

judge issues an initial decision in the proceedings where the administrative law judge finds that written argument is necessary or required for resolution of the issues or the case. If a party files a written posthearing brief, the party shall include proposed findings of fact and conclusions of law, exceptions to rulings of the administrative law judge, and supporting arguments for the findings, conclusions, or exceptions. The administrative law judge shall give the parties a reasonable opportunity, not more than 30 days after receipt of the transcript, to prepare and submit the briefs.

13. Section 13.232 is revised to read as follows:

§ 13.232 Initial decision.

(a) *Contents.* The administrative law judge shall issue an initial decision at the conclusion of the hearing and may affirm, modify, or reverse the allegations contained, or the civil penalty sought, in the complaint. In each oral or written decision, the administrative law judge shall include findings of fact and conclusions of law, and the grounds supporting those findings and conclusions, upon all material issues of fact, the credibility of witnesses, the applicable law, any exercise of the administrative law judge's discretion, the amount of any civil penalty found appropriate by the administrative law judge, and a discussion of the basis for any order issued in the proceedings. The administrative law judge is not required to provide a written explanation for rulings on objections, procedural motions, and other matters not directly relevant to the substance of the initial decision. If the administrative law judge refers to any previous unreported or unpublished initial decision, the administrative law judge shall make copies of that initial decision available to all parties and the FAA decisionmaker.

(b) *Oral decision.* Except as provided in paragraph (c) of this section, at the conclusion of the hearing, the administrative law judge shall issue the initial decision and order orally on the record.

(c) *Written decision.* The administrative law judge may issue a written initial decision not later than 30 days after the conclusion of the hearing or submission of the last posthearing brief where the administrative law judge finds that a written initial decision is necessary or required for resolution of the issues or the case. The administrative law judge shall serve a copy of the written initial decision on each party.

(d) *Order assessing civil penalty.* If the administrative law judge affirms or modifies the allegations contained, or the civil penalty sought, in a complaint, the initial decision issued by the administrative law judge shall become an order assessing civil penalty.

Issued in Washington, DC on February 28, 1990.

Gregory S. Walden,
Chief Counsel.

[FR Doc. 90-4975 Filed 3-1-90; 10:00 am]

BILLING CODE 4910-13-M

14 CFR Part 13

[Docket No. 25690]

Rules of Practice for FAA Civil Penalty Actions

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of public meeting.

SUMMARY: This notice announces a meeting to provide an opportunity for public comment on proposed changes and policy issues related to the FAA's rules of practice implementing the civil penalty authority in actions not exceeding \$50,000 for a violation of the Federal Aviation Act of 1958, or any rule, regulation, or order issued thereunder. At the conclusion of a hearing before the House Subcommittee on Aviation of the Committee on Public Works and Transportation in November 1989, the FAA agreed to reexamine several objections to the rules of practice raised by individuals and by organizations representing air carriers, airport operators, and pilots. In addition to this public meeting, the FAA is soliciting written comments on the matters raised in a notice of proposed rulemaking published concurrently with this notice. The written comments and the comments received at this meeting will assist the FAA in its consideration of potential changes to the rules of practice to be applied in future and, where appropriate, pending civil penalty actions.

DATES: The public meeting will be held on March 12, 1990, from 9:00 a.m. to 4:00 p.m. Written comments on the notice of proposed rulemaking must be received on or before March 30, 1990.

ADDRESSES: The public meeting will be held in the FAA Auditorium, Federal Aviation Administration, 800 Independence Avenue, SW., 3rd Floor, Washington, DC 20591.

Comments on the notice of proposed rulemaking should be submitted, in

triplicate, to the Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC-10), Room 915G, Docket No. 25690, 800 Independence Avenue, SW., Washington, DC 20591. Comments submitted on the notice of proposed rulemaking must be marked "Docket No. 25690." Comments may be inspected in the Rules Docket (Room 915G) between 8:30 a.m. and 5:00 p.m. on weekdays, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Denise Daniels Ross, Special Assistant to the Chief Counsel (AGC-3), Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267-3773.

SUPPLEMENTARY INFORMATION

Background

The House Subcommittee on Aviation of the Public Works and Transportation Committee held a hearing on November 15, 1989, to consider an extension of the FAA's authority to assess civil penalties administratively. The FAA and representatives of the aviation industry, among others, testified about the FAA's authority and the rules of practice implementing that authority. At the hearing, the rules of practice received a significant amount of criticism from the witnesses representing the aviation community.

On November 22, 1989, shortly before Congress concluded its legislative Session, a 4-month extension of the FAA's authority was passed (Public Law 101-236). The President signed that bill into law on December 15, 1989. Under that law, the FAA's authority to assess civil penalties now will expire on April 30, 1990 unless further extended by Congress.

At the conclusion of the Congressional hearing, the FAA agreed to review objections raised by those members of the aviation community who testified at the hearing and who previously commented on the rules. The FAA issued a notice of proposed rulemaking (NPRM) on February 28, 1990, published in a separate part of today's *Federal Register*.

In the NPRM, the agency discussed the most widespread objections to specific rules of practice. Specifically, these complaints focused on several areas of the rules of practice perceived to be biased in favor of the prosecution, to afford less process than desired in on-the-record hearings, or simply contrary to the interests of alleged violators. In the NPRM, the agency requested comment on possible changes to the

rules and a discussion of the public interest and policy served by amending the rules of practice in the manner suggested by participants at the Congressional hearing.

Purpose of the Public Meeting

The NPRM issued on February 28, 1990, is intended to fulfill a commitment made by the agency to the members of the House Subcommittee on Aviation of the Committee on Public Works and Transportation at the hearing held on November 15, 1989. In furtherance of that commitment, this public meeting affords an additional opportunity for interested persons to comment on the proposed changes, the policy and practical effect of the proposals, and to offer and justify other specific changes to the rules. Consistent with the agency's stated position in the NPRM, the FAA is not seeking comment at this public meeting on the legal issues contained in a petition for review filed by the Air Transport Association of America, currently pending before the United States Court of Appeals for the District of Columbia.

Because the authority given the Administrator has been extended only temporarily, the FAA must proceed expeditiously with this rulemaking

action. Consequently, the comment period for the NPRM and the notice provided for this meeting are relatively short. As stated in the NPRM, it is important that the aviation community understand that the speed with which the agency is proceeding is not intended to circumvent meaningful comment. Instead, the FAA requests the aviation community's cooperation in providing reasoned and constructive comment on the policies discussed in the NPRM within a relatively brief time period. The purpose of this meeting is to provide for the expeditious collection of widest possible public comment on the issues raised in the notice. The FAA intends to issue a final rulemaking document soon after the comment period for the NPRM closes.

Meeting Procedures

The meeting will be informal in nature and will be conducted by officials of the FAA. The meeting will be open to all persons on a space-available basis. There will be no admission fee or charge to attend the meeting.

Any person wishing to make a presentation to the FAA will be asked to sign an attendance list and to estimate the amount of time needed for any presentation. This procedure will permit

allocation of an appropriate amount of time for each speaker. The FAA may allocate the time available for each presentation in order to accommodate all speakers. The FAA will make every effort to see that each person on the attendance list has an opportunity to address the panel of FAA officials. The FAA may adjourn the meeting at any time if all persons present have had the opportunity to speak.

Any person who wishes to present a position paper or written comments dealing with the issues raised in the NPRM to the panel is encouraged to submit those comments to the docket prior to the meeting but may present the comments to the panel at the meeting. The meeting will be recorded to ensure that each speaker's oral comments are noted accurately. A copy of the transcript of the oral comments and any written comments received at the hearing will be placed in the public docket for this rulemaking.

Issued in Washington, DC on February 28, 1990.

Gregory S. Walden,
Chief Counsel.

[FR Doc. 90-4976 Filed 3-1-90; 10:00 am]

BILLING CODE 4910-13-M

1500 Part 133

Tuesday
March 6, 1990

Part V

Department of Transportation

Federal Aviation Administration

14 CFR Parts 27, 29, and 133
Airworthiness Standards; Rotorcraft
Regulatory Review Program Amendment
No. 4; Rule

DEPARTMENT OF TRANSPORTATION**Federal Aviation Administration****14 CFR Parts 27, 29, and 133**

[Docket No. 25570, Amdts. 27-26, 29-30, and 133-12]

RIN 2120-AA29

Airworthiness Standards; Rotorcraft Regulatory Review Program Amendment No. 4

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This rule adopts new and revised airworthiness standards for certification of airframe and related equipment on both normal and transport category rotorcraft. In addition, one amendment changes an operating rule affecting external load operators. These amendments grew out of a rotorcraft regulatory review program and the recognition by both government and industry that updated safety standards are needed. These amendments provide a high level of safety in design requirements, while removing certain unnecessary existing burdens and better utilizing the unique characteristics and capabilities of rotorcraft.

EFFECTIVE DATE: April 5, 1990.

The incorporation by reference of certain publications listed in the regulations is approved by the Director of the *Federal Register* as of April 5, 1990.

FOR FURTHER INFORMATION CONTACT: Mr. James H. Major, FAA, Rotorcraft Directorate, Aircraft Certification Service, Fort Worth, Texas 76193-0111, telephone (817) 624-5117.

SUPPLEMENTARY INFORMATION:

Background

These amendments are the last in a series of amendments issued as a part of the Rotorcraft Regulatory Review Program. The first of the series of amendments in this program addressed applicability and icing certification standards and was published in the *Federal Register* on January 31, 1983 (48 FR 4374). The second of the series of amendments dealt with rotorcraft flight characteristics and systems and equipment and was published in the *Federal Register* on November 6, 1984 (49 FR 44422). The third in the series upgraded operation and maintenance rules and was published in the *Federal Register* on November 7, 1986 (51 FR 40692). The fourth in the series involved the powerplant, rotor drive mechanism, and their associated support systems,

and was published in the *Federal Register* on September 2, 1988 (53 FR 34198).

These amendments are based on Notice of Proposed Rulemaking (NPRM) No. 88-7 published in the *Federal Register* on March 21, 1988 (53 FR 9190). In addition, a correction notice, containing minor editorial changes, was published in the *Federal Register* on April 5, 1988 (53 FR 11162).

All interested persons have been given an opportunity to participate in the making of these amendments and due consideration has been given to all matters presented. A number of nonsubstantive changes and minor changes of an editorial and clarifying nature have been made to the proposals based upon relevant comments received and upon further review by the FAA. Except as indicated herein, the proposals contained in the notice have been adopted without change.

A total of six commenters responded to the notice. The commenters represented airframe manufacturers, airworthiness authorities of other countries, rotorcraft owners and operators, and individuals. A majority of the commenters agree with the substance of the NPRM and, in addition, recommend several changes. These recommendations and their dispositions are contained in the following discussion.

