

Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Rotorcraft Issue Area
Performance and Handling Qualities Requirement Working Group
Task 1 – Performance and Handling Qualities Requirements

Task Assignment

[Federal Register: January 20, 1995 (Volume 60, Number 13)]
[Notices]
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DEPARTMENT OF TRANSPORTATION

Aviation Rulemaking Advisory Committee; Performance and Handling
Qualities Requirements Working Group

AGENCY: Federal Aviation Administration (**FAA**), DOT.

ACTION: Notice of establishment of the Performance and Handling
Qualities Requirements Working Group.

SUMMARY: Notice is given of the establishment of the Performance and
Handling Qualities Requirements Working Group and new tasks assigned to
the Aviation Rulemaking Advisory Committee (ARAC). This notice informs
the public of the activities of the ARAC.

FOR FURTHER INFORMATION CONTACT:

Mr. Mark Schilling, Manager, Rotorcraft Standards Staff, 2601 Meacham
Boulevard, Fort Worth Texas, telephone number (817) 222-5110.

SUPPLEMENTARY INFORMATION: The Federal Aviation Administration (**FAA**)
has established an Aviation Rulemaking Advisory Committee (ARAC) (56 FR
2190, January 22, 1991; and 58 FR 9230, February 19, 1993). One area
the ARAC deals with is rotorcraft issues. These issues involve the
airworthiness standards for normal and transport category rotorcraft in
parts 27 and 29 of the Federal Aviation Regulations, which are the
responsibility of the Director, Aircraft Certification Service, **FAA**.

Task

The Performance and Handling Qualities Requirements Working Group
is charged with recommending to ARAC new or revised standards for
flight test procedures and requirements. The products of this exercise
are intended to be harmonized standards, acceptable to both the **FAA** and
the Joint Aviation Authorities.

Specifically, the task is as follows:

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.

ARAC recommendations to the **FAA** should be accompanied by
appropriate documents. Recommendations for rulemaking should be
accompanied by a complete draft of the notice(s) of proposed
rulemaking, including the benefit/cost analysis and other required
analyses. Recommendations for the issuance of guidance material should

be accompanied by a complete advisory circular.

ARAC has formed the Performance and Handling Qualities Requirements Working Group to analyze and recommend to it solutions to issues contained in the assigned tasks. If ARAC accepts the working group's recommendations, it forwards them to the **FAA**.

ARAC working groups are comprised of technical experts on the subject matter. A working group member need not necessarily be a representative of one of the member organizations of ARAC. An individual who has expertise in the subject matter and wishes to become a member of the working group should write the person listed under the caption FOR FURTHER INFORMATION CONTACT expressing the desire, describing his or her interest in the task, and the expertise he or she would bring to the working group. The request will be reviewed by the assistant chair and working group leader, and the individual will be advised whether or not the request can be accommodated.

Working Group Reports

Each working group formed to consider ARAC tasks is expected to comply with the procedures adopted by ARAC and given to the working group chair. As part of the procedures, the working group is expected to:

A. Recommend time line(s) for completion of the task, including rationale, for consideration at the meeting of the ARAC to consider rotorcraft issues held following publication of this notice.

B. Give a detailed conceptual presentation on the task to the ARAC before proceeding with the work stated under item C below. [[Page 4221]]

C. Give a status report on the task at each meeting of ARAC held to consider rotorcraft issues.

The Secretary of Transportation has determined that the formation and use of the ARAC are necessary in the public interest in connection with the performance of duties imposed on the **FAA** by law. Meetings of ARAC will be open to the public except as authorized by section 10(d) of the Federal Advisory Committee Act. Meeting of the Performance and Handling Qualities Requirements Working Group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on January 13, 1995.
Chris A. Christie,
Executive Director, Aviation Rulemaking Advisory Committee.
[FR Doc. 95-1536 Filed 1-19-95; 8:45 am]
BILLING CODE 4910-13-M

February 28, 2002

Action ARM

15w-03 02-7

John D. Swihart, Jr.
7313 Janetta Dr.
Fort Worth, TX 76180

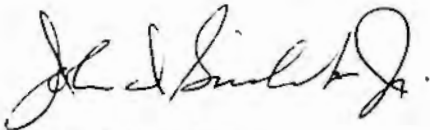
Mr. Nicholas A. Sabatini
Associate Administrator for Regulation and Certification
National Headquarters, AVR-1
800 Independence Ave., SW
Washington, D.C. 20591

Dear Mr. Sabatini:

The Aviation Rulemaking Advisory Committee (ARAC) Working Group activity associated with the Performance and Handling Qualities Requirements Task has been completed. The results of their efforts were submitted to the ARAC for review and approval. The ARAC examined those results at a public meeting on February 15, 2002 in Orlando, Florida and approved them.

Accordingly, the ARAC hereby submits, without change, the proposed NPRM package developed by the Working Group with a recommendation that it be processed for publication.

Very Truly Yours,



John D. Swihart, Jr.
ARAC Assistant Chair for Rotorcraft Issues

cc:
Mr. A. H. Prest, ARAC Chair
Mr. Glenn Rizner, ARAC Vice Chair
Mr. Tony Fazio, ARAC Executive Director
Mr. Mark R. Schilling, ARAC Asst. Executive Director
Mr. Tom Sandberg, Working Group Chair
Mr. Joe Corrao, Helicopter Association International
Ms. Angela Anderson, FAA, ARM-200
Ms. Mary Ann Phillips, FAA, ASW-111

Recommendation

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part Parts 27 and 29

[Docket No. FAA-2000- ; Notice No.]

RIN 2120-

Performance and Handling Qualities Requirements for Rotorcraft

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes changes to the airworthiness standards for normal and transport category rotorcraft. 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 [*Insert date 90 days after date of publication in the **Federal Register.***]

ADDRESSES: Address your comments to the Docket Management System, U.S. Department of Transportation, Room Plaza 401, 400 Seventh Street, SW., Washington, DC 20590-0001. You must identify the docket number FAA-2000-XXXXX at the beginning of your comments, and you should submit two copies of your comments. If you wish to receive confirmation that the FAA received your mailed comments, include a self-addressed, stamped postcard.

You may also submit comments through the Internet to <http://dms.dot.gov>. You may review the public docket containing comments to these proposed regulations in person in the Dockets Office between 9:00 a.m. and 5:00 p.m., Monday through Friday,

except Federal holidays. The Dockets Office is on the plaza level of the NASSIF Building at the Department of Transportation at the above address. Also, you may review public dockets on the Internet at <http://dms.dot.gov>.

FOR FURTHER INFORMATION CONTACT: Lance T. Gant, Rotorcraft Standards Staff, Rotorcraft Directorate, ASW-110, Federal Aviation Administration, Fort Worth, Texas 76193-0110, telephone number (817) 222-5114; facsimile (817) 222-5961, e-mail lance.t.gant@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 9:00 a.m. and 5:00 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.

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 additional 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 mailed 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.

Availability of Rulemaking Documents

You may obtain an electronic copy of this document using the Internet by taking the following steps:

- (1) Go to the search function of the DOT's electronic Docket Management System (DMS) web page (<http://dms.dot.gov/search>).
- (2) On the search page type in the last four digits of the Docket number shown at the beginning of this notice. Click on "search."
- (3) On the next page, which contains the Docket summary information for the Docket you selected, click on the document number of the item you wish to view.

You may also obtain an electronic copy of this document using the Internet through the Office of Rulemaking's web page at <http://www.faa.gov/avr/armhome.htm> or the Federal Register's web page at http://www.access.gpo.gov/su_docs/aces/aces140.html.

You may also obtain a copy of this document by submitting 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 and notice number of this proposal.

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 or revised airworthiness standards. Some of the current regulations are outdated and do not reflect, in some cases, actual certification practices, safety levels attained by modern rotorcraft, and FAA-approved equivalent level of safety findings.

History

It has been approximately 17 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 that time, the FAA has developed formal policy and procedures that address certain aspects of these requirements to make the 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 the Federal Aviation Regulation (FAR) in order to meet customer needs. Conversely, in some cases, the FAA did not foresee some of the situations that have required additional policy, guidance, or standardization when these rules were promulgated. After the publication of the first issue of the Joint Aviation Regulations (JAR) for FAR parts 27 and 29, which closely mirrored FAR part 29 at amendment 31 and FAR part 27 at amendment 27, the European Joint Aviation Authorities (JAA) Helicopter Airworthiness Study Group (HASG) agreed to form a

specialist sub-group to review proposals on flight matters that were not incorporated when the JAR was promulgated. This sub-group consisted of representatives of the HASG, Association of European des Constructeurs de Material Aerospatale (AECMA), Aerospace Industries Association of America (AIA), FAA, United Kingdom Civil Aviation Authority (CAA), and the French Centre d'Essaisen Vol (CEV). The group first met in January 1994 and presented their findings to the HASG in May 1994. By notice in the **Federal Register** (60 FR 4220, January 20, 1995), the FAA announced the establishment of the Performance and Handling Qualities Requirements Harmonization Working Group (PHQHWG) which was formed to continue the work completed by the specialist sub-group and presented to the HASG. The PHQHWG was charged with recommending to 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 includes representatives that expressed an interest through submittal of comments to the FAA or through the public meeting process. The PHQHWG includes representatives from the AIA, the AECMA, the European JAA, Transport Canada, and the FAA Rotorcraft Directorate. Additionally, the PHQHWG consulted representatives from the small rotorcraft manufacturers. This broad participation is consistent with 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 for a total of nine meetings.

General Discussion of the Proposals

Utilizing the report submitted to the HASG as a starting point, the PHQHWG agreed that there was a need to update the rotorcraft performance and handling qualities standards. As the meetings progressed, the group evaluated additional internally-generated proposals that were deemed to be pertinent to the group 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 acceptable methods of compliance for the proposals as well as the current requirements, and appropriate Advisory Circular material was developed concurrently.

There was considerable discussion in the working group with regard to 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 such that system operating characteristics as well as acceptable aircraft handling qualities can 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 to not initiate FAR 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.

Section-by-Section Discussion of the Proposals

Section 27.25 Weight limits

Some recent certifications 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 literal compliance with these minimum standards is realized, the resultant data is presented as performance information in the flight manual. In some cases, an equivalent level of safety has been shown by including limitations in the RFM that show the actual capability of the rotorcraft. The intent of this change is to formalize these equivalent level of safety findings by requiring weight limitations be placed in the RFM if the requirements in §§ 27.79 or 27.143(c)(1) cannot be met.

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) need 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. This proposal would amend this paragraph to explicitly require that the maximum weights, altitudes, and temperatures in which the requirements of § 29.143(c) can be met, which may include limited wind azimuths, must be provided as limitations in the RFM.

