§ 25.253 High-speed characteristics.

(a) * * *

(4) Adequate roll capability to assure a prompt recovery from a lateral upset condition must be available at any speed up to V_{DF}/M_{DF}.

(5) With the airplane trimmed at V_{MO}/M_{MO}, extension of the speedbrakes over the available range of movements of the pilot's control, at all speeds above V_{MO}/M_{MO}, but not so high that V_{DF}/M_{DF} would be exceeded during the maneuver, must not result in:

(i) An excessive positive load factor when the pilot does not take action to counteract the effects of extension;

(ii) Buffeting that would impair the pilot's ability to read the instruments or control the airplane for recovery; or

(iii) A nose down pitching moment, unless it is small.

(b) *Maximum speed for stability characteristics, V_{FC}/M_{FC}.* V_{FC}/M_{FC} is the maximum speed at which the requirements of §§ 25.143(g), 25.147(f), 25.175(b)(1), 25.177(a) through (c), and 25.181 must be met with flaps and landing gear retracted. Except as noted in § 25.253(c), V_{FC}/M_{FC} may not be less than a speed midway between V_{MO}/M_{MO} and V_{DF}/M_{DF}, except that, for altitudes where Mach number is the limiting factor, M_{FC} need not exceed the Mach number at which effective speed warning occurs.

(c) *Maximum speed for stability characteristics in icing conditions.* The maximum speed for stability characteristics with the ice accretions defined in appendix C, at which the requirements of §§ 25.143(g), 25.147(f), 25.175(b)(1), 25.177(a) through (c), and 25.181 must be met, is the lower of:

* * * * *

Issued in Washington, DC, on November 1, 2011.

J. Randolph Babbitt,

Administrator.

[FR Doc. 2011–30954 Filed 11–30–11; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 27 and 29

[Docket No.: FAA–2009–0660; Amdt. Nos. 27–47, 29–54]

RIN 2120–AJ52

Damage Tolerance and Fatigue Evaluation of Composite Rotorcraft Structures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This rule revises airworthiness standards for type certification requirements of normal and transport category rotorcraft. The amendment requires evaluation of fatigue and residual static strength of composite rotorcraft structures using a damage tolerance evaluation, or a fatigue evaluation if the applicant establishes that a damage tolerance evaluation is impractical. The amendment addresses advances in composite structures technology and provides internationally harmonized standards.

DATES: Effective January 30, 2012.

ADDRESSES: For information on where to obtain copies of rulemaking documents and other information related to this final rule, see ''How To Obtain Additional Information'' at the end of the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this action, contact Sharon Y. Miles, Regulations and Policy Group, Rotorcraft Directorate, ASW–111, Federal Aviation Administration, 2601 Meacham Boulevard Fort Worth, Texas 76137–0111; telephone (817) 222–5122; facsimile (817) 222–5961; email *sharon.y.miles@faa.gov.* For legal questions concerning this action, contact Steve C. Harold, Directorate Counsel, ASW–7G1, Federal Aviation Administration, 2601 Meacham Boulevard Fort Worth, Texas 76137–0007, telephone (817) 222–5099; facsimile (817) 222–5945, email *steve.c.harold@faa.gov.*

SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

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

This rulemaking is promulgated under the authority described in subtitle VII, part A, subpart III, section 44701, ''General Requirements,'' Section 44702, ''Issuance of Certificates,'' and Section 44704, ''Type Certificates, Production Certificates, and Airworthiness Certificates.'' Under Section 44701, the FAA is charged with prescribing regulations and minimum standards for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. Under Section 44702, the Administrator may issue various certificates including type certificates, production certificates, air agency certificates, and airworthiness certificates. Under Section 44704, the Administrator must issue type certificates for aircraft, aircraft engines, propellers, and specified appliances when the Administrator finds the product is properly designed and manufactured, performs properly, and meets the regulations and minimum standards prescribed under section 44701(a). This regulation is within the scope of these authorities because it will promote safety of composite structures by updating the existing minimum prescribed standards, used during the type certification process, to address advances in composite structural fatigue substantiation technology. It will also harmonize this standard with international standards for evaluating the fatigue strength of normal and transport category rotorcraft composite primary structural elements.

