elimination or with double elimination.

Note: *In this format, a lower total of matches is played compared to the other format, which means less time is necessary to run the event for a given total number of teams.*

A blind draw will be done for each round. Wherever possible, it is recommended to avoid a same pair of teams in two different rounds.

In a situation of an odd number of teams in a round, the last team which has been drawn will not play in the round. This team will play twice in the following round: in the first match, and then in the last match if the number of teams permits it and if the team is not eliminated after the first match.

For each match, the winning team is selected for the next round.

For the direct elimination option, each team losing its match in the first round is eliminated, and so on for the following rounds.

For the double elimination option, a team will be eliminated after losing two matches.

B.8. ORGANISATION OF A MATCH

A match is subdivided into three sets. Time allocated for each set is 3 (three) minutes.

Another than in exceptional circumstances, the break between two sets will be limited to about two to three minutes, which is normally sufficient to retrieve the drone balls, change the battery pack and place them again on the start areas.

Note: *It is recommended to provide an electronic timer or equivalent to display the remaining playing time. This will be useful for the teams, the officials and the audience.*

B.8.1. Position of the teams on the playing field

The match referee performs a coin toss in order to determine position of the teams on the playing field (left or right side).

The team that wins the coin toss chooses their side, which defines the pilots' area. The teams keep the same side for the entire match, and so will stay in the same pilot’s area for all three sets.

Nevertheless, if the match referee considers that an external factor, such as wind for an outdoor match, may significantly affect the result of the match, he/she may instruct the teams to swap sides. A team cannot complain or protest against such a decision of the match referee, and cannot request a side change between two sets not instructed by the match referee.

After the allocation of the pilots' areas is decided, the captain of each team may check the goal ring in which the team must score.

B.8.2. Start of a set

The start of each set will be done as follows:

- After the drone balls have been placed in their respective start areas, the match referee will request the two team captains if their team are ready to start.
- When the match referee considers that the teams are ready, he/she will announce clearly 'Arm your quads'.
- About 3 to 5 seconds after this announcement, a brief and intelligible sound signal will announce the start of the set.

The match referee must stop the match and request a new start when he/she considers that:

- the start procedure has not been done properly;
- a player starts (drone ball leaving the ground) before the start signal.

In case of an early start of a player, a penalty shot will be granted against the concerned team.

B.8.3. End of a set

The match referee is responsible to define the end of the set.

He/she will take to consider when necessary additional time taking into account that time consumed for a penalty shot must not be considered as a part of the period of time of the set (see B.9.1).

The end of the set will be announced with a brief and intelligible sound signal.

B.8.4. Scoring

A team scores a goal when the drone ball of the Striker crosses the goal ring of the opponent's team, provided that:

- the goal ring has been crossed in the direction of the opponents' baseline,
- and when entire drone ball has passed through the entire opponent goal ring.

The scoring referee concerned is responsible to decide if the goal may be scored. This also applied when an electronic scoring system is used.

Scoring by crossing the opponent's goal ring with the drone ball of an active player who is not the Striker will not be recognized as a goal. There will be no penalty for doing that.

When a team scores a goal, all active players of the concerned team must immediately return to their side of the flying zone, as marked by the centre line, before attempting to score again. The scoring referee concerned is responsible for ensuring this is done properly. In case of an infringement, a penalty shot will be granted against the concerned team (see B.9.1). In addition, a following goal which will be considered by the scoring referee as resulting from the violation of the rule will not be validated.

It is recommended that when a Striker scores a goal, the scoring referee concerned raises a flag until the scorer drone ball had returned to its side of the flying zone and becomes eligible again to score.

A drone ball on the ground being unable to fly and so to return to its side of the flying zone will be considered as being excluded from the remaining of the set.

Attempts to prevent the still active drone balls from returning to their side of the flying zone (and therefore delay the scoring of the next point) is permitted.

Note: *In case of a temporary loss of control on a drone ball, the concerned player must do its best to return on his/her half of the flying zone after recovering control. When the player considers that the drone ball becomes unable to fly, see B.8.5.*

The Striker may pass or remain in his/her own goal ring for defence purposes.

Another player of the team may pass through his/her own goal ring subject doing so it does not block the opponents' team from scoring. When a player, other than the Striker, passes or stays inside his/her own goal ring for defence purposes, a penalty shot is granted against the concerned team (see B.9.1).

B.8.5. Safety occurrence

When a drone ball becomes unable to fly (loss of control, damage,…) or cannot be flown in a safe condition, the active player concerned must activate the drone ball fail-safe, and notify the match referee as soon as the drone ball is on the ground. The player concerned must leave the pilots' area. The team concerned will play shorthanded for the remainder of the set.

Note: *An active player can be requested by the match referee to stop flying if it is considered the drone ball no longer meets acceptable safety standards. It could be for example the case when the drone ball is damaged after a collision or after a crash, or when the battery pack is dangling.*

When this concerns the Striker, the team captain may call a time out to the match referee. The match referee will stop the clock, and will request all players to immediately land their drone ball. After all drone balls have landed, the Striker must disarm his/her drone ball, and then leave the pilots' area.

A different active player of the team concerned will be appointed Striker and his/her drone will be placed in the start area of the team concerned. The team captain will declare the new Striker to the match referee.

The appointment of a new Striker may be done only once in a set for the team concerned.

B.8.6. Set and match result

For each set, the team that scores more goals in the set wins the set. If both teams score the same number of goals, or neither team scores a goal, the set will end with a tie between the two teams.

The team that wins two sets is the winner of the match.

If situation the match ends with a tie between the two teams, the main referee must define how to proceed to decide the winning team when this is necessary (for example, in situation of a direct elimination round): coin toss, overtime period, penalty shoot-out,… This must be clearly announced before the beginning of the event.

Overtime period: This will be run in the same way as a standard set except the first goal determines the winning team (sudden death/golden goal).

Penalty shootout: This will be played in the same way as the penalty shot (see B.9.1). A minimum number of penalty shots (for example 5) will be defined. Whenever possible, penalty shots must be taken by different players of the team. All teams will be informed of the penalty shootout procedure that will be applied before the beginning of the event.

If a team withdraws from a match (or for the rest of event), the match(es) concerned will be considered as being lost by the team. The same applies for a team that has been disqualified from the event.

If a match is definitively stopped before its end, the current result based on the number of sets won determines the winner of the match except when the match is stopped because a team receives a red card (see B.9.4). If both teams are equal and when it is necessary to decide between the two teams (for example for an event with direct elimination rounds), the match referee organizes a coin toss to determine the winner.

If the event cannot go on to the end, the last available provisional ranking will be considered for the final ranking.

B.8.7. Video recorder

In case a video recorder to monitor the match is in use, this “official” video recording cannot be used by the match referee to make decisions or to evaluate a decision during the match.

It may only be used by the concerned official(s) to manage a complaint or protest.

B.9. PENALTIES

All penalties (penalty shot, warning, yellow and red card) are granted by the match referee.

Penalties expire once the match is finished and do not carry over into subsequent matches.

B.9.1. Penalty shot

A penalty shot will be granted against a team in the following situations:

- Start of a drone ball before the start signal (see B.8.2).
- When the player(s) do not return properly to their side of the flying zone after their team has scored a goal (see B.8.4).
- When an active player other than the Striker crosses or remains steady inside his/her team goal ring for defence purposes (see B.8.4).

The penalty shot is taken by the Striker (scorer drone ball) against one defender of the opposite team. A 10 second period is given for the penalty shot attempt after the signal of the match referee.

The time consumed for the penalty shot will not be considered as a part of the period of time of the set.