New § 27.49 Performance at minimum operating speed (former § 27.73)

This proposal 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 requirement, particularly for hot-day and high-altitude conditions. As a result, OGE 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 proposal 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 amended language would provide for such possibilities. This change more clearly states the intent of the rule, which is to demonstrate engine failure along the takeoff flight path at the weight for which takeoff data are provided. The intent of the regulation is unchanged in that a takeoff may not require exceptional skill or favorable conditions throughout the range of approved takeoff altitudes. 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 proposal would revise § 27.75(a) to state the required flight condition in more traditional rotorcraft terminology. Included in this change is the requirement for multi-engine helicopters to demonstrate landings with one engine inoperative and initiated from a steady-state approach. The proposal would also make a minor revision in the text by replacing the word “glide” with “autorotation”.

Section 27.79 Limiting height-speed envelope

The proposal revises § 27.79(a)(1) to include the words "density altitude" after "7000 feet". The proposal would 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 engine 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

The proposal 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 proposal would redesignate § 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 § 27.143(c) is rewritten in a manner 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 rule as previously written could lead some applicants to conclude that only a 17-knot controllability data point must be considered when, in fact, the most critical speed may be less than 17 knots. That was not the intent of that requirement. Additionally, the altitude requirement is clarified with the addition of the words "density altitude".

Section 27.143(c)(2) would be added 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 proposal would also add § 27.143(d) to determine 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 flown. This new requirement, in conjunction with the proposed zero wind OGE hover requirement of § 27.49, would increase the level of safety by requiring additional performance information.

Section 29.143 Controllability and maneuverability

The proposal 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 § 29.143(c) was rewritten in a manner 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 rule as previously written could lead to 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. The proposal would add § 29.143(c)(4) 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. The new rule reflects current practice.

The proposal would add a new § 29.143(d) 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 concern to the pilot.

Sections 27.173 and 29.173 Static longitudinal stability

A minor clarification change is made to paragraph (a) to change "a speed" to "an airspeed". Additionally, these proposals would combine paragraph (c) with paragraph (b). The proposals would reword the paragraph 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. 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 present paragraph (c) would be redesignated as paragraph (d). The present paragraph (d) containing the hover demonstration point would be deleted.

The present requirement is not appropriate for the newer generation of rotorcraft. When the current rule was written, the cruise demonstration of $0.7 V_H$ to $1.1 V_H$ typically represented approximately a 30-knot 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 regulation.

For the demonstration in autorotation, the current rule does not precisely define the trim speed. The proposal would add two typically used trim speeds--minimum rate of descent and best angle of glide airspeeds--for the stability demonstration. These

airspeeds are currently defined and used in other sections of the regulation (§§ 27.67 and 27.71). The proposal 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 the present regulation. However, the proposed points 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.

These proposals would delete the hover demonstration requirements of §§ 27.175(d) and 29.175(d). The controllability and maneuverability requirements contained in §§ 27.143(c) and 29.143(c), adequately address the safety concerns during hover flight. In conjunction with this proposal, §§ 27.173(c) and 29.173(c) would also be removed.

Sections 27.177 and 29.177 Static directional stability

These proposals would revise §§ 27.177 and 29.177 to change the demonstration criteria. The present rule contains general language and relies on a pilot's subjective judgement that he is approaching the slideslip limit, which could cause some difficulties in making compliance determinations due to a lack of objective test criteria. The proposals would provide a definition of the slideslip envelope 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. These characteristics do not materially affect the safety considerations of static directional stability.

Section 27.903 Engines

This proposal 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 study of accident and incident data shows a large number of engine failures or flameouts. A number of these resulted in successful in-flight restarts (on rotorcraft with the capability) following failure due to causes such as snow and ice ingestion, fuel contamination, or fuel mismanagement. Even though a restart capability will not be useful in every case, such as when there is engine damage or insufficient altitude to carry out the restart procedure, a restart capability will enhance safety. The proposed text, taken directly from § 29.903(e), would require an in-flight restart capability for both single-engine and multiengine rotorcraft.

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 as proposed in § 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 were inadvertently not removed from § 27.1587.

Section 29.1587 Performance information

The proposal to revise § 29.1587 would require new performance information that would 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 as presented in the proposed changes to § 29.143.

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

The proposal amends paragraph (V)(a) to allow for a minimal amount of neutral or negative stability around trim and removes the words "approximate constant proportion", which is a subjective standard and is subject to differing interpretation. This is consistent with the change that is proposed in § 27.177 of the VFR requirements. Additionally, the proposed paragraph requires that the pilot be able to maintain the desired heading without exceptional skill or alertness.

The proposal revises paragraph VII(a)(1) and VII(a)(2). The original intent of the rule remains fundamentally unchanged. The change elaborates on 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 proposal amends paragraph (V)(a) to allow for a minimal amount of neutral or negative stability around trim and removes the words "approximate constant proportion", which is a subjective standard and is subject to differing interpretation. This is consistent with the change that is proposed in the VFR requirements. Additionally, the proposed paragraph requires that the pilot must be able to maintain the desired heading without exceptional skill or alertness. In paragraph (V)(b), the word "cycle" is replaced by the correct word, "cyclic".

The proposal revises paragraph VII(a)(1) and VII(a)(2). The original intent of the rule remains fundamentally unchanged. The change elaborates on the standards that must be met when considering a stability augmentation system failure.

Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. We have determined that there are no new information collection requirements associated with this proposed rule.

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.

Economic Evaluation, Regulatory Flexibility Determination, International Trade Impact Assessment, and Unfunded Mandates Assessment

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency propose or adopt a regulation only upon a determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. section 2531-2533) 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 also requires agencies to consider international standards and, where appropriate, use them as the basis of U.S. standards. And fourth, the Unfunded Mandates Reform Act of 1995 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.)

In conducting these analyses, the FAA has determined this rule 1) has benefits which do justify its costs, is not a “significant regulatory action” as defined in the Executive Order and is not “significant” as defined in DOT's Regulatory Policies and Procedures; 2) will not have a significant impact on a substantial number of small entities; 3) reduces barriers to international trade; and 4) does not impose an unfunded mandate on state, local, or tribal governments, or on the private sector. These analyses, available in the docket, are summarized below.

The purpose of this proposal is to codify existing policy and practice and to revise the flight requirements to incorporate flight test procedures for performance and handling qualities that reflect the evolution of rotorcraft capabilities. The proposal consists of rules that would update the rotorcraft performance and handling qualities' standards. These rules revise several sections of FAR parts 27 and 29 pertaining to flight performance and handling qualities. The FAA estimates that the total cost expected to accrue from implementation of the proposed rule to be \$305,000 in 2000 dollars or \$203,000 over the next 10 years when costs are discounted at 7 percent. The industry is expected to incur almost all of the above costs. Costs to the FAA are expected to be small and cannot be quantified with any degree of accuracy.

Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) of 1980, (5 U.S.C. 601 et seq.) directs the

FAA to fit regulatory requirements to the scale of the business, organizations, and governmental jurisdictions subject to the regulation. We are required to determine whether a proposed or final action will have a significant impact on a substantial number of "small entities" as defined by the Act. If we find that the action will have a significant impact, we must do a "regulatory flexibility analysis."

Trade Impact Assessment

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or 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. The FAA has assessed the potential effect of this proposed rule and has determined that it would have only a domestic impact and therefore no affect on any trade-sensitive activity.

Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate"

under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of \$100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This proposed rule does not meet the cost thresholds described above. Furthermore, this proposed rule would not impose a significant cost on small governments and would not uniquely affect those small governments. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 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 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. Therefore, we determined that this notice of proposed rulemaking would not have federalism implications.

Environmental Analysis

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental impact

statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this proposed rulemaking action qualifies for a categorical exclusion.

Energy Impact

The energy impact of the notice has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Pub. L. 94-163, as amended (42 U.S.C. 6362) and FAA Order 1053.1. It has been determined that the notice is not a major regulatory action under the provisions of the EPCA.

List of Subjects

14 CFR Parts 27 and 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. Revise § 27.25 as follows:

§ 27.25 Weight limits.

(a) * * *

(1) Not more than--

(i) The highest weight selected by the applicant;

(ii) The design maximum weight (the highest weight at which compliance with each applicable structural loading condition of this part is shown);

(iii) The highest weight at which compliance with each applicable flight requirement of this part is shown; or

(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

* * * * *

2. Redesignate § 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.

3. 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--

(1) 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

(2) 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.

4. 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 approach or autorotation speeds appropriate to the type of rotorcraft and selected by the applicant; and the approach and landing made with --

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

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

* * * * *

5. Revise §§ 27.79(a)(1) 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 7,000 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) * * *

(1) * * *

(2) For multiengine helicopters, OEI (where engine isolation features insure 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-foot density altitude or the maximum altitude capability of the helicopter, whichever is less, and--

(3) * * *

6. Amend § 27.143, by revising paragraph (a)(2)(v) by removing the word “Glide” and adding the word “Autorotation” in its place; redesignating 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.

* * * * *

(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 rpm;

(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 rpm.

(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 rpm selected by the applicant; and

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

* * * * *

7. 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; deleting 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.

8. Amend § 27.175 by deleting paragraph (d); revising the introductory text in paragraphs (a) and (b); revising paragraphs (b)(3) and (b)(5); redesignating paragraphs (c) as (d) and revising redesignated 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 $V_y - 10$ kt, to $V_y + 10$ 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--

(1) * * *

(2) * * *

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

(4) * * *

(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 helicopter 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;

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

(2) Airspeeds from 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;

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

9. 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 limit sideslip angle defined under § 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 sideslip to alert the pilot when approaching sideslip limits.

(c) During the maneuver specified in (a), 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.

10. Add a new § 27.903(d).

§ 27.903 Engines.

* * * * *

(d) Restart capability:

(1) A means to restart any engine in flight must be provided.

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

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

11. Amend § 27.1587 by removing the reference “27.51” in paragraph (a) and adding "27.49" in its place; deleting paragraphs (b)(1)(i) and (b)(1)(ii); and revising (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):

(1) * * *

(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 shall 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 shall be stated in the Rotorcraft Flight Manual;

* * * * *

12. Amend Appendix B to Part 27 - Airworthiness Criteria for Helicopter Instrument Flight by revising paragraph 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. Except for a small range of sideslip angles around trim, in straight and steady sideslips up to $\pm 10^\circ$ from trim, directional control position must increase without discontinuity with angle of sideslip. At greater angles up to the maximum sideslip angle appropriate to the type, increased directional control position must produce increased angle of sideslip. It must be possible to maintain balanced flight without exceptional pilot skill or alertness.

(b) * * *

* * * * *

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. The occurrence of any failure condition which would prevent continued safe flight and landing must be extremely improbable. It must be shown that, for any failure condition of the SAS which 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 of this part must be met throughout a practical flight envelope.