Discussion of Comments

Sections 27.307-29.307 Proof of Structure

The notice proposed to clarify these sections by revising paragraph (a) of each section to require proof of compliance with the strength and deformation requirements of subpart C (parts 27 and 29) for the environmental conditions that the structure will experience in operation. These standards apply to metallic as well as composite (nonmetallic) structures.

One commenter supports the proposal for § 29.307 and notes that the requirement also applies to metal components, since the strength of bonded joints in metal structures can be susceptible to temperature and humidity. Another commenter, commenting on both §§ 27.307 and 29.307, agrees with accounting for potential environmental effects but recommends a change to ensure that mandatory full-scale environmental tests would not be required unless necessary. Rather than the wording "in the environment," the commenter recommends "accounting for the environment" to allow coupon/element environmental tests or analysis when

based on proper substantiation. The FAA agrees, and the proposals are adopted with this change. In addition, an editorial change is made to both standards. The word "structures" is added after "those" in the second sentence of each paragraph (a) to clarify the use of structural analysis.

Sections 27.337/29.337 Limit Maneuvering Load Factor

The notice proposed to clarify these standards by revising paragraphs (a) and (b) and adding new subparagraphs (b)(1) and (b)(2) to § 27.337.

The revisions, which also make the two sections parallel, reflect present certification practice in the application of each of these sections. One commenter questions whether the proposal for § 29.337 clarifies the standard, but provided no alternate wording. Therefore, these amendments are adopted as proposed.

Sections 27.351/29.351 Yawing Conditions

The notice proposed to add a new § 27.351 for normal category rotorcraft yawing conditions. Rotorcraft manufacturers have advocated yawing standards for part 27, and several designs have been voluntarily substantiated for yawing conditions. This amendment ensures that objective and limited yawing conditions are considered and uniformly applied for structural design of normal category rotorcraft. No comments were received on the proposal for § 27.351.

The notice also proposed to revise § 29.351 to establish a maximum sideslip angle of 15° at V_{NE} (never-exceed speed) or V_H (maximum speed in level flight with maximum continuous power), whichever is less, and 90° at 0.6 V_{NE} . The design sideslip angle for airspeeds between these two speed points must vary directly with the airspeed. Smaller sideslip angles may be used when substantiated. One commenter was not certain that the specific figure of 15° sideslip at V_{NE} will always be conservative but recommended no other value. Fifteen degrees has been used in the past, and experience shows that it provides a safe structural design standard for rotorcraft.

Therefore, these proposals are adopted without change.

Sections 27.391/29.391 Control Surface and System Loads, General

References to new §§ 27.427 and 29.427 concerning unsymmetrical loads on the horizontal stabilizer need to be added to §§ 27.391 and 29.391 on control surfaces. In addition, a previous

omission is corrected by adding § 27.399 to the reference list in § 27.391. No comments were received, and these amendments are adopted as proposed.

Sections 27.395/29.395 Control System

The notice proposed to divide paragraph (b) of these sections into three subparagraphs for clarification of control boost or actuation systems and to add a new paragraph (b)(4) that contains an increase in minimum design load. The increase in design load accounts for possible jamming, ground gusts, control inertia, or friction.

One comment was received on § 29.395 supporting the proposal. These amendments are adopted as proposed.

Sections 27.427/29.427 Unsymmetrical Loads

The notice proposed to add new and identical §§ 27.427 and 29.427 requiring application of unsymmetrical loads when evaluating horizontal stabilizing surfaces on normal and transport category rotorcraft. Design loads derived from a rational analysis or the proposed empirical design load distributions may be used.

One commenter addressed the proposal for new § 29.427 for transport rotorcraft and agrees that unsymmetrical load distribution on the rotorcraft empennage is different from airplanes due to the unique configuration of rotorcraft. The commenter also agrees with the necessity for a standard but notes that the requirements of paragraph (b)(1) are arbitrary and may not be conservative for certain designs. In the absence of more data, the commenter recommends that the load on the empennage should be related to the maximum loads obtained from all the symmetrical design conditions that have been used to design the rotorcraft as a whole, rather than the proposed loading case.

The FAA has evaluated this comment for both the normal and transport category rotorcraft proposals and disagrees with the suggestion to omit the proposed design loads. Specified design loads are a viable means of achieving safe structural aircraft designs. Further, the specified load distribution is conservative in comparison to the existing standard for small airplanes. The commenter does not provide a substantive argument or recommend an additional factor or design loads to eliminate the alleged lack of conservatism of the design loads or conditions proposed in the notice. The proposal for §§ 27.427 and 29.427 are, therefore, adopted without change.

Sections 27.501/29.501 Ground Loading Conditions: Landing Gear with Skids

The notice proposed to reduce the inward- and outward-acting sideload standard by 50 percent for skid landing gear on normal and transport category rotorcraft. In addition, the notice proposed to distribute the special empirical skid tube, mid-point obstruction design loads evenly.

One commenter supports the proposal for § 29.501 as being a more realistic design requirement. These standards are adopted as proposed.

Section 29.519 Hull type rotorcraft: Water Based and Amphibian

The notice proposed to remove the reference to "limited amphibian" from this section since limited amphibian configurations are obsolete. The notice also proposed to require consideration of wave profiles and the most critical wave and further proposed to define a reference line for the vertical descent velocity.

One comment was received. The commenter supports the proposal and offers an editorial suggestion of inserting the conjunction "and" between the words "hull" and "auxiliary" in paragraph (a). The FAA agrees, and the proposal is adopted with this change.

Sections 27.563/29.563 Structural Ditching Provisions

The notice proposed extensive revisions to these sections to add new standards that would provide a consistent basis for design and evaluation of rotorcraft ditching configurations.

Three commenters responded to these proposals.

One commenter does not recommend a change in the proposals but notes that guidance material for yaw attitude and forward velocity contained in Advisory Circulars (AC) 27-1, Certification of Normal Category Rotorcraft, dated August 29, 1985, and 29-2A, Certification of Transport Category Rotorcraft, dated September 16, 1987, is not consistent with the proposal. The FAA recognizes this, and future changes to the advisory circulars will reflect these amendments.

Another commenter recommends a change to the introductory text of § 27.563 to include an evaluation of survival equipment operation as well as the rotorcraft structure for a particular sea state. The commenter strongly believes that sea state considerations should be an integral part of rotorcraft ditching certification; however, a specific sea state was not recommended.

These standards concern structural strength of the rotorcraft and the associated aircraft flotation devices and not the use or application of the survival equipment. The operating rules are the proper place for such equipment rules. To add either an evaluation of survival equipment operation or a specific seat state to the standard is beyond the scope of the notice. However, guidance material, such as that found in AC's 27-1 and 29-2A, refers to Sea State 4, as defined by the World Meteorological Organization, as an appropriate sea state to consider in pursuing ditching configuration approvals under §§ 27.801 and 29.801.

A third commenter, responding to § 29.563, agrees with adopting a structural design standard for rotorcraft ditching. The commenter notes that one-engine failure and a resulting "ditching" are not as likely as a total power failure or other failure that results in an autorotational landing or ditching at sea. In the commenter's view, the requirement should reflect "an autorotational descent" not a "one-engine-out touchdown." Further, due to "difficulty in achieving accurate control over an autorotational landing," the commenter suggests a forward velocity at touchdown of up to two-thirds of the best autorotational descent speed (V_Y) rather than the 30 knots or a lower descent speed as proposed. The commenter further recommends a 6.5 feet per second limit vertical descent speed based on the landing gear design standard rather than the proposed 5 feet per second limit descent velocity which is derived from the minor crash conditions of §§ 27.561(b)(3) and 29.561(b)(3).

Adopting these additional recommendations is beyond the scope of the notice. An editorial change was made to clarify paragraph (b)(1) in each standard by revising the last sentence to read " * * the float deployed airspeed operating limit multiplied by 1.11." rather than "1.11 of the float deployed airspeed operating limit." Therefore, these proposals are adopted with the editorial change to paragraph (b)(1).

Sections 27.571/29.571 Fatigue Evaluation of Flight Structure

The notice proposed to revise the introductory text of paragraph (a) and paragraph (a)(4) of § 27.571 to require fatigue evaluation of the landing gear, assessment of the effects of the ground-air-ground cycle on the entire rotorcraft, and assessment of the effects of external cargo operations on the rotorcraft whenever approval of an external cargo configuration is requested.

As stated in the notice, a note may be added to the rotorcraft type certification data sheet to convey that an external cargo configuration (which is optional) was not presented for evaluation and approval. However, the type certificate applicant would normally present this type of a configuration for approval, and such a note would be unlikely.

One comment was received on § 27.571. The commenter recommends changes to the proposal to consider the operators who either do not conduct external load lift operations or who only conduct such operations infrequently. The commenter states that the proposal, if adopted without change, would place an undue burden (or penalty) on certain operators. In addition, the commenter states that it is possible to establish a factor that conservatively reduces the basic service life of affected components for each external load lift.

The proposal addressed optional configurations such as external cargo (load lift) operations and other high frequency, high power cycle operations. The FAA believes that this standard can be applied equitably to all operators. The comment relates more to the application of the proposed standard than to the standard itself, and application of the standard can be more appropriately addressed by examples in advisory material. Related draft advisory material for transport category rotorcraft fatigue evaluation was published in Draft AC 29.571-X, Fatigue Evaluation of Transport Category Rotorcraft Structure (51 FR 45424; December 18, 1986). Similar advisory material addressing types of operations and loading spectrum will be developed, if necessary, for normal category rotorcraft. The proposal for § 27.571 is, therefore, adopted as proposed.

The notice also proposed to amend § 29.571 in a manner similar to that proposed for § 27.571 to require fatigue evaluation of the landing gear, assessment of the effects of the ground-air-ground cycle on the entire rotorcraft (not just the landing gear), and assessment of the effects of applicable external cargo operations on a transport category rotorcraft. The FAA has proposed to amend § 29.571 in Notice 86-13, Rotorcraft Structural Fatigue and Damage Tolerance (51 FR 33704; September 22, 1986) by adding a requirement for flaw tolerance to the fatigue evaluation of transport category rotorcraft structure. Notice 86-13 includes the requirement proposed in Notice 88-7. Therefore, the proposal to amend § 29.571 in this rulemaking is not adopted.

Sections 27.613/29.613 Material Strength Properties and Design Values

The notice proposed to amend §§ 27.613 and § 29.613 to include material property design standards for rotorcraft materials that parallel the airplane standards, and to correct an address. Material property design standards are not affected by the aircraft type or category.

One commenter responded to the proposal to amend § 29.613 and notes that the proposed revision to paragraph (b) eliminates the need for a directive verb in proposed paragraph (d). The commenter recommends "may" instead of "must" in paragraph (d) to signify that applicants may use materials which meet published design values or which are otherwise satisfactory. The FAA agrees, and since this comment also applies to § 27.613, both sections have been changed. Except for the wording change in paragraph (d), the standards are adopted as proposed.

