Proposed Rules

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 21

[Docket No. FAA–2022–1548]

Airworthiness Criteria: Special Class Airworthiness Criteria for the Archer Aviation Inc. Model M001 Powered-Lift

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed airworthiness criteria.

SUMMARY: The FAA announces the availability of, and requests comments on, the proposed airworthiness criteria for the Archer Aviation Inc. (Archer) Model M001 powered-lift. This document proposes airworthiness criteria the FAA finds to be appropriate and applicable for the powered-lift design.

DATES: The FAA must receive comments by January 19, 2023.

ADDRESSES: Send comments identified by docket number FAA–2022–1548 using any of the following methods:

- *Federal eRegulations Portal:* Go to *http://www.regulations.gov* and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M–30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE, Room W12–140, West Building Ground Floor, Washington, DC 20590–0001.
- *Hand Delivery of Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington, DC, between 8 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

Privacy: The FAA will post all comments it receives, without change, to *http://www.regulations.gov,* including any personal information the commenter provides. Using the search function of the docket website, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477–19478), as well as at *http://DocketsInfo.dot.gov.*

Docket: Background documents or comments received may be read at *http://www.regulations.gov* at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Anthony Primozich, Center for Emerging Concepts and Innovation (CECI) Branch, AIR–650, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 2200 S 216th Street, Des Moines, WA 98198–6547; telephone and fax 206–231–3014; email *anthony.j.primozich@faa.gov.*

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites interested people to take part in the development of proposed airworthiness criteria for the Archer Model M001 powered-lift by sending written comments, data, or views. Please identify the Archer Model M001 and Docket No. FAA–2022–1548 on all submitted correspondence. The most helpful comments reference a specific portion of the airworthiness criteria, explain the reason for a recommended change, and include supporting data.

Except for Confidential Business Information as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will file in the docket all comments received, as well as a report summarizing each substantive public contact with FAA personnel concerning these proposed airworthiness criteria. Before acting on this proposal, the FAA will consider all comments received on or before the closing date for comments. The FAA will consider comments filed late if it is possible to do so without incurring delay. The FAA may change these airworthiness criteria based on received comments.

Confidential Business Information

Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this notice contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this notice, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as ''PROPIN.'' The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this notice. Submissions containing CBI should be sent to the individual listed under **FOR FURTHER INFORMATION CONTACT**. Any commentary that the FAA receives that is not specifically designated as CBI will be placed in the public docket for this notice.

Background

On March 30, 2022, Archer applied for a type certificate for the Model M001 powered-lift. The Archer Model M001 powered-lift has a maximum gross takeoff weight of 6,500 lbs. and is capable of carrying a pilot and four passengers. The aircraft has a high-wing and V-tail [1] configuration with fixed tricycle landing gear. The aircraft uses 12 electric engines powered by onboard batteries for propulsion instead of conventional air and fuel combustion. Six engines with five-bladed variable-pitch propellers are mounted on the forward edge of the main wing, three to each side, which are capable of tilting to provide both vertical and forward thrust. The other six electric engines drive two-bladed fixed-pitch propellers and are mounted on the aft edge of the main wing, three to each side; they are fixed in place to provide only vertical thrust. The aft-mounted engines operate only during thrust-borne or semi-thrust-

[1] A V-Tail aircraft design incorporates two slanted tail surfaces instead of the horizontal and vertical fins of a conventional aircraft empennage. The two fixed tail surfaces of a V-Tail act as both horizontal and vertical stabilizers and each has a moveable flight-control surface referred to as a ruddervator.

borne flight; in wing-borne forward flight, these engines are switched off and the propellers are faired in line with the aircraft fuselage. The aircraft structure and propellers are constructed of composite materials. The Archer Model M001 powered-lift is intended to be used for part 91 and part 135 operations, with a single pilot onboard, under visual flight rules.

Discussion

Because the FAA has not yet established powered-lift airworthiness standards in 14 CFR, the FAA type certificates powered-lift as special class aircraft. Under the procedures in 14 CFR 21.17(b), the airworthiness requirements for special class aircraft are the portions of the requirements in 14 CFR parts 23, 25, 27, 29, 31, 33, and 35 found by the FAA to be appropriate and applicable to the specific type design and any other airworthiness criteria found by the FAA to provide an equivalent level of safety to the existing standards. This notice announces the applicable regulations and other airworthiness criteria developed, under § 21.17(b), for type certification of the Archer Model M001 powered-lift.

The Archer Model M001 powered-lift has characteristics of both a rotorcraft and an airplane. It is designed to function as a helicopter for takeoff and landing and as an airplane cruising at higher speeds than a helicopter during the en-route portion of flight operations. Accordingly, the Archer Model M001 powered-lift proposed airworthiness criteria contain standards from parts 23, 33, and 35 as well as other proposed airworthiness criteria specific for a powered-lift with electric engines.

For the existing regulations that are included without modification, these proposed airworthiness criteria include all amendments to the existing part 23, 33, and 35 airworthiness standards in effect as of the application date of March 30, 2022. These are part 23, amendment 23–64, part 33, amendment 33–34, and part 35, amendment 35–10.

The Archer Model M001 powered-lift proposed airworthiness criteria also include new performance-based criteria consisting of part 23 standards at amendment 23–64, modified as necessary to capture the powered-lift's transitional flight modes. The FAA developed these criteria because no existing standard captures the powered-lift's transitional flight modes. The proposed criteria also contain definitions specific for a powered-lift, such as flight modes, configurations, speeds, and terminology. Additionally, electric-engine and related propeller airworthiness criteria are proposed. The new requirements specific to the Archer Model M001 powered-lift use an ''AM1.xxxx'' section-numbering scheme.

The FAA selected and designed the particular airworthiness criteria proposed in this notice for the following reasons:

Aircraft-Level Requirements

The proposed installation requirements for cockpit voice and flight data recorders remain unchanged from the normal category airplane airworthiness standards in part 23. The proposed requirement to prepare Instructions for Continued Airworthiness accounts for the applicant's option to install type certificated engines and propellers or to seek approval of the engines and propellers under the aircraft type certificate.

General

The proposed airworthiness criteria include new or modified definitions to explain the unique capabilities and flight phases of the Archer Model M001 powered-lift and the meaning of certain terms used in regulations that have been incorporated by reference. In the event of a loss of engine power, airplanes and rotorcraft inherently have the ability to glide or autorotate, respectively. Although the aircraft may sustain damage, the ability to glide or autorotate allows the aircraft to reasonably protect the occupants. However, not all powered-lift have these capabilities. To address this, the FAA proposes a definition for ''continued safe flight and landing,'' unique for the Archer Model M001 powered-lift, that modifies language from the existing definition in § 23.2000; the FAA also proposes a new definition for ''controlled emergency landing'' to capture the level of performance the Archer Model M001 powered-lift must meet, equivalent to a glide or autorotation.

In addition, because many of the proposed airworthiness criteria are performance-based, like the regulations found in part 23, the FAA has proposed to adopt § 23.2010 by reference, which would require that the means of compliance used to comply with these proposed airworthiness criteria be accepted by the Administrator. Because no powered-lift consensus standards are currently accepted by the Administrator, the means of compliance for the Archer Model M001 powered-lift will be accepted through the issue paper process.[2]

Flight

Although part 23 replaced prescriptive design requirements with performance-based rules that are more easily adaptable to new and novel technology, these performance-based rules were written for conventionally configured airplanes equipped with reversible flight controls for fixed-wing takeoff and landing operations. To accommodate Archer's ability to engage in vertical takeoff and landing operations, these proposed airworthiness criteria adopt language from parts 27 and 29, where appropriate, with changes to allow for safe operation of the powered-lift below the stall speed of the wing. The FAA developed proposed criteria to address the integration of alternating sources of lift: thrust-borne, semi-thrust-borne, and wing-borne. While the FAA has experience certifying indirect flight-control systems such as fly-by-wire systems, Archer's design uses a unique, integrated flight- and propulsion-control system that requires new airworthiness criteria.

In addition, the FAA proposes a new AM1.2105, which incorporates all of § 23.2105 and adds criteria in new paragraphs (f) and (g). Proposed AM1.2105(f) and (g) would ensure the pilot is capable of executing a controlled emergency landing in the event of a loss of power or thrust, whether by the aircraft's ability to glide or autorotate, or through an equivalent means that reasonably protects occupants.

Powerplant

Part 23 (amendment 23–64) addresses electric propulsion, but only for conventionally configured airplanes that use propulsion for forward thrust. Archer's new and novel design uses a distributed propulsion system to provide forward thrust, lift, and control. While some of these design features can be addressed by existing airworthiness standards in parts 23 and 27, other features require the development of new airworthiness criteria. The proposed airworthiness criteria address the following unique and novel powerplant installation features:

- multi-engine isolation in a distributed propulsion system,
- simplified control of distributed propulsion,
- integration of a propulsion system into aircraft flight controls, and

[2] See Order 8110.112A, Standardized Procedures for Usage of Issue Papers and Development of Equivalent Levels of Safety Memorandums.

• energy-system crashworthiness associated with vertical takeoff and landing capability.