Penalty shots may be staged at the end of the set with remaining battery. This must be announced by the event director before the beginning of the event.

B.9.2. Warning

A warning may be given to a team in the following situations:

- Non authorised person (reserve player, coach,...) in the pilots' area during a set.
- Minor uncivilized conduct of a player or a coach towards a referee, an opponent player or coach, or a spectator.
- Delay of the start of the match or of a set caused by a team without acceptance of the match referee.
- Simple movement of a drone ball before the start signal which will not be considered as an early start.
- Unintentional contact during a set of a flying drone ball on a done ball which is on ground.
- Unintentional contact during a set of a drone ball on a person.

B.9.3. Yellow card

When two warnings are given for the same reason during a match to a team, a yellow card is given to the team.

In addition, a yellow card may be directly given to a team in the following situations:

- Change of an active player during a set.
- Major uncivilized conduct of a player or a coach towards a referee, an opponent player or coach, or a spectator.
- Intentional manipulation of a drone ball during a set.
- Intentional contact during a set of a flying drone ball on a done ball which is on ground.
- Intentional contact during a set of a drone ball on a person.

The active player responsible receiving the yellow card will be ejected from the rest of the set, and the team concerned will continue with the remaining active players.

When the yellow card does not concern a particular active player, the team captain decides the active player to be ejected from the rest of the set.

B.9.4. Red card

When two yellow cards are given during a match to a team, a red card is given to the team.

In addition, a red card may be directly given to a team in the following situations:

- Active player not registered on the list of the players.
- Severe uncivilized conduct of a player or a coach towards a referee, an opponent player or coach, or a spectator.
- Dangerous or hazardous behaviour or action by an active player during a set.

The active player receiving the red card will be ejected from the rest of the match, and the team concerned will play with one less drone during the rest of the match.

When the red card does not concern a particular active player, the team captain decides the active player to be ejected from the rest of the match.

B.10. INTERRUPTION OF THE EVENT

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

- For an outdoor event, due to atmospheric conditions (rain, stormy condition, …) in which it would be dangerous to continue to fly, or if wind is continuously stronger than 9 m/s measured at 2 m above the ground near in the centre of the playing zone for at least one (1) minute.
- Any incident affecting safety or requiring access for emergency services.

The decision is taken by the main referee in conjunction with the event director.

The match referee has the right to interrupt a set for an external disturbance or any other justified reason. When an interruption occurs during a set, the set must be completely rerun when possible except if the match referee considers a team as directly responsible of the interruption (for example forfeit). In that situation, the team which is the cause of the interruption loses the set which means the other team wins it.

The decision to stop definitively a match must be taken by the main referee.

B.11. DISQUALIFICATION FROM THE EVENT

A disqualification from the event is decided by the event director with the consent of the Jury.

A disqualification from the event affects the concerned team for the entire event. A disqualified team 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 a drone ball or equipment that does not conform to the rules.
- Deliberate very dangerous behaviour by an active player on another person.
- Unsporting behaviour by a member of the team.

B.12. OFFICIALS

B.12.1. Event director

The event director has a complete oversight of the event.

He/she has the responsibility of the safety concerns and will support the main referee to ensure compliance of the event with rules.

He/she is also in charge of:

- Organizing the running of the event (draws, detailed schedule, order of the matches, etc.) according to the event format which has been retained.
- Nominating for each match the match referee and the scoring referees.
- Validating the result of each match and the provisional and final rankings.

The following responsibilities and duties of the event director are also defined in the present rules:

- Definition of the eventual restrictions for use of RC systems equipment outside the playing field (see B.1.4).
- Possibility of practice flights (see B.6).
- Disqualification from the event of a team (see B.11)

B.12.2. Referees

A main referee will be appointed for the event in order to manage sportive conduct of the event in conjunction with the event director.

In addition, match referees may be appointed. When match referees are not appointed, the main referee act as match referee.

In any case, scoring referees will be appointed.

B.12.2.1 Main referee

The main referee has the final authority regarding application of the drone soccer rules for the event.

Responsibilities and duties of the main referee as defined in the present rules are:

- Before the beginning of the event, mention how it will be proceeded to decide the winning team (when this is necessary) in case a match ends with a tie between the two teams (see B.8.6).
- Compliance of the drone balls with specification rules (see B.1).

  Note: *Model processing may be organized before the event, where important characteristics of each model may be checked and the drone ball marked to signify compliance. During the event, in case of doubt, the main referee may request the organiser to check the characteristics of a specific drone ball. He/she may also consider a random spot-check following any match to check the most important characteristics of the drone ball.*
- Interruption of the event or delay of the start if necessary (see B.10).

B.12.2.2 Match referee

The match referee has the overall responsibility to lead the match seamlessly, smoothly, and fairly in cooperation with the scoring referees.

He/she must also pay appropriate attention to the safety concerns during the match and take care that only authorized persons are present on the playing field.

He/she will be positioned in order to have an overview of the entire playing field and to be seen by the active players. He/she will be equipped with a microphone or equivalent in order to be heard clearly by every active player on both sides of the playing field.

Responsibilities and duties of the match referee as defined in the present rules are:

- Choice of the position of the two teams on the playing field (see B.8.1).
- Check before each set that the active players for both teams are on the players' list (see B.4.2).
- Start (see B.8.2B.8.3) and end (see B.8.3) of each set.
- Break time between two sets (see B.8).
- Validation of goals and scores in cooperation with the scoring referees (see B.8.4).
- Request an active flyer to stop flying if it is considered the drone ball no longer meets acceptable safety standards (see B.8.5).
- Set and match result in cooperation with the scoring referees (see B.8.6).
- Granting of penalties (see B.9).
- Interruption of a set for an external disturbance or any other justified reason (see B.10).
- At the end of the match, record the score of each set in cooperation with the scoring referees, the final result of the match, the penalties which have been granted during the match and any incident which to notice.

The match referee may change his/her decision if he/she considers he/she has made an error of judgment or after considering the advice of a scoring referee. In any case, the position of the match referee prevails.

B.12.2.3 Scoring referee

Two scoring referees should be appointed prior to each match with one on each side of the playing field match.

Both will be positioned outside the flying zone. The scoring referees will follow the game on their side of the playing field to follow the scoring of the Striker concerned.

The match referee may specify before the match to the scoring referees what he/she expects first and foremost from them.

B.12.3. Jury

In any International event included in the FAI Contest Calendar, a FAI Jury must be nominated according to Volume CIAM General Rules C.7.1 and C.7.3.

In the other events, a Jury may be nominated to make all decisions dictated by any circumstances which may arise and to rule on disputes.

C. F9U (PROVISIONAL CLASS) - DRONE RACING RULES

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.

C.1. 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.*

C.1.1. 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.

C.1.2. Motorization

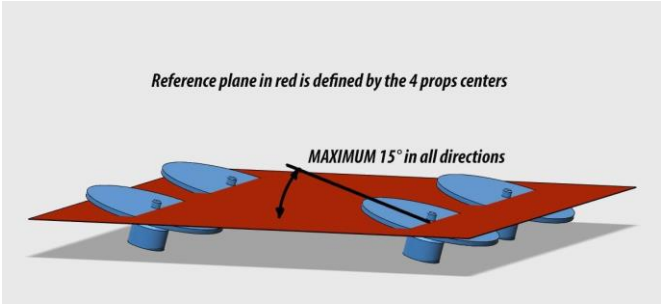
Only electric motors are allowed.

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.



C.1.3. Propellers

Maximum diameter: 6 inches (15.2 cm).

Full metal propellers are forbidden.

