

# **Biplane Air Racing Class Technical Rules**

**Issue Date: 1 April 2025**



# **BARC Technical Rules**

## **Revision Log**

Revision 0 - 28 September 2024 - Original

Revision 1 - 1 April 2025

Revision 1 Summary:

Changes to 4.A. per Class Vote

# **Table of Contents**

- 1. Biplane Definition**
- 2. General Design**
- 3. Aircraft**
- 4. Engines**
- 5. Propellers**
- 6. Wings**
- 7. Landing Gear**
- 8. Cockpit Visibility**
- 9. Fuel Systems & Fuel Capacity**
- 10. Equipment**
- 11. Safety Equipment**
- 12. Flight Testing Requirements**
- 13. Technical Inspection**
- 14. Technical Protests**
- 15. Foreign Entries**
- 16. General Airworthiness & Safety**

# BARC Technical Rules

## 1. Biplane Definition

- A. A biplane is a single-engine aircraft with a tractor-propeller and two wings (an upper wing and a lower wing).
- B. The aircraft must have a conventional tail assembly with horizontal and vertical stabilizers and elevators and a rudder. This assembly must be fuselage mounted well aft of the trailing edge of the wings.
- C. Biplanes may be single-place or two-place.

## 2. General Design

- A. Pilot seating position(s) must be upright, prone cockpit designs are not allowed.
- B. Aircraft CG calculated using the pilot's actual weight must fall within the aircraft's weight & balance limits. Calculated CG outside of limits will not be allowed to participate.
- C. Minimum allowable empty weight of aircraft is 500 Lbs.
- D. Two-seat aircraft may have a maximum empty weight of 1300 Lbs.

## 3. Aircraft

- A. All Aircraft must have a current Standard or Experimental Airworthiness certificate.
- B. Required documentation including Registration, Airworthiness Certificate, Operating Limitations and Weight & Balance as well as aircraft log books must be made available upon FAA and/or Biplane Class Officials request.
- C. All FAA and Biplane Air Racing Class required flight testing must be completed prior to Technical Inspection.

## 4. Engines

- A. Single-seat biplanes may use any air-cooled, direct-drive, aircraft piston engine with a total displacement of 364 cubic inches or less.
  - a. Engines may incorporate the following modifications:
    - i. Any modified cam shaft is allowed.
    - ii. Any compression ratio is allowed.
    - iii. Porting and polishing is allowed.
    - iv. Any ignition system is allowed that does not interfere with radio communications.
- B. Two-seat biplane may use any air-cooled, direct-drive, aircraft piston engine with a total displacement of 560 cubic inches or less.
  - a. If certificated they may not be modified from manufacturer configuration.
  - b. If experimental, engine displacement, compression ratio and camshafts must conform to production specification for an equivalent certificated engine.

## BARC Technical Rules

- c. Engine components such as crankcase, crankshaft, cylinder assemblies, and connecting rods must be factory or conforming aftermarket parts.
- C. Spray-bars that serve to supplement cylinder and/or oil cooling are permitted.
- D. Engines must be naturally aspirated. No superchargers, turbo chargers or any other intake pressurization devices are allowed.
- E. All aircraft must have a ¼" or greater diameter engine retention cable, attaching the engine to a fuselage structural component strong enough to hold the engine weight in case of an engine mount failure.

### 5. Propellers

- A. Single-seat aircraft may use any fixed-pitch propeller.
- B. Two-seat aircraft may use fixed-pitch or constant-speed propellers.
- C. Constant speed propeller RPM may not exceed manufacturer specification. If experimental, propeller governor limitations must be set to certificated specifications.

### 6. Wings

- A. Wings must be a minimum of 75 square feet in total horizontal wing area. This includes the area displaced by the fuselage on the lower wing. The displaced wing area is defined as the area of the trapezoid defined by the four points where the lower wing meets the wing root fairing, or the fuselage if no fairing is used. Fillets, fairings, fences, winglets, droop tips and stall strips are not calculated as additional wing area.
- B. The top wing must be mounted to the fuselage above the head of the pilot using a pylon or cabane struts.
- C. Neither wing may make up a minimum of less than 45% of the total wing area.
- D. Inter-plane struts are required, and must be a minimum of ¾ inch thick.
- E. Flaps are allowed, but extended flaps do not add to calculated wing area.
- F. At least 50% of the span must have some overlap between upper and lower wings.

### 7. Landing Gear

- A. Landing Gear must be fixed, non-retractable.
- B. 4.00 x 5 or larger tires must be used on the 2 main wheels. Any size wheel can be used on the 3<sup>rd</sup> position but must also be fixed/non-retractable.
- C. Brakes that can prevent wheel rotation while at full power at the race venue are required, and an adequate tailwheel is required.
- D. Aircraft must have a steerable or locking/free-castering tailwheel and sufficient taxi maneuverability under its own power such that pilots may enter and exit the runway without assistance.

