



[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 27

[Docket No.FAA-2019-0106; Notice No. 27-046-SC]

Special Conditions: Robinson Helicopter Company, Model Robinson R66, Visual Flight Rules Autopilot and Stability Augmentation System (AP/SAS System).

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This action proposes special conditions for the Robinson Helicopter Company (Robinson) Model R66 helicopter. This helicopter will have a novel or unusual design feature associated with installation of the autopilot and stability augmentation system (AP/SAS system). The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: Send your comments on or before **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Send comments identified by docket number [FAA-2019-XXXX] 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, D.C., 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, S.E., Washington, D.C., 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, D.C., between 9 a.m., and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Andy Shaw, Aerospace Engineer, FAA, Rotorcraft Standards Branch, Policy and Innovation Division, 10101 Hillwood Pkwy, Fort Worth, TX 76177; telephone (817) 222-5384; email Andy.Shaw@faa.gov.

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

The FAA will consider all comments it receives on or before the closing date for comments. The FAA will consider comments filed late if it is possible to do so without incurring expense or delay. The FAA may change these special conditions based on the comments it receives.

Background

On June 8, 2018, Robinson applied to amend type certificate (TC) Number R00015LA to install an AP/SAS system on the Robinson Model R66 helicopter. The Robinson Model R66 helicopter is a 14 CFR part 27 normal category, single turbine engine, conventional helicopter designed for civil operation. This helicopter model is capable of carrying up to four passengers with one pilot and has a maximum gross weight of up to 2,700 pounds, depending on the model configuration. The major design features include a 2-blade main rotor, an anti-torque tail rotor system, a skid landing gear, and a visual flight rule basic avionics configuration. Robinson proposes to modify this model helicopter by installing an AP/SAS system.

The AP/SAS system provides attitude stabilization in two or three axes (pitch and roll with optional yaw) as well as higher-level autopilot functions such as altitude hold, heading command and navigation tracking. However, the possible failure conditions for this system, and their effect on the continued safe flight and landing of the helicopter, are more severe than those envisioned by the present rules.

The effect on safety is not adequately covered under 14 CFR 27.1309 for the application of new technology and new application of standard technology. Specifically, the present provisions of § 27.1309(c) do not adequately address the safety requirements for systems whose failures could result in catastrophic or hazardous/severe-major failure conditions, or for complex systems whose failures could result in major failure conditions. The current regulations are inadequate because when § 27.1309(c) were promulgated, it was not envisioned that this type of rotorcraft would use systems that are complex or whose failure could result in "catastrophic" or "hazardous/severe-major" effects on the rotorcraft. This is particularly true with the application of new technology, new application of standard technology, or other applications not envisioned by the rule that affect safety.

Type Certification Basis

Under 14 CFR 21.101, Robinson must show that the Model R66 helicopter, as modified by the installed AP/SAS, continues to meet the applicable regulations in effect on the date of application for the change to the type certificate. The baseline certification basis for the unmodified Robinson Model R66 helicopter is listed in TC Number R00015LA. Additionally, compliance must be shown to any applicable equivalent level of safety findings, exemptions, and special conditions prescribed by the Administrator as part of the certification basis.

The Administrator has determined the applicable airworthiness regulations (that is, 14 CFR part 27), as they pertain to this amended TC, do not contain adequate or appropriate safety standards for the Robinson Model R66 helicopter because of a novel or unusual design feature. Therefore, special conditions are prescribed under § 21.16.

In addition to the applicable airworthiness regulations and special conditions, Robinson must show compliance of the AP/SAS amended TC altered model R66 helicopter with the noise certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in § 11.19, in accordance with § 11.38 and they become part of the type certification basis under § 21.101(d).

Novel or Unusual Design Features

The Robinson Model R66 helicopter will incorporate the following novel or unusual design features: AP/SAS. The AP/SAS performs non-critical control functions.