C.1.4. Radio control (RC) equipment

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

Frequencies and emission power must comply with the relevant regulations in the organiser country.

The organiser may define a list of authorized RC equipment, for example 868 MHz / 915 MHz modules.

The output power of 868 MHz / 915 MHz RC modules must be set to the lower of 100 mW, or the limit as defined by relevant regulations in the organiser country.

The organiser may also define a list of authorised equipment in order to minimize risk of radio control problems. This information must be available at least one month before the event.

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 C.9.2).

C.1.5. Video system

Analogic and digital video devices operated on 5.8 GHz band may be used for piloting. The video receiver system provided by the organiser must be compliant with analogic and digital video transmitters.

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 organiser may request use of a certain type of VTX antennas with the appropriate polarization.*

Recording of all races by the organiser is strongly recommended 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 C.9.2).

C.1.6. LED light unit (Optional)

In order to improve the view of the models during the races for the audience, and/or to facilitate the task of the judges, the organizer may request the competitors to equip their models with a LED light unit including possibility to choose the colour so that each model in flight will have a different colour.

In that situation, the specifications for the LED light unit will be as follows:

- 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.*

C.1.7. Identification mark

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

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

C.2. RACING CIRCUIT

The racing circuit may be outdoor or indoor.

A racing circuit (or track) is a volume that defines a 3D flight path. It is formed by a start line, obstacles to be crossed or avoided and a finish line.

The racing circuit can be a closed loop where several laps must be completed or an open loop to be flown once. In both cases, the track can be divided into sectors to facilitate timekeeping.

The minimum length of a racing circuit from the start line to the end line, including all laps, is 250 m. The length of a track is measured along the centreline of the optimum 3D flight path.

The organiser may keep the circuit secret or make it public before the event. In both cases, the organiser must make every effort to prevent giving an unfair advantage to some competitors.

If the circuit is made public, it must be published at least one month before the event. Only minor changes are allowed following publication and those changes must be justified. The organiser must inform the competitors immediately after any changes are approved.

If the circuit is kept secret, the main characteristics (approximate length, number of laps, focused on speed/technical/both, types of obstacles, etc.) must be published at least one month before the event to allow time for the competitors to adapt their equipment as much as possible for the event.

See Annex C.1 for the racing circuit specifications and recommendations.

C.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, all concerned competitors will be disqualified from the event by the event director with the consent of the Jury.

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.

C.4. MODEL REGISTRATION AND PROCESSING

Each competitor can register up to three models. The organiser will mark each registered model with an easily visible, difficult to falsify identification such as a sticker or paint mark.

During registration, the specifications of the model may be checked by the organiser including:

- Identification mark.
- Weight and size.
- Batteries (voltage).
- Fail-safe and associated device to cut off the motors.
- Radio control equipment.
- VTX, camera and headset goggle.
- LED light unit if such a device is required by the organiser.

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 event.

During the event, on request of the race director, or event director, or Jury, 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 by the event director with the consent of the Jury.

C.5. PRACTICE FLIGHTS

At least one practice session or warm up will be organized to ensure track, models and competitors are ready. It must be held on the race circuit.

The organizer will define the conditions and number of practice sessions. This information must be available at least one month before the event. As suggested options, warm up can be one or more free practice sessions organized by random groups with an allocated time/laps, or a practice race just before the first race. All competitors will be allocated same time/laps to ensure for all of them the same flight opportunities on the track.

It is mandatory for every competitor to participate on at least one practice session or warm up. If the model is not able to start or crashes immediately after the start, it will be considered a race incident. No reflight will be possible on that practice session. If a competitor has not been able to fly on at least one practice session, the competitor concerned may be not authorized to compete in the event; this is decided by the event director with the consent of the Jury.

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 concerned competitor may arise (See C.9.2).

C.6. EVENT ORGANISATION

An event is normally organized on the basis of three stages:

- Qualification stage (rounds for qualification for the elimination stage).
- Elimination stage (to qualify for the final stage by successive elimination rounds).
- Final stage.

Note: *The event may be organized with only one stage based a fixed number of rounds for all competitors, especially when the total number of competitors is below 16. For each race, each competitor will be awarded a number of points corresponding to his/her place. The final placing is then done taking into account the sum of the points awarded to every competitor in all rounds.*

Each round for the qualification stage and the elimination stage is organized by groups (subdivision of the round corresponding to the number of competitors flying at the same time in the same race).

The event will be run with a maximum of 4 (four) competitors per race in order to minimize risk of video problems especially for elimination and final stages.

Nevertheless, when the number of competitors justifies it, the qualifying rounds may be run with 6 (six) competitors per group subject it is legally and technically possible.

Races with 3 (three) consecutive laps to complete and 3 (three) minutes flight time allowed for that must be considered as the standard way to proceed for the entire event. This applies for all stages (qualifying, elimination and final) including the additional rounds optional sequence.

Note: *For a specific event for which a different number of laps is duly justified, the rules concerned will be adapted consequently as local rules.*

C.6.1. Timekeeping

Drone racing consisting to complete three laps in as short a time as possible, an accurate timekeeping of all laps completed is important for the quality of the event.

In addition, laps which are not finished will no more be considered and contribute to a result, placing or tie-breakers.

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

Note: *In case timekeeping will be done without electronic timing system (manual timekeeping only), the organiser must inform the competitors at least one month before the event.*

For the qualifying stage, timekeeping for each model is 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 stage, final stage and additional rounds optional sequence (See C.6.6), timekeeping is triggered at the start of the race when the start signal is sounded.

C.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.

C.6.3. Qualification stage

The number of qualifying rounds is defined by the organiser according to the available time with, whenever possible, a minimum of 3 (three) qualifying rounds.

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.

Composition and flight order of the groups for the races will be determined with a blind draw.

Note: *A different draw for each qualifying round is recommended in order to avoid the same competitors fly in the same group for all qualifying rounds. In any case, the same draw cannot be applied to more than three qualifying rounds.*

Races with fewer than the required number of competitors (4 or 6), for example in case of withdrawal of a competitor, will be put at the end of the draw of the round, in order to allow a complete competitors race with competitor(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 race director (under supervision of a Jury member) in order to achieve as much as possible a minimum of 3 competitors per group.

Two options may be considered for the qualification stage. The organiser defines which one will be used and must announce it at least one month before the event.

a) Option 1 - Fastest time to complete 3 consecutive laps

Note: *It is not recommended to use this qualification method when 3 qualifying rounds or less are scheduled.*

The result of each competitor in each qualification round is the registered time to complete the 3 consecutive laps. For a competitor not completing 3 laps, the number of laps completed and the corresponding registered time will be considered for the result.

A ranking will be established at the end of the qualifying stage taking into account the best result obtained by each competitor on their qualifying flights. The competitors with a time on 3 laps will be ranked ahead those with a time on 2 laps, which in turn are ranked ahead those with only 1 lap. Those who have been able to get any registered time will be ranked at the end.

In situation of a tie for the last place(s) for selection to the elimination round, the 2nd best result will be considered to split the tie, and then if necessary the 3rd result. In case the results of the qualifying flights are not sufficient, a tie-break flight will be organized between the competitors still concerned by the tie.

When the number of competitors required for the elimination stage is not reached, an additional qualifying flight will be organized for the competitors who have not been able to get a time at that stage. This will be repeated until the appropriate number of competitors for the elimination stage is reached.

b) Option 2 - Average of the 3 best times to perform a lap

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 to perform a valid lap are ranked after those with times taking into account the average of their 2 times, which in turn are ranked ahead those with only 1 registered time to perform a valid lap. Those who have been able to get any registered time are ranked at the end.