Sections 27.629/29.629 Flutter

The notice proposed to remove the word "part" and insert the words "aerodynamic surface" in these sections. These revisions prevent any misunderstanding since flutter is an aeroelastic phenomenon associated with aerodynamic surfaces, such as stabilizers, fins, control surfaces, wings, and rotor blades.

One comment was received on the proposal for § 29.629. The commenter contends that the proposed requirement is inadequate but did not submit a counterproposal. The commenter provides arguments and procedures for an analysis but concludes by recommending advisory material to encompass procedures, criteria, and concerns. The commenter's recommendation will be considered and may be included in future advisory material, but it is not appropriate for an objective design standard such as § 29.629. These proposals are, therefore, adopted without change.

Sections 27.663/29.663 Ground Resonance Prevention Means

The notice proposed to amend paragraph (a) of § 27.663 to include failure assessment and allow the use of analysis or tests to prove that a malfunction or failure of a single means will not result in ground resonance of the rotorcraft (dynamic instability of the rotorcraft while in contact with the ground). No comments were received on § 27.663, and this section is adopted as proposed.

In addition, the notice proposed to revise paragraph (a) of § 29.663 to

include failure assessment and to allow the use of analysis or tests to prove that a malfunction or failure of a single means will not cause ground resonance of the rotorcraft. The notice also proposed to revise paragraph (b) to result in a standard parallel to present § 27.663(b).

One comment was received on § 29.663. The commenter recommends adding a specific level of reliability in paragraph (a) or initiating guidance material. The FAA will consider adding a reliability value to advisory material as the commenter recommends, but amending the standard is beyond the scope of the notice. It is noted that compliance with the standard may be achieved by means other than reliability methods; e.g., by showing that malfunction or failure of a single means will not cause ground resonance. In this way, a deterministic method rather than a probability assessment method may be employed. This section is adopted as proposed.

Sections 27.674/29.674 Interconnected Controls

The notice proposed to add new §§ 27.674 and 29.674 for interconnected controls. These proposed standards would require continued operation of the flight control systems after malfunction, failure, or jamming of an interconnected flight control or engine control for normal and transport category rotorcraft. These standards specifically include primary flight controls such as the cyclic and collective controls, if interconnected.

One commenter contends that these proposals are unrealistic and unnecessary in light of the present flight control design standards and the excellent service experience of primary flight controls, even for those that are interconnected. The commenter also states that safe flight is generally impossible after a malfunction, failure, or jam of a primary control. The commenter proposes to limit the standard to consideration of malfunctions of auxiliary controls when connected to primary flight controls since current state-of-the-art flight control system designs can address malfunctions of an auxiliary control when connected to a primary control. These systems allow continued safe flight and landing after such malfunctions. The FAA agrees, and the comment is incorporated.

Another comment was received on § 29.674 that applies equally to § 27.674. The commenter suggests inserting the word "primary" between "each" and "flight" for clarity and further suggests

that the examples given in the last clause of the proposal are confusing and should be deleted.

The FAA agrees with the commenter's recommendations and further agrees that the present standards provide for reliable primary control systems. Therefore, proposed §§ 27.674 and 29.674 are revised to apply to each primary flight control when connected to an auxiliary control, and the last clause, which contains examples, is removed. Advisory material will be used to provide examples. The amendments are also clarified by adding the words "and landing" after "safe flight." This completes the last and final phase of a safe flight. In addition, an editorial change to § 29.674 reverses the words "independently operate" to "operate independently" to agree with § 27.674. The amendments to §§ 27.674 and 29.674 are adopted with the changes discussed.

Section 27.685 Control System Details

The notice proposed to amend the standard for control system details by adding a new paragraph (d) for cable control system standards and new paragraphs (e) and (f), identical to § 29.685 (e) and (f) for control system bearing standards. This amendment adds design standards for a cable control system that are similar to those for transport rotorcraft control system found in § 29.685(d). No comments were received. The proposal is adopted without change.

Sections 27.727/29.727 Reserve Energy Absorption Drop Test

The notice proposed to clarify these sections by adding a definition for the collapse of any type landing gear on normal and transport category rotorcraft. One comment was received in support of these proposals. The proposals are adopted without change.

Section 29.755 Hull Buoyancy

The notice proposed to remove paragraph (b), which contains superfluous standards for limited amphibian hull buoyancy, and to remove the designator "(a)" from paragraph (a). Present §§ 29.519 and 29.803 for rotorcraft ditching configurations are sufficient. See the discussions of §§ 29.519 and 29.803 for further information. No comments were received, and the proposal is adopted without change.

Sections 27.783/29.783 Doors

The notice proposed to revise paragraph (b) of § 27.783 by removing the word "disc" following "rotor" to avoid possible confusion between rotorcraft rotors and turbine engine rotor discs. For passenger protection, the

notice proposed to further revise paragraph (b) to require consideration of engine intakes, exhausts, and propellers so that the requirements parallel those of proposed § 29.783(b). No comments were received on § 27.783, and it is adopted as proposed.

The notice also proposed to revised paragraphs (b) and (c) of § 29.783 to clarify the standard and improve protection of passengers and other persons who use rotorcraft doors. Two commenters were received.

One commenter suggests retaining the sentence from present § 27.783(b) for the standard to require the location of passenger doors way from any rotor disc. The commenter, however, would rely on door operating procedures only when the door could not be located away from any rotor disc. The commenter supports the remaining aspects of the proposal. The FAA believes the amendment, as adopted, achieves the overall objective of the comment, but further advisory material may be developed, as necessary, to explain the standard concerning door location and/or procedures related to the potential hazards that are listed in the amendment.

Another commenter proposes adding a new paragraph (h) to refer to § 29.783(e) and exclude cargo, baggage, and service doors that are not suitable or approved as passenger exits. The FAA disagrees. As stated in the notice proposal for § 29.783, the FAA intends to require that "each external door" not "just the passenger doors" be included in the evaluation. Rotorcraft cargo and baggage doors are commonly loaded or unloaded with the engines running and rotors turning.

No commenters object to adding the phrase "persons crowding against doors, including inward opening doors" to paragraph (c). However, as an editorial oversight, the phrase "with the rotorcraft on the ground" was dropped from the second sentence in paragraph (c) in the notice. Other than adding this phrase back into the amendment as an editorial change to paragraph (c), § 29.783 is adopted as proposed.

Section 29.803 Emergency Evacuation

The notice proposed to remove and reserve paragraph (c) concerning limited amphibians (current helicopters are designed for ditching rather than limited amphibious operations) and to add new paragraphs (d) and (e). New paragraph (d) addresses and evacuation demonstration for certain rotorcraft designs, and paragraph (e) allows a combination of analysis and tests or demonstrations, as prescribed. The explanation in the notice contained a

sequence for use in determining when a demonstration is required. Appendix D to part 29, adopted herein, contains the demonstration procedures.

One commenter contends that the proposal is confusing and does not achieve the objective expressed in the explanation. The commenter also raises questions about the standard, as related to exits, exit size, and the number of passengers, and suggests that a cabin seating capacity of less than 40 seats may be more critical than higher capacity arrangements. In addition, the commenter recommends an evacuation demonstration of all larger rotorcraft, while resting on one side, as an objective measurement of compliance with § 29.807(c)(1). The NPRM proposed an evacuation demonstration for rotorcraft resting on their sides for configurations that have only side exits and a maximum seating capacity of 10 or more passengers. The commenter states that a single, small roof exit complies with the present standard and the proposed standard but contends it may not suffice for rapid evacuation of the rotorcraft. The commenter also contends that the proposal would allow provision of a roof exit to exempt the rotorcraft from an evacuation demonstration. The commenter further suggests that demonstration criteria be related to 10 or more passengers per exit and suggests that the number of passengers should be related to the exit size.

The FAA disagrees with the commenter. The present certification standards for interior arrangements and exits have provided an acceptable level of safety for transport rotorcraft. The present exit locations and size, as related to the number of passengers, have proven satisfactory. The amendment adds explicit demonstration requirements rather than relying on the application of design standards alone. The amendment addresses the concerns for "dense" interior arrangements for either smaller or larger transport rotorcraft designs. An evacuation demonstration of every transport rotorcraft design has not been required in the past and is unnecessary. A second commenter requests that the FAA withdraw the proposals for paragraph (d)(3) of § 29.803, paragraph (c)(2) of § 29.807, and associated paragraph (b) of the new Appendix D that would require evacuation demonstrations with rotorcraft resting on their side for certain configurations. The commenter recommends a standard similar to current § 29.807(c). The commenter contends that a mandatory rollover evacuation demonstration is not

justified by service history and that the cost of such a demonstration would unduly restrain rotorcraft design flexibility without contributing to passenger safety. The commenter states that an evacuation demonstration with the rotorcraft resting on its side would cost from \$500,000 to \$800,000, disregarding liability insurance costs. This is significantly higher than the \$125,000 to \$300,000 cost range estimate in Notice 88-7 for the one-time evacuation demonstration with the rotorcraft upright. Since the concerns of the second commenter are beyond the scope of the notice, separate rulemaking will be necessary to achieve the intent of the commenter's proposal. Accordingly, proposed paragraph (d)(3) of § 29.803 is not adopted. Other than this change, the amendment is adopted as proposed. For comments on related changes, see § 29.807 and Appendix D.

Section 29.805 Flightcrew Emergency Exits

The notice proposed to amend the standard to ensure that crew exits are not obstructed in the event of a "ditching." One comment was received which supports the proposal. An editorial change is made to the first sentence of paragraph (c) by removing "may" and inserting "must." The proposal is adopted with this editorial change.

Sections 27.807/29.807 Passenger Emergency Exits

The notice proposed to amend paragraph (c) of § 29.807 to add options allowing approval of smaller transport rotorcraft designs having only side-of-fuselage exits. These options include (1) an evacuation demonstration; (2) design features to allow evacuation of rotorcraft having nine or less passengers with the rotorcraft on its side; or (3) design features that minimize the probability of the rotorcraft coming to rest on its side. One comment was received in support of this part of the proposal. As noted in the comments for § 29.803, a commenter objects to requiring an evacuation demonstration with the rotorcraft resting on its side and requests that proposed § 29.807 (c)(2) and (c)(3) be withdrawn. For the reasons stated in the discussions for § 29.803, the FAA agrees, and proposed paragraphs § 29.807 (c)(2) and (c)(3) are not adopted.

In addition, the notice proposed to amend the "ditching" exit standards in both §§ 27.807(d) and 29.807(d) to ensure the exits are not blocked during the conditions or obstructions noted.