I. Overview of Final Rule

Composite structures present unique material behaviors and react differently from metallic structures to damage and loading conditions. This rule addresses the unique characteristics of composite materials and requires applicants to evaluate these materials in a different manner from traditional metallic materials. This rulemaking addresses the type certification requirements for substantiating and certifying composite rotorcraft structures, including different aspects of the evaluation for the most critical issues for each class of materials.

This rule changes the certification standards in areas of frequent non-standardization and misinterpretation by applicants for certification of rotorcraft composite structures. This rule is intended to require damage tolerance and fatigue evaluation of composite structures in order to prevent reduction of structural strength of rotorcraft. In composite structures, low cycle fatigue often yields minimal damage growth, whereas accidental damage from impact can immediately reduce residual structural strength. This is different in metals, where any critical damage to the structure is sensitive to cyclic fatigue loads.

These rule changes also address material and process variability and environmental effects. A strength requirement for ultimate loads will be applied when maximum acceptable manufacturing defects and service damage are present. However, these rule changes provide an exception to the requirement for a damage tolerance evaluation if the applicant can establish that the damage tolerance evaluation is impractical within the limits of geometry, inspectability, and good design practice. In that instance, the

applicant may be allowed to perform a fatigue evaluation for some rotorcraft structures and damage scenarios based on supplemental procedures, such as establishing a retirement time. Under this exception, an applicant could demonstrate that certain damage will not grow or does not grow beyond a certain threshold or size, and that the damaged structure could still carry ultimate loads. In this case, an inspection may not be necessary and the structure could be assigned a retirement life instead of a required inspection program. Further, this rule will require an applicant to conduct a threat assessment, which is associated with the service history of composite structures.

The rule requires that applicants consider varying types of damage, loading conditions, threat assessments, manufacturing defects, and the residual strength associated with composite structures. In developing these requirements, the FAA recognized that it may be impractical within the limits of geometry, inspectability, or good design practice to evaluate all the composite structures of a rotorcraft using a damage tolerance evaluation. Therefore, the rule allows for a fatigue evaluation of particular rotorcraft composite structures under §§ 27.573(e) and 29.573(e), where appropriate, if the applicant can establish that performing a damage tolerance evaluation is impractical within the limits of geometry, inspectability, and good design practice for those principal structural elements (PSEs). As part of the approval process for fatigue evaluation of a particular rotorcraft composite structure, the applicant will be required to identify the PSEs and the types of damage considered, establish supplemental procedures to minimize the risk of catastrophic failure associated with those types of damage, and include procedures in the Airworthiness Limitation section of the Instructions for Continued Airworthiness. These requirements minimize the risk of catastrophic failure of composite structures used on rotorcraft certificated in accordance with part 27 and part 29 standards.

A. Key Provisions in the New Rule

Some of the requirements for evaluating composite structures came from the current § 29.571 standards. These requirements in the evaluation process include certain steps, such as identification of the PSEs, the in-flight measurements of loads, and the use of loading spectra, as severe as those expected in-service. These rule changes add more detailed steps and do not refer to the current flaw tolerant safe-life and fail-safe evaluations because there are more suitable ways of describing each approach under damage tolerance. Further, this rule does not refer to the traditional safe-life method because composites have sensitivities to defects and damage that must be considered in design and certification testing that makes the traditional safe-life method inappropriate.

These rule changes revise the standards for determining inspection intervals and retirement times based on results of damage tolerance and fatigue evaluation. Currently, the minimum residual structural strength requirement for any damage or defect that can be found by inspection is tied to limit loads (maximum loads to be expected in service). These rule changes link the required residual structural strength to the probability of a given damage type, inspection interval, and damage detectability. This link is necessary for at least two reasons. First, one of the more critical threats—impact damage—could immediately lower residual structural strength to well below ultimate loads (limit loads multiplied by prescribed factors of safety) if it occurs. These requirements will help ensure that, as the residual structural strength is lowered, the earlier damage will be detected and repaired. Inspections will be required that will be frequent and comprehensive enough to reveal any damage or defect growth to minimize the time that the rotorcraft might be operated at less than an ultimate load capability. Second, the requirements address rare damage (such as a high-energy, blunt impact) that is not detectable with the currently prescribed inspection schemes for aircraft in operational service. Although such damage may have a low probability of occurring, the rules require that sufficient residual structural strength exists to compensate for such damage.