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

In situation of a tie for the last place(s) for selection to the elimination stage, the 4th best time recorded to perform one valid circuit lap result will be considered to split the tie, and then if necessary the 5rh one, and so on. In case the times are not sufficient, a tie-break flight will be organized between the competitors still concerned by the tie.

In both options, when the number of competitors required for the elimination stage is finally not reached, an additional qualifying flight will be organized for the competitors who have not been able to get a time at that stage. This will be repeated until the appropriate number of competitors for the elimination stage is reached.

The competitors who need an additional qualifying flight to achieve a time to be selected for the elimination stage will be placed after those who are already selected, and then those who need a second additional flight, and so on.

C.6.4. Elimination stage

The elimination stage will be organized according to one of the three following scenarios:

- Scenario A - 64 competitors selected from qualification stage.
- Scenario B - 32 competitors selected from qualification stage.
- Scenario C - 16 competitors selected from qualification stage.

The choice of scenario will be done by the organiser before the beginning of the event considering the total number of competitors in order to give possibility to a maximum of competitors to fly the elimination stage.

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 optional sequence

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

This sequence is optional. The organiser must inform the competitors at least one month before the event if double elimination sequence will be applied or not.

This optional 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.

For each scenario, the composition of races for the first elimination round and detailed organisation of the rounds up to the final are defined in:

- Annex C.2 for scenario A (64 competitors selected from qualification stage).
- Annex C.3 for scenario B (32 competitors selected from qualification stage).
- Annex C.4 for scenario C (16 competitors selected from qualification stage).

Note: *When the number of competitors is lower than the number of competitors required for the considered scenario, some races of the 1st elimination round will be flown with 3 competitors instead 4. As an illustration, if for the scenario B there are only 28 competitors (instead the 32 normally required), then races 1, 4, 5 and 8 will be flown with 3 competitors considering there are no competitors placed 29 to 32 after the qualifying stage.*

C.6.5. Final stage

The organizer must clearly inform the competitors before the competition begins which option for the final stage will be applied. If it is not done, the final must be run with only one final race.

The number of laps to complete in each final race will be the same as for the elimination stage.

C.6.5.1 Double elimination sequence not applied for the elimination stage

The two best placed competitors in each of the two semi-final races are selected for the final race to determine their final ranking from 1st to 4th place.

A small final may be organised for the other two competitors from the semi-final races to determine their final ranking from 5th to 8th place.

C.6.5.2 Double elimination sequence applied for the elimination 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 race to determine their final ranking from 1st to 4th place.

C.6.5.3 Successive final races (Optional)

Instead a single final race, the final may 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 2nd to 4th 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 2nd, 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.

Note: This option of successive final races cannot be applied to the small final which may be organised when the double elimination sequence is not applied for the elimination stage (See C.6.5.1).

C.6.6. Additional rounds optional sequence

This sequence is optional. This option allows the competitors who are not selected to fly in the first elimination round after the qualification stage to be entitled to participate to additional rounds to determine their final placing.

The organiser must inform the competitors at least one month before the event if additional rounds sequence will be applied or not, and when applied how it will be organized.

The additional rounds sequence may be organized:

- with successive eliminating rounds as proceeded for the elimination stage (See C.6.4);
- or with a fixed number of rounds for all concerned competitors.

Additional rounds sequence based on a fixed number of rounds for all concerned competitors

The number of additional rounds is defined by the organiser considering the available time.

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

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 result of each competitor in each additional round is the registered time to complete the 3 consecutive laps. For a competitor not completing 3 laps, the number of laps completed and the corresponding registered time will be considered for the result.

The ranking at the end of the additional rounds will be established taking into account the best result obtained by each competitor on their additional rounds. The competitors with a time on 3 laps are ranked ahead those with a time on 2 laps which in turn are ranked ahead those with only 1 lap. Those who have been able to get any registered time are ranked at the end.

In case of ties, the placing in the ranking established at the end of the qualifying stage will be considered to split the tie for the concerned competitors.

C.6.7. Final classification

Final classification tables are provided in Annex C.2 for scenario A, Annex C.3 for scenario B and Annex C.4 for scenario C.

Those tables cover the different possible situation with double elimination and/or additional rounds sequences applied or not.

C.7. FLIGHT OCCURRENCES

C.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 as soon as possible of the incident and how to proceed.

Note: *The organiser must define the person (race director, starter,...) in charge to decide how to proceed and to clearly inform the pilots.*

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.

C.7.2. Faults and penalties

In the case a pilot does not fly on the expected way (does no cross an 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.

C.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 google.

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

C.7.4. Safety issue

A pilot can be requested to stop its flight 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 race director 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.

C.8. 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, where appropriate, 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.

C.9. DISQUALIFICATION

C.9.1. Disqualification from the race

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

- Start before the start signal (See C.6.2).
- Collision with another model when executing a manoeuvre to correct a mistake (See C.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 race director or, where applicable, by the 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 by the event director with the consent of the Jury.

C.9.2. Disqualification from the event

A disqualification from the event is decided by the event director with the consent of the 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.

C.10. OFFICIALS

C.10.1. Jury

In any International event included in the FAI Contest Calendar, a FAI Jury must be nominated according to Volume CIAM General Rules C.7.1 and C.7.3.

In the other events, a Jury may be nominated to make all decisions dictated by any circumstances which may arise and to rule on disputes.

C.10.2. Officials required to run the event

- Event director in charge of preparation, organisation and oversight of the event. The event director has responsibility to ensure compliance with the applicable rules and safety during the whole event.
- Race director in charge of preparation, organisation and oversight of the races. The race director has responsibility to ensure compliance with the applicable rules and safety during the whole race.
- Starter. The starter may be assisted by another official in charge to call pilots for racing, do pre-flight checking, etc.
- Official responsible for score sheets gathering and/or for results accounting.

Note: *If timekeeping is done manually (not recommended), one timekeeper minimum per pilot is necessary.*

According to the event standing and the number of competitors, some official tasks may be assumed by the same person.

C.10.3. Judges

Considering recording of the races is strongly recommended (See C.1.5), judges assigned to check the performance of the pilots are not an obligation. Where judges are assigned to pilots, the organiser may arrange for dedicated judges or select competitors to fulfil the role; potential conflict of interest situation will be avoided by ensuring that judges will not judge a competitor from their own country.

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*

Judges assigned will have a video device (video screen, headset or goggles) allowing them to follow the flight of their assigned pilot, sharing the same picture as the pilot.

The 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.

Other judges may be assigned by the organizer to perform tasks such as supervision of the pilot judges, monitoring that models stay in visual line of sight or don't cross the safety line, information of the competitors, etc.

C.11. INTERRUPTION OF THE EVENT

The event should be interrupted or the start delayed by the race director or event director 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.

C.12. COMPETITORS INFORMATION

The organiser must display on the site:

- Jury composition.
- Start list for every round.
- Results after every round.
- Rankings.

Note: *A posting on Internet is also advised if conditions permit it, in order to make it possible for those who are not at the site to follow the progress of the event.*

- ANNEX C.1 -

RACING CIRCUIT

1. Racing circuit design

The track should be designed to maximize competition and to demonstrate piloting skills. The organiser is encouraged to demonstrate creativity and to take advantage of the specifics of the site. It is recommended to facilitate live spectator viewing by making the track understandable from an outside point of view.

All racing circuits must be designed on the “safety first” principle. The flight path must prevent accidental diversions from the racing area. In this context, if a pilot flies out of the optimal path, any trajectory to get back to the track must be made in the direction of a safe area without any persons (public, pilots, helpers, judges).