* * * * *

PART 29 - AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY

ROTORCRAFT

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

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

14. Amend § 29.25 by adding paragraph (a)(4)

§ 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 shall be stated in the Limitations section of the Rotorcraft Flight Manual.

* * * * *

15. Amend § 29.143 by revising paragraph (a)(2)(v) by removing the word "Glide" and adding the word "Autorotation" in its place; redesignating 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.

* * * * *

(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 rpm selected by the applicant; and
- (4) Altitude, from standard sea level conditions to the maximum takeoff and

landing altitude capability of the rotorcraft.

* * * * *

16. 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; deleting 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.

17. Amend § 29.175 by deleting paragraph (d); revising the introductory text in paragraphs (a) and (b); revising paragraphs (b)(3) and (b)(5); redesignating paragraph (c) as paragraph (d) and revising the redesignated paragraph (d); and adding a new paragraph (c) 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 $V_y - 10$ kt, to $V_y + 10$ 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--

(1) * * *

(2) * * *

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

(4) * * *

(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 helicopter 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;

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

(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;

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

18. 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 limit sideslip angle defined under § 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 sideslip to alert the pilot when approaching sideslip limits.

(c) During the maneuver specified in (a), 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.

19. 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. This data shall 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. This data shall be clearly referenced to the appropriate hover charts; and

* * * * *

20. Amend Appendix B to Part 29 - Airworthiness Criteria for Helicopter Instrument Flight by revising paragraph (V)(b) by removing the word "cycle" and adding the correct word "cyclic" in its place; and revising paragraph 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. Except for a small range of sideslip angles around trim, in straight and steady sideslips up to $\pm 10^\circ$ from trim, directional control position must increase without discontinuity with angle of sideslip. At greater angles up to the

maximum sideslip angle appropriate to the type, increased directional control position must produce 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. The occurrence of any failure condition which would prevent continued safe flight and landing must be extremely improbable. It must be shown that for any failure condition of the SAS which 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;

(iii) For Category A helicopters, the dynamic stability requirements of Subpart B of this part must also be met throughout a practical flight envelope; and

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

* * * * *

Issued in Washington, DC, on

[Name of Office Director]

[Title of Office Director]



U.S. Department
of Transportation
**Federal Aviation
Administration**

Mr. John D. Swihart, Jr.
Helicopter Association International
7313 Janetta Drive
Fort Worth, TX 76180

Dear Mr. Swihart:

This letter is to inform you of the status of the Performance and Handling Qualities Requirements Working Group's recommendation for the task Performance Handling Qualities for Rotorcraft.

We received your recommendation on February 28, 2002, and we are actively working on the Notice of Proposed Rulemaking. We will place a copy of the final document on our web site once it is published in the Federal Register.

We would like to thank you and the working group for all the support you gave to this project, we now consider this recommendation closed.

Sincerely,

Anthony F. Fazio
Executive Director, Aviation Rulemaking Advisory
Committee

In acting on a request by a foreign air carrier for a statement of authorization under part 212, OST must find that the operation meets the requirements of that rule and is in the public interest.⁴ The applicant foreign air carrier must demonstrate that its proposed arrangement with the U.S. air carrier for the foreign carrier to conduct a flight or series of flights with the foreign air carrier's aircraft and crew in foreign air transportation for an authorized U.S. carrier meets these standards. In particular, one way in which the public interest standard of part 212 could be met would be for the foreign air carrier to show that (1) operational control of the flight or flights rests with it and not with the U.S. certificated air carrier; (2) legal and actual possession of the aircraft at all times will remain with the foreign air carrier; (3) the country that issued its air operator certificate (AOC) has been rated as Category 1 under the FAA's International Aviation Safety Assessment program;⁵ and (4) the U.S. certificated air carrier involved has assessed the level of safety of the service to be provided by the foreign air carrier involved and has found it to be satisfactory.

The foreign air carrier may provide information on operational control by submitting, with its application for a statement of authorization, a copy of the agreement for the aircraft with crew that it has entered into with the U.S. certificated air carrier. In making a determination on operational control, the FAA will consider the terms of that agreement and all other relevant factors to ensure that the foreign air carrier will exercise authority over initiating, conducting or terminating a flight conducted under the agreement. Likewise, in determining whether the foreign air carrier retains actual and legal possession of the aircraft, the FAA will consider all relevant factors, including the foreign air carrier's right to substitute other aircraft for the aircraft identified in the agreement, or its right to use the aircraft identified in the agreement for its own purposes when the aircraft is not needed by the U.S. air carrier.

The U.S. certificated air carrier involved in the arrangement may demonstrate its assessment of the safety of the service by conducting a safety audit of the foreign air carrier under an FAA-approved safety audit program, comparable to the audits that U.S. carriers now perform under the OST/FAA Code-Share Safety Program. The FAA would review the safety audit along with the agreement for the aircraft

with crew and provide the Department with the results of that review.⁶

Because these applications are handled on a case-by-case basis, applicants may, of course, endeavor to show that the foreign air carrier is in operational control and that the operation is in the public interest by providing information and evidence other than that outlined above, but the burden of making that showing is on the applicants.

To summarize applicable regulations, one way that a foreign air carrier may demonstrate a public interest basis under which it could make an arrangement (which may be characterized by the parties as a wet lease) to conduct a flight or series of flights with the foreign carrier's aircraft and crew for a U.S. carrier authorized to perform the relevant foreign air transportation is to show that:

- The foreign air carrier involved holds a foreign air carrier permit or exemption authority from OST to conduct charter operations;
- The country that issued the foreign air carrier's AOC is rated as Category 1 under the FAA's International Aviation Safety Assessment program;
- The operations to be conducted represent foreign air transportation and not prohibited cabotage, in accordance with 49 U.S.C. 41703;
- The foreign air carrier files an application for a statement of authorization for any such operation proposed;
- The foreign air carrier demonstrates that it will be in operational control of the proposed operation, for example, by providing with its application, for review by the FAA, copies of the agreement for the aircraft with crew, that it has entered into with the U.S. certificated air carrier;
- The foreign air carrier demonstrates that it will retain legal and actual possession of the aircraft;
- The foreign air carrier provides evidence that the U.S. certificated air carrier involved has conducted a safety audit of the foreign carrier, consistent with an FAA-approved safety audit program, and has submitted a report of that audit to the FAA for review;
- The FAA notifies OST that it has determined that operational control of the proposed flights rest with the foreign air carrier applicant, that the oversight of the operation will remain with the country that issued the foreign air carrier's AOC, and that the safety audit meets the standards of the U.S. certificated air carrier's safety audit program; and

—OST determines that the proposed operations meet the requirements of 14 CFR part 212 and are in the public interest, and grants the statement of authorization requested by the foreign air carrier.

We will publish this Notice in the **Federal Register**, and will serve this Notice on all U.S. certificated air carriers and all foreign air carriers holding OST authority.

Dated: February 15, 2008.

Michael W. Reynolds,

Acting Assistant Secretary for Aviation and International Affairs, Department of Transportation.

Nicholas A. Sabatini,

Associate Administrator for Aviation Safety, Federal Aviation Administration.

[FR Doc. E8-3470 Filed 2-28-08; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 27 and 29

[Docket No.: FAA-2006-25414; Amendment Nos. 27-44 and 29-51]

RIN 2120-AH87

Performance and Handling Qualities Requirements for Rotorcraft

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This final rule provides 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 enhance the safety standards for performance and handling qualities to reflect the evolution of rotorcraft capabilities. This rule harmonizes U.S. and European airworthiness standards for rotorcraft performance and handling qualities.

DATES: These amendments become effective on March 31, 2008. Affected parties, however, do not have to comply with the information collection requirements of this rule until the OMB approves the FAA's request for this information collection requirement. The FAA will publish a separate document notifying you of the OMB Control Number and the compliance date(s) for the information collection requirements of this rule.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this final

⁴ See 14 CFR § 212.11(a).

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SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

The FAA's authority to issue rules on 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, 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 that authority 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

Due to technological advances in design and operational trends in normal and transport rotorcraft performance and handling qualities, new and revised airworthiness standards have been developed. Some current part 27 and part 29 regulations do not reflect safety

levels attainable by modern aircraft and FAA-approved equivalent level of safety findings. In fact, it has been more than 20 years since the last major promulgation of rules that address rotorcraft performance and handling qualities (Amendments 29-24 and 27-21).¹ Since then, the FAA has developed policies and procedures that address certain aspects of these requirements to make the rotorcraft airworthiness standards workable within the framework of later rotorcraft designs and operational needs. Additionally, most rotorcraft manufacturers have routinely exceeded the minimum safety requirements in current part 27 and part 29 regulations.

History of the NPRM

On January 20, 1995, the FAA tasked the Performance and Handling Qualities Harmonization Working Group (PHQHWG) 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, which included broad membership from government authorities and industry representatives throughout the international rotorcraft community, met a total of ten times beginning in March 1995 to ensure participation by all interested parties early in the rulemaking process. Based on the recommendations of the PHQHWG, we published a notice of proposed rulemaking (NPRM 06-11)² in the *Federal Register* on July 25, 2006. The comment period for that NPRM closed on October 23, 2006.

Summary of Comments

The FAA received a total of 34 comments to the NPRM from four commenters: Erickson Air-Crane, Transport Canada, and three individuals, two of whom submitted their comments jointly. One commenter agreed with the proposed changes but had a comment relating to our economic evaluation. The remaining 33 comments related to specific proposed rule changes and included suggested changes, as discussed more fully in the discussion of the final rule below.

¹ aircraft and its occupants, both direct and consequential, caused or contributed to by one or more failures, considering relevant adverse operation or environmental conditions." ARP4761 further states that, "for each failure condition, the analyst must assign probability requirements." In existing

Discussion of the Final Rule

Weight Limits (§§ 27.25, 29.25)

The FAA proposed § 27.25(a)(1)(iv) to formalize previous equivalent level of safety findings by establishing a maximum allowable weight if the requirements in § 27.79 or § 27.143(c)(1) cannot be met. The equivalent level of safety is attained by prohibiting certain operations and including limitations in the Rotorcraft Flight Manual (RFM) that reflect the actual capability of the aircraft.