These rule changes require that all PSEs, the failure of which could result in catastrophic failure of the rotorcraft, meet ultimate load residual structural strength requirements or require a retirement time if there could be any damage that may not be found by a maintenance inspection. Under this rule, an applicant will establish a retirement time to address the damage that may not be found by inspection or to eliminate the burden of the repeated inspection by the rotorcraft owners. For damage detectable by inspection, the rule establishes a limit load requirement to repair and restore the structure to its ultimate strength capability.

These rule changes add all PSE assessments for damage threats, residual strength, and fatigue characteristics to the list of requirements for inspection intervals or require replacement times as stated in §§ 27.573(d)(2) and 29.573(d)(2). The fatigue evaluation will include the PSEs of the airframe, main and tail rotor drive systems, main and tail rotor blades and hubs, rotor controls, fixed and movable control surfaces, engine and transmission mountings, landing gear, and other parts. In addition, performing damage tolerance evaluations of the strength of composite detail design points and fabrication techniques is considered critical by the FAA to avoid catastrophic failure due to static or fatigue loads.

The rule requires consideration of the effects of fatigue damage on stiffness, dynamic behavior, loads, and functional performance of composite structures. These characteristics are not considered to be a serious threat to residual structural strength. Currently, such requirements are limited to fail-safe evaluations.

The FAA recognizes there may be limited cases in which a damage tolerance evaluation may be impractical. In these rare cases, the applicant is required to identify the nature of the evaluation and provide a justification to the FAA for the impracticality determination. The justification must support the specific types of damage to the PSE to qualify for a fatigue evaluation. Finally, the rule requires the applicant to establish replacement times, structural inspection intervals, and related structural inspection procedures to minimize the risk of catastrophic failure because of PSE damage. The required replacement times, inspection intervals, and structural inspections will be included in the Instructions for Continued Airworthiness as required by §§ 27.1529 and 29.1529.

Additionally, the FAA recognizes that rare types of damage, such as high-energy, blunt impacts may not be uncovered as part of a base field inspection during scheduled maintenance inspection intervals. Therefore, this rule requires that the applicant substantiate sufficient residual structural strength to maintain an adequate level of safety in the event of an occurrence of rare damage. Supplemental procedures may be required to adequately address rare impact damage.

B. Airworthiness Limitations Section (Appendix A to Parts 27 and 29)

These sections require the mandatory replacement times, structural inspection intervals, and related structural inspection procedures produced under

the requirements of §§ 27.571 and 29.571, the new §§ 27.573 and 29.573, and any other similar requirement for type certification be included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness.

C. Benefit-Cost Comparison

This final rule adopts as regulatory requirements past FAA and industry practice regarding the use of composites on rotorcraft, including special conditions and advisory circulars. Although we anticipate both cost savings and improved safety as a consequence of the requirement for testing, inspection, and replacement schedules, we are unable to quantify these benefits. Nevertheless, based on industry-provided data, we believe that this final rule will yield benefits exceeding the estimated costs.

II. Background and Statement of the Issues

The evolution of composite technology used in rotorcraft structures is advancing rapidly. These rapid changes, along with the increased use of composites in rotorcraft structures, issues discovered during certification of composite structures, and service experiences of composite rotorcraft structures over the last 25 years, have caused us to reconsider the current regulations and guidance materials for damage tolerance and fatigue evaluation and to address the state of technology in composite structures. The current certification process is based on a broad interpretation of metallic fatigue substantiation and the design and construction airworthiness standards. However, composite and metal structures are different. Composites are complex materials that have unique advantages in fatigue strength, weight, and tolerance to damage. The methodologies for evaluating metallic structures are not necessarily suitable for composite structures. Because composite structures differ from metallic structures, the current regulations, §§ 27.571 and 29.571, do not adequately provide the fatigue certification requirements for composite rotorcraft structures.

This may lead to inconsistent interpretations from one rotorcraft certification project to another, resulting in different burdens on applicants to substantiate their composite rotorcraft structures. It has also caused confusion for some certification applicants. These applicants state there is no clear, complete guidance for certification of composite rotorcraft structures.

To address these concerns, the FAA tasked the Aviation Rulemaking Advisory Committee (ARAC) [1] through its Composite Rotorcraft Structure working group to provide advice and recommendations as follows:

- Recommend revisions to FAA Regulations/Joint Aviation Regulations (JAR) parts 27 and 29 for composite structures that are harmonized.
- Evaluate and recommend, as appropriate, regulations, advisory material, and related guidance to achieve the goal of improved tolerance to flaws and defects in composite structure with methodology and procedures that are practical and appropriate to rotorcraft.