2. Safety

The area where the flight zone is allocated shall be demarcated by a “safety line”. The safety line shall surround the start line, end line, obstacles, 3D flight path, trajectories to get back to the track and areas which a model can reach in case of crash or losing of control.

The safety line must be an unmistakable physical element or marker that must not be crossed by any person without the authorization of an official. The organiser must prepare basic procedures in case of fire or first aid inside the safety line. The plans must be informed to any person before being authorized to cross the safety line

During races or if any model is flying, the presence of any person without the adequate safety equipment (nets, cages, protection suit) in the flight area is strictly forbidden.

The organiser must take care that the competition, live viewing and media coverage of the event can be done while guaranteeing the safety of the concerned persons. Areas for pilots, officials and spectators must be secured (nets, fences, transparent walls, recommended minimum separation,…) to avoid uncontrolled models reaching them.

3. Start

To avoid collisions during the start, the models shall be placed on the start line using one of two schemes:

1) Side by side in a single line perpendicular to the optimum starting trajectory, with a minimum separation of 0.5 m and a maximum separation of 1 m between models.
2) An inverted 'V' or '_/' pattern with one or more models in the front. The minimum separation between models shall be 0.5 m on the side and 0.5 m on the front/back. The maximum separation shall be 1 m on the side and 1.5 m on the back.

If the track is a closed circuit, the start line can be outside of the circuit track.

The model positioning during the start should benefit the pilot with the best performance during the previous stage. If two or more pilots have the same previous performance, the positioning will be decided by a draw.

4. Obstacles

The number of obstacles must be adapted to the environment characteristics; in particular, the available space. The number of obstacles shall maximize competition and demonstrate pilot skills.

Obstacles can be located at any height and position. The flight path between obstacles must allow a smooth flight.

Obstacles must contrast with the background and be perfectly visible with a standard FPV video device at a distance of 30 m. The flight path, once in the area defined by the obstacle, must be clearly marked and obvious to follow.

There are two types of obstacles:

1) Obstacles to be crossed

   This type of obstacle (single air gate, combination of air gates, tunnel, etc.) can be crossed in any 3D direction. The internal space can be 2D or 3D of any length and shape. The internal space along with any area used by the optimal flight path must be free of any rigging (wire, rope, etc.).

   The obstacle inside shall be free space within a minimum diameter of 1.5 m centred in the optimal flight path.

2) Obstacles to be avoided

This type of obstacle (wall, flag, pylon, flyer, etc.) defines virtual or physical areas that are not intended to cross. They can be a single obstacle to avoid shortcuts or a combination of them that create structures such as horizontal or vertical slaloms.

The design must allow a free space to avoid the obstacle. The free space shall be of a minimum 2.5 m diameter centred in the optimal 3D flight path.

Note: *Small gates/obstacles are not recommended considering this increases the risk of collisions between drone balls passing the gate/obstacle at the same moment.*

Reasonable efforts should be made by organisers to create or to cover obstacles by shock absorbing materials to protect models in case of a crash.

5. Finish line

The finish line indicates the end of the race. If the track is a closed circuit, the finish line is not necessarily on the circuit track.

The finish line shall be defined by a 2D area to be crossed. The pilot finishes the race when his/her model touches the area and crosses it completely.

There shall be a pick-up area after the finish line to land or to recover safely the models. The area shall be designed not to interfere after crossing the finish line with the flight of the other pilots.