One commenter suggested that the proposed changes potentially lower the level of safety currently required under part 27 standards, are redundant and unnecessary, appear to delete the low-speed controllability requirements as a component in establishing the maximum weight under § 27.25(a)(1)(iii), and therefore should be withdrawn. The commenter stated that under the current standard the flight requirements that typically establish the maximum weight for a helicopter with a single main rotor are in-ground effect (IGE) hover performance (§ 27.73), height-velocity (§ 27.79), and low-speed controllability (§ 27.143). The commenter further stated that the structure of § 27.25 will always establish the maximum weight at a value that allows compliance with §§ 27.79 and 27.143(c)(1) because the applicant will always select the weights allowed by § 27.25(a)(1)(iii) to show compliance with §§ 27.73, 27.79 and 27.143. Under the scenario the FAA used to justify the proposed change (making an equivalent level of safety finding to § 27.143(c) and statements in advisory material for § 29.143(c) that relate to possible removal, under certain circumstances, of operating limitations based on any hover controllability condition), the commenter stated that the FAA intends to delete the low-speed controllability requirements of the current rule as parameters for establishing maximum weight. The commenter maintained that this would reduce the margin of safety for helicopter operations, particularly above sea level, and would require exceptional piloting skills or exceptionally favorable conditions in order to conduct safe operations. Such requirements are prohibited by certain regulations, such as § 27.51(a)(1).

We disagree with a majority of these comments. Proposed § 27.25(a)(1)(iv) is not redundant or unnecessary because it provides an additional standard, rather than a replacement standard, for determining the maximum weight. Recent certifications have resulted in rotorcraft designs that have been unable

to meet the current standards for controllability near the ground (§ 27.143 Controllability and maneuverability) while at the maximum weight established at 7,000 feet density altitude when meeting the standards for performance at minimum operating speed (§ 27.73) and for establishing the respective limiting height-speed envelope (§ 27.79). For those certification projects, we have permitted the applicant to show compliance through equivalent level of safety findings. In those cases, this new standard would allow for weight-altitude-temperature (WAT) limitations to be established for a part 27 rotorcraft that cannot meet the requirements of § 27.143(c) at 7,000 feet. The rotorcraft would then be required to operate within the weights, altitudes, and temperatures specified by those WAT limitations. This “part 29 methodology,” which imposes WAT limitations not usually required of normal category rotorcraft, therefore raises the minimum level of safety by restricting the aircraft from operating in those environmental conditions where the low-speed controllability requirements cannot be met.

As alluded to by the commenter, these equivalent level of safety prohibitions and limitations have historically been obtained through use of a certification methodology analogous to that for part 29 rotorcraft certification. They do not circumvent or eliminate the low speed controllability requirements for part 27 rotorcraft. As previously noted, one factor we have used in establishing WAT limitations is the low-speed controllability requirement of § 29.143(c). After these changes are effective, the low-speed controllability requirement of § 27.143(c) will remain a factor in establishing the WAT limitations. While we partially agree with the commenter’s concerns about operating limitations being a greater workload on pilots, we do not believe that any new requirements proposed in this rule are beyond the scope of normal piloting responsibilities. Whether such data are provided in the Rotorcraft Flight Manual (RFM) as performance data or in the Limitations Section should not materially affect pilot workload. We agree with the commenter that certain environmental conditions may require increased pilot vigilance in determining wind speed and direction in order to adhere to some limitations and prohibitions. However, we believe that following such limitations should not require exceptional piloting skill. Furthermore, this standard does not reduce the margin of safety because,

historically, such a margin of safety was maintained by an equivalent level of safety finding. Under the new standard, which adopts this equivalent level of safety as another alternative, prohibiting and limiting certain operations will maintain, not lower, that established level of safety. Accordingly, we are adopting the changes as proposed.

We proposed to amend § 29.25 by requiring that the maximum weights, altitudes, and temperatures demonstrated for compliance with § 29.143(c), which may also include wind azimuths, become operating limitations for Category B rotorcraft with a passenger seating capacity of nine or less. Such limitations are necessary to ensure safe aircraft operations within the demonstrated performance envelope of such rotorcraft.

Four comments were received regarding § 29.25. One commenter stated that the intent and applicability in this proposed rule change is confusing in the context of discussions associated with previous amendments to part 29 of the regulations and associated advisory material. The commenter recommended that the paragraph be rewritten to: (1) Clarify how this paragraph affects the relief granted to Category B rotorcraft at Amendment 29–24; (2) address maximum safe wind limitations in § 29.1583; and (3) make the paragraph applicable to all Category B rotorcraft, not just those having a passenger capacity of nine or less, if the intent of the change is to grant relief under certain conditions from any hover controllability conditions determined under § 29.143(c).

The FAA does not agree that the intent and applicability of the proposed change is confusing in the context of previous amendments to part 29 and the associated advisory material. As explicitly stated in the proposed change to § 29.25(a)(4) this paragraph of the regulation applies only to Category B rotorcraft with nine or less passenger seats. Even though there may be some imprecise wording in our advisory material, we chose to exclude Category B rotorcraft with ten or more passenger seats from this change to ensure that a higher level of safety is maintained for those transport category rotorcraft configured for 10 or more passenger seats. In short, we expect a higher level of safety to be applied to all Category A rotorcraft and most Category B rotorcraft. For those Category B rotorcraft having nine or less passenger seats, in prior certifications in which the current standards for controllability near the ground (§ 29.143(c)) could not be met, we have allowed the applicant

to show compliance through an equivalent level of safety finding. We accepted these findings as providing the same level of safety as that for part 27 certifications, which also allows for configurations of no more than nine passenger seats. In those certification projects, this new standard would allow for demonstrated wind velocities and azimuths to be included as an operating limitation, which must be stated as such in the RFM. That is, for those part 29, Category B rotorcraft with nine or less passenger seats, we believe that by requiring the wind operating envelope to be a limitation, the proposed standard provides the same level of safety as in the standards prescribed by part 27, which also limits the seating capacity to nine or less passenger seats. This methodology is consistent with the standards adopted by Amendments 29–21 and 29–24, which, among other things, established different criteria for Category A and Category B rotorcraft certification in § 29.1 as a function of both aircraft weight and maximum passenger seating capacity. We believe that the proposed change is materially consistent with the current guidance material in Advisory Circular (AC) 29–2C, which only will need to be revised to reflect the requirement that the appropriate limitations be included in the RFM for these aircraft. Even though previous amendments did not specifically require that operating envelopes be included in the limitations section of the RFM for these aircraft, the proposed change makes this a requirement to further increase the safety standards. Further, because this standard deals with aircraft weight for various conditions—maximum weights, altitudes, and temperatures (WAT)—we opted to place the limitations requirement in this regulation, rather than in § 29.1583, to further emphasize that the maximum WAT conditions at which the rotorcraft can safely operate near the ground with maximum wind velocity are limitations and may also include other demonstrated wind velocities and azimuths.

Another commenter stated that revising the rule by addition of a new paragraph potentially lowers the level of safety established for part 29 standards; potentially shifts the burden for maintaining the currently established level of safety from the type design to the flight crew; and that maintaining the current version of § 29.25(a) is satisfactory and need not be changed. The commenter therefore recommended that the proposed change to § 29.25(a) be withdrawn. The commenter stated that the low-speed-controllability rule

consists of two elements, wind speed and weight. The commenter further stated that, under current regulations, all part 29 Category B rotorcraft are at a competitive disadvantage when compared to similarly-sized part 27 rotorcraft because, for part 27 rotorcraft, there is no requirement to take-off and land above 7,000 feet density altitude at a weight which allows all-azimuth low speed controllability in winds of at least 17 knots above 7,000 feet density altitude. The commenter asserts that part 29 transport category rotorcraft must be designed to operate at the maximum weight that allows compliance with § 29.143(c) at each takeoff and landing altitude. If the low speed requirement is deleted for part 29 Category B rotorcraft with nine or less passenger seats as proposed, the commenter believes the part 29 flight crew of these rotorcraft will be required to compensate by being more alert to the wind conditions when operating near maximum weight. Because the margin of safety currently provided by the part 29 design may no longer be included in the design of the rotorcraft, the commenter contends that this requirement would shift the burden for maintaining the currently established level of safety from the type design holder to the flight crew.

The FAA does not agree that these requirements will result in a lower safety standard for part 29 or that the requirement potentially shifts the burden for maintaining safety from the type design holder to the flight crew. Not only is this requirement a safety improvement, but critical safety information such as maximum weight, altitude, and temperature operating limits (which may include limited wind azimuths) would be listed in the Limitations Section of the RFM. Currently, we require that information to be placed in the Limitations Section of the RFM only for Category A rotorcraft. Our position as reflected in the preamble of the NPRM (82-12)³ leading to Amendment 29-24, states, in part, "The FAA considers the 17-knot controllability requirement an appropriate minimum safety requirement for Category A rotorcraft. * * * This proposal would add the requirement that the wind value be placed in the Flight Manual as a limitation for Category A rotorcraft. * * * In roles envisioned for utility rotorcraft and those carrying less than 10 passengers, takeoffs and landings are frequently conducted from sites where wind information is not readily

obtainable. To require this wind information as an operating limitation for Category B is impractical." However, we have reevaluated our position relating to operating limitations and are now requiring this information for Category B rotorcraft with nine or less passenger seats be placed in the Limitations Section, for the same reasons described in our disposition of the first three comments to this section.

The commenter is correct that, under current regulations, all part 29 Category B rotorcraft must be designed to operate at the maximum weight that allows compliance with § 29.143(c) at each takeoff and landing altitude, and that for part 27 rotorcraft, there is no requirement to demonstrate all-azimuth low speed controllability in winds of at least 17 knots, above 7,000 feet density altitude and at the maximum weight. The commenter stated that this places part 29, Category B rotorcraft at a competitive disadvantage when compared to similarly-sized part 27 rotorcraft. We disagree. For Category B rotorcraft having nine or less passenger seats, in prior certifications in which the current standards for controllability near the ground (§ 29.143(c)) could not be met, we have allowed the applicant to show compliance through equivalent level of safety findings. We accepted these findings as providing the same level of safety as that for part 27 certifications, which also allows for no more than nine passenger seats, by allowing operating limitations in the RFM which may include wind velocities and azimuths. In those certification projects, this new standard would allow for demonstrated wind velocities and azimuths to be included as an operating limitation in the RFM. That is, for those part 29, Category B rotorcraft with nine or less passengers, we believe that by requiring wind operating envelope to be a limitation, the new standard provides the same level of safety as in the standards prescribed by part 27, which also limits the seating capacity to nine or less passenger seats.

As discussed earlier, the FAA did not intend to delete the low speed requirement for part 29 Category B rotorcraft with nine or less passenger seats. One factor we have used in establishing WAT limitations is the low-speed controllability requirement of § 29.143(c), which this final rule now formalizes.

Performance at Minimum Operating Speed (New § 27.49)

We proposed to re-designate § 27.73 as § 27.49 and add a requirement to determine the out-of-ground effect

(OGE) hover performance, because OGE operations have become commonplace. The proposed change mandates that OGE hover data be determined throughout the range of weights, altitudes, and temperatures; most manufacturers already present this data in the RFM.