This rule is based on ARAC's recommendations to the FAA. The recommendations have been placed in the docket for this rulemaking.

A. Related Activity

At the same time ARAC was tasked with providing advice and recommendations for composite rotorcraft structures, they were also tasked with providing advice and recommendations for metallic rotorcraft structures. However, because of the unique characteristics and structural capabilities of composite structures, the FAA established a separate rule for the damage tolerance and fatigue evaluations of rotorcraft composite structures. In response to the ARAC recommendations for improved standards for metallic structures, the FAA has developed a separate rule entitled ''Fatigue Tolerance Evaluation of Metallic Structures.''

B. Summary of the NPRM

The FAA published the NPRM for this composite structures rule in the **Federal Register** on January 6, 2010 (75 FR 793). The comment period for the NPRM closed on April 6, 2010. However, in response to a European Aviation Safety Agency (EASA) request, the FAA subsequently reopened the comment period to July 16, 2010 (published in the **Federal Register** on May 5, 2010, 75 FR 24502). The FAA received 12 comments to the docket on the NPRM. Commenters included two manufacturers, a government agency, and an engineering company.

C. General Overview of Comments

The FAA received various comments from four commenters—Adhesion Associates, Eurocopter France, Sikorsky Aircraft, and Transport Canada. All of the commenters generally supported the proposed changes; however, some suggested changes and clarifications to the rule, as discussed more fully in the next section of this document. The FAA received comments on the following general areas of the proposal.

- Definition of the term ''composites.''
- Reconciling differences related to compliance methodology approval authority between § 29.571 (metallics) and § 29.573 (composites).
- Reevaluating the economic impact of the rule.
- The manner of the application of ''safe life evaluation'' as established in the Advisory Circular (AC) 27–1B or 29–2C, Miscellaneous Guidance-08 and its relationship to these new rule changes.
- Rewording To clarify that the application of the changes to the Appendix A required by this rule applies to structures only.
- Requesting further rulemaking to address the potential for subsequent service adhesion failures and the effect of micro-voiding on bonding strength.

III. Discussion of Public Comments and Final Rule

Definition of the Term ''Composites''

Sikorsky Aircraft recommended a further definition of ''composites,'' beyond that contained in Advisory Circular (AC) 21–26, because it believes this is a necessary part of compliance for determining, for a given structure, whether to use § 29.571 or § 29.573.

The term ''composites'' is widely understood throughout the aviation industry to be different materials that are bonded or composed to create a structural component material. It has been defined in AC 21–26 as a material containing two or more distinct materials (fillers, reinforcing materials, and compatible plastic resin) designed to exhibit specific performance properties. A further definition is unnecessary. This definition is consistent with the FAA intent when it uses the term ''composites'' in both §§ 27.573 and 29.573. Therefore, the FAA is adopting the rule as proposed.

Reconciling Difference Between This Rule and the § 29.571 (Metallics) Rule, in the Approval Authority of Compliance Methodology and Methodology Results

Sikorsky Aircraft identified the difference between §§ 27.573 and 29.573, which refer to FAA approval, and § 29.571 (metallics), which refers to the Administrator's approval. It states that the language used in the approval process should be similar for § 29.571 (metallics) and § 29.573 (composites).

[1] Published in the **Federal Register**, April 5, 2000 (65 FR 17936).

The FAA agrees that this could cause confusion. The wording is changed in this rule to make it consistent with the wording in § 29.571 (metallics). The intent of §§ 29.571, 27.573, and 29.573 is that the approval of the methodology for the evaluation remains with the FAA (Administrator).

Re-Wording To Clarify That Changes to the Appendix Apply to Structures Only

Eurocopter France recommended rewording the proposed amended language to part 29, Appendix A, from ''required for type certification'' to ''required for type certification of structures'' to eliminate addressing non-structural elements. It further recommended implementation of the policy statement ASW–100–09–003 (Subj: Policy Statement Concerning Life Limits and Instructions for Continued Airworthiness for Rotorcraft), and for the FAA to address mandatory Instruction for Continued Airworthiness (ICA) for non-structural elements through a new rulemaking task, in coordination with the European Aviation Safety Agency (EASA).

