DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 27 and 29

[Docket No. FAA–2006–25414; Notice No. 06–11]

RIN 2120–AH87

Performance and Handling Qualities Requirements for Rotorcraft

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA is proposing new and revised airworthiness standards for normal and transport category rotorcraft due to technological advances in design and operational trends in normal and transport rotorcraft performance and handling qualities. The changes would enhance the safety standards for performance and handling qualities to reflect the evolution of rotorcraft capabilities.

DATES: Send your comments on or before October 23, 2006.

ADDRESSES: You may send comments [identified by Docket Number FAA–2006–25414] using any of the following methods:

- DOT Docket Web site: Go to *http://dms.dot.gov* and follow the instructions for sending your comments electronically.
- Government-wide rulemaking Web site: Go to *http://www.regulations.gov* and follow the instructions for sending your comments electronically.
- Mail: Docket Management Facility, U.S. Department of Transportation, 400 Seventh Street, SW., Nassif Building, Room PL–401, Washington, DC 20590–0001.
- Fax: 1–202–493–2251.
- Hand Delivery: Room PL–401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For more information on the rulemaking process, see the **SUPPLEMENTARY INFORMATION** section of this document.

Privacy: We will post all comments we receive, without change, to *http://dms.dot.gov,* including any personal information you provide. For more information, see the Privacy Act discussion in the **SUPPLEMENTARY INFORMATION** section of this document.

Docket: To read background documents or comments received, go to *http://dms.dot.gov* at any time or to Room PL–401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Jeff Trang, Rotorcraft Standards Staff, Rotorcraft Directorate, ASW–110, Federal Aviation Administration, Fort Worth, Texas 76193–0110, telephone number (817) 222–5135; facsimile (817) 222–5961, e-mail *jeff.trang@faa.gov.*

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. We also invite comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this preamble between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. You may also review the docket using the Internet at the web address in the **ADDRESSES** section.

Privacy Act: Using the search function of our docket Web site, anyone can find and read the comments received into any of our dockets, including the name of the individual sending the comment (or signing the comment on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19477–78) or you may visit *http://dms.dot.gov.*

Before acting on this proposal, we will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring expense or delay. We may change this proposal in light of the comments we receive.

If you want the FAA to acknowledge receipt of your comments on this proposal, include with your comments a pre-addressed, stamped postcard on which the docket number appears. We will stamp the date on the postcard and mail it to you.

Proprietary or Confidential Business Information

Do not file in the docket information that you consider to be proprietary or confidential business information. Send or deliver this information directly to the person identified in the **FOR FURTHER INFORMATION CONTACT** section of this document. You must mark the information that you consider proprietary or confidential. If you send the information on a disk or CD–ROM, mark the outside of the disk or CD–ROM and also identify electronically within the disk or CD–ROM the specific information that is proprietary or confidential.

Under 14 CFR 11.35(b), when we are aware of proprietary information filed with a comment, we do not place it in the docket. We hold it in a separate file to which the public does not have access, and place a note in the docket that we have received it. If we receive a request to examine or copy this information, we treat it as any other request under the Freedom of Information Act (5 U.S.C. 552). We process such a request under the DOT procedures found in 49 CFR part 7.

Availability of Rulemaking Documents

You can get an electronic copy using the Internet by:

(1) Searching the Department of Transportation's electronic Docket Management System (DMS) Web page (*http://dms.dot.gov/search*);

(2) Visiting the FAA's Regulations and Policies Web page at *http://www.faa.gov/regulations_policies/*; or

(3) Accessing the Government Printing Office's Web page at *http://www.gpoaccess.gov/fr/index.html.*

You can also get a copy by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267–9680. Make sure to identify the docket number, notice number, or amendment number of this rulemaking.

Authority for This Rulemaking

The FAA's authority to issue rules regarding aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, ''General requirements,'' Section 44702, ''Issuance of Certificates,'' and

Section 44704, ''Type Certificates, production certificates, and airworthiness certificates.'' Under Section 44701, the FAA is charged with prescribing regulations and minimum standards for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. Under Section 44702, the FAA may issue various certificates including type certificates, production certificates, air agency certificates, and airworthiness certificates. Under Section 44704, the FAA shall issue type certificates for aircraft, aircraft engines, propellers, and specified appliances when the FAA finds that the product is properly designed and manufactured, performs properly, and meets the regulations and minimum prescribed standards. This regulation is within the scope of these authorities because it would promote safety by updating the existing minimum prescribed standards, used during the type certification process, to reflect the enhanced performance and handling quality capabilities of rotorcraft. It would also harmonize this standard with international standards for evaluating the performance and handling qualities of normal and transport category rotorcraft.

Background

Statement of the Problem

Due to technological advances in design and operational trends in normal and transport rotorcraft performance and handling qualities, the FAA is proposing new and revised airworthiness standards. Some current part 27 and 29 regulations do not reflect, in some cases, safety levels attainable by modern rotorcraft, and FAA-approved equivalent level of safety findings.

History

It has been more than 20 years since the last major promulgation of rules that address the performance and handling qualities of rotorcraft (Amendments 29–24 and 27–21, 49 FR 44433 and 49 FR 44436, November 6, 1984). Since then, the FAA has developed policy and procedures that address certain aspects of these requirements to make the parts 27 and 29 rules workable within the framework of later rotorcraft designs and operational needs. In addition, most manufacturers have routinely exceeded some of the minimum performance requirements in part 27 and 29 of Title 14 of the Code of Federal Regulation (CFR) to meet customer needs.

After the publication of the first issue of the Joint Aviation Regulations (JAR) for parts 27 and 29, which closely mirrored 14 CFR part 29 at amendment 31 and 14 CFR part 27 at amendment 27, the European Joint Aviation Authorities (JAA) Helicopter Airworthiness Study Group (HASG) and the FAA agreed to form a specialist subgroup to review proposals on flight matters that were not incorporated during promulgation of the JAR. This subgroup consisted of representatives of the JAA, Association of European des Constructeurs de Material Aerospatiale (AECMA), Aerospace Industries Association of America (AIA), and the FAA.

The subgroup first met in January 1994, and presented their findings to the HASG and the FAA in May 1994. The FAA announced the formation of the Performance and Handling Qualities Requirements Harmonization Working Group (PHQHWG) in the **Federal Register** (60 FR 4220, January 20, 1995) to act on the recommendation presented to the HASG and the FAA by the specialist subgroup. The PHQHWG was charged with recommending to the Aviaiton Rulemaking Advisory Committee (ARAC) new or revised standards for flight-test procedures and requirements. The PHQHWG was tasked to ''Review Title 14 Code of Federal Regulations part 27 and Appendix B, and part 29 and Appendix B, and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy relative to the issue of harmonizing performance and handling qualities requirements.''