One commenter responded to the proposals for both §§ 27.807(d) and

29.807(d). The commenter recommends changes (exit threshold below the water line) which would allow water to enter the cabin interior, thereby reducing the rotorcraft height above the water, improving the stability, and reducing the probability of capsizing in rough seas. The commenter acknowledges that stability on the water must be approved with the exits open and water inside the cabin.

The commenter justifies the recommendation by stating that the helicopter's stability on water can be significantly improved by reducing its center of gravity height above the water level. This improvement in stability compensates for the inconvenience of water over the threshold and inside the cabin, which cannot be avoided in rough seas anyway. Positive stability characteristics are essential for safety. The commenter suggests that larger ditching exits should be used to accommodate passengers who wear life jackets or survival clothing.

A commenter submitted an interpretation of the phrase "be above the water line" for the transport rotorcraft exit standard. The commenter states that operators, especially North Sea operators, support the interpretation to allow water above the exit threshold. The comment was directed at advisory material and not to the standard.

The FAA agrees that capsize stability would be improved by adopting these recommendations; however, they far exceed the scope of the notice to ensure that exits are usable. The commenters did not otherwise disagree with the proposal. The proposals for §§ 27.807(d) and 29.807(d) are, therefore, adopted without change.

Section 29.809 Emergency Exit Arrangement

The notice proposed to amend this standard for exit arrangement to include consideration of descent provisions with the landing gear damaged or the rotorcraft resting on its side and to provide specific criteria for the slide currently required for a floor level exit. The notice also proposed to allow a rope or other means to assist descent instead of the slide, provided an evacuation demonstration is successfully completed.

One comment was received. The commenter agrees with the intent to provide for damaged or disarranged landing gear in the demonstration but questions that necessity for a slide at a floor level exit when the exit threshold is less than 6 feet from the ground. Contrary to the commenter's statement, none is required by the standard. The commenter expresses concern with

potential problems in complying with the proposal whenever the rotorcraft is resting on its side, but this concern is adequately addressed by the requirements of §§ 29.803 and 29.807. In addition, the commenter opposes use of a rope in place of a slide. Since the use of a rope is restricted to helicopters having 30 seats or fewer and requires an evacuation demonstration to validate the effectiveness of using the rope, the FAA disagrees.

Finally, the commenter suggests consideration of the words "appropriate assist means" rather than "slide" for paragraph (f). The FAA does not agree. The word "slide" is more appropriate and is derived from a similar standard, § 25.809(f)(1), for airplanes.

The proposal is, therefore, adopted without change.

Section 29.811 Emergency Exit Marking

The notice proposed to allow a 2-inch colored band outlining each exit release lever or device of each exit if the exit is also normally used for entering and leaving the rotorcraft. One comment was received which supports the proposal. The proposal is adopted without change.

Section 29.855 Cargo and Baggage Compartments

The notice proposed to amend the standard to allow small, accessible cargo and baggage compartments to be lined with passenger compartment materials rather than fire resistant materials.

One comment was received. The commenter believes protective breathing equipment should be required. The FAA disagrees because rotorcraft are typically unpressurized, have simple ventilation systems, fly at altitudes of 3,000 feet or less above the ground, and do not have integral supplemental oxygen systems. For rotorcraft with small, accessible compartments of 200 cubic feet or less, protective breathing equipment for appropriate crewmembers is unnecessary as an airworthiness standard. Protective breathing equipment, typically portable, may be imposed by the applicable operating rules when necessary for certain rotorcraft cargo operations. Therefore, the proposal is adopted without change.

Sections 27.861/29.861 Fire Protection of Structures, Controls, and Other Parts

The notice proposed to amend §§ 27.861 and 29.861 to allow use of fireproof material parts in areas affected by powerplant fires, in normal category and transport Category B rotorcraft,

without further proof or qualification. One comment was received on both proposals. The commenter notes that the definition of "fireproof" in § 1.1 of part 1 does not specify the temperature and time interval for which a fireproof part must continue to perform its intended function.

The commenter provided a hypothetical case which assumes a steel drive shaft is exposed to a 2,000 °F fire for 30 minutes. In the case, the steel drive shaft could sustain sufficient loss of stiffness to affect airworthiness adversely. The FAA finds the hypothetical case overly conservative and unreasonable. The FAA currently accepts use of fireproof parts, without further proof, in areas affected by aircraft powerplant fires as stated in §§ 23.865 and 25.865 for airplanes and § 29.861(d) for transport category A rotorcraft. The level of safety for § 27.861 is, in general, increased by adoption of the proposal, not decreased.

Also, the specific extreme case presented by the commenter may be adequately addressed, when necessary, by application of § 21.21(b)(2). The definition of fireproof advocated by the commenter agrees with the FAA-accepted definition such as that found in AC 23-2, "Flammability Tests," dated August 20, 1984; i.e., 2,000 °F exposure for 15 minutes. Specific design features for future rotorcraft designs may be evaluated, as they have in the past, by use of fireproof materials in conjunction with any other design consideration under § 21.21(b)(2).

Notwithstanding the concern of the commenter, the standards cited for airplanes and transport rotorcraft have been found to provide safe aircraft. The equivalent standard should be extended to normal category and transport category B rotorcraft as an option within the standards proposed in the notice. The proposals are, therefore, adopted without change.

Sections 27.865/29.865 External Load Attaching Means

The notice proposed to amend §§ 27.865 and 29.865 to allow use of a design factor less than 2.5 g's, provided the lower load factor is not likely to be exceeded by virtue of the rotorcraft characteristics and capability. It also proposed to exclude fatigue evaluation of the cargo attaching means except as stated in the requirements.

Two comments were received that apply to both sections. One commenter recommends significant changes to the proposal to address both a "vertical" type of Class B rotorcraft-load combination and a "nonvertical" type of Class C rotorcraft-load combination

such as wire pulling or stringing. The commenter recommends removing the sections referenced in the proposal and adding phrases to allow use of a reduced design load factor, since the application of the specific sections does not implement the objective of the proposal. In addition, for the nonvertical type load (Class C or noncargo hook), the external load is primarily horizontal and the maximum maneuver load factor is well below 2.5 g's.

The commenter recommends a standard allowing use of a design "load factor due to flight and design characteristics for which authorization is requested * * *". In conjunction with the reduced load factor, the load direction would be "in any direction for which there is a possibility of loading."

The citation of the standards is essential to establish the rational design load factor, which is less than 2.5 g's. The commenter's recommendation may have merit, but the present standard and its predecessor have been used successfully for both vertical and nonvertical types of loads. Further, to reduce the design load factor below 2.5 g's, other than as proposed, is beyond the scope of the notice.

Another commenter agrees with the proposal but further recommends amending the driveshaft standard of § 27.935, Shafting joints, to require the applicant to list the maximum driveshaft misalignment angle and further prove that this angle will not be exceeded for all types of operation for which certification is requested. This recommendation is beyond the scope of the notice and is, therefore, not adopted. Additional advisory material may address the driveshaft misalignment problem encountered in certain external cargo operations.

One commenter recommends an editorial change to remove the word "of" and insert "times" in place thereof to clarify that the maximum external load is multiplied by the factor in the standard. The FAA agrees; however, instead of the word "times," the words "multiplied by" are being inserted to clarify the standard even further.

One additional comment was submitted specifically for proposed § 29.865. The commenter expresses dissatisfaction with the proposed reduction in the design limit load factor below 2.5 g's. The FAA notes that the reduction in load factor is related to the characteristics and capability of the rotorcraft design approved under the standards referenced. (For example, reduced load factors below 2.5 g's are already provided for in current § 29.337.) The commenter further notes fatigue substantiation is not required for the

attaching means, and rotorcraft use in "external cargo" service results in temporary, high loads for the reasons cited by the commenter. Fatigue evaluation of external cargo attaching means was not proposed in the notice; failure of the attaching means is not considered a hazard to the rotorcraft because "emergency" release of the cargo is a typical feature and requirement.

The commenter also states that the effect of the external load and operations on the whole rotorcraft must be determined. The commenter offered examples such as swinging loads. However, the commenter would consider the proposal to amend § 29.865 acceptable if the fatigue substantiation proposal to amend § 29.571 were adopted. As noted above, the FAA has not adopted proposed § 29.571. The fatigue substantiation of the whole rotorcraft for certain heavy-lift operations has been proposed in Notice 86-13, and the issue raised by the commenter will be addressed in that proceeding, if adopted.

Therefore, the proposals to amend §§ 27.865 and 29.865 are adopted without change.

Section 29.1415 Ditching Equipment

The notice proposed to revise the equipment standard of § 29.1415 for ditching equipment to agree with the operating rules. The operating rules require enough liferafts to accommodate the occupants of the aircraft. The amendment to paragraph (b)(1) requires at least two liferafts to accommodate all occupants.

Two commenters responded, and both disagree with the proposal. One recommends changing the operating rules instead of the airworthiness standards, and the other suggests that the airworthiness standards supplement the operating rules cited.

The FAA notes that the operating rules supplement or complement the airworthiness standards and that they also apply to airplanes. Consideration of the loss of a liferaft is not in operating rules such as FAP parts 91 and 135, which are typically used for helicopter operations. Changing the operating rules is beyond the scope of the notice.

One commenter further states that rotorcraft have a higher probability of ditching and should have more stringent requirements such as those contained in present § 29.1415(b)(1). The commenter's experience in actual ditchings is that loss of liferafts can be expected, and asserts that the standard should not be relaxed; i.e., sufficient liferafts should be required to provide for all occupants if

one liferaft is lost. The FAA disagrees. Experience under current operating rules has shown that excess capacity of liferafts beyond the rated capacity has been sufficient without also requiring excess liferafts. Therefore, the proposal is adopted without change.

Appendix D to Part 29—Criteria for Demonstration of Emergency Evacuation Procedures Under § 29.803

The notice proposed to add a new appendix D that contains the provisions, criteria, or conditions for compliance with the emergency evacuation demonstration standards required by § 29.803, as amended. One commenter supports the proposal.

Notice 89-23 (54 FR 37414; September 8, 1989), proposes, in part, to change the age and sex distribution of participants for use in the evacuation demonstration of transport airplanes having 44 or more passengers. This proposed change would avoid the risk of injury to participants over 60 years of age and prevent violation of state child labor laws while complying with airplane evacuation demonstration standards. The proposed change to part 25 was considered "comparable to * * * current (part 25 rules)" (i.e., the new distribution of age and sex for the mixture of demonstration participants is expected to give results comparable to those demonstrations with the current age and sex distribution of participants). Since the age and sex distribution proposed in Notice 89-23 for transport airplanes is different from the distribution proposed in Notice 88-7 for rotorcraft, possible final rulemaking action resulting from Notice 89-23 will be evaluated to determine if additional rulemaking is warranted for transport rotorcraft. Adopting the age and sex distribution proposals of Notice 89-23 at this time is beyond the scope of Notice 88-7.