### 8. Cockpit Visibility

- A. The pilot's field of vision should be approximately 270 degrees horizontally and 140 degrees vertically.

## BARC Technical Rules

B. Wind Screens are mandatory. Canopies are optional.

### 9. Fuel Systems and Fuel Capacity

- A. The minimum fuel capacity is 14 gallons.
- B. The allowed fuel grades are UL91, UL94 (purple), 100R, G100UL, Avgas 100 (green) and 100LL (blue), and 115/145 (purple).
- C. All fuels must be purchased at the racing venue and be available to all biplane class competitors.
- D. No additives or oxidizers such as nitrous oxide are allowed.
- E. ADI, nitro methane, alcohol, hydrazine or any other racing fuels are not allowed.

### 10. Equipment

- A. Aircraft must be equipped with an operable two-way VHF radio that enables the pilot to hear and be heard and understood by officials on the ground and other aircraft on the course. Well-integrated handheld installations are acceptable provided they afford functional two-way communications.

### 11. Safety Equipment

- A. Seat belts with a shoulder harness are mandatory, must be securely mounted to the aircraft structure and must be worn for all race operations.
- B. Fire retardant clothing is required.
- C. Helmets are recommended, but not required.
- D. Canopies must have an externally actuated latch that is conspicuously labeled and that allows crash/fire/rescue crews to unlatch and open the canopy from outside the aircraft for pilot extraction. Pilots must be able to release the canopy from inside the cockpit and exit without assistance. Outside assistance for securing the canopy is permissible.
- E. Parachutes are recommended but not mandatory. If a parachute is used, it must meet the requirements of FAR 91.307 (a).

### 12. Flight Testing Requirements

- A. Entrants will be required to show a minimum of 5 hours documented testing time on their aircraft as configured at the time of technical inspection. Temporary speed improvements (e.g. application of tape or removal of spades, etc) are not considered a change of configuration for this provision.
- B. The test flights should be logged in the aircraft's maintenance records and should be no less than 3 flights to allow adequate post flight examination during the testing time.
- C. The following maneuvers must be performed satisfactorily during flight test. These maneuvers only certify the aircraft, pilot proficiency maneuvers during training events are independent of this requirement.
  - a. Execute one left roll and one right roll within a plus or minus 50 feet altitude.
  - b. Execute a 4 G pull up at maximum level flight airspeed.
  - c. Dive aircraft to 110% of the maximum indicated level speed at the pressure altitude of the race venue.

## **BARC Technical Rules**

- D. Major modifications will trigger the flight testing requirements of A, B and C.
- E. If the aircraft is operated in multiple configurations (e.g. different propellers), it is required to have met the flight testing requirements of A, B and C for each each configuration in which the aircraft will operate.

### **13. Technical Inspection**

- A. The BARC Tech Inspector reports directly to the Technical Advisor of the class. If the Technical Advisor serves as the Tech Inspector, he/she will report directly to the President of the class. The Tech Inspector will inspect all aircraft to ensure conformity to the BARC Technical Rules.
- B. Inspections will be conducted in the aircraft's assigned parking location. No aircraft is allowed to practice, qualify or race until the Tech Inspection is complete and the aircraft has passed inspection. Aircraft assembled at the race site may not be flown prior to passing technical inspection.
- C. Once inspected, class aircraft must remain staged in their assigned parking for the duration of the event except as needed for race events including test flights, race heats, photo missions and maintenance actions that cannot be completed in the parking area.
- D. Aircraft are subject to spot inspections at any time.
- E. Aircraft found to have unauthorized modifications will be disqualified, and the owner(s) suspended for up to 2 years. Final disqualifications and suspensions require majority vote of the BARC Board of Directors.

### **14. Technical Protests**

- A. Technical Protests may be filed if a competitor feels that another competitor is in violation of the BARC Technical Rules.
- B. Protests must be reported in writing and submitted to either the Tech Inspector, Technical Advisor or the class President.
- C. The member who files the protest must post a protest fee of \$250. Successful protests will have their protest fee refunded. If the protest is unfounded the protest fee will be awarded to the defending member to offset associated maintenance costs.

### **15. Foreign Entries**

- A. In the event of foreign entries, those aircraft must meet the airworthiness requirements in the country the plane is registered for certification.

### **16. General Airworthiness & Safety Concerns**

- A. The BARC board of directors, by majority vote, can refuse entry or remove any participating aircraft from flight activities. Poor workmanship, design details, condition, result from damage, etc. can be grounds for refusal.
- B. The BARC Board of Directors holds the final authority for all safety concerns with regard to the aircraft and pilots participating in the class. The BOD may remove any aircraft or pilot by majority vote for any safety concern to include safety concerns not covered by the scope of this document.