The PHQHWG included representatives that expressed an interest by responding to the notice the FAA published in the **Federal Register**. The PHQHWG included representatives from the AIA, the AECMA, the European JAA, Transport Canada, and the FAA Rotorcraft Directorate. Additionally, the PHQHWG consulted representatives from the manufacturers of small rotorcraft. This broad participation is consistent with the FAA policy to involve all known interested parties as early as practicable in the rulemaking process. The PHQHWG first met in March 1995 and has subsequently met nine times.

General Discussion of the Proposals

Using the report submitted to the HASG as a starting point, the PHQHWG agreed there was a need to update the rotorcraft performance and handling qualities standards. As the meetings progressed, the group evaluated additional internally generated proposals to change the performance and handling qualities requirements that were believed to be pertinent to the group's task. These proposals were either accepted or rejected on their merits and by consensus of the group. The group also came to a common understanding of some acceptable methods of compliance for the proposals as well as the current requirements, and appropriate Advisory Circular material was developed concurrently with this proposed rule.

There was much discussion in the working group about the evolution of the Appendix B Instrument Flight Rules (IFR) flight characteristic requirements. Early IFR helicopters were developed using relatively simple analog systems consisting primarily of two or three-axis rate damping with, in some cases, attitude or heading hold features. Today, there are complex digital automatic flight control systems or flight management systems available with highly redundant system architectures. These highly complex systems may have enough redundancy or compensating features to allow system operating characteristics as well as acceptable aircraft handling qualities to be maintained in degraded modes of operation. Due to the difficulty of adequately addressing all the various elements of these complex systems and the associated flight characteristics, it was decided not to initiate parts 27 and 29 rulemaking addressing these complex systems at this time, and that the certification requirements for these types of complex systems would be handled on a case-by-case basis within the current regulatory structure.

Section-by-Section Discussion of the Proposals

Section 27.25 Weight Limits

Paragraph (a)(1)(iv) would be added to formalize the equivalent level of safety findings by establishing a maximum weight limit if the requirements in § 27.79 or § 27.143(c)(1) cannot be met. Some recent certifications of part 27 rotorcraft have required placing weight, altitude, and temperature limitations in the Rotorcraft Flight Manual (RFM) to achieve an equivalent level of safety with certain flight requirements. Specifically, the requirement for controllability near the ground while at maximum weight and 7,000 feet density altitude and the requirement to establish the height-speed envelope at maximum weight or the highest weight allowing for hover out-of-ground-effect (OGE) for altitudes above sea level are considered a minimum level of safety for normal category rotorcraft. If compliance with these minimum standards is reached, the resultant data is put in the flight manual as performance information. In some cases, an equivalent level of safety

has been attained by prohibiting certain operations and including limitations in the RFM that reflect the actual capability of the rotorcraft.

Section 29.25 Weight Limits

Amendments 29–21 (48 FR 4374, January 31, 1983) and 29–24 (49 FR 44422, November 6, 1984) granted relief to certain operating limitations for Category B certificated rotorcraft with a passenger seating capacity of nine or less. These amendments stated that, for these rotorcraft, the hover controllability requirements of § 29.143(c) should not be operating limitations. However, these amendments did not specifically include language that would assure appropriate limitations are provided in the RFM. The FAA has determined that it is necessary to establish appropriate limitations to ensure safe aircraft operations within the demonstrated performance envelope of the helicopter. This proposed rule would amend § 29.25 by requiring that the maximum weights, altitudes, and temperatures demonstrated for compliance with § 29.143(c), which may also include limited wind azimuths, become operating limitations.

New § 27.49 Performance at Minimum Operating Speed (Formerly § 27.73)

This proposed rule would redesignate § 27.73 as § 27.49 and add a requirement to determine the OGE hover performance. Installed engine power available on normal category helicopters has increased significantly since the promulgation of the original part 27 requirement, particularly for hot-day and high-altitude conditions. As a result, OGE helicopter operations once limited to special missions have become common. Most manufacturers present OGE hover performance data in approved flight manuals, although these data are not currently required. This change would mandate the current industry practice and require that OGE hover data be determined throughout the range of weights, altitudes, and temperatures.

Section 27.51 Takeoff

The proposed rule would revise the wording of § 27.51 to recognize that the most critical center-of-gravity (CG) may not be the extreme forward CG, and would require that tests be performed at the most critical CG configuration and at the maximum weight for which takeoff certification is requested. The current standard requires that tests be performed at the extreme forward CG and at a weight selected by the applicant for altitudes above sea level. Although for most rotorcraft the extreme forward CG is most critical, this may not be true for all rotorcraft, and the proposed language would provide for such possibilities. This change to § 27.51 more clearly states the intent of the current rule, which is to demonstrate engine failure along the takeoff flight path at the weight for which takeoff data are provided. The requirement to demonstrate safe landings after an engine failure at any point along the takeoff path up to the maximum takeoff altitude or 7,000 feet, whichever is less, has been clarified to explicitly state that the altitudes cited in the requirement are density altitudes.

Section 27.75 Landing

The proposed rule would revise § 27.75(a) to state the required flight condition in more traditional rotorcraft terminology. Included in this revision to § 27.75(a) is the requirement for multi-engine helicopters to demonstrate landings with one engine inoperative and initiated from an established approach. The proposed rule would also make a minor revision in the text of paragraph (a) of this section by replacing the word ''glide'' with ''autorotation.''

Section 27.79 Limiting Height-Speed Envelope

The proposed rule would revise § 27.79(a)(1) to include the words ''density altitude'' after ''7000 feet.'' The proposed rule would also revise § 27.79(a)(2) by removing the word ''lesser'' from the first sentence. This change reflects that current OGE weights for helicopters are not necessarily less than the maximum weight at sea level. Additionally, in § 27.79(b)(2), the term ''greatest power'' is removed and replaced with language that more clearly states the power to be used on the remaining engine(s) for multi-engine helicopters. This ''minimum installed specification power'' is the minimum uninstalled specification engine power after it is corrected for installation losses. The specific text in the proposed rule of the ambient conditions that define the engine power to be used during the compliance demonstration is consistent with existing advisory material and current industry practice.

Section 27.143 Controllability and Maneuverability

This proposed rule would revise § 27.143(a)(2)(v) to replace the word ''glide'' with ''autorotation.'' This minor change does not affect the method of compliance but states the required flight condition in more traditional rotorcraft terminology.

This proposed rule would re-designate § 27.143(c) paragraphs (1) through (4). Paragraph (4) would become paragraph (1) and paragraphs (1), (2), and (3) would become paragraphs (i), (ii), and (iii). Paragraph (c) in § 27.143 is rewritten to more clearly state that controllability on or near the ground must be demonstrated throughout a range of speeds from zero to at least 17 knots. The current part 27 rule could lead some applicants to conclude that only a 17-knots controllability data point must be considered. That was not the intent of the current part 27 requirement. The most critical speed may be less than 17 knots. Additionally, the altitude requirement is clarified with the addition of the words ''density altitude.''