Another commenter responding to § 29.803 requests that the FAA withdraw the proposals related to an evacuation demonstration with the rotorcraft resting on its side, and the FAA agrees. Because of the resulting changes to § 29.803, corresponding changes are also necessary to appendix D. Therefore, appendix D is revised by deleting paragraph (b), by deleting the title and designator for paragraph (a), and by redesignating the remaining paragraphs respectively. This proposal is adopted with the changes discussed.

Section 133.43 Structure and Design

The notice proposed to amend this operating rule to allow use of restricted category (military) rotorcraft cargo hook systems that have a primary and manual

load release device. No comments were received, and the proposal is adopted without change.

Regulatory Evaluation Summary

Introduction

This is a summary of the industry cost impact and benefit assessment for RRRP Amendment No. 4. This amendment adds new standards, amends existing airframe and related equipment standards in parts 27 and 29, and amends external cargo standards in part 133.

Summary

The estimates of economic impacts for the changes to parts 27 and 29, and the change to part 133, are based on the best information currently available to the FAA. This information indicates that the great majority of the amendments update the FAR to reflect current technology and, therefore, would have negligible or no cost.

The amendment to § 29.803(d)(3) expected to have some economic impact is related to the added emergency evacuation demonstration required for two categories of rotorcraft: (1) Those with a seating capacity of more than 44 passengers and (2) those with 10 or more passengers per exit, no main aisle to each row of seats, and access to each passenger exit by virtue of design features of seats, such as folding or break-over seat backs or folding seats. The evacuation demonstration is to be conducted with the rotorcraft in an upright position. Although few rotorcraft are now included in these categories, future certifications are possible.

The FAA requested detailed information on evacuation demonstration costs from interested persons, including rotorcraft manufacturers, in Notice No. 88-7. However, such costs were not provided during the comment period. The FAA's own estimates, based on evacuation demonstrations or tests conducted with small airplanes having 10 or more passengers, indicate one-time discounted certification costs ranging from \$61,470 to \$102,450 in 1989 dollars.

The expected benefit of requiring demonstrations is the assurance that the emergency exits allow rapid evacuation in the event of an incident or accident. Available data of past transport rotorcraft accidents do not identify whether an insufficient number of, or difficult to reach, emergency exits contributed to injuries or fatalities in otherwise survivable accidents, but it is possible that this could occur if emergency egress is not assured for certain transport rotorcraft designs. In

terms of dollar benefits, the evacuation demonstration requirement will be cost beneficial if only one life were saved over the operating life of the rotorcraft design (assumed to be 20 years).

Regulatory Flexibility Determination

The FAA has determined that under the criteria of the Regulatory Flexibility Act (RFA) of 1980, the amendments to parts 27, 29, and 133 will not have a significant economic impact on a substantial number of small entities. The RFA requires agencies to specifically review rules which may have a "significant economic impact on a substantial number of small entities." Significant economic impact on a small manufacturer, one with fewer than 75 employees, means annualized net compliance costs greater than or equal to the threshold value of \$15,340, in 1988 dollars. A substantial number of small entities means a number which is not less than 11 and which is more than one-third of the small entities subject to a proposed or existing rule, or any number of small entities affected which is substantial in the judgment of the rulemaking official. Only 2 of the 10 rotorcraft manufacturers that are subject to the amendments to parts 27 and 29 have fewer than 75 employees, neither one of which would incur costs by an amount in excess of the threshold cost value as a result of these amendments.

International Trade Impact Statement

The FAA believes that the certification costs that may be imposed by the amendments will not result in a competitive trade disadvantage for U.S. manufacturers in domestic or foreign markets. This conclusion is based on the fact that foreign manufacturers must comply with the certification standards of parts 27 and 29 as a condition of entry into the U.S. market, which is the largest segment of their export market. The FAA further believes that to remain competitive in overseas markets, foreign vendors will export similarly equipped rotorcraft to both the United States and other countries. Foreign and U.S. rotorcraft manufacturers are expected to pass the new certification costs on to consumers.

Federalism Implications

The regulations adopted herein will not have substantial direct effects 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, in accordance with Executive Order 12612, it is determined that this final rule does not

have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

For the reasons discussed in the preamble, and based on the findings in the Regulatory Flexibility Determination and the International Trade Impact Analysis, the FAA has determined that this regulation is not major under Executive Order 12291. In addition, the FAA certifies that these amendments do not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. These amendments are considered nonsignificant under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979). A regulatory evaluation of the amendments, including a Regulatory Flexibility Determination and Trade Impact Analysis, has been placed in the docket. A copy may be obtained by contacting the person identified under "FOR FURTHER INFORMATION CONTACT."

List of Subjects:

14 CFR Parts 27 and 29

Air transportation, Aircraft, Aviation safety, Safety, Rotorcraft, Incorporation by reference.

Part 133

Aircraft, Narcotics, Pilots, Drugs, Mail.

Adoption of the Amendments

Accordingly, parts 27, 29 and 133 of the Federal Aviation Regulations (14 CFR parts 27, 29, and 133) are amended 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. 1344, 1354(a), 1355, 1421, 1423, 1425, 1428, 1429, and 1430; 49 U.S.C. 106(g) (Revised Pub. L. 97-449, January 12, 1983).

2. Section 27.307 is amended by revising paragraph (a) to read as follows:

§ 27.307 Proof of structure.

(a) Compliance with the strength and deformation requirements of this subpart must be shown for each critical loading condition accounting for the environment to which the structure will be exposed in operation. Structural analysis (static or fatigue) may be used only if the structure conforms to those structures for which experience has shown this method to be reliable. In

other cases, substantiating load tests must be made.

* * * * *

3. Section 27.337 is revised to read as follows:

§ 27.337 Limit maneuvering load factor.

The rotorcraft must be designed for—

(a) A limit maneuvering load factor ranging from a positive limit of 3.5 to a negative limit of -1.0 ; or

(b) Any positive limit maneuvering load factor not less than 2.0 and any negative limit maneuvering load factor of not less than -0.5 for which—

(1) The probability of being exceeded is shown by analysis and flight tests to be extremely remote; and

(2) The selected values are appropriate to each weight condition between the design maximum and design minimum weights.

4. A new § 27.351 is added to read as follows:

§ 27.351 Yawing conditions.

(a) Each rotorcraft must be designed for the loads resulting from the maneuvers specified in paragraphs (b) and (c) of this section with—

(1) Unbalanced aerodynamic moments about the center of gravity which the aircraft reacts to in a rational or conservative manner considering the principal masses furnishing the reacting inertia forces; and

(2) Maximum main rotor speed.

(b) To produce the load required in paragraph (a) of this section, in unaccelerated flight with zero yaw, at forward speeds from zero up to $0.6 V_{NE}$ —

(1) Displace the cockpit directional control suddenly to the maximum deflection limited by the control stops or by the pilot force specified in § 27.395(a);

(2) Attain a resulting sideslip angle or 90° , whichever is less; and

(3) Return the directional control suddenly to neutral.

(c) To produce the load required in paragraph (a) of this section, in unaccelerated flight with zero yaw, at forward speeds from $0.6 V_{NE}$ up to V_{NE} or V_H , whichever is less—

(1) Displace the cockpit directional control suddenly to the maximum deflection limited by the control stops or by the pilot force specified in § 27.395(a);

(2) Attain a resulting sideslip angle or 15° , whichever is less, at the lesser speed of V_{NE} or V_H ;

(3) Vary the sideslip angles of paragraphs (b)(2) and (c)(2) of this section directly with speed; and

(4) Return the directional control suddenly to neutral.

5. Section 27.391 is revised to read as follows:

§ 27.391 General.

Each auxiliary rotor, each fixed or movable stabilizing or control surface, and each system operating any flight control must meet the requirements of §§ 27.395, 27.397, 27.399, 27.401, 27.403, 27.411, 27.413, and 27.427.

6. Section 27.395 is amended by revising paragraph (b) to read as follows:

§ 27.395 Control system.

* * * * *

(b) Each primary control system, including its supporting structure, must be designed as follows:

(1) The system must withstand loads resulting from the limit pilot forces prescribed in § 27.397.

(2) Notwithstanding paragraph (b)(3) of this section, when power-operated actuator controls or power boost controls are used, the system must also withstand the loads resulting from the force output of each normally energized power device, including any single power boost or actuator system failure.

(3) If the system design or the normal operating loads are such that a part of the system cannot react to the limit pilot forces prescribed in § 27.397, that part of the system must be designed to withstand the maximum loads that can be obtained in normal operation. The minimum design loads must, in any case, provide a rugged system for service use, including consideration of fatigue, jamming, ground gusts, control inertia, and friction loads. In the absence of rational analysis, the design loads resulting from 0.60 of the specified limit pilot forces are acceptable minimum design loads.

(4) If operational loads may be exceeded through jamming, ground gusts, control inertia, or friction, the system must withstand the limit pilot forces specified in § 27.397, without yielding.

7. A new § 27.427 is added following § 27.413 and before the heading, Ground Loads, to read as follows:

§ 27.427 Unsymmetrical loads.

(a) Horizontal tail surfaces and their supporting structure must be designed for unsymmetrical loads arising from yawing and rotor wake effects in combination with the prescribed flight conditions.

(b) To meet the design criteria of paragraph (a) of this section, in the absence of more rational data, both of the following must be met:

(1) One hundred percent of the maximum loading from the symmetrical flight conditions in § 27.413 acts on the surface on one side of the plane of symmetry, and no loading acts on the other side.

(2) Fifty percent of the maximum loading from the symmetrical flight conditions in § 27.413 acts on the surface on each side of the plane of symmetry but in opposite directions.

(c) For empennage arrangements where the horizontal tail surfaces are supported by the vertical tail surfaces, the vertical tail surfaces and supporting structure must be designed for the combined vertical and horizontal surface loads resulting from each prescribed flight condition, considered separately. The flight conditions must be selected so the maximum design loads are obtained on each surface. In the absence of more rational data, the unsymmetrical horizontal tail surface loading distributions described in this section must be assumed.

8. Section 27.501 is amended by revising paragraphs (d)(3) and (f)(2)(ii) to read as follows:

§ 27.501 Ground loading conditions: Landing gear with skids.

* * * * *

(d) * * *

(3) The total sideload must be applied equally between the skids and along the length of the skids.

* * * * *

(f) * * *

(2) * * *

(ii) Distributed equally over 33.3 percent of the length between the skid tube attachments and centrally located midway between the skid tube attachments.

9. Section 27.563 is revised to read as follows:

§ 27.563 Structural ditching provisions.

If certification with ditching provisions is requested, structural strength for ditching must meet the requirements of this section and § 27.801(e).