Discussion

To comply with the provisions of the special conditions, the FAA proposes to require that Robinson provide the FAA with a systems safety assessment (SSA) for the final AP/SAS installation configuration that will adequately address the safety objectives established by a functional hazard assessment (FHA). This process will ensure that all failure conditions and their resulting effects are adequately addressed for the installed AP/SAS. The SSA process is part of the overall safety assessment process discussed in FAA Advisory Circular 27-1B, Certification of Normal Category Rotorcraft, and Society of Automotive Engineers document Aerospace Recommended Practice 4761, Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment.

These proposed special conditions would require that the AP/SAS installed on a Robinson Model R66 helicopter meet the requirements to adequately address the failure effects identified by the FHA, and subsequently verified by the SSA, within the defined design integrity requirements.

Failure conditions are classified according to the severity of their effects on the rotorcraft.

Radio Technical Commission for Aeronautics, Inc. (RTCA) Document DO-178C, Software Considerations in Airborne Systems and Equipment Certification, provides software design assurance levels most commonly used for the major, hazardous/severe-major, and catastrophic failure condition categories. The AP/SAS system equipment must be qualified for the expected installation environment. The test procedures prescribed in RTCA Document DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment, are recognized by the FAA as acceptable methodologies for finding compliance with the environmental requirements. Equivalent environment test standards may also be acceptable. Environmental qualification provides data to show that the AP/SAS system can perform its intended function under the expected operating condition. Some of the main considerations for environmental concerns are installation locations and the resulting exposure to environmental conditions for the AP/SAS system equipment, including considerations for other equipment that may also be affected environmentally by the AP/SAS equipment installation. The level of environmental qualification must be related to the severity of the considered failure conditions and effects on the rotorcraft.

Applicability

These special conditions are applicable to the AP/SAS installed as an amended TC approval in Robinson Model R66 helicopter, TC Number R00015LA.

Conclusion

This action affects only certain novel or unusual design features for an AP/SAS amended TC installed on one model helicopter. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of these features.

List of Subjects in 14 CFR Part 27

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows :

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the amended type certification basis for installation of the AP/SAS system on Robinson Model R66 helicopters.

Instead of the requirements of 14 CFR 27.1309(b) and (c), the following must be met for certification of the AP/SAS system installed on Robinson Model R66 helicopters :

a. The equipment and systems must be designed and installed so that any equipment and systems do not adversely affect the safety of the rotorcraft or its occupants.

b. The rotorcraft systems and associated components considered separately and in relation to others systems, must be designed and installed so that:

(1) The occurrence of any catastrophic failure condition is extremely improbable;

(2) The occurrence of any hazardous failure condition is extremely remote; and

(3) The occurrence of any major failure condition is remote.

c. Compliance with the requirements of these special conditions may be shown by a variety of methods, which typically consist of analysis, flight tests, ground tests, and simulation, as a minimum. Compliance methodology is related to the associated failure condition category. Compliance with the requirements for failure conditions classified as "major" may be shown by analysis, in combination with appropriate testing to validate the analysis. Compliance with the requirements for failure conditions classified as "hazardous/severe-major" may be shown by flight-testing in combination with analysis and simulation, and the appropriate testing to validate the analysis. Flight tests may be

limited for “hazardous/severe-major” failure conditions and effects due to safety considerations. Compliance with the requirements for failure conditions classified as "catastrophic" may be shown by analysis, and appropriate testing in combination with simulation to validate the analysis. Very limited flight tests in combination with simulation are used as a part of a showing of compliance for “catastrophic” failure conditions. Flight tests are performed only in circumstances that use operational variations, or extrapolations from other flight performance aspects to address flight safety.

d. These special conditions require that the AP/SAS system installed on a Robinson Model R66 helicopter, Type Certificate Number R00015LA, meet these requirements to adequately address the failure effects identified by the FHA, and subsequently verified by the SSA, within the defined design system integrity requirements.

e. Information concerning an unsafe system operating condition must be provided in a timely manner to the crew to enable them to take appropriate corrective action. An appropriate alert must be provided if immediate pilot awareness and immediate or subsequent corrective action is required. Systems and controls, including indications and annunciations, must be designed to minimize crew errors that could create additional hazards.

Issued in Fort Worth, Texas on June 19, 2019.

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