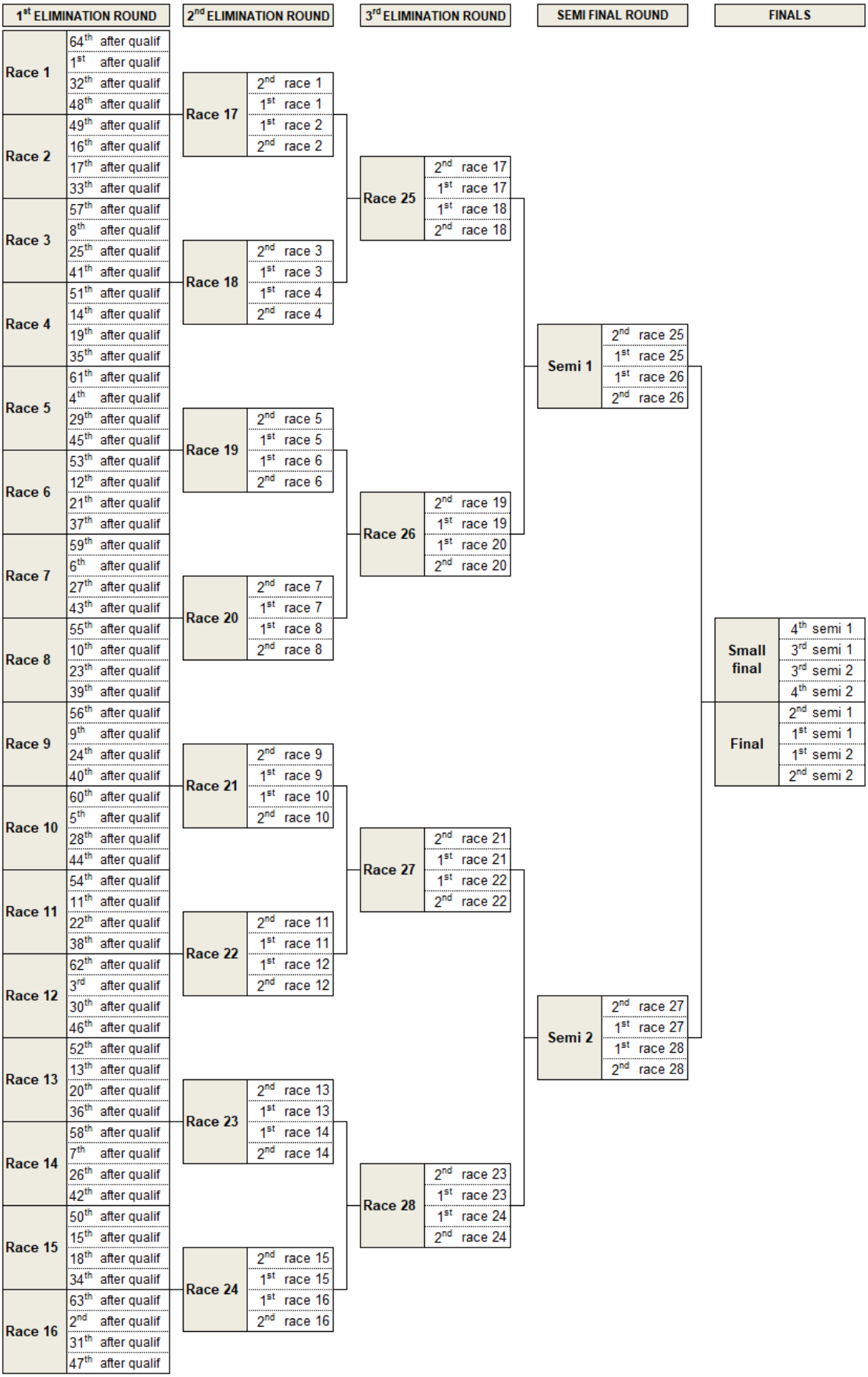
- ANNEX C.2 -

SCENARIO A - 64 competitors selected from qualification stage

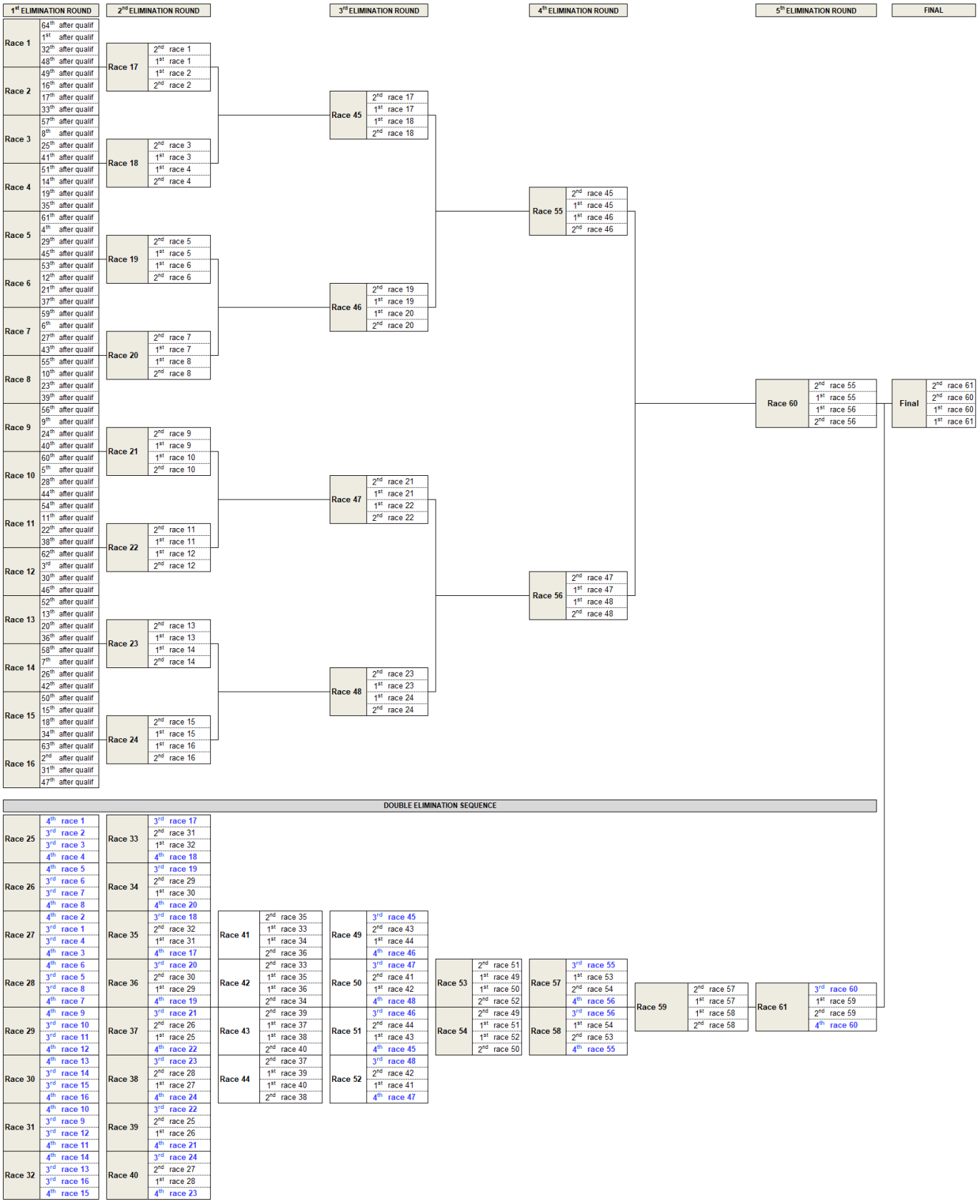
1- Composition of the races for the 1st elimination round

Race 1	Placed 1	Placed 32	Placed 48	Placed 64
Race 2	Placed 16	Placed 17	Placed 33	Placed 49
Race 3	Placed 8	Placed 25	Placed 41	Placed 57
Race 4	Placed 14	Placed 19	Placed 35	Placed 51
Race 5	Placed 4	Placed 29	Placed 45	Placed 61
Race 6	Placed 12	Placed 21	Placed 37	Placed 53
Race 7	Placed 6	Placed 27	Placed 43	Placed 59
Race 8	Placed 10	Placed 23	Placed 39	Placed 55
Race 9	Placed 9	Placed 24	Placed 40	Placed 56
Race 10	Placed 5	Placed 28	Placed 44	Placed 60
Race 11	Placed 11	Placed 22	Placed 38	Placed 54
Race 12	Placed 3	Placed 30	Placed 46	Placed 62
Race 13	Placed 13	Placed 20	Placed 36	Placed 52
Race 14	Placed 7	Placed 26	Placed 42	Placed 58
Race 15	Placed 15	Placed 18	Placed 34	Placed 50
Race 16	Placed 2	Placed 31	Placed 47	Placed 63

2- Organisation of the rounds (without applying double elimination optional sequence)



3- Organisation of the rounds with the double elimination sequence



4- Final classification

Place	Without double elimination
1	1st in final
2	2nd in final
3	3rd in final
4	4th in final
5	1st in small final
6	2nd in small final
7	3rd in small final
8	4th in small final
9 to 16	3rd and 4th in races 25 to 28 with final placing according to provisional ranking after qualifying stage
17 to 32	3rd and 4th in races 17 to 24 with final placing according to provisional ranking after qualifying stage
33 to 64	3rd and 4th in races 1 to 16 with final placing according to provisional ranking after qualifying stage

Place	With double elimination
1	1st in final
2	2nd in final
3	3rd in final
4	4th in final
5	3rd in race 61
6	4th in race 61
7	3rd in race 59
8	4th in race 59
9 to 12	3rd and 4th in races 57 and 58 with final placing according to provisional ranking after qualifying stage
13 to 16	3rd and 4th in races 53 and 54 with final placing according to provisional ranking after qualifying stage
17 to 24	3rd and 4th in races 49 to 52 with final placing according to provisional ranking after qualifying stage
25 to 32	3rd and 4th in races 41 to 44 with final placing according to provisional ranking after qualifying stage
33 to 48	3rd and 4th in races 33 to 40 with final placing according to provisional ranking after qualifying stage
49 to 64	3rd and 4th in races 25 to 32 with final placing according to provisional ranking after qualifying stage

	With additional rounds sequence
65 and beyond	**Sequence with successive eliminating rounds as proceeded for the elimination stage:** Placing done as defined for places 1 to 64.
	Sequence based on a fixed number of additional rounds for all competitors: Placing according to sum of points in all additional rounds. In case of tie, provisional ranking after qualifying stage considered to split the tie for the concerned competitors.
	Additional rounds sequence not applied Placing according to provisional ranking after qualifying stage.