(a) *Forward speed landing conditions.* The rotorcraft must initially contact the most critical wave for reasonably probable water conditions at forward velocities from zero up to 30 knots in likely pitch, roll, and yaw attitudes. The rotorcraft limit vertical descent velocity may not be less than 5 feet per second relative to the mean water surface. Rotor lift may be used to act through the center of gravity throughout the landing impact. This lift may not exceed two-thirds of the design maximum weight. A maximum forward velocity of less than 30 knots may be used in design if it can

be demonstrated that the forward velocity selected would not be exceeded in a normal one-engine-out touchdown.

(b) *Auxiliary or emergency float conditions—(1) Floats fixed or deployed before initial water contact.* In addition to the landing loads in paragraph (a) of this section, each auxiliary or emergency float, of its support and attaching structure in the airframe or fuselage, must be designed for the load developed by a fully immersed float unless it can be shown that full immersion is unlikely. If full immersion is unlikely, the highest likely float buoyancy load must be applied. The highest likely buoyancy load must include consideration of a partially immersed float creating restoring moments to compensate the upsetting moments caused by side wind, unsymmetrical rotorcraft loading, water wave action, rotorcraft inertia, and probable structural damage and leakage considered under § 27.801(d). Maximum roll and pitch angles determined from compliance with § 27.801(d) may be used, if significant, to determine the extent of immersion of each float. If the floats are deployed in flight, appropriate air loads derived from the flight limitations with the floats deployed shall be used in substantiation of the floats and their attachment to the rotorcraft. For this purpose, the design airspeed for limit load is the float deployed airspeed operating limit multiplied by 1.11.

(2) *Floats deployed after initial water contact.* Each float must be designed for full or partial immersion prescribed in paragraph (b)(1) of this section. In addition, each float must be designed for combined vertical and drag loads using a relative limit speed of 20 knots between the rotorcraft and the water. The vertical load may not be less than the highest likely buoyancy load determined under paragraph (b)(1) of this section.

10. Section 27.571 is amended by revising the introductory text of paragraph (a) and paragraph (a)(4) to read as follows:

§ 27.571 Fatigue evaluation of flight structure.

(a) *General.* Each portion of the flight structure (the flight structure includes rotors, rotor drive systems between the engines and the rotor hubs, controls, fuselage, landing gear, and their related primary attachments), the failure of which could be catastrophic, must be identified and must be evaluated under paragraph (b), (c), (d), or (e) of this section. The following apply to each fatigue evaluation:

* * * * *

(4) The loading spectra must be as severe as those expected in operation including, but not limited to, external cargo operations, if applicable, and ground-air-ground cycles. The loading spectra must be based on loads or stresses determined under paragraph (a)(3) of this section.

* * * * *

11. Section 27.613 is amended by revising paragraphs (b) and the introductory text of (d) and by adding a new paragraph (e) to read as follows:

§ 27.613 Material strength properties and design values.

* * * * *

(b) Design values must be chosen to minimize the probability of structural failure due to material variability. Except as provided in paragraphs (d) and (e) of this section, compliance with this paragraph must be shown by selecting design values that assure material strength with the following probability—

(1) Where applied loads are eventually distributed through a single member within an assembly, the failure of which would result in loss of structural integrity of the component, 99 percent probability with 95 percent confidence; and

(2) For redundant structure, those in which the failure of individual elements would result in applied loads being safely distributed to other load-carrying members, 90 percent probability with 95 percent confidence.

* * * * *

(d) Design values may be those contained in the following publications (available from the Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120) or other values approved by the Administrator:

* * * * *

(e) Other design values may be used if a selection of the material is made in which a specimen of each individual item is tested before use and it is determined that the actual strength properties of that particular item will equal or exceed those used in design.

§ 27.629 [Amended]

12. Section 27.629 is amended by removing the word "part" and inserting in place thereof the words "aerodynamic surface."

13. Section 27.663 is amended by revising paragraph (a) to read as follows:

§ 27.663 Ground resonance prevention means.

(a) The reliability of the means for preventing ground resonance must be shown either by analysis and tests, or reliable service experience, or by showing through analysis or tests that malfunction or failure of a single means will not cause ground resonance.

* * * * *

14. A new § 27.674 is added to read as follows:

§ 27.674 Interconnected controls.

Each primary flight control system must provide for safe flight and landing and operate independently after a malfunction, failure, or jam of any auxiliary interconnected control.

15. Section 27.685 is amended by adding new paragraphs (d), (e), and (f) to read as follows:

§ 27.685 Control system details.

* * * * *

(d) Cable systems must be designed as follows:

(1) Cables, cable fittings, turnbuckles, splices, and pulleys must be of an acceptable kind.

(2) The design of the cable systems must prevent any hazardous change in cable tension throughout the range of travel under any operating conditions and temperature variations.

(3) No cable smaller than three thirty-seconds of an inch diameter may be used in any primary control system.

(4) Pulley kinds and sizes must correspond to the cables with which they are used. The pulley cable combinations and strength values which must be used are specified in Military Handbook MIL-HDBK-5C, Vol. 1 & Vol. 2, Metallic Materials and Elements for Flight Vehicle Structures, (Sept. 15, 1976, as amended through December 15, 1978). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. section 552(a) and 1 CFR part 51. Copies may be obtained from the Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania, 19120. Copies may be inspected at the FAA, Rotorcraft Standards Staff, 4400 Blue Mount Road, Fort Worth, Texas, or at the Office of the Federal Register, 1100 L Street NW., Room 8301, Washington, DC.

(5) Pulleys must have close fitting guards to prevent the cables from being displaced or fouled.

(6) Pulleys must lie close enough to the plane passing through the cable to prevent the cable from rubbing against the pulley flange.

(7) No fairlead may cause a change in cable direction of more than 3°.

(8) No clevis pin subject to load or motion and retained only by cotter pins may be used in the control system.

(9) Turnbuckles attached to parts having angular motion must be installed to prevent binding throughout the range of travel.

(10) There must be means for visual inspection at each fairlead, pulley, terminal, and turnbuckle.

(e) Control system joints subject to angular motion must incorporate the following special factors with respect to the ultimate bearing strength of the softest material used as a bearing:

(1) 3.33 for push-pull systems other than ball and roller bearing systems.

(2) 2.0 for cable systems.

(f) For control system joints, the manufacturer's static, non-Brinell rating of ball and roller bearings must not be exceeded.

16. Section 27.727 is amended by revising paragraph (c) to read as follows:

§ 27.727 Reserve energy absorption drop test.

* * * * *

(c) The landing gear must withstand this test without collapsing. Collapse of the landing gear occurs when a member of the nose, tail, or main gear will not support the rotorcraft in the proper attitude or allows the rotorcraft structure, other than the landing gear and external accessories, to impact the landing surface.

17. Section 27.783 is amended by revising paragraph (b) to read as follows:

§ 27.783 Doors.

* * * * *

(b) Each external door must be located where persons using it will not be endangered by the rotors, propellers, engine intakes, and exhausts when appropriate operating procedures are used. If opening procedures are required, they must be marked inside, on or adjacent to the door opening device.

18. Section 27.807 is amended by revising paragraph (d) to read as follows:

§ 27.807 Emergency exits.

* * * * *

(d) *Ditching emergency exits for passengers.* If certification with ditching provisions is requested, one emergency exit on each side of the fuselage must be proven by test, demonstration, or analysis to—

(1) Be above the waterline;

(2) Have at least the dimensions specified in paragraph (b) of this section; and

(3) Open without interference from flotation devices whether stowed or deployed.

19. Section 27.861 is revised to read as follows:

§ 27.861 Fire protection of structure, controls, and other parts.

Each part of the structure, controls, rotor mechanism, and other parts essential to a controlled landing that would be affected by powerplant fires must be fireproof or protected so they can perform their essential functions for at least 5 minutes under any foreseeable powerplant fire conditions.

20. Section 27.865 is amended by revising the introductory text of paragraph (a) and by adding a new paragraph (d) to read as follows:

§ 27.865 External load attaching means.

(a) It must be shown by analysis or test, or both, that the rotorcraft external load attaching means can withstand a limit static load equal to 2.5, or some lower factor approved under §§ 27.337 through 27.341, multiplied by the maximum external load for which authorization is requested. The load is applied in the vertical direction and in any direction making an angle of 30° with the vertical, except for those directions having a forward component. However, the 30° angle may be reduced to a lesser angle if—

* * * * *

(d) The fatigue evaluation of § 27.571(a) does not apply to this section except for a failure of the cargo attaching means that results in a hazard to the rotorcraft.

PART 29—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY ROTORCRAFT

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

Authority: 49 U.S.C. 1344, 1354(a), 1355, 1421, 1423, 1424, 1425, 1428, 1429, and 1430; 49 U.S.C. 106(g) (Revised Pub. L. 97-449, January 12, 1983).

22. Section 29.307 is amended by revising paragraph (a) to read as follows:

§ 29.307 Proof of structure.

(a) Compliance with the strength and deformation requirements of this subpart must be shown for each critical loading condition accounting for the environment to which the structure will be exposed in operation. Structural analysis (static or fatigue) may be used only if the structure conforms to those structures for which experience has shown this method to be reliable. In

other cases, substantiating load tests must be made.

23. Section 29.337 is amended by revising paragraph (a) and the introductory text of paragraph (b) to read as follows:

§ 29.337 Limit maneuvering load factor.

(a) A limit maneuvering load factor ranging from a positive limit of 3.5 to a negative limit of -1.0; or

(b) Any positive limit maneuvering load factor not less than 2.0 and any negative limit maneuvering load factor of not less than -0.5 for which—

24. Section 29.351 is revised to read as follows:

§ 29.351 Yawing conditions.

(a) Each rotorcraft must be designed for the loads resulting from the maneuvers specified in paragraphs (b) and (c) of this section, with—

(1) Unbalanced aerodynamic moments about the center of gravity which the aircraft reacts to in a rational or conservative manner considering the principal masses furnishing the reacting inertia forces; and

(2) Maximum main rotor speed.

(b) To produce the load required in paragraph (a) of this section, in unaccelerated flight with zero yaw, at forward speeds from zero up to $0.6 V_{NE}$ —

(1) Displace the cockpit control suddenly to the maximum deflection limited by the control stops or by the maximum pilot force specified in § 29.395(a);

(2) Attain a resulting sideslip angle or 90° , whichever is less; and

(3) Return the directional control suddenly to neutral.

(c) To produce the load required in paragraph (a) of the section, in unaccelerated flight with zero yaw, at forward speeds from $0.6 V_{NE}$ up to V_{NE} or V_H , whichever is less—

(1) Displace the cockpit directional control suddenly to the maximum deflection limited by the control stops or by the pilot force specified in § 29.395(a);

(2) Attain a resulting sideslip angle or 15° , whichever is less, at the lesser speed of V_{NE} or V_H ;

(3) Vary the sideslip angles of paragraphs (b)(2) and (c)(2) of this section directly with speed; and

(4) Return the directional control suddenly to neutral.