Section 27.143(c)(2) is revised to require that controllability be determined at altitudes above 7,000 feet density altitude if takeoff and landing data are scheduled above that altitude. Currently, no requirement exists to determine controllability above 7,000 feet, even though takeoff and landing data may be presented above that altitude. With the advent of lighter and more powerful engines, it is not uncommon for rotorcraft to operate at altitudes that, until recently, were limited to a small number of rotorcraft performing very specialized operations. Since more rotorcraft are operating at these altitudes, safety dictates that controllability and maneuverability be determined above 7,000 feet.

The proposed rule would add § 27.143(d) to require the determination of controllability for wind velocities from zero to at least 17 knots OGE at weights selected by the applicant. Operations in support of law enforcement, search and rescue, and media coverage are often performed in such a manner that the rotorcraft performance in rearward or quartering flight is important in accomplishing the mission. This new requirement in § 27.143(d), in conjunction with the proposed OGE hover requirement of § 27.49, would increase the level of safety by requiring additional performance information.

Section 29.143 Controllability and Maneuverability

The proposed rule would revise § 29.143(a)(2)(v) to replace the word ''glide'' with ''autorotation.'' This minor change does not affect the method of compliance but states the required flight condition in more traditional rotorcraft terminology.

Paragraph (c) in section § 29.143 would be rewritten to clarify that

controllability on or near the ground must be demonstrated throughout a range of speeds from zero to at least 17 knots. The current part 29 rule could lead some applicants to the conclusion that only a 17-knot controllability data point must be considered when, in fact, the most critical speed may be less than 17 knots. This proposed rule would add paragraph (c)(4) to § 29.143 to explicitly require that controllability be determined for wind velocities up to at least 17 knots, at an altitude from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft. This proposed rule reflects current practice.

This proposed rule would add paragraph (d) to § 29.143 to require that controllability be determined for wind velocities up to at least 17 knots OGE at weights selected by the applicant. Today, operations in support of law enforcement, search and rescue, and media coverage will often be performed in such a manner that the rotorcraft performance in rearward or quartering flight are of a safety concern.

Sections 27.173 and 29.173 Static Longitudinal Stability

A minor clarification change is proposed to paragraph (a) in §§ 27.173 and 29.173 to change ''a speed'' to ''an airspeed.'' Paragraph (b) would be combined with paragraph (c) in §§ 27.173 and 29.173 to allow neutral or negative static stability in limited areas of the flight envelope, if adequate compensating characteristics are present and the pilot can maintain airspeed within 5 knots of the desired trim speed during the conditions specified in §§ 27.175 and 29.175.

The ability to maintain appropriate airspeed control during other flight conditions would be tested under §§ 27.143 and 29.143. Neutral or negative static longitudinal stability in limited flight domains has been allowed for numerous rotorcraft under equivalent level of safety findings when adequate compensating features have been present. The satisfactory experience gained with these equivalent safety findings has provided the basis for the proposed change. Historically, these limited flight domains have been encountered at the aft limit of the weight/CG envelopes during descent, or autorotation, or climb stability demonstrations. Historically, negative longitudinal control position gradient versus airspeed has generally been no more than 2 to 3 percent of the total control travel.

Additionally, these proposals would delete the §§ 27.173(c) and 29.173(c) requirements relating to the hover demonstration specified in the current §§ 27.175(d) and 29.175(d). See additional discussion at §§ 27.175 and 29.175.

Sections 27.175 and 29.175 Demonstration of Static Longitudinal Stability

The proposals in paragraphs (a) and (b) would decrease the speed range about the specified trim speeds to more representative values than are currently contained in the rule. A new paragraph (c) would require an additional level flight demonstration point. The current paragraph (c) would be re-designated as paragraph (d), and the current paragraph (d) containing the hover demonstration would be deleted.

Some current requirements in §§ 27.175 and 29.175 are not appropriate for the newer generation of rotorcraft. When the current regulation was written, the cruise demonstration of 0.7 V_H to 1.1 V_H typically represented approximately a 30 knots speed variation for helicopters. Now, the cruise demonstration, between the maximum and the minimum speeds (1.1 V_H and 0.7 V_H), can encompass such a large speed range that the trim point and end points actually represent completely different flight regimes rather than perturbations about a trim point in a given flight regime. For some modern helicopters with a never-exceed speed (V_{NE}) in excess of 150 knots, the speed variation for the cruise demonstration could approach 60 knots, which makes the maneuver difficult to perform and does not represent a normal variation about a trim point. These proposals would reduce the speed range for the cruise demonstration to ±10 knots about the specified trim point.

An additional demonstration point at a trim airspeed of $V_{NE} - 10$ knots is proposed to maintain the data coverage over a speed range similar to that contained in the current §§ 27.175(b) and 29.175(b).

For the demonstration in autorotation, the current requirement specifies that the rotorcraft be trimmed at speeds found necessary by the Administrator to demonstrate stability. The proposed rule would specify typically used trim speeds—minimum rate of descent and best angle of glide airspeeds—for the stability demonstration. The conditions required to develop these airspeeds are currently stated in §§ 27.67, 27.71, 29.67 and 29.71. The proposed rule would also limit the speed range for demonstration to ±10 knots from the trim points. The proposed new trim points and speed ranges may not encompass V_{NE} in autorotation as explicitly required in current §§ 27.175 and 29.175. The proposed trim points, however, provide data at the most likely operating conditions. Autorotation at V_{NE} is typically a transient and dynamic flight condition that often places high workload demands on the pilot due primarily to maintaining rotor speed control and the desired flight path. During these dynamic conditions of autorotation at V_{NE} that are evaluated under §§ 27.143 and 29.143, longitudinal static stability is less important than in the more stabilized conditions as proposed.

This proposed rule would delete the hover demonstration requirements of current §§ 27.175(d) and 29.175(d). The requirement to demonstrate static longitudinal stability in a hover has been shown to be unnecessary since the proper sense and motion of controls during hover are evaluated as part of other required tests. The controllability and maneuverability requirements of §§ 27.143(a) and (c) and 29.143(a) and (c) adequately address the safety considerations during hover flight.

Sections 27.177 and 29.177 Static Directional Stability

This proposed rule would revise §§ 27.177 and 29.177 to change the demonstration criteria for static directional stability. The current part 27 and 29 rule contains general language and relies primarily on a pilot's subjective judgment that he is approaching the sideslip limit, which renders it difficult to make compliance determinations due to a lack of objective test criteria. The proposals would provide further objective criteria over which the directional stability characteristics of rotorcraft are evaluated. The proposed rule also allows for a minimal amount of negative stability around each trim point. This recognizes the characteristics exhibited by many rotorcraft that have some airflow blockage of the vertical fin or tail rotor at small sideslip angles. This minimal amount of negative stability does not materially affect the overall safety considerations of static directional stability.