The proposed airworthiness criteria in AM1.2405 combine engine and propeller control functions from §§ 23.2405 and 23.2425, and revise the application to capture all powerplant control functions including engine control, propeller control, and nacelle rotation. Energy system airworthiness criteria in proposed AM1.2430 would include a requirement to address energy system crashworthiness to capture the intent of § 27.952 and would delete requirements specific to liquid fuel systems. The powerplant fire-protection airworthiness criteria in proposed AM1.2440 would replace prescriptive language from § 23.2440 for designated fire zones, with generalized fire-zone language to address all powerplant-related fire threats. Electric propulsion systems introduce new fire threats from high-voltage electrical power and battery systems. Designated fire zones assume a kerosene-based fire threat, which is inconsistent with fire threats from electric powerplant installations. These proposed criteria are intended to allow for safe operation of the powered-lift using an all-electric distributed propulsion system for thrust-borne, semi-thrust-borne, and wing-borne flight.

Structures

The flight and ground loads for powered-lift are generally comprised of three types of flight configurations: vertical, transition, and forward. The proposed airworthiness criteria are not taken solely from the forward-flight requirements of part 23 (for airplanes) or the vertical-flight requirements of part 27 (for rotorcraft). Powered-lift also rely on a transitional type of lift, which may include a combination of forward and vertical flight loads. The aerodynamic flow field around the powered-lift during transitional type of lift can be considerably different from what is traditionally observed during forward and vertical flight. In some flight configurations, the powered-lift may experience a combination of forward and vertical flight loads (forces). In other configurations, the aircraft may undergo a completely new type of aerodynamic flow field, not experienced during strictly forward or vertical flight. Traditional existing airworthiness standards do not adequately represent the aerodynamic loads, used for structural design, of a powered-lift. Therefore, the FAA finds that additional airworthiness criteria are necessary for structural design. The FAA created AM1.2200 and AM1.2225 by revising §§ 23.2200 and 23.2225 to address the powered-lift structural design envelope. The FAA created AM1.2240 by revising § 23.2240 to remove level 4 airplane requirements, because the Archer Model M001 powered-lift is not a level 4 airplane.

In addition, the FAA proposes a new AM1.2320, which incorporates all of § 23.2320 except for § 23.2320(b). Proposed AM1.2320(b) contains a new bird strike requirement specific for the applicant's design. The FAA recognizes the threat from bird strikes in the environment in which these aircraft are intended to operate is more severe than the environment that rotorcraft or part 23 fixed-wing aircraft operate in today. The Archer Model M001 powered-lift has inherent design features and expected operations that potentially expose the aircraft to a higher probability of impact with birds.

The Archer Model M001 powered-lift will operate at altitudes similar to rotorcraft, and the FAA expects it will cruise at airspeeds that are the same as or greater than rotorcraft. However, the FAA expects the Archer Model M001 powered-lift will spend less time in hover compared to rotorcraft, increasing high-speed flight time. The FAA also recognizes that the Archer Model M001 powered-lift will be much quieter than conventional helicopter turboshaft engines and rotors. As a result, birds will have fewer cues to the existence of the vehicle due to quiet approach environments.

All of these factors combined increase the aircraft's exposure to birds. Accordingly, the FAA proposes a more comprehensive bird strike requirement for the Archer Model M001 powered-lift. As cited in the Aviation Rulemaking Advisory Committee (ARAC) Rotorcraft Bird Strike Working Group (RBSWG) report,[3] an analysis of bird strike threats against rotorcraft showed the median bird size for birds involved in damaging strikes was 1.125 kg (2.5 lb). Based on that research, the FAA proposes a bird impact size of 1.0 kg (2.2-lb), consistent with rotorcraft industry testing. The applicant must perform an evaluation at the aircraft level to determine what parts of the aircraft are exposed to potential bird strikes.

The FAA also proposes a requirement for bird deterrence devices to reduce the potential for bird strikes. Research, testing, and use of bird-deterrence technology has shown to be effective in reducing bird strikes.[4] Alerting birds to the presence of the aircraft allows birds to avoid striking the aircraft. Bird deterrence systems may include, for example, light technology to aid birds in detecting and avoiding the aircraft.

Electric Engines

The electric engines proposed for installation on the Archer Model M001 powered-lift use electric power instead of air-and-fuel combustion to propel the aircraft. These electric engines are designed, manufactured, and controlled differently than aircraft engines that operate using aviation fuel. These engines are built with an electric motor, a controller, and a high-voltage system that draws energy from electrical storage or generating systems. The engines in the Archer Model M001 powered-lift are devices that convert electrical energy into mechanical energy; electric current flowing through wire coils in the motor produces a magnetic field that interacts with magnets on the rotating armature shaft. The controller is a system that consists of two main functional elements: the motor controller and an electric-power inverter to drive the motor associated with an electric engine. The high-voltage system is a combination of wires, power-conditioning components, and connectors that couple an energy source to an electric engine, associated motor, and a controller.

The technology required to provide energy through these high-voltage and high-current electronic components introduces potential hazards that do not exist in aircraft engines that operate using aviation fuel. For example, high-voltage transmission lines, electromagnetic fields, magnetic materials, and high-speed electrical switches form the electric engine's physical properties. Operating at these high power levels also exposes the electric engines to potential failures, which could adversely affect safety, and that are not common to aircraft engines that operate using aviation fuel.

Propellers

Part 35 contains airworthiness standards to ensure that uninstalled propellers meet the minimum level of safety that the FAA deems acceptable. Part 35 requirements are appropriate for propellers that are installed on conventional airplanes, type certificated under part 23 or part 25, that have construction and blade-pitch actuation methods typically found on such airplanes.

[3] ARAC RBSWG Report, Rev. B, May 8, 2019, page 15, Section ''Bird Mass'' (ARAC RBSWG Report), *https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information?documentID=3964.*

[4] ARAC RBSWG Report, pages 48–50.

Emerging electric-powered and hybrid electric-powered aircraft, especially electric powered-lift that are intended for ''air taxi'' type operations in and near urban areas and capable of vertical and short takeoff and landing, often feature propellers designed for both horizontal thrust and vertical lift. In addition, propeller blade-pitch actuation for such aircraft typically is performed electrically, and is more extensively integrated into the aircraft's propulsion and flight-control system compared to conventional airplanes type certificated under part 23 or part 25.

Propellers are integral parts of a variety of airplane propulsion systems and, until the advent of electric engines, have been subjected to the forces of fossil-fuel-powered reciprocating and turbine combustion engines. Electric engines present different considerations due to the increased torque and potentially higher revolutions per minute.

The most basic requirement, for all conventional part 23 and 25 aircraft as well as the Archer Model M001 powered-lift, is to reduce the risk of propeller failure or release of debris to the occupants and critical aircraft structures and components to an acceptable level. Features and characteristics of propellers must ensure that they are safe for the certification application requested.

These proposed airworthiness criteria would require functional engine demonstrations, including feathering, negative torque, negative thrust, and reverse-thrust operations, as appropriate, using a representative propeller. The applicant may conduct these demonstrations as part of the endurance and durability demonstrations.

Applicability

These airworthiness criteria, established under the provisions of § 21.17(b), are applicable to the Archer Model M001 powered-lift. Should Archer wish to apply these airworthiness criteria to other powered-lift models, it must submit a new application for a type certificate.

The Proposed Airworthiness Criteria

The FAA proposes to establish the following airworthiness criteria for type certification of the Archer Model M001 powered-lift. The FAA proposes that compliance with the following criteria will provide an equivalent level of safety to existing rules.

Aircraft–Level Requirements

§ 23.1457 Cockpit voice recorders.

(a) through (g) [Applicable to Model M001]

§ 23.1459 Flight data recorders.

(a) through (e) [Applicable to Model M001]

AM1.1529 Instructions for Continued Airworthiness

The applicant must prepare Instructions for Continued Airworthiness (ICA), in accordance with Appendices A, A1, and A2, that are acceptable to the Administrator. ICA for the aircraft, engines, and propellers may be shown in a single aircraft ICA manual if the engine and propeller approvals are sought through the aircraft certification program. Alternatively, the applicant may provide individual ICA for the aircraft, engines, and propellers. The instructions may be incomplete at the time of type certification if a program exists to ensure their completion prior to delivery of the first aircraft, or issuance of a standard certificate of airworthiness, whichever occurs later.

SUBPART A—General

AM1.2000 Applicability and Definitions

(a) These airworthiness criteria prescribe airworthiness standards for the issuance of a type certificate, and changes to that type certificate, for the Archer Aviation Inc. Model M001 powered-lift.

(b) For purposes of these airworthiness criteria, the following definitions apply:

(1) *Continued safe flight and landing* means an aircraft is capable of continued controlled flight and landing, possibly using emergency procedures, without requiring exceptional pilot skill or strength.

(2) *Phases of flight* means ground operations, takeoff, climb, cruise, descent, approach, hover, and landing.

(3) *Source of lift* means one of three sources of lift: thrust-borne, wing-borne, and semi-thrust-borne. Thrust-borne is defined as when the powered-lift is maneuvering in the vertical plane and lift is predominately from downward thrust. Wing-borne is defined as when the powered-lift is maneuvering in the horizontal plane and lift is predominately from fixed airfoil surfaces. Semi-thrust-borne is the combination of thrust-borne and wing-borne, where both forms of lift are applied.

(4) *Loss of power/thrust* means a condition when the aircraft can no longer provide the commanded power or thrust required for continued safe flight and landing.

(5) *Controlled emergency landing* means the pilot is capable of choosing the direction and area of touchdown, and the aircraft is capable of reasonably protecting occupants. Upon landing, some damage to the aircraft may be acceptable.

(c) Terms used in the part 23 provisions that are adopted in these airworthiness criteria are interpreted as follows:

''Airplane'' means ''aircraft.''

''This part'' means ''these airworthiness criteria.''

§ 23.2010 Accepted means of compliance.

(a) through (b) [Applicable to Model M001]

SUBPART B—Flight Performance

§ 23.2100 Weight and center of gravity.