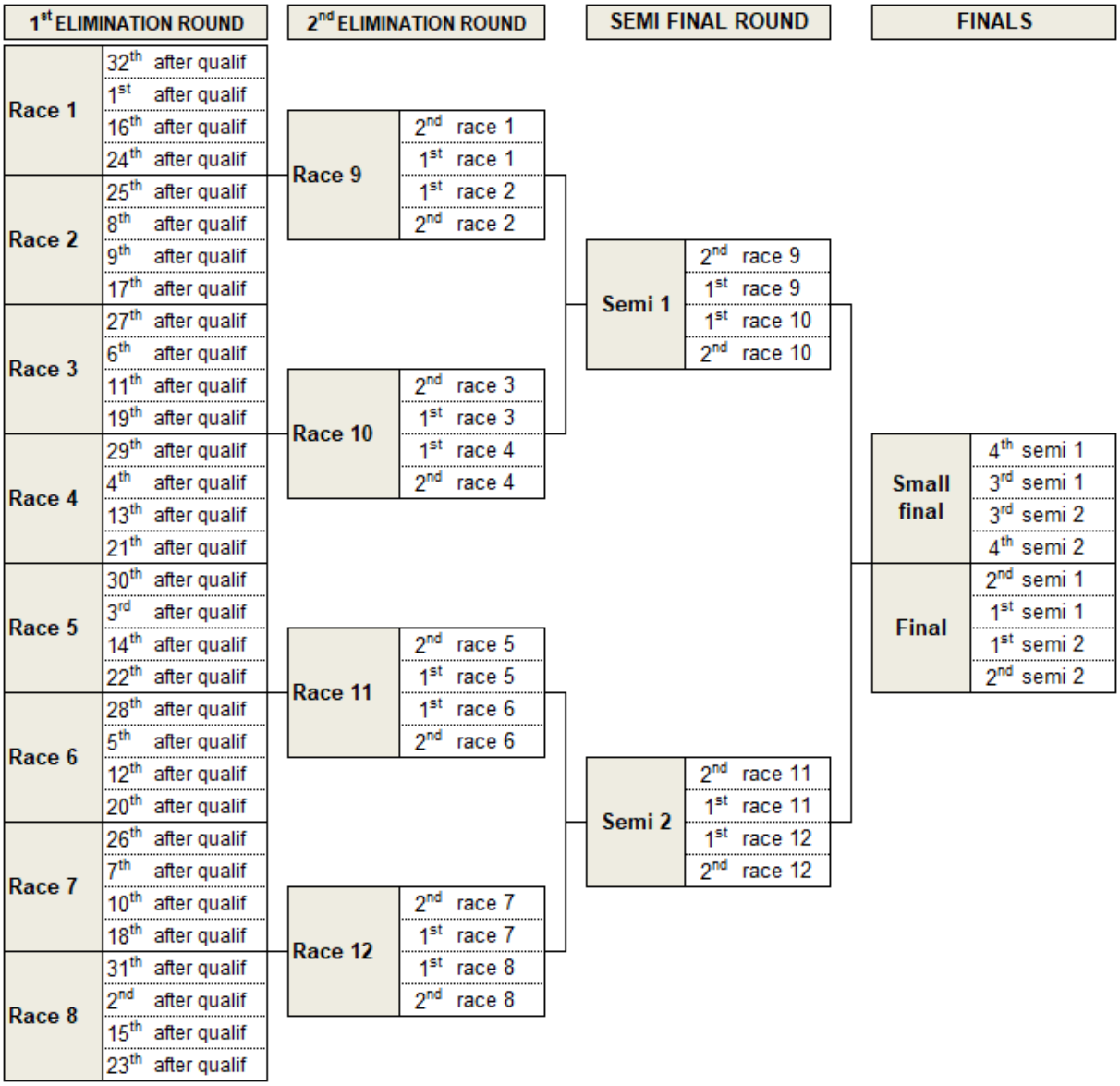
- ANNEX C.3 -

SCENARIO B - 32 competitors selected from qualification stage

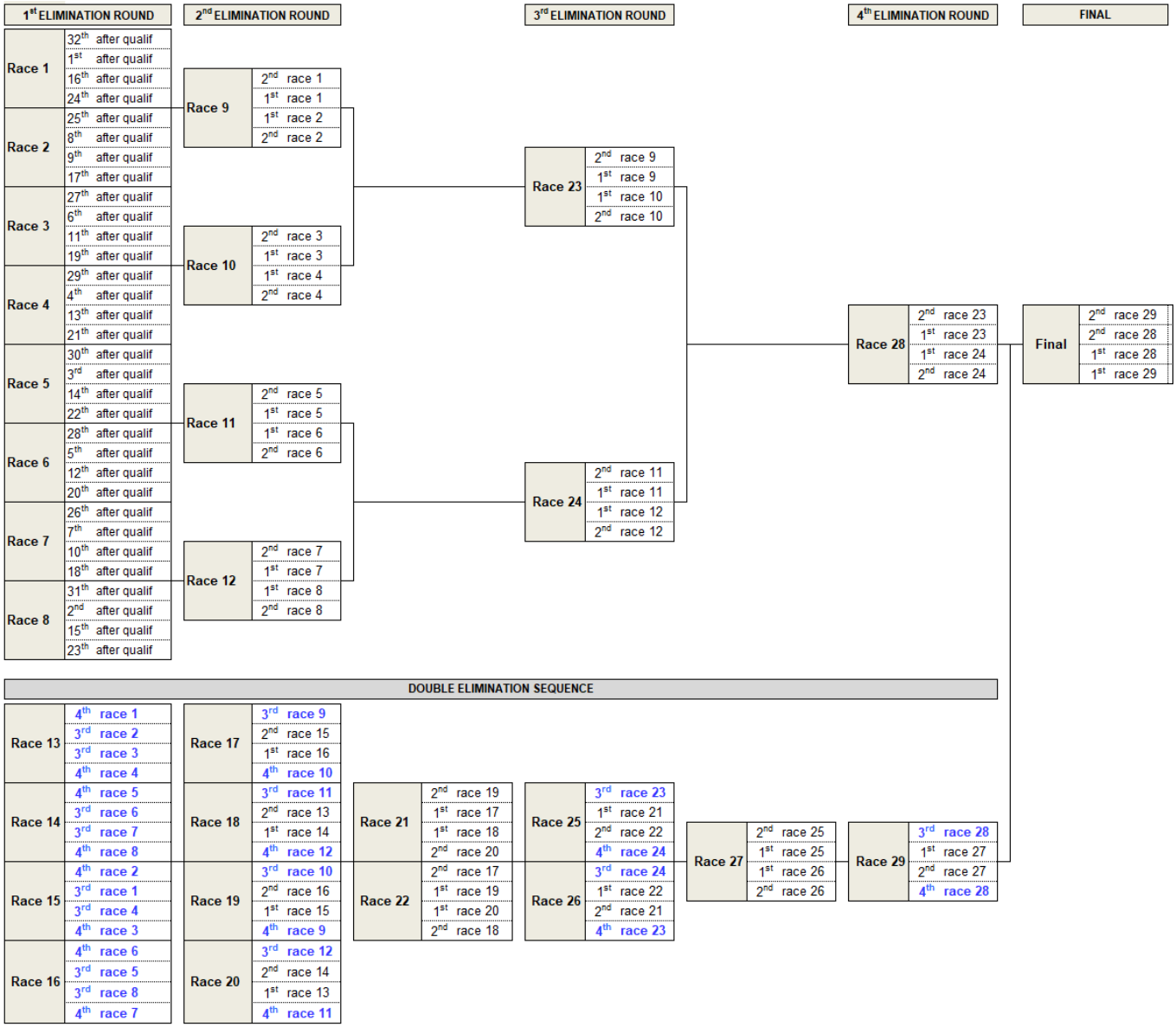
1- Composition of the races for the 1st elimination round

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

2- Organisation of the event (without double elimination)



3- Organisation of the event with the double elimination



4- Final classification

Place	Without double elimination
1	1st in final
2	2nd in final
3	3rd in final
4	4th in final
5	1st in small final
6	2nd in small final
7	3rd in small final
8	4th in small final
9 to 16	3rd and 4th in races 9 to 12 with final placing according to provisional ranking after qualifying stage
17 to 32	3rd and 4th in races 1 to 8 with final placing according to provisional ranking after qualifying stage

Place	With double elimination
1	1st in final
2	2nd in final
3	3rd in final
4	4th in final
5	3rd in race 29
6	4th in race 29
7	3rd in race 27
8	4th in race 27
9 to 12	3rd and 4th in races 25 and 26 with final placing according to provisional ranking after qualifying stage
13 to 16	3rd and 4th in races 21 and 22 with final placing according to provisional ranking after qualifying stage
17 to 24	3rd and 4th in races 17 to 20 with final placing according to provisional ranking after qualifying stage
25 to 32	3rd and 4th in races13 to 16 with final placing according to provisional ranking after qualifying stage

	With additional rounds sequence
33 and beyond	**Sequence with successive eliminating rounds as proceeded for the elimination stage:** Placing done as defined for places 1 to 32.
	Sequence based on a fixed number of additional rounds for all competitors: Placing according to sum of points in all additional rounds. In case of tie, provisional ranking after qualifying stage considered to split the tie for the concerned competitors.
	Additional rounds sequence not applied Placing according to provisional ranking after qualifying stage.