The FAA received a comment, outside of our proposed rule change, suggesting that in this final rule, where we are re-designating § 27.73 as § 27.49, that we revise paragraph (a)(2)(ii) to encompass the entire flight envelope requested by the applicant, including the temperature-altitude hover ceiling requirements where the temperature at sea level is well above the minimum standard 100 °F condition envisioned in § 27.1043(b). The commenter further stated that, if we adopt their suggested change to re-designate § 27.49(a)(2)(ii), for consistency we should revise §§ 27.51, 27.79(a)(1) and (a)(2), and 27.143(c)(1) to require turbine-powered rotorcraft to demonstrate compliance at maximum weight from sea level at temperatures established under § 27.1043(b) to 2,500 feet pressure altitude at a temperature corresponding to the established sea level temperature decreased by the standard lapse rate. The commenter also stated that the FAA should consider revising the 7,000 feet density altitude standard in proposed §§ 27.51(b), 27.79(a)(1), and 27.143(c)(1) and (c)(2) to 7,000 feet density altitude with temperature corresponding to the sea level temperature established in compliance with § 27.1043(b) decreased by the standard lapse rate. The commenter further stated that these changes would acknowledge the increased capability of turbine-powered rotorcraft by requiring compliance at the edge of the envelope requested, not to a single density altitude, which may not reflect the intended operational envelope of the rotorcraft. Although this comment may have merit, it is beyond the scope of our proposals and is not adopted. We may consider it in future rulemaking actions. Accordingly, it is adopted as proposed.

Takeoff (§ 27.51), Landing (§ 27.75), and Engines (§ 27.903)

We received no comments on these proposals; all three are adopted as proposed.

We proposed to revise § 27.51 to recognize in the standard that the most critical center-of-gravity (CG) may not be the extreme forward CG, and require that tests be performed at the most critical CG configuration and at the maximum weight for which takeoff certification is requested. Further, we proposed to clarify the requirement to

³ 47 FR 37806-01, August 26, 1982, Docket # 23266.

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, to explicitly state that the altitudes cited are density altitudes.

We proposed to revise § 27.75(a) to: (1) State the required flight condition in more traditional rotorcraft terminology; (2) require multi-engine helicopters to demonstrate landings with one engine inoperative and initiated from an established approach; and (3) replace the word “glide” with the word “autorotation.”

We proposed to add paragraph § 27.903(d) to require engine restart capability, which is a fundamental necessity for any aircraft to minimize the risk of a forced landing. A restart capability will enhance safety, even if it may not be useful in every case such as when engine damage exists or when there is insufficient altitude to implement the engine restart procedure. We intend that the restart procedure be included in the RFM.

Glide Performance (§ 27.71)

One commenter noted that the word “glide” has been replaced with “autorotation” in the proposed text of § 27.143. However, the title of § 27.71 remains “Glide Performance.” The commenter recommended that the title of § 27.71 be changed to “Autorotation Performance,” to provide consistency with the proposed changes. The FAA agrees with the comment and the title has been changed.

Performance at Minimum Operating Speed (§ 27.73)

One commenter noted that in our proposed re-designation of current § 27.73 to § 27.49, we proposed to change the ambient temperature in paragraph (a)(2)(ii) from “°F” to “°C.” Consequently, the commenter recommended that all sections of part 27 containing temperature callouts likewise be revised. We disagree. The NPRM does not change the ambient temperature callout from degrees-Fahrenheit to degrees-Celsius. Rather, it recognizes degrees-Celsius in addition to degrees-Fahrenheit when making the temperature callout. Incorporating similar changes to other temperature callouts will be considered for future changes to part 27. Accordingly, the change is adopted as proposed.

Limiting Height—Speed Envelope (§ 27.79)

We proposed to revise § 27.79(a)(1) to include the words “density altitude” after “7,000 feet.” We also proposed to revise § 27.79(a)(2) by removing “lesser”

from the first sentence, reflecting that current OGE weights for helicopters are not necessarily less than the maximum weight at sea level. Finally, we proposed to remove the term “greatest power” from § 27.79(b)(2) and replace it 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 power corrected for installation losses.

One commenter to the proposed language suggested that the FAA seems to be aligning the sections of part 27 with part 29, as was proposed with the re-designation of § 27.73 as § 27.49. Consequently, the commenter recommended that § 27.79 be re-designated as § 27.87. The FAA agrees that this paragraph re-designation better aligns the requirements for performance at minimum operating speed in part 27 and part 29. Furthermore, the re-designating of the paragraph is administrative in nature and imposes no additional requirements on applicants. Accordingly, the recommendation is adopted as proposed.

The second commenter noted that since the height-velocity (H-V) envelope for part 27 aircraft is not a limitation, the word “limiting” should be deleted from the title of § 27.79 and from any other references to the H-V envelope contained in part 27. The FAA agrees with the comment, since § 27.1587 requires that the H-V envelope be published in the RFM as performance information. Accordingly, the title of the paragraph is changed.

Controllability and Maneuverability (§§ 27.143, 29.143)

We proposed to revise §§ 27.143(a)(2)(v) and 29.143(a)(2)(v) to replace the word “glide” with “autorotation.” We proposed to re-designate portions of § 27.143, and to rewrite §§ 27.143(c) and 29.143(c) 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. We also proposed to clarify the altitude requirement with the addition of the words “density altitude.” We further proposed to revise § 27.143(c)(2) to require that controllability be determined at altitudes above 7,000 feet density altitude if takeoff and landing are scheduled above that altitude. Lastly, we proposed to add §§ 27.143(d) and 29.143(d), to require the determination of controllability for wind velocities from zero to at least 17 knots OGE at weights selected by the applicant. These proposed changes,

together with the new OGE hover requirement of § 27.49, would increase the level of safety by requiring additional performance information.

Relative to both sections 27.143 and 29.143, one commenter noted that the reference to “paragraph (e)” in paragraph (b)(4) of the current rule (which we did not propose to change in the NPRM) should be changed to read “paragraph (f).” The FAA agrees. As indicated in the NPRM, we proposed to re-designate §§ 27.143 and 29.143 paragraphs (d) and (e) as paragraphs (e) and (f), respectively. However, we failed to propose to change the reference in paragraphs in §§ 27.143 and 29.143(b)(4) from paragraph (e) to paragraph (f). That is, we gave no indication that we proposed to delete the exception enumerated in (b)(4) to exclude helicopters from the (b)(4) requirement if the helicopter demonstrates compliance with current paragraph (e) (re-designated paragraph (f)). Because these paragraph re-designations, as well as the unchanged provisions of paragraph (b), were intended only to continue the current requirements, we believe changing the reference in paragraph (b)(4) from (e) to (f) is non-substantive, constitutes a correction of an error, is consistent with our intended changes without which the proposed change would have unintended consequences, and continues the current standard to exclude the same helicopters from the provisions of paragraph (b)(4). We have changed the reference in the final rule.

A second comment stated that the NPRM proposes to add requirements to determine low-speed controllability: (1) Near the ground for takeoff and landing altitudes above 7,000 feet density altitude, and (2) for OGE for the altitude range from standard sea level to the maximum takeoff and landing altitude capability of the aircraft. The commenter stated that under § 27.25(a), the weight selected by the applicant to establish the all-azimuth wind velocities would be a factor in determining the maximum weight. The commenter stated that this weight would undoubtedly be much less than the maximum weight determined under the current rule and thus would make the rotorcraft less competitive. Further, the commenter assumes that the intent of the proposal is to develop additional performance information beyond that currently available, to assist the flight crew. The commenter stated that if these assumptions are true, the NPRM should be revised to clearly indicate that the proposed paragraphs are not applicable as flight requirements when establishing the maximum weight under § 27.25(a).

The FAA does not agree. As noted in the NPRM, the intent of the proposed language is to increase the level of safety by providing additional performance information in the RFM. This is further reflected in the proposed § 27.1587(a)(2), which proposed to explicitly require presentation of performance information found in meeting the requirements of the proposed § 27.143. Consequently, the new § 27.143(d)(4) will not be used in determining the rotorcraft's maximum weight under § 27.25(a). Except for the reference change in paragraph § 27.143(b)(4), the changes are adopted as proposed.

Another comment suggests that we used the word "manner" instead of "maneuver" in proposed § 29.143(c). The proposed requirement reads, in part, "* * * the rotorcraft can be operated without loss of control on or near the ground in any manner appropriate to the type. * * *" The commenter suggests that the word "manner" should be changed to "maneuver" because the latter is used in the current requirement and also in the proposed and current requirement in § 27.143(c). We agree. The word "manner," as used in the proposed text, is an error. We intended to use the word "maneuver" in proposed § 29.143(c) and we have made that non-substantive change in this final rule.

Static Longitudinal Stability (§§ 27.173, 29.173)

We proposed to clarify §§ 27.173(a) and 29.173(a) by changing "a speed" to "airspeed." We also proposed to combine paragraphs (b) and (c) to allow neutral or negative static stability in limited areas of the flight envelope, if adequate compensating features are present and the pilot can maintain airspeed within five knots of the desired trim airspeed under the conditions of §§ 27.175 and 29.175. Such neutral or negative static stability in limited flight domains have been allowed for numerous rotorcraft under equivalent level of safety findings. Lastly, we proposed to delete the §§ 27.173(c) and 29.173(c) requirements relating to the hover demonstration in current §§ 27.175(d) and 29.175(d).

We received no substantive comments relative to the proposed changes to § 27.173. One commenter noted that the proposed revision to § 29.173(b) has an open parenthesis mark in front of the "5 knots" and suggested that open parenthesis mark should be a "±" symbol. We agree and have made that change in the final rule. The other proposed changes have been adopted as proposed.

Demonstration of Static Longitudinal Stability (§§ 27.175, 29.175)

We proposed to decrease, in paragraphs (a) and (b) of §§ 27.175 and 29.175, the airspeed range about the specified trim speeds to more representative values than are currently contained in the rule. We also proposed to add a new paragraph (c) to require an additional level flight demonstration point, at a trim airspeed of $V_{NE} - 10$ knots, because the data coverage under the current cruise demonstration speed in modern helicopters may no longer represent a normal variation about a trim point. Additionally, we proposed to re-designate the current paragraph (c) as paragraph (d), and to delete the current paragraph (d) containing the hover demonstration, as the safety considerations associated with hovering flight are adequately addressed by §§ 27.143(a) and 29.143(a), respectively.