(a) through (c) [Applicable to Model M001]

AM1.2105 Performance Data

(a) Unless otherwise prescribed, an aircraft must meet the performance requirements of this subpart in still air and standard atmospheric conditions.

(b) Unless otherwise prescribed, the applicant must develop the performance data required by this subpart for the following conditions:

(1) Airport altitudes from sea level to 10,000 feet (3,048 meters); and

(2) Temperatures above and below standard day temperature that are within the range of operating limitations, if those temperatures could have a negative effect on performance.

(c) The procedures used for determining takeoff and landing performance must be executable consistently by pilots of average skill in atmospheric conditions expected to be encountered in service.

(d) Performance data determined in accordance with paragraph (b) of this section must account for losses due to atmospheric conditions, cooling needs, installation losses, downwash considerations, and other demands on power sources.

(e) The hovering ceiling, in and out of ground effect, must be determined over the ranges of weight, altitude, and temperature, if applicable.

(f) Continued safe flight and landing must be possible from any point within the flight envelope following a critical loss of thrust not shown to be extremely improbable.

(g) The aircraft must be capable of a controlled emergency landing, after loss of power or thrust, by gliding or autorotation, or an equivalent means, to mitigate the risk of loss of power or thrust.

AM1.2110 Minimum Safe Speed

The applicant must determine the aircraft minimum safe speed for each flight condition encountered in normal operations, including applicable sources of lift and phases of flight, to maintain controlled safe flight. The minimum safe speed determination must account for the most adverse conditions for each flight configuration.

AM1.2115 Takeoff Performance

(a) The applicant must determine takeoff performance accounting for flight envelope and obstacle safety margins.

(b) The applicant must determine takeoff performance accounting for any loss of thrust not shown to be extremely improbable.

AM1.2120 Climb Requirements

(a) The applicant must demonstrate minimum climb performance at each weight, altitude, and ambient temperature within the operating limitations using the procedures published in the flight manual.

(b) The applicant must demonstrate minimum climb performance accounting for any loss of thrust not shown to be extremely improbable.

AM1.2125 Climb Information.

(a) The applicant must determine climb performance at each weight, altitude, and ambient temperature within the operating limitations using the procedures published in the flight manual.

(b) The applicant must determine climb performance accounting for any loss of thrust not shown to be extremely improbable.

AM1.2130 Landing

The applicant must determine the following, for standard temperatures at critical combinations of weight and altitude within the operational limits:

(a) The landing performance, assuming approach paths applicable to the aircraft.

(b) The approach, transition if applicable, and landing speeds, configurations, and procedures, which allow a pilot of average skill to land within the published landing performance consistently and without causing damage or injury, and which allow for a safe transition to the balked landing conditions of these airworthiness criteria, accounting for the minimum safe speed.

FLIGHT CHARACTERISTICS

AM1.2135 Controllability

(a) The aircraft must be controllable and maneuverable, without requiring exceptional piloting skill, alertness, or strength, within the operating envelope—

(1) At all loading conditions for which certification is requested;

(2) During all phases of flight while using applicable sources of lift;

(3) With likely flight-control or propulsion-system failure;

(4) During configuration changes;

(5) In all degraded flight-control-system operating modes not shown to be extremely improbable; and

(6) In thrust-borne operation, and must be able to land safely in wind velocities from zero to a wind limit appropriate for the aircraft from any azimuth angle.

(b) The applicant must determine critical control parameters, such as limited-control power margins, and if applicable, account for those parameters in developing operating limitations.

(c) It must be possible to make a smooth change from one flight condition to another (changes in configuration, and in source of lift and phase of flight) without exceeding the approved flight envelope.

AM1.2140 Trim

(a) The aircraft must maintain lateral and directional trim without further force upon, or movement of, the primary flight controls or corresponding trim controls by the pilot, or the flight-control system, under normal phases of flight while using applicable sources of lift in cruise.

(b) The aircraft must maintain longitudinal trim without further force upon, or movement of, the primary flight controls or corresponding trim controls by the pilot, or the flight-control system, under the following conditions:

(1) Climb.

(2) Level flight.

(3) Descent.

(4) Approach.

(c) Residual control forces must not fatigue or distract the pilot during normal operations of the aircraft and likely abnormal or emergency operations, including loss of thrust not shown to be extremely improbable on multi-engine aircraft.

AM1.2145 Stability

(a) Aircraft not certified for aerobatics must exhibit stable characteristics in normal operations and after likely failures of the flight and propulsion control system.

(b) No aircraft may exhibit any divergent longitudinal stability characteristic so unstable as to increase the pilot's workload or otherwise endanger the aircraft and its occupants.

AM1.2150 Minimum Safe Speed Flight Characteristics, Minimum Safe Speed Warning, and Spins.

(a) The aircraft must have controllable minimum safe speed flight characteristics in straight flight, turning flight, and accelerated turning flight with a clear and distinctive minimum safe speed warning that provides sufficient margin to prevent inadvertent slowing below minimum safe speed.

(b) Aircraft not certified for aerobatics must not have a tendency to inadvertently depart controlled flight from thrust asymmetry after a critical loss of thrust.

(c) Aircraft certified for aerobatics that include spins must have controllable stall characteristics and the ability to recover within one and one-half additional turns after initiation of the first control action from any point in a spin, not exceeding six turns or any greater number of turns for which certification is requested, while remaining within the operating limitations of the aircraft.

(d) Spin characteristics in aircraft certified for aerobatics that includes spins must recover without exceeding limitations and may not result in unrecoverable spins—

(1) With any typical use of the flight or engine-power controls; or

(2) Due to pilot disorientation or incapacitation.

§ 23.2155 Ground and water handling characteristics.

[Applicable to Model M001]

§ 23.2160 Vibration, buffeting, and high-speed characteristics.

(a) [Applicable to Model M001]

(b) through (d) [Not applicable to Model M001]

AM1.2165 Performance and Flight Characteristics Requirements for Flight in Atmospheric Icing Conditions

(a) An applicant who requests certification for flight in atmospheric icing conditions must show the following in the icing conditions for which certification is requested:

(1) Compliance with each requirement of this subpart, except those applicable to spins and any that must be demonstrated at speeds in excess of—

(i) 250 knots calibrated airspeed (CAS);

(ii) V_{MO}/M_{MO} or V_{NE}; or

(iii) A speed at which the applicant demonstrates the airframe will be free of ice accretion.

(2) The means by which minimum safe speed warning is provided to the pilot for flight in icing conditions and non-icing conditions is the same.

(b) The applicant must provide a means to detect icing conditions for which certification is not requested and show the aircraft's ability to avoid or exit those icing conditions.

(c) The applicant must develop an operating limitation to prohibit intentional flight, including takeoff and landing, into icing conditions for which the aircraft is not certified to operate.

SUBPART C—Structures

AM1.2200 Structural Design Envelope

The applicant must determine the structural design envelope, which describes the range and limits of aircraft design and operational parameters for which the applicant will show compliance with the requirements of this subpart. The applicant must account for all aircraft design and operational parameters that affect structural loads, strength, durability, and aeroelasticity, including:

(a) Structural design airspeeds, landing-descent speeds, and any other airspeed limitation at which the applicant must show compliance to the requirements of this subpart. The structural design airspeeds must—

(1) Be sufficiently greater than the minimum safe speed of the aircraft to safeguard against loss of control in turbulent air; and

(2) Provide sufficient margin for the establishment of practical operational limiting airspeeds.

(b) Design maneuvering load factors not less than those, which service history shows, may occur within the structural design envelope.

(c) Inertial properties including weight, center of gravity, and mass moments of inertia, accounting for—

(1) Each critical weight from the aircraft empty weight to the maximum weight; and

(2) The weight and distribution of occupants, payload, and fuel.

(d) Characteristics of aircraft control systems, including range of motion and tolerances for control surfaces, high lift devices, or other moveable surfaces.

(e) Each critical altitude up to the maximum altitude.

(f) Engine-driven lifting-device rotational speed and ranges, and the maximum rearward and sideward flight speeds.

§ 23.2205 Interaction of systems and structures.

[Applicable to Model M001]

Structural Loads

§ 23.2210 Structural design loads.

(a) through (b) [Applicable to Model M001]

§ 23.2215 Flight load conditions.

(a) through (c) [Applicable to Model M001]

§ 23.2220 Ground and water load conditions.

[Applicable to Model M001]

AM1.2225 Component loading conditions

The applicant must determine the structural design loads acting on:

(a) Each engine mount and its supporting structure such that both are designed to withstand loads resulting from—

(1) Powerplant operation combined with flight gust and maneuver loads; and

(2) For non-reciprocating powerplants, sudden powerplant stoppage.

(b) Each flight control and high-lift surface, their associated system and supporting structure resulting from—

(1) The inertia of each surface and mass balance attachment;

(2) Flight gusts and maneuvers;

(3) Pilot or automated system inputs;

(4) System induced conditions, including jamming and friction; and

(5) Taxi, takeoff, and landing operations on the applicable surface, including downwind taxi and gusts occurring on the applicable surface.

(c) A pressurized cabin resulting from the pressurization differential—

(1) From zero up to the maximum relief pressure combined with gust and maneuver loads;

(2) From zero up to the maximum relief pressure combined with ground and water loads if the aircraft may land with the cabin pressurized; and

(3) At the maximum relief pressure multiplied by 1.33, omitting all other loads.

(d) Engine-driven lifting-device assemblies, considering loads resulting from flight and ground conditions, as well limit input torque at any lifting-device rotational speed.