25. Section 29.391 is revised to read as follows:

§ 29.391 General.

Each auxiliary rotor, each fixed or movable stabilizing or control surface, and each system operating any flight control must meet the requirements of §§ 29.395 through 29.403, 29.411, 29.413, and 29.427.

26. Section 29.395 is amended by revising paragraph (b) to read as follows:

§ 29.395 Control system.

(b) Each primary control system, including its supporting structure, must be designed as follows:

(1) The system must withstand loads resulting from the limit pilot forces prescribed in § 29.397;

(2) Notwithstanding paragraph (b)(3) of this section, when power-operated actuator controls or power boost controls are used, the system must also withstand the loads resulting from the limit pilot forces prescribed in § 29.397 in conjunction with the forces output of each normally energized power device, including any single power boost or actuator system failure;

(3) If the system design or the normal operating loads are such that a part of the system cannot react to the limit pilot forces prescribed in § 29.397, that part of the system must be designed to withstand the maximum loads that can be obtained in normal operation. The minimum design loads must, in any case, provide a rugged system for service use, including consideration of fatigue, jamming, ground gusts, control inertia, and friction loads. In the absence of a rational analysis, the design loads resulting from 0.60 of the specified limit pilot forces are acceptable minimum design loads; and

(4) If operational loads may be exceeded through jamming, ground gusts, control inertia, or friction, the system must withstand the limit pilot forces specified in § 29.397, without yielding.

27. A new § 29.427 is added following § 29.413 and before the heading, Ground Loads, to read as follows:

§ 29.427 Unsymmetrical loads.

(a) Horizontal tail surfaces and their supporting structure must be designed for unsymmetrical loads arising from yawing and rotor wake effects in combination with the prescribed flight conditions.

(b) To meet the design criteria of paragraph (a) of this section, in the absence of more rational data, both of the following must be met:

(1) One hundred percent of the maximum loading from the symmetrical flight conditions in § 29.413 acts on the

surface on one side of the plane of symmetry, and no loading acts on the other side.

(2) Fifty percent of the maximum loading from the symmetrical flight conditions in § 29.413 acts on the surface on each side of the plane of symmetry, in opposite directions.

(c) For empennage arrangements where the horizontal tail surfaces are supported by the vertical tail surfaces, the vertical tail surfaces and supporting structure must be designed for the combined vertical and horizontal surface loads resulting from each prescribed flight condition, considered separately. The flight conditions must be selected so that the maximum design loads are obtained on each surface. In the absence of more rational data, the unsymmetrical horizontal tail surface loading distributions described in this section must be assumed.

28. Section 29.501 is amended by revising paragraphs (d)(3) and (f)(2)(ii) to read as follows:

§ 29.501 Ground loading conditions: Landing gear with skids.

(d) ***

(3) The total sideload must be applied equally between skids and along the length of the skids.

(f) ***

(2) ***

(ii) Distributed equally over 33.3 percent of the length between the skid tube attachments and centrally located midway between the skid tube attachments.

29. Section 29.519 is amended by revising the section heading and by revising paragraphs (a), (b), and (c) to read as follows:

§ 29.519 Hull type rotorcraft: Water-based and amphibian.

(a) *General.* For hull type rotorcraft, the structure must be designed to withstand the water loading set forth in paragraphs (b), (c), and (d) of this section considering the most severe wave heights and profiles for which approval is desired. The loads for the landing conditions of paragraphs (b) and (c) of this section must be developed and distributed along and among the hull and auxiliary floats, if used, in a rational and conservative manner, assuming a rotor lift not exceeding two-thirds of the rotorcraft weight to act throughout the landing impact.

(b) *Vertical landing conditions.* The rotorcraft must initially contact the most critical wave surface at zero forward speed in likely pitch and roll attitudes

which result in critical design loadings. The vertical descent velocity may not be less than 6.5 feet per second relative to the mean water surface.

(c) *Forward speed landing conditions.* The rotorcraft must contact the most critical wave at forward velocities from zero up to 30 knots in likely pitch, roll, and yaw attitudes and with a vertical descent velocity of not less than 6.5 feet per second relative to the mean water surface. A maximum forward velocity of less than 30 knots may be used in design if it can be demonstrated that the forward velocity selected would not be exceeded in a normal one-engine-out landing.

30. Section 29.563 is revised to read as follows:

§ 29.563 Structural ditching provisions.

If certification with ditching provisions is requested, structural strength for ditching must meet the requirements of this section and § 29.801(e).

(a) *Forward speed landing conditions.* The rotorcraft must initially contact the most critical wave for reasonably probable water conditions at forward velocities from zero up to 30 knots in likely pitch, roll, and yaw attitudes. The rotorcraft limit vertical descent velocity may not be less than 5 feet per second relative to the mean water surface. Rotor lift may be used to act through the center of gravity throughout the landing impact. This lift may not exceed two-thirds of the design maximum weight. A maximum forward velocity of less than 30 knots may be used in design if it can be demonstrated that the forward velocity selected would not be exceeded in a normal one-engine-out touchdown.

(b) *Auxiliary or emergency float conditions.*—(1) *Floats fixed or deployed before initial water contact.* In addition to the landing loads in paragraph (a) of this section, each auxiliary or emergency float, or its support and attaching structure in the airframe or fuselage, must be designed for the load developed by a fully immersed float unless it can be shown that full immersion is unlikely. If full immersion is unlikely, the highest likely float buoyancy load must be applied. The highest likely buoyancy load must include consideration of a partially immersed float creating restoring moments to compensate the upsetting moments caused by side wind, unsymmetrical rotorcraft loading, water wave action, rotorcraft inertia, and probable structural damage and leakage considered under § 29.801(d). Maximum roll and pitch angles determined from compliance with § 29.801(d) may be

used, if significant, to determine the extent of immersion of each float. If the floats are deployed in flight, appropriate air loads derived from the flight limitations with the floats deployed shall be used in substantiation of the floats and their attachment to the rotorcraft. For this purpose, the design airspeed for limit load is the float deployed airspeed operating limit multiplied by 1.11.

(2) *Floats deployed after initial water contact.* Each float must be designed for full or partial immersion prescribed in paragraph (b)(1) of this section. In addition, each float must be designed for combined vertical and drag loads using a relative limit speed of 20 knots between the rotorcraft and the water. The vertical load may not be less than the highest likely buoyancy load determined under paragraph (b)(1) of this section.

31. Section 29.613 is amended by revising paragraph (b) and the introductory text of paragraph (d) and by adding a new paragraph (e) to read as follows:

§ 29.613 Material strength properties and design values.

(b) Design values must be chosen to minimize the probability of structural failure due to material variability. Except as provided in paragraphs (d) and (e) of this section, compliance with this paragraph must be shown by selecting design values that assure material strength with the following probability—

(1) Where applied loads are eventually distributed through a single member within an assembly, the failure of which would result in loss of structural integrity of the component, 99 percent probability with 95 percent confidence; and

(2) For redundant structures, those in which the failure of individual elements would result in applied loads being safely distributed to other load-carrying members, 90 percent probability with 95 percent confidence.

(d) Design values may be those contained in the following publications (available from the Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120) or other values approved by the Administrator:

(e) Other design values may be used if a selection of the material is made in which a specimen of each individual item is tested before use and it is determined that the actual strength

properties of that particular item will equal or exceed those used in design.

§ 29.629 [Amended]

32. Section 29.629 is amended by removing the word "part" and inserting in place thereof the words "aerodynamic surface."

33. Section 29.663 is revised to read as follows:

§ 29.663 Ground resonance prevention means.

(a) The reliability of the means for preventing ground resonance must be shown either by analysis and tests, or reliable service experience, or by showing through analysis or tests that malfunction or failure of a single means will not cause ground resonance.

(b) The probable range of variations, during service, of the damping action of the ground resonance prevention means must be established and must be investigated during the test required by § 29.241.

34. A new § 29.674 is added to read as follows:

§ 29.674 Interconnected controls.

Each primary flight control system must provide for safe flight and landing and operate independently after a malfunction, failure, or jam of any auxiliary interconnected control.

35. Section 29.727 is amended by revising paragraph (c) to read as follows:

§ 29.727 Reserve energy absorption drop test.

(c) The landing gear must withstand this test without collapsing. Collapse of the landing gear occurs when a member of the nose, tail, or main gear will not support the rotorcraft in the proper attitude or allows the rotorcraft structure, other than landing gear and external accessories, to impact the landing surface.

§ 29.755 [Amended]

36. Section 29.755 is amended by removing the designator "(a)" from paragraph (a) and by removing paragraph (b).

37. Section 29.783 is amended by revising paragraphs (b) and (c) to read as follows:

§ 29.783 Doors.

(b) Each external door must be located, and appropriate operating procedures must be established, to ensure that persons using the door will not be endangered by the rotors,

propellers, engine intakes, and exhausts when the operating procedures are used.

(c) There must be means for locking crew and external passenger doors and for preventing their opening in flight inadvertently or as a result of mechanical failure. It must be possible to open external doors from inside and outside the cabin with the rotorcraft on the ground even though persons may be crowded against the door on the inside of the rotorcraft. The means of opening must be simple and obvious and so arranged and marked that it can be readily located and operated.

* * * * *

38. Section 29.803 is amended by removing and reserving paragraph (c) and by adding new paragraphs (d) and (e) to read as follows:

§ 29.803 Emergency evacuation.

* * * * *

(d) Except as provided in paragraph (e) of this section, the following categories of rotorcraft must be tested in accordance with the requirements of appendix D of this part to demonstrate that the maximum seating capacity, including the crewmembers required by the operating rules, can be evacuated from the rotorcraft to the ground within 90 seconds:

(1) Rotorcraft with a seating capacity of more than 44 passengers.

(2) Rotorcraft with all of the following:

(i) Ten or more passengers per passenger exit as determined under § 29.807(b).

(ii) No main aisle, as described in § 29.815, for each row of passenger seats.

(iii) Access to each passenger exit for each passenger by virtue of design features of seats, such as folding or break-over seat backs or folding seats.

(e) A combination of analysis and tests may be used to show that the rotorcraft is capable of being evacuated within 90 seconds under the conditions specified in § 29.803(d) if the Administrator finds that the combination of analysis and tests will provide data, with respect to the emergency evacuation capability of the rotorcraft, equivalent to that which would be obtained by actual demonstration.

39. Section 29.805 is amended by adding a new paragraph (c) to read as follows:

§ 29.805 Flightcrew emergency exits.