Section 27.903 Engines

This proposed rule would revise § 27.903 to add a new paragraph (d) to require engine restart capability. A restart capability is a fundamental necessity for any aircraft to minimize the risk of a forced landing. A restart capability will enhance safety, even though it will not be useful in every case such as when there is engine damage or insufficient altitude to carry out the restart procedure. A study of

accident and incident data shows a large number of engine failures or flameouts on rotorcraft with a restart capability. A number of these incidents resulted in successful in-flight restarts following failure due to causes such as snow and ice ingestion, fuel contamination, or fuel mismanagement. The data related to the accident and incident engine failures or flameouts are contained in the Docket. The proposed text, taken directly from current § 29.903(e), would require an in-flight restart capability for both single-engine and multiengine rotorcraft. We intend that restart procedures be included in the RFM.

Section 27.1587 Performance Information

Section 27.1587(a) would be revised to include a reference to new § 27.49. Section 27.1587(a)(2)(i) and (ii) would be revised to specifically include requirements for presenting maximum safe winds for OGE operations established in the proposed § 27.143. Section 27.1587(b)(1)(i) and (ii) would be deleted. These two paragraphs were moved into § 27.1585(a) by Amendment 27–21, and inadvertently left in from § 27.1587.

Section 29.1587 Performance Information

The proposal to revise § 29.1587 would require new performance information be included in the RFM. Sections 29.1587(a)(7) and 29.1587(b)(8) would be amended to include the requirements for presenting maximum safe winds for OGE operations.

Appendix B to Part 27—Airworthiness Criteria for Helicopter Instrument Flight

The proposed rule would amend paragraph (V)(a) to allow for a minimal amount of neutral or negative stability around trim and would replace the words ''in approximately constant proportion'' with ''without discontinuity.'' This is intended to be a more objective standard that does not allow irregularity in the aircraft response to control input. Also, this is consistent with the change that is proposed in § 27.177 of the VFR requirements that proposes more specific criteria to evaluate stability characteristics, but also recognizes a minimal amount of negative stability. Additionally, the proposed paragraph would require that the pilot be able to maintain the desired heading without exceptional skill or alertness. This proposed rule would also revise paragraph VII(a)(1) and VII(a)(2). This revision would reorganize the paragraphs and further specify the standards that must be met when considering a stability augmentation system failure.

Appendix B to Part 29—Airworthiness Criteria for Helicopter Instrument Flight

The proposed rule would amend paragraph (V)(a) to allow for a minimal amount of neutral or negative stability around trim and would replace the words ''in approximately constant proportion'' with ''without discontinuity.'' This is intended to be a more objective standard that does not allow irregularity in the aircraft response to control input. Also, this is consistent with the change that is proposed in § 29.177 of the VFR requirements that proposes more specific criteria to evaluate stability characteristics, but also recognizes a minimal amount of negative stability. Additionally, the proposed paragraph would require that the pilot be able to maintain the desired heading without exceptional skill or alertness. Lastly, in paragraph (V)(b)—the word ''cycle'' is replaced by the correct word, ''cyclic.''

This proposed rule would revise paragraphs VII(a)(1) and VII(a)(2). This change would reorganize the paragraphs and further specify the standards that must be met when considering a stability augmentation system failure.

Paperwork Reduction Act

This proposal contains the following new information collection requirements. As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the FAA has submitted the information requirements associated with this proposal to the Office of Management and Budget for review.

Title: Performance and Handling Qualities Requirements for Rotorcraft.

Summary: This proposal would revise the airworthiness standards for normal and transport category rotorcraft performance and handling qualities. This proposal would increase the current minimum safety standards to require compliance with certain current industry practices and FAA policies that result in higher safety standards, and would result in harmonized international standards. Proposed §§ 27.49(a)(3) and 27.143(d) require all applicants seeking certification for a normal category rotorcraft to determine out-of-ground effect performance data, and the proposed § 27.1587 requires that performance data be provided to operators in the RFM that must be furnished with each rotorcraft. For those applicants seeking certification for a transport category rotorcraft, proposed § 29.143(d) requires that they determine additional out-of-ground effect performance data. Proposed § 29.1587 requires that performance data, in addition to current § 29.49 and other data, be provided to operators in the RFM.

Use of: The required performance information would be determined during the certification process for various rotorcraft weights, altitudes, and temperatures and would be collected from rotorcraft certification applicants. This performance information would be inserted into the RFM and used by rotorcraft operators to determine whether their rotorcraft was capable of performing certain missions in their operating environment.

Respondents (including number of): We anticipate an average of 4 normal or transport category rotorcraft certification applicants every 10 years would be required to determine this performance information and provide it to operators in each RFM. We anticipate 50 rotorcraft are delivered for each new certification and a RFM must be furnished with each rotorcraft.

Frequency: The frequency of determining the performance data would depend on how often an applicant seeks the certification of a rotorcraft. We anticipate four new rotorcraft certifications each 10 years. This performance data would be provided when the manufacturer delivers each rotorcraft to an operator. Based on industry responses, we anticipate 50 rotorcraft are delivered per certification, resulting in 50 manuals.

Annual Burden Estimate: The performance data must be collected during each certification and disclosed in each RFM. Based on industry response, we anticipate that it would take 20 hours at $100 per hour to collect the performance data for four certifications every 10 years for an annual collection burden of $200.00 ($100 * (20/10)). We further anticipate 2 additional pages would be required to place the data in the RFM. We estimate an annual paperwork burden of 120 pages with an annual reproduction cost of $6.00. Therefore, the estimated total annual cost burden of the additional paperwork for this proposed rule would be $206.00.

The agency is soliciting comments to—

(1) Evaluate whether the proposed information requirement is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;

(2) Evaluate the accuracy of the agency's estimate of the burden;

(3) Enhance the quality, utility, and clarity of the information to be collected; and

(4) Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Individuals and organizations may submit comments on the information collection requirement by September 25, 2006, and should direct them to the address listed in the **ADDRESSES** section of this document. Comments also should be submitted to the Office of Information and Regulatory Affairs, OMB, New Executive Building, Room 10202, 725 17th Street, NW., Washington, DC 20053, Attention: Desk Officer for FAA.

According to the 1995 amendments to the Paperwork Reduction Act (5 CFR 1320.8(b)(3)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid OMB control number. The OMB control number for this information collection will be published in the **Federal Register**, after the Office of Management and Budget approves it.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no ''differences'' with these proposed regulations.

Executive Order 12866, DOT Regulatory Policies and Procedures, Economic Assessment, Regulatory Flexibility Determination, Trade Impact Assessment, and Unfunded Mandates Assessment

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this proposed rule. We suggest readers seeking greater detail read the full regulatory evaluation, a copy of which we have placed in the docket for this rulemaking.

In conducting these analyses, FAA has determined that this proposed rule: (1) Has benefits that justify its costs, (2) is not an economically ''significant regulatory action'' as defined in section 3(f) of Executive Order 12866, (3) is not ''significant'' as defined in DOT's Regulatory Policies and Procedures; (4) would not have a significant economic impact on a substantial number of small entities; (5) would not have a significant effect on international trade; and (6) would not impose an unfunded mandate on state, local, or tribal governments, or on the private sector by exceeding the threshold identified above. These analyses are summarized below.