§ 23.2230 Limit and ultimate loads.

(a) through (b) [Applicable to Model M001]

Structural Performance

§ 23.2235 Structural strength.

(a) through (b) [Applicable to Model M001]

AM1.2240 Structural Durability

(a) The applicant must develop and implement inspections or other procedures to prevent structural failures due to foreseeable causes of strength degradation, which could result in serious or fatal injuries, or extended periods of operation with reduced safety margins. Each of the inspections or other procedures developed under this section must be included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness, required by AM1.1529.

(b) For pressurized aircraft:

(1) The aircraft must be capable of continued safe flight and landing following a sudden release of cabin pressure, including sudden releases caused by door and window failures.

(2) For aircraft with maximum operating altitude greater than 41,000 feet, the procedures developed for compliance with paragraph (a) of this section must be capable of detecting damage to the pressurized cabin structure before the damage could result in rapid decompression that would result in serious or fatal injuries.

(c) The aircraft must be designed to minimize hazards to the aircraft due to structural damage caused by high-energy fragments from an uncontained engine or rotating machinery failure.

§ 23.2245 Aeroelasticity.

(a) through (b) [Applicable to Model M001]

Design

§ 23.2250 Design and construction principles.

(a) through (e) [Applicable to Model M001]

§ 23.2255 Protection of structure.

(a) through (c) [Applicable to Model M001]

§ 23.2260 Materials and processes.

(a) through (g) [Applicable to Model M001]

§ 23.2265 Special factors of safety.

(a) through (c) [Applicable to Model M001]

Structural Occupant Protection

§ 23.2270 Emergency conditions.

(a) through (e) [Applicable to Model M001]

SUBPART D—Design and Construction

AM1.2300 Flight-control systems

(a) The applicant must design flight-control systems to:

(1) Operate easily, smoothly, and positively enough to allow proper performance of their functions; and

(2) Protect against likely hazards.

(b) The applicant must design trim systems, if installed, to:

(1) Protect against inadvertent, incorrect, or abrupt trim operation; and

(2) Provide a means to indicate—

(i) The direction of trim control movement relative to aircraft motion;

(ii) The trim position with respect to the trim range;

(iii) The neutral position for lateral and directional trim; and

(iv) The range for takeoff for all applicant-requested center of gravity ranges and configurations.

(c) In addition to paragraph (a) and (b) of this section, for indirect flight-control systems:

(1) A means must be provided to indicate to the flightcrew any significant changes or degradation to the handling or operational characteristics of the aircraft during normal and abnormal system operation; and

(2) Features that protect the aircraft against loss of control, structural damage, or exceeding critical limits must be designed such that—

(i) The onset characteristics of each protection feature is smooth and appropriate for the phase of flight and type of maneuver;

(ii) There are no adverse flight characteristics in aircraft response to flight-control inputs, unsteady atmospheric conditions, and other likely conditions, including simultaneous limiting events; and

(iii) The aircraft is capable of continued safe flight and landing following failures not shown to be extremely improbable throughout the approved flight envelope and expected operational conditions.

§ 23.2305 Landing gear systems.

(a) through (c) [Applicable to Model M001]

§ 23.2310 Buoyancy for seaplanes and amphibians.

(a) through (b) [Applicable to Model M001]

Occupant System Design Protection

§ 23.2315 Means of egress and emergency exits.

(a) through (b) [Applicable to Model M001, including the ditching exclusion in (a)(1)]

AM1.2320 Occupant Physical Environment.

(a) The applicant must design the aircraft to:

(1) Allow clear communication between the flightcrew and passengers;

(2) Protect the pilot and flight controls from propellers; and

(3) Protect the occupants from serious injury due to damage to windshields, windows, and canopies.

(b) The aircraft must be capable of continued safe flight and landing after a bird strike with a 2.2-lb (1.0 kg) bird. In addition, the aircraft design must include bird deterrence devices to reduce the potential for bird strikes.

(c) The aircraft must provide each occupant with air at a breathable pressure, free of hazardous concentrations of gases, vapors, and smoke during normal operations and likely failures.

(d) If a pressurization system is installed in the aircraft, it must be designed to protect against:

(1) Decompression to an unsafe level; and

(2) Excessive differential pressure.

(e) If an oxygen system is installed in the aircraft, it must—

(1) Effectively provide oxygen to each user to prevent the effects of hypoxia; and

(2) Be free from hazards in itself, in its method of operation, and its effect upon other components.

Fire and High Energy Protection

§ 23.2325 Fire protection.

(a)(1), (a)(2), (b) through (d), (f)(1), and (g) through (h) [Applicable to Model M001]

(a)(3), (e), and (f)(2) [Not applicable to Model M001]

AM1.2330 Fire Protection in Fire Zones and Adjacent Areas.

(a) Flight controls, engine mounts, and other flight structures within or adjacent to fire zones must be capable of withstanding the effects of a fire.

(b) Engines in a fire zone must remain attached to the aircraft in the event of a fire.

(c) In fire zones, terminals, equipment, and electrical cables used during emergency procedures must perform their intended function in the event of a fire.

AM1.2335 Lightning and Static Electricity Protection.

(a) The aircraft must be protected against catastrophic effects from lightning.

(b) The aircraft must be protected against hazardous effects caused by an accumulation of electrostatic charge.

SUBPART E—Powerplant

AM1.2400 Powerplant Installation.

(a) For the purpose of this subpart, the aircraft powerplant installation must include each component necessary for propulsion, which affects propulsion safety, or provides auxiliary power to the aircraft.

(b) Each aircraft engine and propeller must have a type certificate or be approved under the aircraft type certificate using standards found in subparts H and I.

(c) The applicant must construct and arrange each powerplant installation to account for—

(1) Likely operating conditions, including foreign-object threats;

(2) Sufficient clearance of moving parts to other aircraft parts and their surroundings;

(3) Likely hazards in operation including hazards to ground personnel; and

(4) Vibration and fatigue.

(d) Hazardous accumulations of fluids, vapors, or gases must be isolated from the aircraft and personnel compartments and be safely contained or discharged.

(e) Powerplant components must comply with their component limitations and installation instructions or be shown not to create a hazard.

AM1.2405 Power or Thrust Control Systems.

(a) Any power or thrust control system, reverser system, or powerplant control system must be designed so no unsafe condition results during normal operation of the system.

(b) Any single failure or likely combination of failures or malfunctions of a power or thrust control system, reverser system, or powerplant control system must not prevent continued safe flight and landing of the aircraft.

(c) Inadvertent flightcrew operation of a power or thrust control system, reverser system, or powerplant control system must be prevented, or if not prevented, must not prevent continued safe flight and landing of the aircraft.

(d) Unless the failure of an automatic power or thrust control system is extremely remote, the system must—

(1) Provide a means for the flightcrew to verify the system is in an operating condition;

(2) Provide a means for the flightcrew to override the automatic function; and

(3) Prevent inadvertent deactivation of the system.

§ 23.2410 Powerplant installation hazard assessment.

(a) through (c) [Applicable to Model M001]

§ 23.2415 Powerplant ice protection.

(a) through (b) [Applicable to Model M001]

AM1.2425 Powerplant Operational Characteristics

(a) Each installed powerplant must operate without any hazardous characteristics during normal and emergency operation within the range of operating limitations for the aircraft and the engine.

(b) The design must provide for the shutdown and restart of the powerplant in flight within an established operational envelope.

AM1.2430 Energy Systems

(a) Each energy system must—

(1) Be designed and arranged to provide independence between multiple energy-storage and supply systems, so that failure of any one component in one system will not result in loss of energy storage or supply of another system;

(2) Be designed to prevent catastrophic events due to lightning strikes, taking into account direct and indirect effects on the aircraft where the exposure to lightning is likely;

(3) Provide the energy necessary to ensure each powerplant and auxiliary power unit functions properly in all likely operating conditions;

(4) Provide the flightcrew with a means to determine the total useable energy available and provide uninterrupted supply of that energy when the system is correctly operated, accounting for likely energy fluctuations;

(5) Provide a means to safely remove or isolate the energy stored in the system from the aircraft; and

(6) Be designed to retain energy under all likely operating conditions and to minimize hazards to occupants following an emergency landing or otherwise survivable impact (crash landing).

(7) [Reserved]

(b) Each energy-storage system must—

(1) Withstand the loads under likely operating conditions without failure; and

(2) Be isolated from personnel compartments and protected from hazards due to unintended temperature influences.

(3) [Reserved]

(4) [Reserved]

(c) Each energy-storage refilling or recharging system must be designed to—

(1) Prevent improper refilling or recharging; and

(2) [Reserved]

(3) Prevent the occurrence of hazard to the aircraft or to persons during refilling or recharging.

§ 23.2435 Powerplant induction and exhaust systems.

(a) through (b) [Applicable to Model M001]

AM1.2440 Powerplant Fire Protection

There must be means to isolate and mitigate hazards to the aircraft in the event of a powerplant-system fire or overheat in operation.

SUBPART F—Equipment

§ 23.2500 Airplane level systems requirements.

(a) through (b) [Applicable to Model M001]

§ 23.2505 Function and installation.

[Applicable to Model M001]

§ 23.2510 Equipment, systems, and installations.

(a) through (c) [Applicable to Model M001]

AM1.2515 Electrical- and Electronic-System Lightning Protection

(a) Each electrical or electronic system that performs a function, the failure of which would prevent the continued safe flight and landing of the aircraft, must be designed and installed such that—

(1) The function at the aircraft level is not adversely affected during and after the time the aircraft is exposed to lightning; and

(2) The system recovers normal operation of that function in a timely manner after the aircraft is exposed to lightning unless the system's recovery conflicts with other operational or functional requirements of the system.