One commenter suggested that discrepancies may exist between § 27.175(d)(1) and (2), and §§ 27.67 and 27.71. Specifically, § 27.175 requires that static longitudinal stability be demonstrated in autorotation about the airspeeds for minimum rate-of-descent and best angle-of-glide. However, § 27.71 requires that the minimum rate of descent and the best angle of glide airspeeds be determined only for single engine helicopters and multiengine helicopters that do not meet Category A engine isolation requirements. Therefore, the commenter stated that this requirement would not apply to multi-engine helicopters that meet Category A engine isolation requirements. The commenter recommended that these sections be reconciled for part 27 designs that meet Category A engine isolation requirements. The FAA does not agree that any action is necessary. While § 27.71 does not have an explicit requirement to determine these two autorotation speeds for part 27 rotorcraft that meet Category A engine isolation requirements, § 27.141 requires that the rotorcraft demonstrate satisfactory flight characteristics for "any condition of speed, power, and rotor r.p.m. for which certification is requested; * * *." Further, the two trim airspeeds explicitly cited in the proposed rule are intended to provide data at the most likely operating conditions flown during an autorotation, thereby providing a higher level of safety. Consequently, we are adopting the language as proposed.

One commenter stated that the proposed revision to paragraph § 29.175(b) reads, "* * * in the climb condition at speeds from $V_y - 10$ kt, to $V_y + 10$ kt. * * *" The commenter

recommended that we delete the comma after " $V_y - 10$ kt." We agree. That comma in the proposed text is a typographical error and has been removed in this final rule. Otherwise, the changes are adopted as proposed.

Static Directional Stability (§§ 27.177, 29.177)

We proposed to revise §§ 27.177 and 29.177 to provide further objective criteria over which the directional stability characteristics are evaluated. We also proposed to allow for a minimum amount of negative stability around each trim point, which does not materially affect the overall safety considerations of static directional stability.

One commenter noted a typographical error in the proposed text of § 27.177, in that paragraph (a)(1) has an open parenthesis mark in front of "10 degrees" and suggests that it should be a "±" symbol. We agree and have corrected that error in § 27.177(a)(1) of this final rule. Otherwise, the proposal is adopted as proposed.

Two comments were received regarding § 29.177. In the first comment, Transport Canada stated that they do not think that § 29.177(a)(1) makes sense in relation to § 29.177(a). They recited what they assumed we meant by the proposal and stated that "paragraph 29.177(a)(1) specifies a range of sideslip angles and the lesser sideslip angle in this range will always be the smallest angle in the range." We do not agree and have not made any changes based on this comment. We believe that the commenter has misinterpreted our meaning in the "* * * sideslip angles up to the lesser of—" language in proposed § 29.177(a). This language modifies the four options listed in paragraphs § 29.177(a)(1) through § 29.177(a)(4) and is intended to mean the lesser value found from each of those four subsequent paragraphs. Paragraph 29.177(a)(1) is intended to provide options of sideslip angles from trim that are 50° wide (+25° to -25°) at the minimum-rate-of-descent airspeed less 15 knots, then varying linearly and narrowing to 20° wide (+10° to -10°) at the V_{ne} airspeed.

The second commenter suggested that the phrase in proposed § 29.177(c) that reads "paragraph (a) of this paragraph" be changed to read "paragraph (a) of this section." We agree. The correct reference is to paragraph (a) of § 29.177. Except for changing the word "paragraph" to "section" for proposed § 29.177(c), the other changes are adopted as proposed.

Performance Information (§§ 27.1587, 29.1587)

We proposed to revise § 27.1587(a) to include reference to new § 27.49. We also proposed to revise § 27.1587(a)(2)(i) and (ii) to specifically include requirements for presenting maximum safe winds for OGE operations established in proposed § 27.143. Lastly, we proposed to delete § 27.1587(b)(1)(i) and (ii), which were moved into § 27.1585(a) by Amendment 27–21 and inadvertently left in § 27.1587.

Three comments were received regarding § 27.1587. The first commenter suggested that the term “maximum wind value” in § 27.1587(a)(2)(ii) could be confusing and ambiguous and recommended that the term “maximum wind value” be replaced with “in winds of not less than 17 knots from all azimuths.” We disagree. The requirements of this proposed rule assume that the requirements of § 27.143(c) can be met by the applicant. The proposed change seeks to ensure that appropriate performance information will be included in the RFM, whether it is 17 knots or some higher demonstrated value.

The second commenter suggested that § 27.1587(a)(2)(ii) is in conflict with the proposed § 27.143(c)(2) and (3). Specifically, the former paragraph uses the term “maximum weight,” while the latter two allow the applicant to select a weight, which may be less than the maximum weight. The FAA disagrees. The proposed text of § 27.1587(a) explicitly requires that the RFM contain information determined in accordance with § 27.143(c) and (d). The term “maximum weight,” subsequently used in paragraph (a)(2)(ii) is intended to be a further description of the maximum weight used when demonstrating compliance with § 27.143(c) and (d).

The third comment stated that the FAA has no formal definition of “maximum safe wind,” nor is there a flight requirement to demonstrate a “maximum safe wind.” The commenter recommended that the FAA explain the term and include definitions in part 27 and part 29. The FAA agrees that the comment may have merit. However, the term is currently used in both part 27 and part 29, and has been used throughout the history of these regulations, to include Civil Air Regulations 6 and 7, predecessors to this regulation. Development of a formal definition may be evaluated for incorporation in future rulemaking. Accordingly, the changes are adopted as proposed.

We proposed to revise § 29.1587 to require new performance information be included in the RFM, including the requirement for presenting maximum safe winds for OGE operations.

A commenter stated that the proposed paragraphs (a)(7) and (b)(8) require, in part, “* * * 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. * * *” The commenter stated that the requirement is redundant, is not pertinent to a paragraph referring only to OGE hover performance, and that other paragraphs of § 29.1587 already contain the in-ground-effect (IGE) hovering requirement. The commenter recommended that the IGE requirement be deleted from each proposed paragraph. We agree that the “in-ground-effect” requirement is redundant and unnecessary. In adopting the changes to this section, we have deleted the “in-ground-effect” hovering requirement from the proposed § 29.1587(a)(7) and § 29.1587(b)(8).

The commenter further stated that the proposed paragraphs (a)(7) and (b)(8) conflict with the proposed revision to § 29.143(d). Specifically, proposed paragraphs (a)(7) and (b)(8) require the applicant to publish performance data for the “maximum weight,” whereas proposed § 29.143(d) allows a “weight selected by the applicant” when demonstrating the OGE requirement. The commenter stated that the “weight selected by the applicant” may not be the “maximum weight.” Therefore, the commenter recommended that § 29.1587(a)(7) and (b)(8) be changed to reflect the “weight selected by the applicant” as stated in § 29.143(d). We disagree. Proposed § 29.143(d) does allow for a “weight selected by the applicant” for the controllability and maneuverability standards. However, the proposed § 29.1587(a)(7) and (b)(8) also require that OGE performance data be provided at minimum operating speeds under § 29.49 over the ranges of “weight, altitude, and temperature” for which certification is requested, in addition to performance data at the maximum weight for each altitude and temperature at which the helicopter can hover safely in winds of not less than 17 knots from all azimuths. Consequently, the intent of this final rule is to require new OGE hover performance data be provided at the maximum weight used to demonstrate compliance with §§ 29.49 and 29.143(d).

The commenter stated that § 29.1587(b)(2) could be revised to more clearly indicate that the hover ceiling data is for IGE hovering. We agree that

making specific reference to the IGE hover ceiling, adds clarification, and removes any ambiguity in the requirement. Accordingly, the recommendation is adopted.

The commenter also suggested that since § 29.1587(b)(8) uses the term “winds of at least 17 knots from all azimuths,” it “would seem reasonable to expect paragraph (b)(4) to be similarly changed.” We do not agree. Section 29.1587(b)(4) assumes that the requirements of § 29.143(c) for critical conditions can be met during IGE operations. Consequently, the requirements of (b)(4) ensure that, if a higher wind value exists that could present an unsafe condition, the consideration of those higher wind values are reflected in the appropriate performance information in the RFM for the maximum safe winds for operations near the ground. Conversely, paragraph (b)(8) requires presentation of the maximum weight at which the rotorcraft can hover OGE in 17-knot winds from any azimuth.

The commenter questioned why we proposed to remove the term “maximum safe wind” from current § 29.1587(a)(7) and replace it with “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.” The commenter noted that in § 29.1587(b)(8) the FAA proposed to continue to use the current terminology “maximum safe wind” but add an “almost separate and distinct parameter,” that is to say, “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,” the exact language we proposed as replacement language in paragraph (a)(7). The commenter stated that there is some apparent confusion over the definition and use of the term “maximum safe wind.” The commenter further postulated that in the proposed paragraph (a)(7), standard maximum safe wind seems to be equated with winds established for all-azimuth low speed controllability as defined in § 29.143(c). Conversely, proposed paragraph (b)(8) seems to treat maximum safe wind as something other than winds established for all-azimuth low speed controllability. The commenter believes that “maximum safe wind” could be viewed as a range of wind speeds and azimuths for safe operation where the wind speed is neither less than the wind speed established by § 29.143(c) nor more than

the demonstrated speed, particularly in non-critical azimuth ranges. The commenter stated that the FAA has neither a formal definition of "maximum safe wind" nor a flight requirement to demonstrate a "maximum safe wind," and therefore recommended that the FAA explain the term and include a formal definition in part 27 and part 29. The FAA disagrees. In paragraphs (a)(7) and (b)(8), we proposed to more explicitly relate these requirements to those of § 29.143. The term "maximum safe wind" is also included in paragraph (b)(8) to provide for the presentation of additional wind speeds and azimuths in which Category B rotorcraft may be safely operated. While this term is not formally defined, it has been used in the certification standards since the existence of Civil Air Regulations 6 and 7; development of a formal definition will be evaluated in future rule changes. We did not make any changes to § 21.1587 based on these comments.

Airworthiness Criteria of Helicopter Instrument Flight (Appendix B to Part 27 and Appendix B to Part 29)

We proposed to amend paragraph V(a) to allow for a minimal amount of neutral or negative stability around trim and to replace the phrase "in approximately constant proportion" with "without discontinuity." We also proposed to require that the pilot be able to maintain the desired heading without exceptional skill or alertness. Additionally, we proposed to reorganize paragraphs VII(a)(1) and VII(a)(2) and to revise them to specify the standards that must be met when considering a stability augmentation system failure. Finally, in paragraph V(b) of Appendix B to Part 29, we proposed to replace the word "cycle" with the correct word, "cyclic."