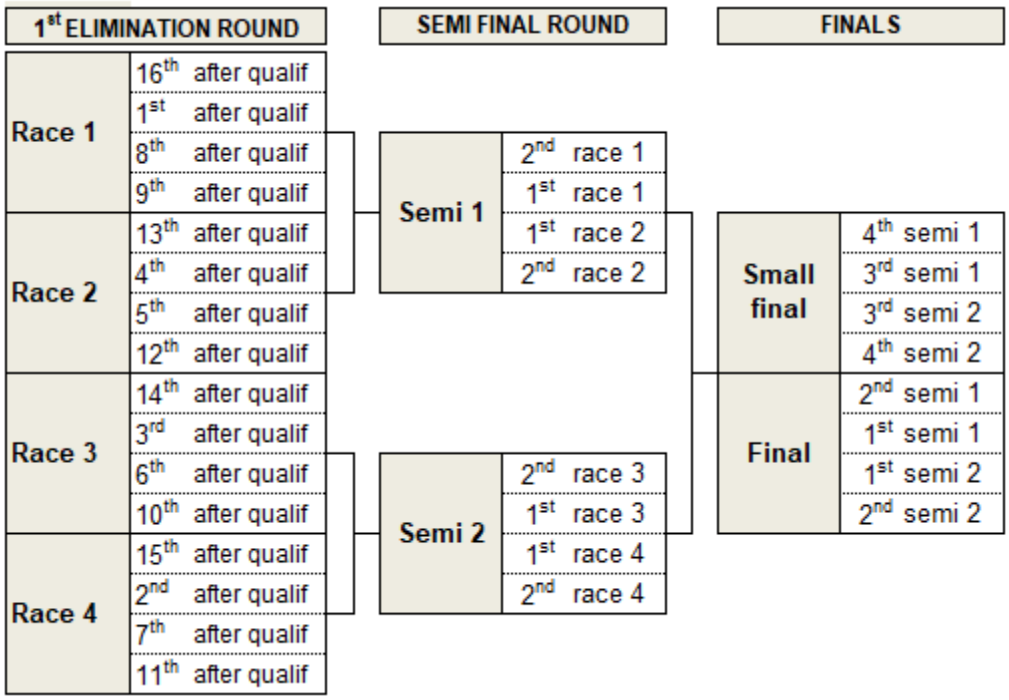
- ANNEX C.4 -

SCENARIO C - 16 competitors selected from qualification stage

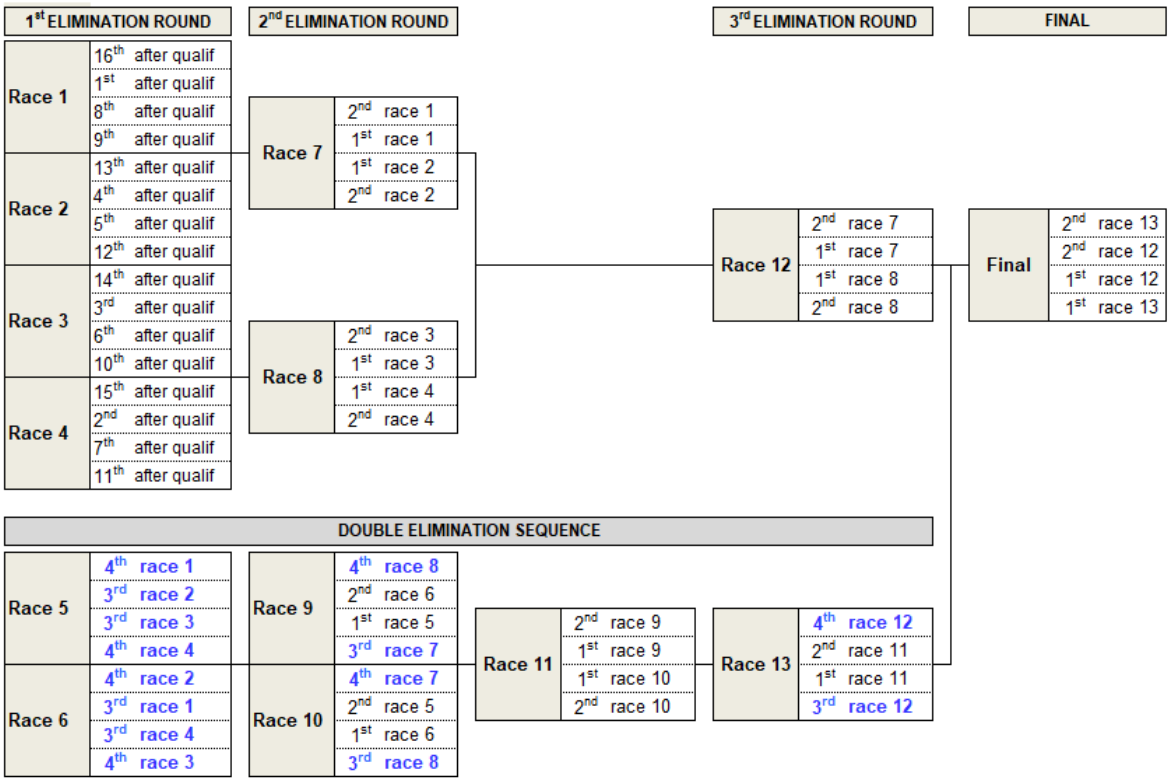
1- Composition of the races for the 1st elimination round

Race 1	Placed 1	Placed 8	Placed 9	Placed 16
Race 2	Placed 4	Placed 5	Placed 12	Placed 13
Race 3	Placed 3	Placed 6	Placed 10	Placed 14
Race 4	Placed 2	Placed 7	Placed 11	Placed 15

2- Organisation of the event (without double elimination)



3- Organisation of the event with double elimination



4- Final classification

Place	Without double elimination
1	1st in final
2	2nd in final
3	3rd in final
4	4th in final
5	1st in small final
6	2nd in small final
7	3rd in small final
8	4th in small final
9 to 16	3rd and 4th in races 1 to 4 with final placing according to provisional ranking after qualifying stage

Place	With double elimination
1	1st in final
2	2nd in final
3	3rd in final
4	4th in final
5	3rd in race 13
6	4th in race 13
7	3rd in race 11
8	4th in race 11
9 to 12	3rd and 4th in races 9 and 10 with final placing according to provisional ranking after qualifying stage
13 to 16	3rd and 4th in races 5 and 6 with final placing according to provisional ranking after qualifying stage

	With additional rounds sequence
17 and beyond	**Sequence with successive eliminating rounds as proceeded for the elimination stage:** Placing done as defined for places 1 to 16.
	Sequence based on a fixed number of additional rounds for all competitors: Placing according to sum of points in all additional rounds. In case of tie, provisional ranking after qualifying stage considered to split the tie for the concerned competitors.
	Additional rounds sequence not applied Placing according to provisional ranking after qualifying stage.