(b) For an aircraft approved for operation under instrument flight rules (IFR), each electrical and electronic system that performs a function, the failure of which would significantly reduce the capability of the aircraft or the ability of the flightcrew to respond to an adverse operating condition, must be designed and installed such that the system recovers normal operation of that function in a timely manner after the aircraft is exposed to lightning.

§ 23.2520 High-intensity Radiated Fields (HIRF) protection.

(a) through (b) [Applicable to Model M001]

§ 23.2525 System power generation, storage, and distribution.

(a) through (c) [Applicable to Model M001]

§ 23.2530 External and cockpit lighting.

(a) through (e) [Applicable to Model M001]

§ 23.2535 Safety equipment.

[Applicable to Model M001]

AM1.2540 Flight in Icing Conditions

An applicant who requests certification for flight in icing conditions must show the following in the icing conditions for which certification is requested:

(a) The ice protection system provides for safe operation; and

(b) The aircraft design must provide protection from slowing to less than the minimum safe speed when the autopilot is operating.

§ 23.2545 Pressurized systems elements.

[Applicable to Model M001]

§ 23.2550 Equipment containing high-energy rotors.

[Applicable to Model M001]

SUBPART G—Flightcrew Interface and Other Information

AM1.2600 Flightcrew Interface

(a) The pilot compartment, its equipment, and its arrangement to include pilot view, must allow each pilot to perform their duties for all sources of lift and phases of flight and perform any maneuvers within the operating envelope of the aircraft, without excessive concentration, skill, alertness, or fatigue.

(b) The applicant must install flight, navigation, surveillance, and powerplant controls and displays, as needed, so qualified flightcrew can monitor and perform defined tasks associated with the intended functions of systems and equipment, without excessive concentration, skill, alertness, or fatigue. The system and equipment design must minimize flightcrew errors, which could result in additional hazards.

§ 23.2605 Installation and operation.

(a) through (c) [Applicable to Model M001]

§ 23.2610 Instrument markings, control markings, and placards.

(a) through (c) [Applicable to Model M001]

AM1.2615 Flight, Navigation, and Powerplant Instruments

(a) Installed systems must provide the flightcrew member who sets or monitors parameters for the flight, navigation, and powerplant, the information necessary to do so during each source of lift and phase of flight. This information must—

(1) Be presented in a manner that the crewmember can monitor the parameter and determine trends, as needed, to operate the aircraft; and

(2) Include limitations, unless the limitations cannot be exceeded in all intended operations.

(b) Indication systems that integrate the display of flight or powerplant parameters to operate the aircraft, or are required by the operating rules of title 14, chapter I, must—

(1) Not inhibit the primary display of flight or powerplant parameters needed by any flightcrew member in any normal mode of operation; and

(2) In combination with other systems, be designed and installed so information essential for continued safe flight and landing will be available to the flightcrew in a timely manner after any single failure or probable combination of failures.

AM1.2620 Aircraft Flight Manual

The applicant must provide an Aircraft Flight Manual that must be delivered with each aircraft.

(a) The Aircraft Flight Manual must contain the following information—

(1) Aircraft operating limitations;

(2) Aircraft operating procedures;

(3) Performance information;

(4) Loading information; and

(5) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) The portions of the Aircraft Flight Manual containing the information specified in paragraphs (a)(1) through (a)(4) of this section must be approved by the FAA in a manner specified by the Administrator.

SUBPART H—Electric Engine Requirements

§ 33.5 Instruction manual for installing and operating the engine.

(a) through (c) [Applicable to Model M001]

§ 33.7 Engine ratings and operating limitations.

(a) [Applicable to Model M001]

(b) through (d) [Not applicable to Model M001]

AM1.2702 Engine Ratings and Operating Limits

Ratings and operating limits must be established and included in the type certificate data sheet based on:

(a) Shaft power, torque, rotational speed, and temperature for:

(1) Rated takeoff power;

(2) Rated maximum continuous power; and

(3) Rated maximum temporary power and associated time limit.

(b) Duty Cycle and the rating at that duty cycle. The duty cycle must be declared in the type certificate data sheet.

(c) Cooling fluid grade or specification.

(d) Power-supply requirements.

(e) Any other ratings or limitations that are necessary for the safe operation of the engine.

§ 33.8 Selection of engine power and thrust ratings.

(a) through (b) [Applicable to Model M001]

§ 33.15 Materials.

(a) through (b) [Applicable to Model M001]

§ 33.17 Fire protection.

(a) through (g) [Applicable to Model M001]

AM1.2704 Fire Protection.

High-voltage electrical wiring interconnect systems must be protected against arc faults. Non-protected electrical wiring interconnects must be analyzed to show that arc faults do not cause a hazardous engine effect.

AM1.2705 Durability.

The engine design and construction must minimize the development of an unsafe condition of the engine between maintenance intervals, overhaul periods, or mandatory actions described in the applicable ICA.

§ 33.21 Engine cooling.

[Applicable to Model M001]

AM1.2706 Engine Cooling

If cooling is required to satisfy the safety analysis as described in AM1.2717, the cooling-system monitoring features and usage must be documented in the engine installation manual.

§ 33.23 Mounting attachment and structure.

(a) through (b) [Applicable to Model M001]

§ 33.25 Accessory attachments.

[Applicable to Model M001]

AM1.2709 Overspeed

(a) A rotor overspeed must not result in a burst, rotor growth, or damage that results in a hazardous engine effect, as defined in AM1.2717(d)(2). Compliance with this paragraph must be shown by test, validated analysis, or a combination of both. Applicable assumed rotor speeds must be declared and justified.

(b) Rotors must possess sufficient strength with a margin to burst above certified operating conditions and above failure conditions leading to rotor overspeed. The margin to burst must be shown by test, validated analysis, or a combination thereof.

(c) The engine must not exceed the rotor-speed operational limitations that could affect rotor structural integrity.

§ 33.28 Engine control systems.

(b)(1)(i), (b)(1)(iii), and (b)(1)(iv) [Applicable to Model M001]

(a), (b)(1)(ii), (b)(2) through (m) [Not applicable to Model M001]

AM1.2710 Engine Control Systems

(a) Applicability.

These requirements apply to any system or device that is part of the engine type design that controls, limits, monitors, or protects engine operation and is necessary for the continued airworthiness of the engine.

(b) Engine control.

The engine control system must ensure the engine does not experience any unacceptable operating characteristics or exceed its operating limits, including in failure conditions where the fault or failure results in a change from one control mode to another, from one channel to another, or from the primary system to the back-up system, if applicable.

(c) Design assurance.

The software and complex electronic hardware, including programmable logic devices, must be—

(1) Designed and developed using a structured and systematic approach that provides a level of assurance for the logic commensurate with the hazard associated with the failure or malfunction of the systems in which the devices are located; and

(2) Substantiated by a verification methodology acceptable to the Administrator.

(d) Validation.

All functional aspects of the control system must be substantiated by test, analysis, or a combination thereof, to show that the engine control system performs the intended functions throughout the declared operational envelope.

(e) Environmental limits.

Environmental limits that cannot be adequately substantiated by endurance demonstration, validated analysis, or a combination thereof must be demonstrated by the system and component tests in AM1.2727.

(f) Engine control system failures.

The engine control system must—

(1) Have a maximum rate of Loss of Power Control (LOPC) that is suitable for the intended aircraft application;

(2) When in the full-up configuration, be single fault tolerant, as determined by the Administrator, for electrical, electrically detectable, and electronic failures involving LOPC events;

(3) Not have any single failure that results in hazardous engine effects; and

(4) Not have any likely failures or malfunctions that lead to local events in the intended aircraft application.

(g) System-safety assessment.

The applicant must perform a system-safety assessment. This assessment must identify faults or failures that affect normal operation, together with the predicted frequency of occurrence of these faults or failures. The intended aircraft application must be taken into account to assure the assessment of the engine control system safety is valid.

(h) Protection systems.

The engine control devices and systems' design and function, together with engine instruments, operating instructions, and maintenance instructions, must ensure that engine operating limits will not be exceeded in-service.

(i) Aircraft-supplied data.

Any single failure leading to loss, interruption, or corruption of aircraft-supplied data (other than power command signals from the aircraft), or aircraft-supplied data shared between engine systems within a single engine or between fully independent engine systems, must—

(1) Not result in a hazardous engine effect, as defined in AM1.2717(d)(2), for any engine installed on the aircraft; and

(2) Be able to be detected and accommodated by the control system.

(j) Engine control system electrical power.

(1) The engine control system must be designed such that the loss, malfunction, or interruption of the control system electrical power source will not result in a hazardous engine effect, as defined in AM1.2717(d)(2), the unacceptable transmission of erroneous data, or continued engine operation in the absence of the control function. The engine control system must be capable of resuming normal operation when aircraft-supplied power returns to within the declared limits.

(2) The applicant must identify and declare, in the engine installation manual, the characteristics of any electrical power supplied from the aircraft to the engine control system for starting and operating the engine, including transient and steady-state voltage limits, or electrical power supplied from the engine to the aircraft via energy regeneration, and any other characteristics necessary for safe operation of the engine.

§ 33.29 Instrument connection.

(a), (e), and (g) [Applicable to Model M001]

(b) through (d) and (h) [Not applicable to the Model M001]

AM1.2711 Instrument Connection

(a) In addition, as part of the system-safety assessment of AM1.2710(g) and AM1.2733(g), the applicant must assess the possibility and subsequent effect of incorrect fit of instruments, sensors, or connectors. Where practicable, the applicant must take design precautions to prevent incorrect configuration of the system.