* * * * *

(c) Each exit must not be obstructed by water or flotation devices after a ditching. This must be shown by test, demonstration, or analysis.

40. Section 29.807 is amended by revising paragraph (d) (introductory text); and by adding a new paragraph (d)(3) to read as follows:

§ 29.807 Passenger emergency exits.

* * * * *

(d) *Ditching emergency exits for passengers.* If certification with ditching provisions is requested, ditching emergency exits must be provided in accordance with the following requirements and must be proven by test, demonstration, or analysis unless the emergency exits required by paragraph (b) of this section already meet these requirements.

* * * * *

(3) Flotation devices, whether stowed or deployed, may not interfere with or obstruct the exits.

* * * * *

41. Section 29.809 is amended by revising paragraph (f) and by adding new paragraphs (g), (h), and (i) to read as follows:

§ 29.809 Emergency exit arrangement.

* * * * *

(f) Except as provided in paragraph (h) of this section, each land-based rotorcraft emergency exit must have an approved slide as stated in paragraph (g) of this section, or its equivalent, to assist occupants in descending to the ground from each floor level exit and an approved rope, or its equivalent, for all other exits, if the exit threshold is more than 6 feet above the ground—

(1) With the rotorcraft on the ground and with the landing gear extended;

(2) With one or more legs or part of the landing gear collapsed, broken, or not extended; and

(3) With the rotorcraft resting on its side, if required by § 29.803(d).

(g) The slide for each passenger emergency exit must be a self-supporting slide or equivalent, and must be designed to meet the following requirements:

(1) It must be automatically deployed, and deployment must begin during the interval between the time the exit opening means is actuated from inside the rotorcraft and the time the exit is fully opened. However, each passenger emergency exit which is also a passenger entrance door or a service door must be provided with means to prevent deployment of the slide when the exit is opened from either the inside or the outside under nonemergency conditions for normal use.

(2) It must be automatically erected within 10 seconds after deployment is begun.

(3) It must be of such length after full deployment that the lower end is self-

supporting on the ground and provides safe evacuation of occupants to the ground after collapse of one or more legs or part of the landing gear.

(4) It must have the capability, in 25-knot winds directed from the most critical angle, to deploy and, with the assistance of only one person, to remain usable after full deployment to evacuate occupants safely to the ground.

(5) Each slide installation must be qualified by five consecutive deployment and inflation tests conducted (per exit) without failure, and at least three tests of each such five-test series must be conducted using a single representative sample of the device. The sample devices must be deployed and inflated by the system's primary means after being subjected to the inertia forces specified in § 29.561(b). If any part of the system fails or does not function properly during the required tests, the cause of the failure or malfunction must be corrected by positive means and after that, the full series of five consecutive deployment and inflation tests must be conducted without failure.

(h) For rotorcraft having 30 or fewer passenger seats and having an exit threshold more than 6 feet above the ground, a rope or other assist means may be used in place of the slide specified in paragraph (f) of this section, provided an evacuation demonstration is accomplished as prescribed in § 29.803(d) or (e).

(i) If a rope, with its attachment, is used for compliance with paragraph (f), (g), or (h) of this section, it must—

(1) Withstand a 400-pound static load; and

(2) Attach to the fuselage structure at or above the top of the emergency exit opening, or at another approved location if the stowed rope would reduce the pilot's view in flight.

42. Section 29.811 is amended by revising paragraph (f)(1) to read as follows:

§ 29.811 Emergency exit marking.

* * * * *

(f) * * *

(1) There must be a 2-inch colored band outlining each passenger emergency exit, except small rotorcraft with a maximum weight of 12,500 pounds or less may have a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

* * * * *

43. Section 29.855 is amended by revising paragraph (a) to read as follows:

(a) Each exit must not be obstructed by water or flotation devices after a ditching. This must be shown by test, demonstration, or analysis.

(b) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(c) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(d) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(e) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(f) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(g) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(h) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(i) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(j) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(k) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(l) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(m) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(n) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(o) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(p) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(q) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(r) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(s) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(t) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(u) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(v) Each exit must be clearly marked by a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

§ 29.855 Cargo and baggage compartments.

(a) Each cargo and baggage compartment must be constructed of or lined with materials in accordance with the following:

(1) For accessible and inaccessible compartments not occupied by passengers or crew, the material must be at least fire resistant.

(2) Materials must meet the requirements in § 29.853(a)(1), (a)(2), and (a)(3) for cargo or baggage compartments in which—

(i) The presence of a compartment fire would be easily discovered by a crewmember while at the crewmember's station;

(ii) Each part of the compartment is easily accessible in flight;

(iii) The compartment has a volume of 200 cubic feet or less; and

(iv) Notwithstanding § 29.1439(a), protective breathing equipment is not required.

44. Section 29.861 is amended by revising paragraph (b) to read as follows:

§ 29.861 Fire protection of structure, controls, and other parts.

(b) For Category B rotorcraft, fireproof or protected so that they can perform their essential functions for at least 5 minutes under any foreseeable powerplant fire conditions.

45. Section 29.865 is amended by revising the introductory text of paragraph (a) and by adding a new paragraph (d) to read as follows:

§ 29.865 External load attaching means.

(a) It must be shown by analysis or test, or both, that the rotorcraft external load attaching means can withstand a limit static load equal to 2.5, or some lower factor approved under §§ 29.337 through 29.341, multiplied by the maximum external load for which authorization is requested. The load is applied in the vertical direction and in any direction making an angle of 30° with the vertical, except for those directions having a forward component. However, the 30° angle may be reduced to a lesser angle if—

(d) The fatigue evaluation of § 29.571(a) does not apply to this section except for a failure of the cargo attaching means that results in a hazard to the rotorcraft.

46. Section 29.1415 is amended by revising paragraph (b)(1) to read as follows:

§ 29.1415 Ditching equipment.

(b) * * *

(1) Provide not less than two rafts, of an approximately equal rated capacity and buoyancy to accommodate the occupants of the rotorcraft; and

47. A new Appendix D is added to part 29 to read as follows:

Appendix D—Criteria for Demonstration of Emergency Evacuation Procedures Under § 29.803

(a) The demonstration must be conducted either during the dark of the night or during daylight with the dark of night simulated. If the demonstration is conducted indoors during daylight hours, it must be conducted inside a darkened hangar having doors and windows covered. In addition, the doors and windows of the rotorcraft must be covered if the hangar illumination exceeds that of a moonless night. Illumination on the floor or ground may be used, but it must be kept low and shielded against shining into the rotorcraft's windows or doors.

(b) The rotorcraft must be in a normal attitude with landing gear extended.

(c) Safety equipment such as mats or inverted liferafts may be placed on the floor or ground to protect participants. No other equipment that is not part of the rotorcraft's emergency evacuation equipment may be used to aid the participants in reaching the ground.

(d) Except as provided in paragraph (a) of this appendix, only the rotorcraft's emergency lighting system may provide illumination.

(e) All emergency equipment required for the planned operation of the rotorcraft must be installed.

(f) Each external door and exit and each internal door or curtain must be in the takeoff configuration.

(g) Each crewmember must be seated in the normally assigned seat for takeoff and must remain in that seat until receiving the signal for commencement of the demonstration. For compliance with this section, each crewmember must be—

(1) A member of a regularly scheduled line crew; or

(2) A person having knowledge of the operation of exits and emergency equipment.

(h) A representative passenger load of persons in normal health must be used as follows:

(1) At least 25 percent must be over 50 years of age, with at least 40 percent of these being females.

(2) The remaining, 75 percent or less, must be 50 years of age or younger, with at least 30 percent of these being females.

(3) Three life-size dolls, not included as part of the total passenger load, must be carried by passengers to simulate live infants 2 years old or younger, except for a total passenger load of fewer than 44 but more than 19, one doll must be carried. A doll is not required for a 19 or fewer passenger load.

(4) Crewmembers, mechanics, and training personnel who maintain or operate the

rotorcraft in the normal course of their duties may not be used as passengers.

(i) No passenger may be assigned a specific seat except as the Administrator may require. Except as required by paragraph (1) of this appendix, no employee of the applicant may be seated next to an emergency exit, except as allowed by the Administrator.

(j) Seat belts and shoulder harnesses (as required) must be fastened.

(k) Before the start of the demonstration, approximately one-half of the total average amount of carry-on baggage, blankets, pillows, and other similar articles must be distributed at several locations in the aisles and emergency exit access ways to create minor obstructions.

(l) No prior indication may be given to any crewmember or passenger of the particular exits to be used in the demonstration.

(m) The applicant may not practice, rehearse, or describe the demonstration for the participants nor may any participant have taken part in this type of demonstration within the preceding 6 months.

(n) A pretakeoff passenger briefing may be given. The passengers may also be advised to follow directions of crewmembers, but not be instructed on the procedures to be followed in the demonstration.

(o) If safety equipment, as allowed by paragraph (c) of this appendix, is provided, either all passenger and cockpit windows must be blacked out or all emergency exits must have safety equipment to prevent disclosure of the available emergency exits.

(p) Not more than 50 percent of the emergency exits in the sides of the fuselage of a rotorcraft that meet all of the requirements applicable to the required emergency exits for that rotorcraft may be used for demonstration. Exits that are not to be used for the demonstration must have the exit handle deactivated or must be indicated by red lights, red tape, or other acceptable means placed outside the exits to indicate fire or other reasons why they are unusable. The exits to be used must be representative of all the emergency exits on the rotorcraft and must be designated by the applicant, subject to approval by the Administrator. If installed, at least one floor level exit (Type I; § 29.807(a)(1)) must be used as required by § 29.807(c).

(q) All evacuees must leave the rotorcraft by a means provided as part of the rotorcraft's equipment.

(r) Approved procedures must be fully utilized during the demonstration.

(s) The evacuation time period is completed when the last occupant has evacuated the rotorcraft and is on the ground.

PART 133—ROTORCRAFT EXTERNAL-LOAD OPERATIONS

48. The authority citation for part 133 continues to read as follows:

Authority: 49 U.S.C. 1348, 1354(a), 1421, and 1427; 49 U.S.C. 106(g) (Revised Pub. L. 97-449, January 12, 1983).

49. Section 133.43 is amended by removing the "or" at the end of paragraphs (a)(2) and (b)(1); by

removing the period at the end of paragraphs (a)(3) and (b)(2); by inserting "; or" at the end of paragraphs (a)(3) and (b)(2); and by adding new paragraphs (a)(4) and (b)(3) to read as follows:

§ 133.43 Structures and design.

(a) * * *

(4) Section 21.25 of this chapter.

(b) * * *

(3) Section 21.25 of this chapter, except the device must comply with §§ 27.865(b) and 29.865(b), as applicable, of this chapter.

* * * * *

Issued in Washington, DC, on February 12, 1990.

James B. Busey,

Administrator.

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