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**Subject: TYPE CERTIFICATION--AIRSHIPS**

**Date: 9/25/92  
Initiated By: ACE-100**

**AC No: 21.17-1A  
Change: 1**

1. PURPOSE. This advisory circular (AC) describes two acceptable criteria, but not the only means, for the type certification of airships that may be used by an applicant in showing compliance with § 21.17(b) of the Federal Aviation Regulations (FAR), part 21. General guidance relative to airship type certification is also provided. This material is neither mandatory nor regulatory in nature and does not constitute a regulation.

2. CANCELLATION: Advisory Circular No. 21.17-1, "Type Certification--Airships," dated September 30, 1987, is cancelled.

3. RELATED FEDERAL AVIATION REGULATIONS (FAR).

- a. Section 21.5--Airplane or Rotorcraft Flight Manual.
- b. Section 21.17--Designation of applicable regulations.
- c. Part 23--Airworthiness Standards: Normal, Utility, and Acrobatic Category Airplanes.
- d. Part 33--Airworthiness Standards: Aircraft Engines.
- e. Part 35--Airworthiness Standards: Propellers.
- f. Part 45, Subpart C--Nationality and Registration Marks.
- g. Section 91.31--Civil aircraft flight manual, marking, and placard requirements.
- h. Section 91.33--Powered civil aircraft with standard category U.S. airworthiness certificates; instruments and equipment requirements.

4. BACKGROUND.

a. Original Airship Design Criteria. Prior to the revision of § 21.17(b) of the FAR, in amendment 21-60, effective April 13, 1987, airworthiness criteria for the type certification of airships were not covered in the FAR. Although the Federal Aviation Administration's (FAA) predecessor agency issued two type certificates for airships in 1935 and 1948, the airships were built

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to U.S. Navy detail design specifications, and civil approval for the type certificates was based on the Navy's approval of the airship design. This procedure was unique at the time and was predicated on the extensive experience of the U.S. Navy with airship design, construction, and operation. The U.S. Navy decommissioned its last airship in the early 1960's and does not presently operate airships.

b. Development of FAA Airship Criteria. In March 1979, the FAA received an application for a type certificate for a small, nonrigid airship, and the FAA initiated action to develop airship design criteria for type certification. The project was given low priority because the applicant abandoned its effort and no further applications for airship type certification were anticipated. Little progress was made to further develop FAA airship design criteria until January 1983, when the FAA received another application for an airship type certificate. With the assistance of National Aeronautics and Space Administration (NASA) personnel, the FAA renewed its efforts to establish airship design criteria. NASA's experience is based primarily on U.S. Navy experience with the design and operation of airships between 1940 and 1962, when the Navy decommissioned its last airship. In addition to NASA's experience, portions of part 23 of the FAR and the British Civil Air Requirements (BCAR) section Q, dated December 1979, dealing with nonrigid airships, were reviewed for possible incorporation into the FAA airship design criteria. As a result, the FAA developed airship design criteria that are suitable for the U.S. type certification of nonrigid, conventional airships. The criteria are based primarily on Part 23 of the FAR, U.S. Navy detail design specifications of airships, and additional criteria developed by FAA/NASA that were determined to be appropriate for current airship designs. The original FAA airship design criteria were contained in FAA document FAA P-8110-2 titled, "Airship Design Criteria (ADC)." Since that time, the FAA has made one revision to the ADC. This change was noticed in the Federal Register; however, the change was never incorporated into the ADC. While applying this version of the ADC to actual type certification projects, the FAA discovered portions of the report that required additional clarification or revision. These changes have been incorporated in change 1 to FAA P-8110-2 dated July 24, 1992.

5. DISCUSSION. Section 21.17 of the FAR was amended to provide for the certification of special classes of aircraft by adding § 21.17(b). Aircraft covered under § 21.17(b) include gliders, airships, and other aircraft for which there are no airworthiness standards established as a separate part in subchapter C of the FAR. Pursuant to § 21.17(b), the certification basis for a special class aircraft may include designated FAR provisions or such other airworthiness criteria found acceptable to the Administrator. This

AC contains a list of design criteria found acceptable to the Administrator for the type certification of airships under § 21.17(b).

6. ACCEPTABLE CRITERIA. Applicants may utilize one of the following means of showing compliance to § 21.17(b) for type certification of nonrigid, near-equilibrium, conventional, airships.

- a. FAA P-8110-2, Change 1, Airship Design Criteria (ADC).
- b. Other Airworthiness Criteria.

(1) In the event that the airworthiness criteria prescribed in the ADC are inadequate or otherwise inappropriate as a certification basis of an airship due to its unique design or design features, other criteria may be developed. FAA approval is required before the initial application of the airworthiness criteria as the certification basis of an airship. Guidance for preparation and approval of these criteria are outlined as follows:

(i) These criteria must provide for a level of safety equivalent to that prescribed in § 21.17(b). Any proposed airworthiness criteria submitted to the FAA should be comparable to the ADC in its thoroughness, conciseness, clarity, and amount of detail. It is envisaged by the FAA that to achieve a feasible set of airworthiness criteria, an engineering staff experienced in airship design, in conducting certification programs, and with the development of procedures and standards will be necessary. If the Administrator finds that there is a need, the FAA may participate in the development of such criteria depending on the feasibility of completing the project and the availability of personnel.