(b) The applicant must provide instrumentation enabling the flightcrew to monitor the functioning of the engine cooling system unless evidence shows that:

(1) Other existing instrumentation provides adequate warning of failure or impending failure;

(2) Failure of the cooling system would not lead to hazardous engine effects before detection; or

(3) The probability of failure of the cooling system is extremely remote.

AM1.2712 Stress Analysis

(a) A mechanical, thermal, and electromagnetic stress analysis must show a sufficient design margin to prevent unacceptable operating characteristics and hazardous engine effects.

(b) Maximum stresses in the engine must be determined by test, validated analysis, or a combination thereof, and must be shown not to exceed minimum material properties.

AM1.2713 Critical and Life-Limited Parts

(a) The applicant must show, by a safety analysis or means acceptable to the Administrator, whether rotating or moving components, bearings, shafts, static parts, and non-redundant mount components should be classified, designed, manufactured, and managed throughout their service life as critical or life-limited parts.

(1) *Critical part* means a part that must meet prescribed integrity specifications to avoid its primary failure, which is likely to result in a hazardous engine effect as defined in AM1.2717(d)(2).

(2) *Life-limited parts* may include but are not limited to a rotor and major structural static part, the failure of which can result in a hazardous engine effect due to low-cycle fatigue (LCF) mechanism or any LCF-driven mechanism coupled with creep, or other failure mode. A life limit is an operational limitation that specifies the maximum allowable number of flight cycles that a part can endure before the applicant must remove it from the engine.

(b) In establishing the integrity of each critical part or life-limited part, the applicant must provide to the Administrator the following three plans for approval: an engineering plan, a manufacturing plan, and a service-management plan, as defined in § 33.70.

AM1.2714 Lubrication System

(a) The lubrication system must be designed and constructed to function properly between scheduled maintenance intervals in all flight attitudes and atmospheric conditions in which the engine is expected to operate.

(b) The lubrication system must be designed to prevent contamination of the engine bearings and lubrication system components.

(c) The applicant must demonstrate by test, validated analysis, or a combination thereof, the unique lubrication attributes and functional capability of paragraphs (a) and (b) of this section.

AM1.2715 Power Response

The design and construction of the engine, including its control system, must enable an increase—

(a) From the minimum power setting to the highest rated power without detrimental engine effects;

(b) From the minimum obtainable power while in flight, and while on the ground, to the highest rated power within a time interval determined to be safe for aircraft operation; and

(c) From the minimum torque to the highest rated torque without detrimental engine or aircraft effects, to ensure aircraft structural integrity or aircraft aerodynamic characteristics are not exceeded.

AM1.2716 Continued Rotation

If the design allows any of the engine main rotating systems to continue to rotate after the engine is shut down while in-flight, this continued rotation must not result in hazardous engine effects, as specified in AM1.2717(d)(2).

§ 33.75 Safety analysis.

(a)(1) through (a)(2), (d), (e), and (g)(2) [Applicable to Model M001]

(a)(3) through (c), (f), (g)(1), and (g)(3) [Not applicable to Model M001]

AM1.2717 Safety Analysis

(a) The applicant must comply with § 33.75(a)(2) using the failure definitions in paragraph (d) of this section.

(b) If the failure of such elements is likely to result in hazardous engine effects, then the applicant may show compliance by reliance on the prescribed integrity requirements such as § 33.15, AM1.2709, AM1.2713, or combinations thereof, as applicable. The failure of such elements and associated prescribed integrity requirements must be stated in the safety analysis.

(c) The applicant must comply with § 33.75(d) and (e) using the failure definitions in paragraph (d) of this section.

(d) Unless otherwise approved by the Administrator, the following definitions apply to the engine effects when showing compliance with this condition:

(1) A minor engine effect does not prohibit the engine from meeting its type-design requirements and the intended functions in a manner consistent with § 33.28(b)(1)(i), (b)(1)(iii), and (b)(1)(iv), and the engine complies with the operability requirements such as AM1.2715, AM1.2725, and AM1.2731, as appropriate.

(2) The engine effects in § 33.75(g)(2) are hazardous engine effects with the addition of:

(i) Electrocution of the crew, passengers, operators, maintainers, or others; and

(ii) Blockage of cooling systems that are required for the engine to operate within temperature limits.

(3) Any other engine effect is a major engine effect.

(e) The intended aircraft application must be taken into account to assure that the analysis of the engine system safety is valid.

AM1.2718 Ingestion

(a) Ingestion from likely sources (foreign objects, birds, ice, hail) must not result in hazardous engine effects defined by AM1.2717(d)(2), or unacceptable power loss.

(b) Rain ingestion must not result in an abnormal operation such as shutdown, power loss, erratic operation, or power oscillations throughout the engine operating range.

(c) If the design of the engine relies on features, attachments, or systems that the installer may supply, for the prevention of unacceptable power loss or hazardous engine effects following potential ingestion, then the features, attachments, or systems must be documented in the engine installation manual.

(d) Ingestion sources that are not evaluated must be declared in the engine installation manual.

AM1.2719 Liquid Systems

(a) Each liquid system used for lubrication or cooling of engine components must be designed and constructed to function properly in all flight attitudes and atmospheric conditions in which the engine is expected to operate.

(b) If a liquid system used for lubrication or cooling of engine components is not self-contained, the interfaces to that system must be defined in the engine installation manual.

(c) The applicant must establish by test, validated analysis, or a combination of both, that all static parts subject to significant gas or liquid pressure loads will not:

(1) Exhibit permanent distortion beyond serviceable limits or exhibit leakage that could create a hazardous condition when subjected to normal and maximum working pressure with margin.

(2) Exhibit fracture or burst when subjected to the greater of maximum possible pressures with margin.

(d) Compliance with paragraph (c) of this section must take into account:

(1) The operating temperature of the part;

(2) Any other significant static loads in addition to pressure loads;

(3) Minimum properties representative of both the material and the processes used in the construction of the part; and

(4) Any adverse physical geometry conditions allowed by the type design, such as minimum material and minimum radii.

(e) Approved coolants and lubricants must be listed in the engine installation manual.

AM1.2720 Vibration Demonstration

(a) The engine must be designed and constructed to function throughout its normal operating range of rotor speeds and engine output power, including defined exceedances, without inducing excessive stress in any of the engine parts because of vibration and without imparting excessive vibration forces to the aircraft structure.

(b) Each engine design must undergo a vibration survey to establish that the vibration characteristics of those components that may be subject to induced vibration are acceptable throughout the declared flight envelope and engine operating range for the specific installation configuration. The possible sources of the induced vibration that the survey must assess are mechanical, aerodynamic, acoustical, or electromagnetic. This survey must be shown by test, validated analysis, or a combination thereof.

AM1.2721 Overtorque

When approval is sought for a transient maximum engine overtorque, the applicant must demonstrate by test, validated analysis, or a combination thereof, that the engine can continue operation after operating at the maximum engine overtorque condition without maintenance action. Upon conclusion of overtorque tests conducted to show compliance with this subpart, or any other tests that are conducted in combination with the overtorque test, each engine part or individual groups of components must meet the requirements of AM1.2729.

AM1.2722 Calibration Assurance

Each engine must be subjected to calibration tests to establish its power characteristics and the conditions both before and after the endurance and durability demonstrations specified in AM1.2723 and AM1.2726.

AM1.2723 Endurance Demonstration

(a) The applicant must subject the engine to an endurance demonstration, acceptable to the Administrator, to demonstrate the engine's limit capabilities.

(b) The endurance demonstration must include increases and decreases of the engine's power settings, energy regeneration, and dwellings at the power settings or energy regeneration for durations that produce the extreme physical conditions the engine experiences at rated performance levels, operational limits, and at any other conditions or power settings that are required to verify the limit capabilities of the engine.

AM1.2724 Temperature Limit

The engine design must demonstrate its capability to endure operation at its temperature limits plus an acceptable margin. The applicant must quantify and justify to the Administrator the margin at each rated condition. The demonstration must be repeated for all declared duty cycles and associated ratings, and operating environments, that would impact temperature limits.

AM1.2725 Operation Demonstration

The engine design must demonstrate safe operating characteristics, including but not limited to power cycling, starting, acceleration, and overspeeding throughout its declared flight envelope and operating range. The declared engine operational characteristics must account for installation loads and effects.

AM1.2726 Durability Demonstration

The engine must be subjected to a durability demonstration to show that each part of the engine has been designed and constructed to minimize any unsafe condition of the system between overhaul periods or between engine replacement intervals if the overhaul is not defined. This test must simulate the conditions in which the engine is expected to operate in-service, including typical start-stop cycles.

AM1.2727 System and Component Tests

The applicant must show that systems and components will perform their intended functions in all declared environmental and operating conditions.

AM1.2728 Rotor Locking Demonstration

If shaft rotation is prevented by locking the rotor(s), the engine must demonstrate:

(a) Reliable rotor locking performance;

(b) Reliable unlocking performance; and

(c) That no hazardous engine effects, as specified in AM1.2717(d)(2), will occur.

AM1.2729 Teardown Inspection

The applicant must comply with either paragraph (a) or (b) of this section as follows:

(a) Teardown evaluation.

(1) After the endurance and durability demonstrations have been completed, the engine must be completely disassembled. Each engine component and lubricant must be within service limits and eligible for continued operation in accordance with the information submitted for showing compliance with AM1.1529.