The intent of the policy statement and this rule is to require that any life limit or required inspection interval for type certification is included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness. This is the same wording used in the current 14 CFR part 23, Appendix G23.4. This is also consistent with the intent of the airworthiness limitations section of the Appendix to highlight certification limitations regardless of whether they are structural or non-structural.

The FAA does not anticipate further rulemaking to implement the policy statement because it does not differentiate between structural or non-structural elements. Therefore, the FAA is adopting the provision as proposed.

Cost Estimates to the Economic Impact of the Rules

Sikorsky Aircraft believes the cost estimates for this rule should be calculated based on 12,000 hours per certification project.

Based on this commenter's cost estimate of 12,000 hours, at $86 per hour, the total nominal dollar estimate will be $1,032,000 ($567,000 in present value). The original hours provided in the ARAC recommendation were 8290 hours at $86 per hour. Taking into account the intervening 27 years, the present value difference between these estimates is $175,000. Based on this information, we estimate the nominal total compliance costs of this final rule to be between our original estimate of $713,000 and the commenter based estimate of $1,032,000.

Acceptability of ''Traditional Safe Life'' Approach in the Context of Flaw Tolerance Requirements, and the Application of ACs 27–1B and 29–2C, Miscellaneous Guidance (MG) 8, Paragraph g(6)(iii)(C)) (Safe Life Evaluation)

Transport Canada requested confirmation of the FAA's position concerning the acceptability of the ''traditional safe life'' approach for flaw tolerance requirements, and asks that the FAA consider amending MG 8 to clarify that the ''traditional safe life'' is not appropriate for composites, if that is the case. Transport Canada further suggested that the FAA amend §§ 27.573 and 29.573 to include clarification to this effect, since the flaw tolerance concept is applicable to both static and fatigue strength, and to consider incorporating into the new rule requirements for environmental conditions, maximum manufacturing defects and service damages, and the effect of repeat loading (after fatigue).

Intentionally, the proposed rule did not address flaw tolerance or safe life. This was only addressed in MG 8 based on the requirements of the current § 29.571. The requirement is for evaluating damage tolerance as addressed in paragraphs (d) of §§ 27.573 and 29.573. If impractical, paragraph (e) will require a fatigue evaluation. The proposed rule did not specifically address static requirements because they are covered in the current requirements of §§ 27.305 and 29.305. The draft AC for this rule is similar in format to the current MG 8, but has been updated to address the damage tolerance fatigue requirements of composite structures. All of these damage tolerance concerns must be considered under the requirements of paragraphs (d) and (e) of this rule. The miscellaneous guidance referred to in the comment is the applicable guidance for compliance until §§ 27.573 and 29.573 become effective; it is not the guidance for this new rule. Therefore, the FAA is adopting the rule as proposed.

Request for Further Rulemaking To Address Subsequent Service Adhesion Failures

Adhesion Associates Proprietary, Limited, recommended that the FAA address the in-service degradation of the chemical bonds in a new regulation (§ 2x.605 for parts 27 and 29); and that information on the significance, causes, and management procedures for micro-voids be incorporated into AC 20–107B.

The recommendation for a new regulation is beyond the scope of this rulemaking. However, it will be considered in future rulemaking. Likewise, the recommended changes to AC 20–107B will be considered in future AC revisions.

Differences Between the NPRM and the Final Rule

Sections §§ 27.573(b) and 29.573(b) are reworded to be consistent with the wording in § 29.571 for metallic structures.

IV. Regulatory Notices and Analyses

A. Regulatory Evaluation

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this proposed rule. We suggest readers seeking greater detail read the full regulatory evaluation, a copy of which we have placed in the docket for this rulemaking.

In conducting these analyses, FAA has determined that this final rule:

(1) Has benefits that justify its costs;

(2) Is not an economically ''significant regulatory action'' as defined in section 3(f) of Executive Order 12866;

(3) Is ''non-significant'' as defined in DOT's Regulatory Policies and Procedures;

(4) Would not have a significant economic impact on a substantial number of small entities;

(5) Would not have a significant effect on international trade; and

(6) Would not impose an unfunded mandate on state, local, or tribal governments, or on the private sector by exceeding the monetary threshold identified.

These analyses are summarized below.