(ii) The applicant should submit its airworthiness criteria for approval to the certificating aircraft certification office, which will submit them, with recommendations, to the Small Airplane Directorate (ACE-100), Aircraft Certification Service, 601 East 12th Street, Kansas City, MO 64106, for approval by the Manager, Small Airplane Directorate. Upon receipt, ACE-100 will review the airworthiness criteria for applicability to the type design and for completeness. After the criteria are determined by ACE-100 to be acceptable, they will be announced in the Federal Register for public comment as a proposed revision to this AC. The disposition of public comments will be kept on file. Once approved, these criteria may be used as the certification basis for other airships. The approved set of criteria will be listed in this AC, along with information on where they may be obtained. ACE-100 will maintain a file of these criteria.

(2) The approval procedures for significant changes or additions to any previously approved airworthiness criteria proposed for a new project will follow the procedures outlined in (ii) above established for a complete set of airworthiness criteria.

(3) Previously approved airworthiness criteria, when proposed for a new project, should be evaluated for currency based upon advancement of the state-of-the-art airship design, service experience, and amendments to appropriate regulations, such as parts 23 and 25 of the FAR.

(4) Equivalent safety findings may be appropriate in lieu of changes to previously approved airworthiness criteria. In such cases, a showing of equivalent safety should be required of the applicant and approved by ACE-100. Such equivalent safety findings should be part of the type certification basis and noted on the type certificate data sheet.

(5) These criteria will need to provide for Instructions for Continued Airworthiness to show compliance with §° 21.50 of the FAR.

7. ADDITIONAL CRITERIA. In addition to the criteria selected under "Acceptable Criteria," the following related requirements need to be considered for type certification of nonrigid, near-equilibrium, conventional airships.

a. Part 33. Engines may be type certificated in accordance with part 33 or be certificated as an integral part of the airship. When the engines are certificated as an integral part of the airship, the following apply:

(1) Part 33 may be used as a guide by the applicant in developing its airworthiness criteria.

(2) The applicant should provide the certification basis for the engine for review in a timely manner. The procedure for approval by the Administrator is similar to that for the airship airworthiness criteria approval prescribed in paragraph 5(b).

(3) A separate engine type certificate is not issued for engines certificated as an integral part of the airship. Approval of these engines is limited to the installation on that specific airship only.

(4) The engine including the accessory system should not create a hazard to the safe operation of the airship.

b. Part 35. Propellers may be type certificated in accordance with part 35 or be certificated as an integral part of the airship. When the propellers are certificated as an integral part of the airship, the following apply:

(1) Part 35 may be used as a guide by the applicant in developing its airworthiness criteria.

(2) The applicant should provide the certification basis for the propeller review in a timely manner. The procedure for approval by the Administrator is similar to that for the airship airworthiness criteria approval prescribed in paragraph 5(b).

(3) A separate propeller type certificate is not issued for propellers certificated as an integral part of the airship. Approval of these propellers is limited to the installation on that specific airship only.

(4) The propeller should not create a hazard to the safe operation of the airship.

c. Lifting Gas. Hydrogen is not an acceptable lifting gas for use in airships.

d. Part 36. There are no noise requirements for airships in part 36. A finding, under the Noise Control Act of 1972, however, is to be conducted by the FAA for all aircraft before a new type certificate can be issued. Amended type certificates do not require findings.

e. Section 21.5. The Airplane Flight Manual requirements of § 21.5 are applicable to airships. In addition, compliance with the civil aircraft operating limitations and marking requirements of § 91.31 is necessary.

f. Part 45, Subpart C. Nationality registration markings requirements of U.S.-registered airships are provided by part 45, subpart C.

\* g. Section 91.205. Instrument and equipment requirements for U.S.-registered airships are provided by § 91.205. Notwithstanding § 91.205(b)(12), an approved safety belt needs to be provided for each seat.

## 8. OTHER INFORMATION.

a. Certification Basis. An FAA letter may be used by the Aircraft Certification Office (ACO) to inform the applicant of the airworthiness criteria selected in accordance with paragraph 5 that were found to be acceptable to the Administrator for showing

compliance with § 21.17(b). These airworthiness criteria should be identified by title, number, revision, and date of approval.

b. Type Certificate Data Sheet (TCDS). Section 21.17(b) will be cited as the certification basis for airships. The TCDS will list, as the certification basis, § 21.17(b) and the airworthiness criteria established in paragraph a. above. These criteria need to be identified by title, number, revision, and date of approval.

9. HOW TO ORDER.

a. AC 21.17-1A, "Type Certification--Airships." This AC may be obtained from the U.S. Department of Transportation, General Services Section, M-443.2, Washington, DC 20590.

b. FAA P-8110-2, Change 1, "Airship Design Criteria." This change dated July 24, 1992, may be obtained from the Small Airplane Directorate (ACE-110), Aircraft Certification Service, Federal Aviation Administration, 601 East 12th Street, Kansas City, MO 64106.

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