(2) Each engine component having an adjustment setting and a functioning characteristic that can be established independent of installation on or in the engine must retain each setting and functioning characteristic within the established and recorded limits at the beginning of the endurance and durability demonstrations.

(b) Non-Teardown evaluation.

If a teardown is not performed for all engine components, then the life limits for these components and lubricants must be established based on the endurance and durability demonstrations and documented in the Instructions for Continued Airworthiness in accordance with AM1.1529.

AM1.2730 Containment

The engine must provide containment features that protect against likely hazards from rotating components as follows—

(a) The design of the case surrounding rotating components must provide for the containment of the rotating components in the event of failure, unless the applicant shows that the margin to rotor burst precludes the possibility of a rotor burst.

(b) If the margin to rotor burst shows that the case must have containment features in the event of failure, the case must provide for the containment of the failed rotating components. The applicant must define by test, validated analysis, or a combination thereof, and document in the engine installation manual, the energy level, trajectory, and size of fragments released from damage caused by the rotor failure, and that pass forward or aft of the surrounding case.

AM1.2731 Operation With a Variable-Pitch Propeller

The applicant must conduct functional demonstrations including feathering, negative torque, negative thrust, and reverse thrust operations, as applicable, with a representative propeller. These demonstrations may be conducted in a manner acceptable to the Administrator as part of the endurance, durability, and operation demonstrations.

AM1.2732 General Conduct of Tests

(a) Maintenance of the engine may be made during the tests in accordance with the service and maintenance instructions submitted in compliance with AM1.1529.

(b) The applicant must subject the engine or its parts to maintenance and additional tests that the Administrator finds necessary if—

(1) The frequency of the service is excessive;

(2) The number of stops due to engine malfunction is excessive;

(3) Major repairs are needed; or

(4) Replacement of a part is found necessary during the tests or due to the teardown inspection findings.

(c) Upon completion of all demonstrations and testing specified in these airworthiness criteria, the engine and its components must be—

(1) Within serviceable limits;

(2) Safe for continued operation; and

(3) Capable of operating at declared ratings while remaining within limits.

AM1.2733 Engine Electrical Systems

(a) Applicability.

Any system or device that provides, uses, conditions, or distributes electrical power, and is part of the engine type design, must provide for the continued airworthiness of the engine and maintain electric engine ratings.

(b) Electrical systems.

The electrical system must ensure the safe generation and transmission of power, electrical load shedding, and the engine does not experience any unacceptable operating characteristics or exceed its operating limits.

(c) Electrical-power distribution.

(1) The engine electrical-power distribution system must be designed to provide the safe transfer of electrical energy throughout the electrical power plant. The system must be designed to provide electrical power so that the loss, malfunction, or interruption of the electrical power source will not result in a hazardous engine effect, as defined in AM1.2717(d)(2).

(2) The system must be designed and maintained to withstand normal and abnormal conditions during all ground and flight operations.

(3) The system must provide mechanical or automatic means of isolating a faulted electrical-energy generation or storage device from affecting the safe transmission of electric energy to the electric engine.

(d) Protection systems.

The engine electrical devices and systems must interrupt transmission of electrical power when power conditions exceed design limits.

(1) The engine electrical system must be designed such that the loss, malfunction, or interruption of the electrical power source will not result in a hazardous engine effect, as defined in AM1.2717(d)(2).

(2) The applicant must identify and declare, in the engine installation manual, the characteristics of any electrical power supplied from the aircraft to the engine, or electrical power supplied to the aircraft from the engine from energy regeneration, systems for starting and operating the engine, including transient and steady-state voltage limits, and any other characteristics necessary for safe operation of the engine.

(e) Environmental limits.

Environmental limits that cannot be adequately substantiated by endurance demonstration, validated analysis, or a combination thereof must be demonstrated by the system and component tests in AM1.2727.

(f) Electrical-system failures.

The engine electrical system must—

(1) Have a maximum rate of Loss of Power Control (LOPC) that is suitable for the intended aircraft application;

(2) When in the full-up configuration, be single fault tolerant, as determined by the Administrator, for electrical, electrically detectable, and electronic failures involving LOPC events;

(3) Not have any single failure that results in hazardous engine effects; and

(4) Not have any likely failure or malfunction that leads to local events in the intended aircraft application.

(g) System-safety assessment.

The applicant must perform a system-safety assessment. This assessment must identify faults or failures that affect normal operation, together with the predicted frequency of occurrence of these faults or failures. The intended aircraft application must be taken into account to assure the assessment of the engine system safety is valid.

SUBPART I—Propeller Requirements

AM1.2805 Propeller Ratings and Operating Limitations

Propeller ratings and operating limitations must be established by the applicant and approved by the Administrator, including ratings and limitations based on the operating conditions and information specified in this subpart, as applicable, and any other information found necessary for safe operation of the propeller.

§ 35.7 Features and characteristics.

(a) through (b) [Applicable to Model M001]

AM1.2815 Safety Analysis

(a) The applicant must:

(1) Analyze the propeller system to assess the likely consequences of all failures that can reasonably be expected to occur. This analysis will take into account, if applicable:

(i) The propeller system when installed on the aircraft. When the analysis depends on representative components, assumed interfaces, or assumed installed conditions, the assumptions must be stated in the analysis.

(ii) Consequential secondary failures and dormant failures.

(iii) Multiple failures referred to in paragraph (d) of this section, or that result in the hazardous propeller effects defined in paragraph (g)(1) of this section.

(2) Summarize those failures that could result in major propeller effects or hazardous propeller effects defined in paragraph (g) of this section, and estimate the probability of occurrence of those effects.

(3) Show that hazardous propeller effects are not predicted to occur at a rate in excess of that defined as extremely remote (probability of 10^{-7} or less per propeller flight hour). Because the estimated probability for individual failures may be insufficiently precise to enable the applicant to assess the total rate for hazardous propeller effects, compliance may be shown by demonstrating that the probability of a hazardous propeller effect arising from an individual failure can be predicted to be not greater than 10^{-8} per propeller flight hour. In dealing with probabilities of this low order of magnitude, absolute proof is not possible, and reliance must be placed on engineering judgment and previous experience, combined with sound design and test philosophies.

(b) If significant doubt exists as to the effects of failures or likely combination of failures, the Administrator may require assumptions used in the analysis to be verified by test.

(c) The primary failures of certain single propeller elements (for example, blades) cannot be sensibly estimated in numerical terms. If the failure of such elements is likely to result in hazardous propeller effects, those elements must be identified as propeller critical parts. For propeller critical parts, the applicant must meet the prescribed integrity specifications of AM1.2816. These instances must be stated in the safety analysis.

(d) If reliance is placed on a safety system to prevent a failure progressing to hazardous propeller effects, the possibility of a safety system failure, in combination with a basic propeller failure, must be included in the analysis. Such a safety system may include safety devices, instrumentation, early warning devices, maintenance checks, and other similar equipment or procedures.

(e) If the safety analysis depends on one or more of the following items, those items must be identified in the analysis and appropriately substantiated.

(1) Maintenance actions being carried out at stated intervals. This includes verifying that items that could fail in a latent manner are functioning properly. When necessary to prevent hazardous propeller effects, these maintenance actions and intervals must be published in the Instructions for Continued Airworthiness required under AM1.1529. Additionally, if errors in maintenance of the propeller system could lead to hazardous propeller effects, the appropriate maintenance procedures must be included in the relevant propeller manuals.

(2) Verification of the satisfactory functioning of safety or other devices at pre-flight or other stated periods. The details of this satisfactory functioning must be published in the appropriate manual.

(3) The provision of specific instrumentation not otherwise required. Such instrumentation must be published in the appropriate documentation.

(4) A fatigue assessment.

(f) If applicable, the safety analysis must include, but not be limited to, assessment of indicating equipment, manual and automatic controls, governors and propeller-control systems, synchrophasers, synchronizers, and propeller thrust reversal systems.

(g) Unless otherwise approved by the Administrator and stated in the safety analysis, the following failure definitions apply to compliance with these airworthiness criteria.

(1) The following are regarded as hazardous propeller effects:

(i) The development of excessive drag.

(ii) A significant thrust in the opposite direction to that commanded by the pilot.

(iii) The release of the propeller or any major portion of the propeller.

(iv) A failure that results in excessive unbalance.

(2) The following are regarded as major propeller effects for variable-pitch propellers:

(i) An inability to feather the propeller for feathering propellers.

(ii) An inability to change propeller pitch when commanded.

(iii) A significant uncommanded change in pitch.

(iv) A significant uncontrollable torque or speed fluctuation.

AM1.2816 Propeller Critical Parts

The integrity of each propeller critical part identified by the safety analysis required by AM1.2815 must be established by:

(a) A defined engineering process for ensuring the integrity of the propeller critical part throughout its service life,

(b) A defined manufacturing process that identifies the requirements to consistently produce the propeller critical part as required by the engineering process, and

(c) A defined service-management process that identifies the continued airworthiness requirements of the propeller critical part as required by the engineering process.

§ 35.17 Materials and manufacturing methods.

(a) through (c) [Applicable to Model M001]

§ 35.19 Durability.

[Applicable to Model M001]

AM1.2821 Variable- and Reversible-Pitch Propellers

(a) No single failure or malfunction in the propeller system will result in unintended travel of the propeller blades to a position below the in-flight low-pitch position. The extent of any intended travel below the in-flight low-pitch position must be documented by the applicant in the appropriate manuals. Failure of structural elements need not be considered if the occurrence of such a failure is shown to be extremely remote under AM1.2815.