Total Benefits and Costs of This Rulemaking

The estimated cost of this proposed rule is about $558,250 ($364,955 in present value). The estimated potential benefits of avoiding at least one helicopter accident are about $3.9 million ($2.7 million in present value).

Who is Potentially Affected by This Rulemaking

- Operators of U.S.-registered part 27 or 29 rotorcraft, and
- Manufacturers of those rotorcraft.

Our Cost Assumptions and Sources of Information

- Discount rate—7%.
- Period of analysis—10 years.[1]
- Value of fatality avoided—$3.0 million (Source: ''Economic Values for FAA Investment & Regulatory Decisions,'' (March 2004)).

[1] The 10-year analysis period covers our assumption that manufacturers will seek new certification for one large and one small part 27 and two large part 29 rotorcraft.

Benefits of This Rulemaking

The benefits of this NPRM consist of the value of lives and property saved due to avoiding accidents involving part 27 or part 29 rotorcraft. Over the 10-year period of analysis, the potential benefit of the NPRM would be at least $3.9 million ($2.7 million in present value) by preventing one accident.

Costs of This Rulemaking

We estimate the costs of this proposed rule to be about $558,250 ($364,955 in present value) over the 10-year analysis period. Manufacturers of 14 CFR part 27 helicopters would incur costs of $383,250 ($234,039 in present value) and manufacturers of 14 CFR part 29 helicopters would incur costs of $175,000 ($130,916 in present value).

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Pub. L. 96–354) (RFA) establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation.'' To achieve that principle, the RFA requires agencies to consider flexible regulatory proposals, to explain the rationale for their actions, and to solicit comments. The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

We use the Small Business Administration (SBA) guideline of 1,500 employees or less per firm as the criterion for the determination of a

small business in commercial air service.[2]

In order to determine if the proposed rule will have a significant economic impact on a substantial number of small entities, a list of all U.S. rotorcraft manufacturers, who must meet normal and transport category rotorcraft airworthy standards under 14 CFR parts 27 and 29, was tabulated.

Using information provided by three sources: The World Aviation Directory, Dunn and Bradstreet's company databases, and SEC filings through the Internet, we examined the publicly available revenue and employment of all these businesses, after eliminating those with more than 1,500 employees and subsidiaries of larger businesses. An example of a subsidiary business is Bell Helicopter, which is a subsidiary of Textron, Inc.

This methodology resulted in the following list of 6 U.S. part 27 rotorcraft manufactures with less than 1,500 employees. None of the part 29 rotorcraft manufacturers has 1,500 or fewer employees.

U.S. rotorcraft manufactures	Employment
Hiller Aircraft Corp.	35
Brantly Helicopter Industry	35
Enstrom Helicopter Corporation	100
Schweizer Aircraft Corporation	400
Erickson Air-Crane	500
Robinson Helicopter Company, Inc	700

The FAA expects that one large firm and one small firm will seek certification of a new part 27 normal category rotorcraft over the next ten years. Although most of the proposed requirements intended to revise the flight certification requirements are current industry standard and support new FAA rotorcraft policy, some will increase costs, while some will decrease costs. Sections 27.49, 27.143, 29.143, 27.175, 29.175, 27.177, and 27.903 will increase costs by requiring manufacturers to add additional data and testing procedures to the Rotorcraft Flight Manual (RFM). Sections 27.173 and 29.173 on static longitudinal stability would be cost relieving to the manufactures because they delete hover demonstrations not relevant to safety and are redundant with other requirements. We estimate the average compliance costs for such a small firm to be $84,500 as follows:

COMPLIANCE COSTS

Section	Cost
27.49	$21,125
27.143	26,000
27.173	(13,000)
27.175	3,250
27.177	17,875
27.903	16,250
Total	84,500

The annualized cost for this small operator is estimated at $12,030 ($84,500 X 0.142378).[3]

The degree to which a small rotorcraft manufacturer can ''afford'' the cost of compliance is determined by the availability of financial resources. The initial implementation costs of the proposed rule may come from either cash flow or be borrowed. As a proxy for the firm's ability to afford the cost of compliance, we calculated the ratio of the total annualized cost of the proposed rule as a percentage of annual revenue. None of the small business operators potentially affected by this proposed rule would incurred costs greater that 0.2 percent of their annual revenue (see table below).

U.S. rotorcraft manufactures	Employment	Annual revenue	Percentage
Hiller Aircraft Corp.	35	$7,500,000	0.16
Brantly Helicopter Industry	35	15,000,000	0.08
Enstrom Helicopter Corporation	100	35,000,000	0.03
Schweizer Aircraft Corporation	400	35,000,000	0.03
Erickson Air-Crane	500	35,000,000	0.03
Robinson Helicopter Company, Inc	700	80,000,000	0.02

As we expect only one of these companies to certificate a new rotorcraft in the next 10 years, only one would incur compliance costs. We estimated this compliance cost would be less that 0.2 percent of their total annual revenue.

Thus, we determined that no small entity would incur a substantial economic impact in the form of higher annual costs as a result of this proposed rule. Therefore, the FAA certifies that this proposal would not have a significant economic impact on a substantial number of small entities.

International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39) prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. This proposed rule reflects an international effort to have common certification standards, and thus is in accord with the Trade Agreements Act.

Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (adjusted annually for inflation with the base year 1995) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $120.7 million in lieu of $100 million. This proposed rule does not contain such a mandate. The requirements of Title II do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action would not

[2] 13 CFR part 121.201, Size Standards Used to Define Small Business Concerns, Section 48–49 Transportation, Subsector 481 Air Transportation.

[3] Uniform Annual Value discounted at 7% over 10-year period.

have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government, and therefore would not have federalism implications.

Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (codified at 49 U.S.C. 40113(f)) requires the Administrator, when modifying regulations in title 14 of the CFR in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish such regulatory distinctions as he or she considers appropriate. Because this proposed rule would apply to the certification of future designs of normal and transport category rotorcraft and their subsequent operation, it could, if adopted, affect intrastate aviation in Alaska. The FAA therefore specifically requests comments on whether there is justification for applying the proposed rule differently in intrastate operations in Alaska.

Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this proposed rulemaking action qualifies for the categorical exclusion identified in paragraph 312f and involves no extraordinary circumstances.

Regulations that Significantly Affect Energy Supply, Distribution, or Use

The energy impact of the proposed rule has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Public Law 94–163, as amended (42 U.S.C. 6362) and the Department of Transportation implementing regulations, specifically 14 CFR 313.4, that defines a ''major regulatory action.'' We have determined that this notice is not a ''major regulatory action'' under the provisions of the EPCA. Additionally, we have analyzed this proposal under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001).