One commenter noted that, in the proposed change to paragraph VII(a) of Appendix B to Part 27 and Part 29, we replaced the term "failure condition" with the term "failure." The commenter stated that, "in the context of a systems safety assessment a 'failure' and a 'failure condition' are two distinctly different things" and that the proposed change represents an alleviation. Consequently, the commenter stated support for reinstating the original term "failure condition" as intended by the ARAC Performance and Handling Qualities Working Group. Although not stated specifically in the comment, we believe that the commenter is suggesting that the word "condition" be inserted after the word "failure" in the second and third sentences of paragraph VII(a). We agree that we should insert the word

"condition" in the two places in paragraph VII(a) but do not agree that, as stated, the proposal lessens the safety standard. Rather, we believe that omitting the term "condition," as proposed in the NPRM, could result in a perceived change to the requirements for the systems safety assessment for instrument flight certification or could create confusion in future certification activities since its use would not be consistent with other current regulations, advisory material, and industry practice. No such change was intended by the proposal.

SAE Aviation Recommended Practice, ARP4761, defines the term "failure" as "a loss of a function or a malfunction of a system or a part thereof." It further defines the term "failure condition" as "a condition with an effect on the aircraft and its occupants, both direct and consequential, caused or contributed to by one or more failures, considering relevant adverse operation or environmental conditions." ARP4761 further states that, "for each failure condition, the analyst must assign probability requirements." In existing certification activities, we accept these definitions for assigning probability requirements. In application, the five probability classifications (frequent, reasonably probable, remote, extremely remote, and extremely improbable) are intended to relate to an identified "failure condition" resulting from or contributed to by the improper operation or loss of a function or functions and not to the reliability of specific components or systems. The FAA intends that the term "failure condition" relate to the assignment of a probability requirement (in this case, "extremely improbable") to the "failure condition," and not to the "failure" itself. In this standard, a Stability Augmentation System (SAS) failure condition, under these definitions, requires that the applicant take into consideration that the operation is made during instrument flight.

Because we are concerned that this proposal may be viewed as an inadvertent change to the safety standard and the system safety analysis requirements associated with SAS for instrument flight certification, we have changed the proposed standard and now use the term "failure condition" in the suggested two locations in paragraph VII(a). This change is consistent with the intent of the proposed standard, current industry practice, and is the same terminology used elsewhere in our regulations and guidance material. The change is further consistent with our goal of maintaining harmonized certification standards with the

European Aviation Safety Agency (EASA). The remaining proposals are adopted without change.

Appendix C to Part 27 Criteria for Category A

One commenter recognized that we did not propose to change Appendix C to part 27, but suggested that since we are proposing to revise the low speed controllability section of part 27, we should also require all-azimuth low speed controllability in winds of not less than 17 knots at all weights, altitudes and temperatures where Category A takeoff and landing operations are requested for certification. The commenter stated that current Appendix C to part 27 does not require that part 27 rotorcraft certificated for Category A operations meet the low speed controllability requirements of § 29.143(c) because that requirement is not listed in paragraph C27.2 of Appendix C to part 27. The commenter speculated that perhaps "we reasoned that since the low speed controllability requirements of § 27.143(c) and § 29.143(c) are identical, there was not a need to repeat a requirement already in place." However, the commenter stated that there is a difference; specifically with regards to the altitude range over which the two rules apply. The commenter stated that § 27.143(c) applies only from sea level to 7,000 feet density altitude, while § 29.143(c) applies to all altitudes and temperature for takeoff and landing requested for certification. The commenter stated that part 27 rotorcraft certificated for Category A operations should meet the same level of safety as that for transport category rotorcraft. We disagree. Part 27 rotorcraft certificated for Category A operations were not intended to meet the same level of safety as that for transport category rotorcraft. If this were the case, Appendix C to part 27 would have included all the part 29 requirements for Category A, particularly where differences exist between part 27 and part 29. Indeed, different Category A certification requirements exist for part 29 rotorcraft, as a function of aircraft weight and passenger seating capacity.

Performance at Minimum Operating Speed (New § 27.49)

We proposed to re-designate § 27.73 as § 27.49 and add a requirement to determine the OGE hover performance, because such operations have become commonplace. The proposed change mandates that OGE hover data be determined throughout the range of weights, altitudes, and temperatures;

most manufacturers already present this data in the RFM.

Concerning this re-designation of § 27.73 as § 27.49, a commenter suggested that we revise paragraph (a)(2)(ii) to encompass the entire flight envelope requested by the applicant, including the temperature-altitude hover ceiling requirements, where the temperature at sea level is well above the minimum standard 100°F condition envisioned in § 27.1043(b). The commenter further stated that, if we adopt the suggested change to re-designate § 27.49(a)(2)(ii), for consistency we should revise §§ 27.51, 27.79(a)(1) and (a)(2), and 27.143(c)(1) to require turbine-powered rotorcraft to demonstrate compliance at maximum weight from sea level at temperatures established under § 27.1043(b) to 2,500 feet pressure altitude at a temperature corresponding to the established sea level temperature decreased by the standard lapse rate. The commenter also stated that the FAA should consider revising the 7,000 feet density altitude standard in proposed §§ 27.51(b), 27.79(a)(1), and 27.143(c)(1) and (c)(2) to 7,000 feet density altitude with temperature corresponding to the sea level temperature established in compliance with § 27.1043(b) decreased by the standard lapse rate.

The commenter stated that these changes would acknowledge the increased capability of turbine-powered rotorcraft by requiring compliance at the edge of the requested envelope, not to a single density altitude, which may not reflect the intended operational envelope of the rotorcraft. Although this comment may have merit, it is beyond the scope of our proposals and is not adopted. We may consider it in future rulemaking actions.

Takeoff (§ 27.51), Landing (§ 27.75), and Engines (§ 27.903)

We received no comments on our proposed changes to these sections. All are adopted as proposed, but are included here for informational purposes.

We proposed to revise § 27.51 to recognize in the standard that the most critical center-of-gravity (CG) may not be the extreme forward CG, and require that tests be performed at the most critical CG configuration and at the maximum weight for which takeoff certification is requested. Further, we proposed to clarify 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, to explicitly state that the altitudes cited are density altitudes.

We proposed to revise § 27.75(a) to: (1) State the required flight condition in more traditional rotorcraft terminology; (2) require multi-engine helicopters to demonstrate landings with one engine inoperative and initiated from an established approach; and (3) replace the word “glide” with the word “autorotation.”

We proposed to add paragraph § 27.903(d) to require engine restart capability, which is a fundamental necessity for any aircraft to minimize the risk of a forced landing. A restart capability will enhance safety, even if it may not be useful in every case, such as when engine damage exists or when there is insufficient altitude to implement the engine restart procedure. We intend to include the restart procedure in the RFM.

Economic Evaluation

Regarding our economic determination, Erickson Air-Crane Incorporated asked that we correct the *Regulatory Flexibility Determination* section to show that Erickson is a part 29, rather than a part 27, rotorcraft manufacturer; has 600 employees rather than 500; and suggested that we recalculate the percentages in the Annual Revenue table based on these changes. We concur. We have made these changes and do not believe that they materially change the economic determination of this rule.

Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. An agency may not collect or sponsor the collection of information, nor may it impose an information requirement unless it displays a currently valid Office of Management and Budget (OMB) control number.

As required by the Act, we submitted a copy of the new information requirements to OMB for their review when we published the NPRM. Additionally, in the NPRM, we solicited comments from the public on the proposed new information collection requirements. No comments relating to the proposed new information collection requirements were received. Affected parties, however, do not have to comply with the information collection requirements of this rule until the OMB approves the FAA's request for this information collection requirement. The FAA will publish a separate document notifying you of the OMB Control Number and the compliance

date(s) for the information collection requirements of this rule.

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 regulations.

Regulatory Evaluation, Regulatory Flexibility Determination, International 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 final 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 final 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) will not have a significant economic

impact on a substantial number of small entities; (5) will not have a significant effect on international trade; and (6) will not impose an unfunded mandate on state, local, or tribal governments, or on the private sector by exceeding the monetary threshold identified. These analyses are summarized below.

Total Benefits and Costs of This Rulemaking

The estimated cost of this final 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 part 27 or 29 rotorcraft.

Our Cost Assumptions and Sources of Information

- Discount rate—7%.
- Period of analysis—10 years. During this period manufacturers will seek new certifications for one large and one small part 27 and two large part 29 rotorcraft.
- Value of fatality avoided—\$3.0 million (Source: “Economic Values for FAA Investment & Regulatory Decisions” (March 2004)).

Benefits of This Rule

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

Cost of This Rule

We estimate the costs of this final rule to be about \$558,250 (\$364,955 in present value) over the 10-year analysis

period. Manufacturers of 14 CFR part 27 rotorcraft will incur costs of \$383,250 (\$234,039 in present value) and manufacturers of 14 CFR part 29 helicopters will incur costs of \$175,000 (\$130,916 in present value).

Final Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (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 solicit and consider flexible regulatory proposals and to explain the rationale for their actions. 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 proposed or final 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 Act.

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 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.

This Final Regulatory Flexibility Analysis examines the potential costs and benefits to small business entities of a final rule on new and revised performance and handling requirements for rotorcraft. The rule is intended to

revise the flight certification requirements to incorporate flight test procedures for performance and handling qualities that reflect the evolution of rotorcraft capabilities since the last major revisions to this rule.

In addition the rule reflects an international effort to have common rotorcraft certification requirements.

We used the Small Business Administration guideline of 1,500 employees or fewer per firm as the criterion for the determination of a small business in commercial air service.⁴

In order to determine if the final 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, respectively was developed.

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 businesses, and eliminated those with more than 1,500 employees and subsidiaries of larger businesses.

The results of this methodology are displayed on Table VII–1 showing 4 U.S. part 27 rotorcraft manufacturers with fewer than 1,500 employees and one part 29 rotorcraft manufacturer with fewer than 1,500 employees.

One comment was received on the NPRM regulatory flexibility section. The comment was from Erickson Air-Crane. The regulatory flexibility analysis section of the NPRM listed Erickson Air-Crane as a part 27 manufacturer with 500 employees. Erickson Air-Crane commented that they are a part 29 manufacturer with 600 employees. The information provided by Erickson Air-Crane was used in the preparation of this final regulatory flexibility determination.

TABLE VII–1.—U.S. SMALL BUSINESS ROTORCRAFT MANUFACTURERS

No.	Name	Employment
Part 27		
1	Hiller Aircraft Corp	35
2	Brantley Helicopter Industry	35
3	Enstrom Helicopter Corporation	100
4	Robinson Helicopter Company, Inc	700

⁴ 13 CFR 121.201, Size Standards Used to Define Small Business Concerns, Sector 48–49 Transportation, Subsector 481 Air Transportation.

TABLE VII-1.—U.S. SMALL BUSINESS ROTORCRAFT MANUFACTURERS—Continued

No.	Name	Employment
Part 29		
1	Erickson Air-Crane	600

Based on the historic number of new rotorcraft certificates over the next ten years, we expect that only one of the part 27 smaller firms will be affected by this final rule.