(b) For propellers incorporating a method to select blade pitch below the in-flight low-pitch position, provisions must be made to sense and indicate to the flightcrew that the propeller blades are below that position by an amount defined in the installation instructions. The method for sensing and indicating the propeller blade pitch position must be such that its failure does not affect the control of the propeller.

§ 35.22 Feathering propellers.

(a) through (c) [Applicable to Model M001]

AM1.2823 Propeller Control System

The requirements of this section apply to any system or component that controls, limits, or monitors propeller functions.

(a) The propeller control system must be designed, constructed and validated to show that:

(1) The propeller control system, operating in normal and alternative operating modes and in transition between operating modes, performs the functions defined by the applicant throughout the declared operating conditions and flight envelope.

(2) The propeller control system functionality is not adversely affected by the declared environmental conditions, including temperature, electromagnetic interference (EMI), high intensity radiated fields (HIRF), and lightning. The environmental limits to which the system has been satisfactorily validated must be documented in the appropriate propeller manuals.

(3) A method is provided to indicate that an operating mode change has occurred if flightcrew action is required. In such an event, operating instructions must be provided in the appropriate manuals.

(b) The propeller control system must be designed and constructed so that, in addition to compliance with AM1.2815:

(1) No single failure results in a hazardous propeller effect; and

(2) No likely failures or malfunctions lead to local events in the intended aircraft installation.

(c) Electronic propeller-control-system embedded software must be designed and implemented by a method approved by the Administrator that is consistent with the criticality of the performed functions and that minimizes the existence of software errors.

(d) The propeller control system must be designed and constructed so that the failure or corruption of aircraft-supplied data does not result in hazardous propeller effects.

(e) The propeller control system must be designed and constructed so that the loss, interruption, or abnormal characteristic of aircraft-supplied electrical power does not result in hazardous propeller effects. The power quality requirements must be described in the appropriate manuals.

§ 35.24 Strength.

[Applicable to Model M001]

§ 35.33 General.

(a) through (c) [Applicable to Model M001]

§ 35.34 Inspections, adjustments, and repairs.

(a) through (b) [Applicable to Model M001]

§ 35.35 Centrifugal load tests.

(a) through (c) [Applicable to Model M001]

§ 35.36 Bird impact.

[Applicable to Model M001]

§ 35.37 Fatigue limits and evaluation.

(a) through (c) [Applicable to Model M001, except replace the reference to § 35.15 with AM1.2815, and the reference to ''§ 23.2400(c) or § 25.907'' with AM1.2400(c)]

§ 35.38 Lightning strike.

[Applicable to Model M001]

§ 35.39 Endurance test.

(a) through (c) [Applicable to Model M001, except replace the reference to ''part 33'' with ''these airworthiness criteria'']

AM1.2840 Functional Test

The variable-pitch propeller system must be subjected to the applicable functional tests of this section. The same propeller system used in the endurance test of § 35.39 must be used in the functional tests and must be driven by a representative engine on a test stand or on the aircraft. The propeller must complete these tests without evidence of failure or malfunction. This test may be combined with the endurance test for accumulation of cycles.

(a) Governing and reversible-pitch propellers. Thirteen-hundred complete cycles must be made across the range of forward pitch and rotational speed. In addition, 200 complete cycles of control must be made from lowest normal pitch to maximum reverse pitch. During each cycle, the propeller must run for 30 seconds at the maximum power and rotational speed selected by the applicant for maximum reverse pitch.

(b) Feathering propellers. Fifty cycles of feather and unfeather operation must be made.

(c) An analysis based on tests of propellers of similar design may be used in place of the tests of this section.

§ 35.41 Overspeed and overtorque.

(a) through (b) [Applicable to Model M001]

§ 35.42 Components of the propeller control system.

[Applicable to Model M001]

§ 35.43 Propeller hydraulic components.

(a) through (b) [Applicable to Model M001]

Appendix A to Part 23—Instructions for Continued Airworthiness

A23.1 through A23.3(g) and A23.4 [Applicable to Model M001]

A23.3(h) [Not applicable to Model M001]

Appendix A1—Instructions for Continued Airworthiness (Electric Engine)

AAM1.2701 General

(a) This appendix specifies requirements for the preparation of Instructions for Continued Airworthiness for the engines as required by AM1.1529.

(b) The Instructions for Continued Airworthiness for the engine must include the Instructions for Continued Airworthiness for all engine parts.

(c) The applicant must submit to the FAA a program to show how the applicant's changes to the Instructions for Continued Airworthiness will be distributed, if applicable.

A33.2 Format

(a) through (b) [Applicable to Model M001]

A33.3 Content

(a) and (b) [Applicable to Model M001]

(c) [Not applicable to Model M001]

A33.4 Airworthiness Limitations Section

(a) [Applicable to Model M001]

(b) [Not applicable to Model M001]

Appendix A2—Instructions for Continued Airworthiness (Propellers)

AAM1.2801 General

(a) This appendix specifies requirements for the preparation of Instructions for Continued Airworthiness for the propellers as required by AM1.1529.

(b) The Instructions for Continued Airworthiness for the propeller must include the Instructions for Continued Airworthiness for all propeller parts.

(c) The applicant must submit to the FAA a program to show how changes to the Instructions for Continued Airworthiness made by the applicant or by the manufacturers of propeller parts will be distributed, if applicable.

A35.2 Format

(a) through (b) [Applicable to Model M001]

A35.3 Content

(a) through (b) [Applicable to Model M001]

A35.4 Airworthiness Limitations Section

[Applicable to Model M001]

Issued in Washington, DC, on December 12, 2022.

Victor W. Wicklund,

Acting Director, Policy and Innovation Division, Aircraft Certification Service.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2022–1650; Project Identifier MCAI–2022–00210–T]

RIN 2120–AA64

Airworthiness Directives; Airbus Canada Limited Partnership (Type Certificate Previously Held by C Series Aircraft Limited Partnership (CSALP); Bombardier, Inc.) Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to adopt a new airworthiness directive (AD) for certain Airbus Canada Limited Partnership Model BD–500–1A11 airplanes. This proposed AD was prompted by a report that the nose radome lightning diverter strips on certain aircraft were painted in production; paint on the diverter strips can compromise the nose radome lightning protection. This proposed AD would require inspecting for paint on the diverter strips on the nose radome, and replacing the nose radome if necessary, as specified in a Transport Canada AD, which is proposed for incorporation by reference (IBR). The FAA is proposing this AD to address the unsafe condition on these products.

DATES: The FAA must receive comments on this proposed AD by February 3, 2023.

ADDRESSES: You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- *Federal eRulemaking Portal:* Go to *regulations.gov*. Follow the instructions for submitting comments.
- *Fax:* 202–493–2251.
- *Mail:* U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.
- *Hand Delivery:* Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

AD Docket: You may examine the AD docket at *regulations.gov* under Docket No. FAA–2022–1650; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this NPRM, the mandatory continuing airworthiness information (MCAI), any comments received, and other information. The street address for Docket Operations is listed above.

Material Incorporated by Reference:

- For material that is proposed for IBR in this NPRM, contact Transport Canada, Transport Canada National Aircraft Certification, 159 Cleopatra Drive, Nepean, Ontario K1A 0N5, Canada; telephone 888–663–3639; email *AD-CN@tc.gc.ca;* website *tc.canada.ca/en/aviation.* It is also available at regulations.gov under Docket No. FAA–2022–1650.
- For service information identified in this NPRM, contact Airbus Canada Limited Partnership, 13100 Henri-Fabre Boulevard, Mirabel, Québec, J7N 3C6, Canada; telephone 450–476–7676; email *a220__crc@abc.airbus*; website *a220world.airbus.com.*
- You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206–231–3195.

FOR FURTHER INFORMATION CONTACT: Steven Dzierzynski, Aerospace Engineer, Avionics and Electrical Systems Section, FAA, New York ACO Branch, 1600 Stewart Avenue, Suite 410, Westbury, NY 11590; telephone 516–228–7367; email *9-avs-nyaco-cos@faa.gov.*

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites you to send any written relevant data, views, or arguments about this proposal. Send your comments to an address listed under **ADDRESSES**. Include ''Docket No. FAA–2022–1650; Project Identifier MCAI–2022–00210–T'' at the beginning of your comments. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this proposal because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to *regulations.gov*, including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this NPRM.

Confidential Business Information

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as ''PROPIN.'' The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this NPRM. Submissions containing CBI should be sent to Steven Dzierzynski, Aerospace Engineer, Avionics and Electrical Systems Section, FAA, New York ACO Branch, 1600 Stewart Avenue, Suite 410, Westbury, NY 11590; telephone 516–228–7367; email *9-avs-nyaco-cos@faa.gov.* Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

Background

Transport Canada, which is the aviation authority for Canada, has issued Transport Canada AD CF–2022–04, dated February 14, 2022 (Transport Canada AD CF–2022–04) (also referred to as the MCAI), to correct an unsafe condition for certain Airbus Canada Limited Partnership Model BD–500–1A11 airplanes. The MCAI states that the radome lightning diverter strips on certain aircraft were painted in production; paint on the diverter strips can compromise the radome lightning protection. Reduced effectiveness of the diverter strips can lead to the puncture of the nose radome by lightning and potential arc attachment to antennas, structures, and other equipment in the area of the radome. The unsafe condition, if not addressed, could result in damage to the localizer or glideslope antennas, and consequent loss of instrument landing system localizer inputs or deviation information.

The FAA is proposing this AD to address the unsafe condition on these products. You may examine the MCAI