We have determined that this proposed rule is not a ''significant energy action'' under the executive order because it is not a ''significant regulatory action'' under Executive Order 12866, and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

List of Subjects

14 CFR Part 27

Air transportation, Aircraft, Aviation safety, Rotorcraft, Safety.

14 CFR Part 29

Air transportation, Aircraft, Aviation safety, Rotorcraft, Safety.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend parts 27 and 29 of Title 14, Code of Federal Regulations, as follows:

PART 27—AIRWORTHINESS STANDARDS: NORMAL CATEGORY ROTORCRAFT

1. The authority citation for part 27 continues to read as follows:

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

2. Amend § 27.25 by adding the word ''weight'' after the word ''maximum'' and removing the word ''or'' at the end of the sentence in paragraph (a)(1)(ii); removing the word ''and'' and adding the word ''or'' in its place in paragraph (a)(1)(iii); and by adding paragraph (a)(1)(iv) to read as follows:

§ 27.25 Weight limits.

(a) * * *

(1) * * *

(iv) The highest weight in which the provisions of §§ 27.79 or 27.143(c)(1), or combinations thereof, are demonstrated if the weights and operating conditions (altitude and temperature) prescribed by those requirements cannot be met; and

* * * * *

3. Re-designate § 27.73 as new § 27.49 and revise to read as follows:

§ 27.49 Performance at minimum operating speed.

(a) For helicopters—

(1) The hovering ceiling must be determined over the ranges of weight, altitude, and temperature for which certification is requested, with—

(i) Takeoff power;

(ii) The landing gear extended; and

(iii) The helicopter in-ground effect at a height consistent with normal takeoff procedures; and

(2) The hovering ceiling determined under paragraph (a)(1) of this section must be at least—

(i) For reciprocating engine powered helicopters, 4,000 feet at maximum weight with a standard atmosphere; or

(ii) For turbine engine powered helicopters, 2,500 feet pressure altitude at maximum weight at a temperature of standard plus 22 °C (standard plus 40 °F).

(3) The out-of-ground effect hovering performance must be determined over the ranges of weight, altitude, and temperature for which certification is requested, using takeoff power.

(b) For rotorcraft other than helicopters, the steady rate of climb at the minimum operating speed must be determined over the ranges of weight, altitude, and temperature for which certification is requested, with—

(1) Takeoff power; and

(2) The landing gear extended.

4. Revise § 27.51 to read as follows:

§ 27.51 Takeoff.

The takeoff, with takeoff power and r.p.m. at the most critical center of gravity, and with weight from the maximum weight at sea level to the weight for which takeoff certification is requested for each altitude covered by this section—

(a) May not require exceptional piloting skill or exceptionally favorable conditions throughout the ranges of altitude from standard sea level conditions to the maximum altitude for which takeoff and landing certification is requested, and

(b) Must be made in such a manner that a landing can be made safely at any point along the flight path if an engine fails. This must be demonstrated up to the maximum altitude for which takeoff and landing certification is requested or 7,000 feet density altitude, whichever is less.

5. Revise § 27.75(a) to read as follows:

§ 27.75 Landing.

(a) The rotorcraft must be able to be landed with no excessive vertical acceleration, no tendency to bounce, nose over, ground loop, porpoise, or water loop, and without exceptional piloting skill or exceptionally favorable conditions, with—

(1) Approach or autorotation speeds appropriate to the type of rotorcraft and selected by the applicant;

(2) The approach and landing made with—

(i) Power off, for single engine rotorcraft and entered from steady state autorotation; or

(ii) One-engine inoperative (OEI) for multiengine rotorcraft, with each operating engine within approved operating limitations, and entered from an established OEI approach.

* * * * *

6. Amend § 27.79 by removing the word ''rotocraft'' and replacing it with

''rotorcraft'' in paragraph (b)(3) and revising paragraphs (a)(1), (a)(2) and (b)(2) to read as follows:

§ 27.79 Limiting height-speed envelope.

(a) * * *

(1) Altitude, from standard sea level conditions to the maximum altitude capability of the rotorcraft, or 7000 feet density altitude, whichever is less; and

(2) Weight, from the maximum weight at sea level to the weight selected by the applicant for each altitude covered by paragraph (a)(1) of this section. For helicopters, the weight at altitudes above sea level may not be less than the maximum weight or the highest weight allowing hovering out-of-ground effect, whichever is lower.

(b) * * *

(2) For multiengine helicopters, OEI (where engine isolation features ensure continued operation of the remaining engines), and the remaining engine(s) within approved limits and at the minimum installed specification power available for the most critical combination of approved ambient temperature and pressure altitude resulting in 7000 feet density altitude or the maximum altitude capability of the helicopter, whichever is less, and

* * * * *

7. Amend § 27.143 by revising paragraph (a)(2)(v); re-designating paragraphs (d) and (e) as paragraphs (e) and (f) respectively; revising paragraph (c); and adding a new paragraph (d) to read as follows:

§ 27.143 Controllability and maneuverability.

(a) * * *

(2) * * *

(v) Autorotation;

* * * * *

(c) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control on or near the ground in any maneuver appropriate to the type (such as crosswind takeoffs, sideward flight, and rearward flight)—

(1) With altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft or 7000 feet density altitude, whichever is less; with:

(i) Critical Weight;

(ii) Critical center of gravity;

(iii) Critical rotor r.p.m.;

(2) For takeoff and landing altitudes above 7000 feet density altitude with—

(i) Weight selected by the applicant;

(ii) Critical center of gravity; and

(iii) Critical rotor r.p.m.

(d) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control out-of-ground-effect, with—

(1) Weight selected by the applicant;

(2) Critical center of gravity;

(3) Rotor r.p.m. selected by the applicant; and

(4) Altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft.

* * * * *

8. Amend § 27.173 by removing the words ''a speed'' in the two places in paragraph (a) and adding the words ''an airspeed'' in both their places; removing paragraph (c); and revising paragraph (b) to read as follows:

§ 27.173 Static longitudinal stability.

* * * * *

(b) Throughout the full range of altitude for which certification is requested, with the throttle and collective pitch held constant during the maneuvers specified in § 27.175(a) through (d), the slope of the control position versus airspeed curve must be positive. However, in limited flight conditions or modes of operation determined by the Administrator to be acceptable, the slope of the control position versus airspeed curve may be neutral or negative if the rotorcraft possesses flight characteristics that allow the pilot to maintain airspeed within ±5 knots of the desired trim airspeed without exceptional piloting skill or alertness.

9. Amend § 27.175 by removing paragraph (d); revising the introductory text in paragraphs (a) and (b); revising paragraphs (b)(3) and (b)(5); re-designating paragraph (c) as (d) and revising re-designated paragraph (d); and adding a new paragraph (c) to read as follows:

§ 27.175 Demonstration of static longitudinal stability.