Although most of the proposed requirements intended to revise the flight certification requirements are current industry standards 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 RFM. Sections 27.173 and 29.173 on static longitudinal stability will be cost relieving to the manufacturers because they delete hover demonstrations that are redundant with other requirements.

As shown in Table VII-2, we estimate the total compliance costs for a small part 27 firm's new certification to be \$77,000.

TABLE VII-2.—COMPLIANCE COSTS FOR SMALL BUSINESS PART 27 ROTORCRAFT MANUFACTURERS PER CERTIFICATION

Rule section	Cost
27.49	\$20,075
27.143	29,300
27.173	(14,600)
27.175	3,650
27.177	20,075
27.903	18,250
Total	76,750

The annualized cost for this small operator is estimated at \$10,928 (\$76,750 × 0.142378⁵).

As shown in Table VII-3, we estimate the total compliance costs for a small part 29 firm's new certification to be \$175,000.

TABLE VII-3.—COMPLIANCE COSTS FOR SMALL BUSINESS PART 29 ROTORCRAFT MANUFACTURERS PER CERTIFICATION

Rule section	Cost
29.143	\$280,000
29.173	(140,000)

TABLE VII-3.—COMPLIANCE COSTS FOR SMALL BUSINESS PART 29 ROTORCRAFT MANUFACTURERS PER CERTIFICATION—Continued

Rule section	Cost
29.175	35,000
Total	175,000

The annualized cost for this small operator is estimated at \$24,916 (\$175,000 × 0.142378⁶).

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. This ratio is a conservative measure as the annualized value of the 10-year total compliance cost is divided by one year of annual revenue. None of the small business operators potentially affected by this proposed rule will incur costs greater than 0.2 percent of their annual revenue (See Table VII-4).

TABLE VII-4.—IMPACT OF FINAL RULE ON SMALL U.S. ROTORCRAFT MANUFACTURERS

Name	Employment	Annual revenue	Cert. cost	Percentage
U.S. Part 27 Small Rotorcraft Manufacturers				
Hiller Aircraft Corp	35	\$7,500,000	\$10,928	0.15
Brantley Helicopter Industry	35	15,000,000	10,928	0.07
Enstrom Helicopter Corp	100	35,000,000	10,928	0.03
Robinson Helicopter Co., Inc	700	80,000,000	10,928	0.01
U.S. Part 29 Small Rotorcraft Manufacturers				
Erickson Air-Crane	600	35,000,000	24,916	0.07

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

Thus, we determined that no small entity will incur a substantial economic impact in the form of higher annual costs as a result of this rule.

Consequently, the FAA Administrator certifies that this final rule will not have a significant economic impact on a substantial number of small rotorcraft manufacturers.

⁵ Uniform Annual Value discounted at 7% over 10-year period.

Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96-39) prohibits Federal agencies from establishing any

⁶ Uniform Annual Value discounted at 7% over 10-year period. activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not

The FAA has assessed the potential effect of this final rulemaking action and determined that it will reduce trade barriers by narrowing the differences between international and U.S. certification standards. Therefore, this final rule 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) in any 1 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 final rule does not contain such a mandate. The requirements of Title II do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action will not have a substantial direct effect on the States, or 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, does not have federalism implications.

Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the FAA, when modifying its regulations 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 appropriate regulatory distinctions. In the NPRM, we requested comments on whether the proposed rule should apply differently to intrastate operations in Alaska. We did not receive any comments, and we have determined, based on the administrative record of this rulemaking, that there is no need to make any regulatory distinctions applicable to intrastate aviation in Alaska.

considered unnecessary obstacles. The statute also requires consideration of international standards and, where appropriate, that these international standards be the basis for U.S. standards.

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 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 FAA has analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). We have determined that it 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.

Availability of Rulemaking Documents

You may obtain an electronic copy of rulemaking documents using the Internet by—

1. Searching the Federal eRulemaking Portal (<http://www.regulations.gov>);
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 may also obtain 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 amendment number or docket number of this rulemaking.

Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted 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 (Volume 65, Number 70; Pages 19477-78) or you may visit <http://www.regulations.gov>.

Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or

advice about compliance with statutes and regulations within its jurisdiction. If you are a small entity and you have a question regarding this document, you may contact your local FAA official, or the person listed under the **FOR FURTHER INFORMATION CONTACT** heading at the beginning of the preamble. You can find out more about SBREFA on the Internet at http://www.faa.gov/regulations_policies/rulemaking/sbre_act/.

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 Amendment

■ In consideration of the foregoing, the Federal Aviation Administration amends 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;

(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 the section heading of § 27.71 to read as follows:

§ 27.71 Autorotation performance.

* * * * *

■ 6. 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.

* * * * *

■ 7. Re-designate § 27.79 as new § 27.87; revise the section heading; remove the word “rotocraft” and add in its place the word “rotorcraft” in paragraph (b)(3); and revise paragraphs (a)(1), (a)(2) and (b)(2) to read as follows:

§ 27.87 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

* * * * *

■ 8. Amend § 27.143 by revising paragraph (a)(2)(v); re-designating paragraphs (d) and (e) as paragraphs (e) and (f) respectively; revising paragraphs (b)(4) and (c); and adding a new paragraph (d) to read as follows:

§ 27.143 Controllability and maneuverability.

(a) * * *

(2) * * *

(v) Autorotation;

* * * * *

(b) * * *

(4) Power off (except for helicopters demonstrating compliance with paragraph (f) of this section) and power on.

(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.

* * * * *

■ 9. 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.

■ 10. Amend § 27.175 by removing paragraph (d); revising the introductory text 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 $V_y - 10$ kt to $V_y + 10$ 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.

* * * * *

■ 11. 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.

■ 12. 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.

■ 13. Amend § 27.1587 by removing paragraphs (b)(1)(i) and (b)(1)(ii), and revising the introductory text of 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 descent, 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 take off 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;

* * * * *

■ 14. Amend Appendix B to part 27 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 $\pm 10^\circ$ 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 condition that would prevent continued safe flight and landing must be extremely improbable. It must be shown that, for any failure condition 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

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

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

■ 16. 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.

* * * * *

■ 17. Amend § 29.143 by revising paragraph (a)(2)(v); re-designating paragraphs (d) and (e) as paragraphs (e) and (f) respectively; revising paragraphs (b)(4) and (c); and adding a new paragraph (d) to read as follows:

§ 29.143 Controllability and maneuverability.

(a) * * *

(2) * * *

(v) Autorotation; and

* * * * *

(b) * * *

(4) Power off (except for helicopters demonstrating compliance with paragraph (f) of this section) and power on.

(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), 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.

* * * * *

■ 18. Amend § 29.173 by removing the words “a speed” in the two places it

appears 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.

■ 19. 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 $V_y - 10$ kt to $V_y + 10$ 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 V_y .

(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 $- 10$ 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.

■ 20. 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 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.

■ 21. Amend § 29.1587 by revising paragraph (a)(7), (b)(2), 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 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) * * *

(2) The steady rates of climb and in-ground-effect hovering ceiling, together with the corresponding airspeeds and other pertinent information, including

the calculated effects of altitude and temperature;

* * * * *

(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 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

* * * * *

■ 22. Amend Appendix B to Part 29 in paragraph V(b) by removing the word "cycle" and adding the word "cyclic" in its place; and by 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.

* * * * *

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 condition that would prevent continued safe flight and landing must be extremely improbable. It must be shown that, for any failure condition 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.

* * * * *

Issued in Washington, DC, on February 20, 2008.

Robert A. Sturgell,

Acting Administrator.

[FR Doc. E8-3817 Filed 2-28-08; 8:45 am]

BILLING CODE 4910-13-P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Docket No. FAA-2007-0104; Airspace Docket No. 07-AEA-10]

Establishment of Class E Airspace; Oil City, PA

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; confirmation of effective date.

SUMMARY: This action confirms the effective date of a direct final rule that establishes a Class E airspace area to support Area Navigation (RNAV) Global Positioning System (GPS) Special Instrument Approach Procedures (IAPs) that serve the Northwest Medical Center in Oil City, PA.

DATES: Effective 0901 UTC, February 14, 2008. The Director of the Federal Register approves this incorporation by reference action under Title 1, Code of Federal Regulations, part 51, subject to the annual revision of FAA Order 7400.9 and publication of conforming amendments.

FOR FURTHER INFORMATION CONTACT: Daryl Daniels, Airspace Specialist, System Support, AJO2-E2B.12, FAA Eastern Service Center, 1701 Columbia Ave., College Park, GA 30337; telephone (404) 305-5581; fax (404) 305-5572.

SUPPLEMENTARY INFORMATION:

Confirmation of Effective Date

The FAA published this direct final rule with a request for comments in the **Federal Register** on December 19, 2007 (72 FR 71762). The FAA uses the direct final rulemaking procedure for a non-controversial rule where the FAA believes that there will be no adverse public comment. This direct final rule advised the public that no adverse comments were anticipated, and that unless a written adverse comment, or a written notice of intent to submit such

an adverse comment, were received within the comment period, the regulation would become effective on February 14, 2008. No adverse comments were received, and thus this notice confirms that effective date.

Issued in College Park, GA, on February 12, 2008.

John D. Haley,

Acting Manager, System Support Group, Eastern Service Center.

[FR Doc. 08-875 Filed 2-28-08; 8:45 am]

BILLING CODE 4910-13-M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Docket No. FAA-0165; Airspace Docket No. 07-AEA-11]

Establishment of Class E Airspace; Montrose, PA

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; confirmation of effective date.

SUMMARY: This action confirms the effective date of a direct final rule that establishes a Class E airspace area to support Area Navigation (RNAV) Global Positioning System (GPS) special Instrument Approach Procedures (IAPs) that serve the Montrose High School Heliport, Montrose, PA.

DATES: Effective 0901 UTC, February 14, 2008. The Director of the Federal Register approves this incorporation by reference action under Title 1, Code of Federal Regulations, part 51, subject to the annual revision of FAA Order 7400.9 and publication of conforming amendments.

FOR FURTHER INFORMATION CONTACT: Daryl Daniels, Airspace Specialist, System Support, AJO2-E2B.12, FAA Eastern Service Center, 1701 Columbia Ave., College Park, GA 30337; telephone (404) 305-5581; fax (404) 305-5572.

SUPPLEMENTARY INFORMATION:

Confirmation of Effective Date

The FAA published this direct final rule with a request for comments in the **Federal Register** on December 13, 2007 (72 FR 70768). The FAA uses the direct final rulemaking procedure for a non-controversial rule where the FAA believes that there will be no adverse public comment. This direct final rule advised the public that no adverse comments were anticipated, and that unless a written adverse comment, or a written notice of intent to submit such