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Flight test requirements for manned airships

有人驾驶飞艇飞行试验要求

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4 General Requirements

4.1 Test Environment The test environment requirements are as follows:

- a) The flight test site, airspace, and meteorological conditions (including atmospheric temperature, atmospheric pressure, atmospheric humidity, visibility, wind speed, etc.) should meet the requirements. Relevant provisions in the model technical requirements;
- b) Flight tests should be avoided during thunderstorms, strong winds, rain, snow, fog, and haze. Real-time weather data for the flight test area should be available during the flight test. information.

4.2 Test Subjects The airship to be tested should meet the following requirements.

- a) Complete ground testing of the power unit;
- b) Complete the final assembly and testing of the airship;

- c) Complete the airship's electromagnetic compatibility test;
- d) Complete the airship's horizontal measurement and adjust its weight and center of gravity;
- e) Complete the full system's onboard ground testing;
- f) Complete the airship's maiden flight, adjustment test flights, system improvements, and airspeed and static pressure calibration, and be ready for flight testing.

4.3 Test Items The following test items are typically included.

a) Flight performance includes the following test items. 1) Takeoff performance; 2) Climbing performance; 3) Level flight performance; 4) Sliding performance; 5) Landing performance; 6) Load capacity and service ceiling; 7) Battery life.

b) Flight quality includes the following test items. 1) Longitudinal manipulation; 2) Longitudinal stability; 3) Lateral stability.

4.4 Test Supporting Documents Documents required before the test include, but are not limited to, the following.

5.1 Takeoff performance

5.1.1 Test Conditions The experimental conditions are as follows:

- a) Weight and center of gravity are as follows: 1) Maximum net weight and front center of gravity; 2) Maximum net weight and rear center of gravity.
- b) Power status is as follows: 1) Full engine takeoff power; 2) Single-engine shutdown takeoff power (for multi-engine airships).
- c) The thrust vector angle is as follows: 1) At a given location (for vertical takeoff); 2) At the takeoff design values (for runway takeoff).
- d) The wind speed and direction are stable, and the equipment is equipped to measure the ground wind speed and direction. The takeoff wind speed meets the takeoff restrictions of the model.

5.1.2 Test Methods

5.1.2.1 Vertical Takeoff The vertical takeoff method is as follows:

- a) Take off into the wind, determine the takeoff power; the thrust vector angle is generally greater than 60°. After the field height reaches 15m, adjust the thrust vector angle appropriately and transition to... steady climb;
- b) Each state point shall be tested no less than twice.

5.1.2.2 Takeoff The takeoff method is as follows:

- a) Take off into the wind and determine takeoff power;
- b) During acceleration, maintain a stable pitch and yaw angle as much as possible. After accelerating to takeoff speed, pull up the stick to lift off. After takeoff, do not exceed the required pitch angle. After exceeding the limit value, the field height reaches 15m and then transitions to steady-state climbing.
- c) Each state point shall be tested no less than twice.

5.1.3 Data Recording and Processing

5.1.3.1 Recorded parameters include. indicated airspeed, pressure altitude, atmospheric static temperature, surface wind speed and direction, yaw angle, engine speed, thrust vector angle, etc. Navigation horizontal speed, navigation vertical speed, navigation position, navigation altitude.

5.1.3.2 By recording parameters, plot curves of horizontal displacement, height, and velocity as a function of time to determine the acceleration start time, the time of liftoff, and the time of return. At a height of 15m, the following results are given.

- a) Vertical Takeoff. Provide the takeoff time and distance from ground level to 15m altitude, and the vertical takeoff distance at the moment of takeoff to 15m altitude. linear velocity;
- b) Takeoff with a runway. Provide the takeoff runway distance and time from the start of acceleration to the airship's departure from the area. Takeoff distance and takeoff time within the 15m high zone. For multiple tests at the same state point, the arithmetic mean is taken; if necessary, the takeoff performance results can be converted to standard atmospheric conditions. Results at different heights.

5.2 Climbing performance

5.2.1 Test Conditions The experimental conditions are as follows:

- a) Weight, center of gravity. maximum net weight, front center of gravity.
- b) Power status is as follows: 1) All payments are made on demand; 2) Single-launch stop as needed (for multi-launch airships).
- c) Thrust vector angle. Design value for normal climb.
- d) The wind speed and direction in the air are stable, with no obvious turbulence; the wind speed in the air meets the operating restrictions of the model.

5.2.2 Test Methods

5.2.2.1 Normal Climb Rate The normal climb rate test method is as follows:

- a) Within the preset test altitude range, using preset power states (2 to 3, including

full-power continuous state) and climb angle. (2 to 3) Perform a stable ascent;

b) Maintain constant power and climb angle during this period. Once airspeed and rate of climb stabilize, continue this for at least 5 seconds, recording the climb rate and climb angle. rate of lift and elevator deflection;

c) Each state point shall be tested no less than twice.

5.2.2.2 Continuous Maximum Rate of Ascent The method for testing the continuous maximum rate of ascent is as follows:

a) Continuous maximum climb rate test method. Set the power to at least 70% of maximum continuous power for level flight. After the airspeed stabilizes, pull back on the stick to climb. Slowly increase the elevator deflection to increase the climb rate (power can be further increased as needed);

b) When the power, elevator, or pitch angle reaches its maximum limit and the airbag pressure differential remains stable within the normal range, or when the power, elevator, or... When the elevation angle has not reached the maximum limit but the airbag pressure differential has reached the upper limit of the normal range and can remain stable, record the rate of climb at this time. Maximum continuous climb rate;

c) The continuous maximum rate of ascent is tested more than 3 times within the selected altitude range.

5.2.3 Data Recording and Processing

5.2.3.1 Recorded parameters include. barometric altitude, indicated airspeed, vertical speed, atmospheric static temperature, pitch angle, navigation horizontal speed, and navigation vertical speed. Altitude, navigation altitude, engine speed, control surface deflection angle, airbag pressure difference, and auxiliary airbag pressure difference.

5.2.3.2 Plot curves of indicated airspeed, pitch angle, rate of climb, and airbag pressure differential as a function of time. Select data from the stable climb phase for analysis. The stable climb rate and continuous maximum climb rate of the airship at different state points are calculated. For multiple normal climb rate results at the same state point, the arithmetic operation is performed. Average value; for continuous maximum climb rate, the relatively conservative (smaller) result from multiple valid results should be taken.

5.3 Level Flight Performance

5.3.1 Test Conditions The experimental conditions are as follows:

a) Weight and center of gravity are as follows: 1) Normal net weight, normal center of gravity; 2) Maximum net weight and forward center of gravity (only for minimum level flight speed test).