(a) *Climb.* Static longitudinal stability must be shown in the climb condition at speeds from Vy − 10 kt, to Vy + 10 kt with—

* * * * *

(b) *Cruise.* Static longitudinal stability must be shown in the cruise condition at speeds from 0.8 V_{NE} − 10 kt to 0.8 V_{NE} + 10 kt or, if V_H is less than 0.8 V_{NE}, from V_H -10 kt to V_H + 10 kt, with—

* * * * *

(3) Power for level flight at 0.8 V_{NE} or V_H, whichever is less;

* * * * *

(5) The rotorcraft trimmed at 0.8 V_{NE} or V_H, whichever is less.

(c) V_{NE}. Static longitudinal stability must be shown at speeds from V_{NE} − 20 kt to V_{NE} with—

(1) Critical weight;

(2) Critical center of gravity;

(3) Power required for level flight at V_{NE} − 10 kt or maximum continuous power, whichever is less;

(4) The landing gear retracted; and

(5) The rotorcraft trimmed at V_{NE} − 10 kt.

(d) *Autorotation.* Static longitudinal stability must be shown in autorotation at—

(1) Airspeeds from the minimum rate of descent airspeed − 10 kt to the minimum rate of descent airspeed + 10 kt, with—

(i) Critical weight;

(ii) Critical center of gravity;

(iii) The landing gear extended; and

(iv) The rotorcraft trimmed at the minimum rate of descent airspeed.

(2) Airspeeds from best angle-of-glide airspeed − 10 kt to the best angle-of-glide airspeed + 10 kt, with—

(i) Critical weight;

(ii) Critical center of gravity;

(iii) The landing gear retracted; and

(iv) The rotorcraft trimmed at the best angle-of-glide airspeed.

10. Revise § 27.177 to read as follows:

§ 27.177 Static directional stability.

(a) The directional controls must operate in such a manner that the sense and direction of motion of the rotorcraft following control displacement are in the direction of the pedal motion with the throttle and collective controls held constant at the trim conditions specified in § 27.175 (a), (b), and (c). Sideslip angles must increase with steadily increasing directional control deflection for sideslip angles up to the lesser of—

(1) ±25 degrees from trim at a speed of 15 knots less than the speed for minimum rate of descent varying linearly to (10 degrees from trim at V_{NE};

(2) The steady state sideslip angles established by § 27.351;

(3) A sideslip angle selected by the applicant, which corresponds to a sideforce of at least 0.1g; or,

(4) The sideslip angle attained by maximum directional control input.

(b) Sufficient cues must accompany the sideslip to alert the pilot when the aircraft is approaching the sideslip limits.

(c) During the maneuver specified in paragraph (a) of this section, the sideslip angle versus directional control position curve may have a negative slope within a small range of angles around trim, provided the desired heading can be maintained without exceptional piloting skill or alertness.

11. Amend § 27.903 by adding a new paragraph (d) to read as follows:

§ 27.903 Engines.

* * * * *

(d) *Restart capability:* A means to restart any engine in flight must be provided.

(1) Except for the in-flight shutdown of all engines, engine restart capability must be demonstrated throughout a flight envelope for the rotorcraft.

(2) Following the in-flight shutdown of all engines, in-flight engine restart capability must be provided.

12. Amend § 27.1587 by removing paragraphs (b)(1)(i) and (b)(1)(ii) and revising the introductory text in paragraph (a) and paragraphs (a)(2)(i) and (a)(2)(ii) to read as follows:

§ 27.1587 Performance information.

(a) The Rotorcraft Flight Manual must contain the following information, determined in accordance with §§ 27.49 through 27.79 and 27.143(c) and (d):

* * * * *

(2) * *

(i) The steady rates of climb and decent, in-ground effect and out-of-ground effect hovering ceilings, together with the corresponding airspeeds and other pertinent information including the calculated effects of altitude and temperatures;

(ii) The maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground effect and out-of-ground effect in winds of not less than 17 knots from all azimuths. These data must be clearly referenced to the appropriate hover charts. In addition, if there are other combinations of weight, altitude and temperature for which performance information is provided and at which the rotorcraft cannot land and takeoff safely with the maximum wind value, those portions of the operating envelope and the appropriate safe wind conditions must be stated in the Rotorcraft Flight Manual;

* * * * *

13. Amend APPENDIX B TO PART 27—AIRWORTHINESS CRITERIA FOR HELICOPTER INSTRUMENT FLIGHT by revising paragraphs V(a) and VII(a) to read as follows:

Appendix B to Part 27—Airworthiness Criteria for Helicopter Instrument Flight

* * * * *

V. Static lateral-directional stability.

(a) Static directional stability must be positive throughout the approved ranges of airspeed, power, and vertical speed. In straight and steady sideslips up to ±10° from trim, directional control position must increase without discontinuity with the angle of sideslip, except for a small range of sideslip angles around trim. At greater angles up to the maximum sideslip angle appropriate to the type, increased directional control position must produce an increased angle of sideslip. It must be possible to maintain balanced flight without exceptional pilot skill or alertness.

* * * * *

VII. Stability Augmentation System (SAS).

(a) If a SAS is used, the reliability of the SAS must be related to the effects of its failure. Any SAS failure that would prevent continued safe flight and landing must be extremely improbable. It must be shown that, for any failure of the SAS that is not shown to be extremely improbable—

(1) The helicopter is safely controllable when the failure or malfunction occurs at any speed or altitude within the approved IFR operating limitations; and

(2) The overall flight characteristics of the helicopter allow for prolonged instrument flight without undue pilot effort. Additional unrelated probable failures affecting the control system must be considered. In addition—

(i) The controllability and maneuverability requirements in Subpart B of this part must be met throughout a practical flight envelope;

(ii) The flight control, trim, and dynamic stability characteristics must not be impaired below a level needed to allow continued safe flight and landing; and

(iii) The static longitudinal and static directional stability requirements of Subpart B must be met throughout a practical flight envelope.

* * * * *

PART 29—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY ROTORCRAFT

14. The authority citation for part 29 continues to read as follows:

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

15. Amend § 29.25 by adding paragraph (a)(4) to read as follows:

§ 29.25 Weight limits.

(a) * * *

(4) For Category B rotorcraft with 9 or less passenger seats, the maximum weight, altitude, and temperature at which the rotorcraft can safely operate near the ground with the maximum wind velocity determined under § 29.143(c) and may include other demonstrated wind velocities and azimuths. The operating envelopes must be stated in the Limitations section of the Rotorcraft Flight Manual.

* * * * *

16. Amend § 29.143 by revising paragraph (a)(2)(v); re-designating paragraphs (d) and (e) as paragraphs (e) and (f) respectively; revising paragraph (c); and adding a new paragraph (d) to read as follows:

§ 29.143 Controllability and maneuverability.

(a) * * *

(2) * * *

(v) Autorotation; and

* * * * *

(c) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control on or near the ground in any manner appropriate to the type (such as crosswind takeoffs, sideward flight, and rearward flight), with—

(1) Critical weight;

(2) Critical center of gravity;

(3) Critical rotor r.p.m.; and

(4) Altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft.

(d) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control out-of-ground effect, with—

(1) Weight selected by the applicant;

(2) Critical center of gravity;

(3) Rotor r.p.m. selected by the applicant; and

(4) Altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft.

* * * * *

17. Amend § 29.173 by removing the words ''a speed'' in the two places in paragraph (a) and adding the words ''an airspeed'' in their places; removing paragraph (c); and revising paragraph (b) to read as follows:

§ 29.173 Static longitudinal stability.

* * * * *

(b) Throughout the full range of altitude for which certification is requested, with the throttle and collective pitch held constant during the maneuvers specified in § 29.175(a) through (d), the slope of the control position versus airspeed curve must be positive. However, in limited flight conditions or modes of operation determined by the Administrator to be acceptable, the slope of the control position versus airspeed curve may be neutral or negative if the rotorcraft possesses flight characteristics that allow the pilot to maintain airspeed within (5 knots of the desired trim airspeed without exceptional piloting skill or alertness.

18. Revise § 29.175 to read as follows:

§ 29.175 Demonstration of static longitudinal stability.

(a) *Climb.* Static longitudinal stability must be shown in the climb condition at speeds from Vy − 10 kt, to Vy + 10 kt with—

(1) Critical weight;

(2) Critical center of gravity;

(3) Maximum continuous power;

(4) The landing gear retracted; and
(5) The rotorcraft trimmed at Vy.
(b) *Cruise.* Static longitudinal stability must be shown in the cruise condition at speeds from 0.8 V_{NE} − 10 kt to 0.8 V_{NE} + 10 kt or, if V_H is less than 0.8 V_{NE}, from V_H − 10 kt to V_H + 10 kt, with—
(1) Critical weight;
(2) Critical center of gravity;
(3) Power for level flight at 0.8 V_{NE} or V_H, whichever is less;
(4) The landing gear retracted; and
(5) The rotorcraft trimmed at 0.8 V_{NE} or V_H, whichever is less.
(c) *V_{NE}* . Static longitudinal stability must be shown at speeds from V_{NE} − 20 kt to V_{NE} with—
(1) Critical weight;
(2) Critical center of gravity;
(3) Power required for level flight at V_{NE} − 10 kt or maximum continuous power, whichever is less;
(4) The landing gear retracted; and
(5) The rotorcraft trimmed at V_{NE} − 10 kt.
(d) *Autorotation.* Static longitudinal stability must be shown in autorotation at—
(1) Airspeeds from the minimum rate of descent airspeed − 10 kt to the minimum rate of descent airspeed + 10 kt, with—
(i) Critical weight;
(ii) Critical center of gravity;
(iii) The landing gear extended; and
(iv) The rotorcraft trimmed at the minimum rate of descent airspeed.
(2) Airspeeds from the best angle-of-glide airspeed − 10kt to the best angle-of-glide airspeed + 10kt, with—
(i) Critical weight;
(ii) Critical center of gravity;
(iii) The landing gear retracted; and
(iv) The rotorcraft trimmed at the best angle-of-glide airspeed.

19. Revise § 29.177 to read as follows:

§ 29.177 Static directional stability.

(a) The directional controls must operate in such a manner that the sense and direction of motion of the rotorcraft following control displacement are in the direction of the pedal motion with throttle and collective controls held constant at the trim conditions specified in § 29.175 (a), (b), (c), and (d). Sideslip angles must increase with steadily increasing directional control deflection for sideslip angles up to the lesser of—
(1) ±25 degrees from trim at a speed of 15 knots less than the speed for minimum rate of descent varying linearly to ±10 degrees from trim at V_{NE};
(2) The steady-state sideslip angles established by § 29.351;
(3) A sideslip angle selected by the applicant, which corresponds to a sideforce of at least 0.1g; or
(4) The sideslip angle attained by maximum directional control input.
(b) Sufficient cues must accompany the sideslip to alert the pilot when approaching sideslip limits.
(c) During the maneuver specified in paragraph (a) of this paragraph, the sideslip angle versus directional control position curve may have a negative slope within a small range of angles around trim, provided the desired heading can be maintained without exceptional piloting skill or alertness.

20. Amend § 29.1587 by revising paragraph (a)(7) and (b)(8) to read as follows:

§ 29.1587 Performance information.

* * * * *

(a) * * *
(7) Out-of-ground effect hover performance determined under § 29.49 and the maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground effect and out-of-ground effect in winds of not less than 17 knots from all azimuths. These data must be clearly referenced to the appropriate hover charts.
(b) * * *
(8) Out-of-ground effect hover performance determined under § 29.49 and the maximum safe wind demonstrated under the ambient conditions for data presented. In addition, the maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground-effect and out-of-ground-effect in winds of not less than 17 knots from all azimuths. These data must be clearly referenced to the appropriate hover charts; and

* * * * *

21. Amend APPENDIX B TO PART 29—AIRWORTHINESS CRITERIA FOR HELICOPTER INSTRUMENT FLIGHT by amending paragraph (V)(b) by removing the word ''cycle'' and adding the word ''cyclic'' in its place; and revising paragraphs V(a) and VII(a) to read as follows:

APPENDIX B TO PART 29—AIRWORTHINESS CRITERIA FOR HELICOPTER INSTRUMENT FLIGHT

* * * * *

V. Static lateral directional stability.
(a) Static directional stability must be positive throughout the approved ranges of airspeed, power, and vertical speed. In straight and steady sideslips up to ±10° from trim, directional control position must increase without discontinuity with the angle of sideslip, except for a small range of sideslip angles around trim. At greater angles up to the maximum sideslip angle appropriate to the type, increased directional control position must produce an increased angle of sideslip. It must be possible to maintain balanced flight without exceptional pilot skill or alertness.

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VII. Stability Augmentation System (SAS).
(a) If a SAS is used, the reliability of the SAS must be related to the effects of its failure. Any SAS failure that would prevent continued safe flight and landing must be extremely improbable. It must be shown that, for any failure of the SAS that is not shown to be extremely improbable—
(1) The helicopter is safely controllable when the failure or malfunction occurs at any speed or altitude within the approved IFR operating limitations; and
(2) The overall flight characteristics of the helicopter allow for prolonged instrument flight without undue pilot effort. Additional unrelated probable failures affecting the control system must be considered. In addition—
(i) The controllability and maneuverability requirements in Subpart B must be met throughout a practical flight envelope;
(ii) The flight control, trim, and dynamic stability characteristics must not be impaired below a level needed to allow continued safe flight and landing;
(iii) For Category A helicopters, the dynamic stability requirements of Subpart B must also be met throughout a practical flight envelope; and
(iv) The static longitudinal and static directional stability requirements of Subpart B must be met throughout a practical flight envelope.

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