Total Benefits and Costs of This Rulemaking

The estimated total cost of this final rule is between $713,000 ($392,000 in present value at 7%) and $1,032,000 ($567,000 in present value at 7%). The final rule systematizes past FAA and industry practice regarding the use of composites on rotorcraft, including special conditions and advisory circulars. Although we anticipate both cost savings and improved safety as a result of required inspection and replacement schedules, we are unable to quantify these benefits. Nevertheless, we believe that the qualitatively estimated benefits are real and significant and exceed the final rule's costs.

Who is Potentially Affected by this Rulemaking?

- Manufacturers of U.S.-registered part 27 and part 29 rotorcraft.

Our Cost Assumptions and Sources of Information.

- Discount rate—7%.
- Period of analysis of 27 years equals the 27 years of National Transportation Safety Board accident history. During this period, manufacturers will seek new certifications for 10.5 part 27 rotorcraft and six part 29 rotorcraft.

Benefits of This Rule

The final rule adopts as regulatory requirements past FAA and industry practice regarding the use of composites on rotorcraft, including special conditions and advisory circulars. Although we anticipate both cost savings and improved safety as a result of required inspection and replacement schedules, we are unable to quantify these benefits. Nevertheless, we believe that the qualitatively estimated benefits are real and significant and exceed the final rule's costs. We did not receive any comments regarding our conclusion that the benefits exceed the costs.

Cost of This Rule

Based upon the ARAC recommendation, we estimated the costs of this final rule to be about $713,000 ($392,000 in present value) over the 27-year analysis period. Manufacturers of 14 CFR part 27 rotorcraft would incur costs of about $101,000 ($55,000 in present value) and manufacturers of 14 CFR part 29 helicopters would incur costs of about $612,000 ($337,000 in present value).

One commenter provided a cost estimate of 12,000 hours as the cost of the rule. Converting the hours to dollars results in a nominal cost of $1,032,000 ($567,000 in present value); therefore, we estimate that the nominal cost of the final rule will have a range of $713,000 to $1,032,000.

B. Regulatory Flexibility Determination

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

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

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

This final rule directly affects rotorcraft manufacturers.

Part 27 Helicopter Manufacturers

Size Standards

Size standards for small entities are published by the Small Business Administration (SBA) on their Web site at *http://www.sba.gov/size*. The size standards used herein are from ''SBA U.S. Small Business Administration, Table of Small Business Size Standards, Matched to North American Industry Classification System Codes.'' The table is effective August 22, 2008 and uses the NAICS 2007 NAICS codes.

Helicopter manufacturers are listed in the referenced table under Sector 31–33—Manufacturing; Subsector 336—Transportation Equipment Manufacturing; NAICS Code 336411—Aircraft Manufacturing. The small entity size standard is 1,500 employees.

Table R1 shows there are six U.S. part 27 helicopter manufacturers that produce composite helicopters. MD Helicopters, with 400 employees, is the only part 27 helicopter manufacturer to qualify as a small entity. It is estimated that MD Helicopters has annual revenues of $175,000,000. The cost of this rule for one part 27 helicopter certification for a part 27 manufacturer is estimated to be $9,600. This is less than 0.01 percent of MD Helicopters annual revenue. We do not believe that is a significant cost. Therefore, it is not anticipated that this final rule would have a significant economic impact on a substantial number of part 27 helicopter manufacturers.

Table R1

U.S. Part 27 Helicopter Manufacturers

Manufacturer					Annual		
No.	Name	Ultimate Owner	Employees	Small Entity	Revenues (AR)	Proposal Costs (PC)	% PC of AR
1	Agusta (A)	Finmeccanica	73,000	No	€ 15,037,000	N.A.	N.A.
2	Bell Helicopter (B)	Textron	42,000	No	$ 14,200,000,000	N.A.	N.A.
3	Eurocopter (C)	EADS	118,000	No	€ 43,300,000,000	N.A.	N.A.
4	Kaman Aerospace (D)	Kaman Corp.	4,000	No	$ 1,200,000,000	N.A.	N.A.
5	**MD Helicopters (E)(F)**	**None**	**400**	**Yes**	**$ 175,000,000**	**$ 9,600**	**0.01%**
6	Sikorsky (G)	UTC	223,100	No	$ 58,700,000,000	N.A.	N.A.
7	Robinson Helicopters (H)						

Notes:

(A) http://www.finmeccanica.com

(B) http://www.Textron.com/about/company

(C) http://www.eads.com

(D) http://www.kaman.com

(E) http://www.linkedin.com

(F) http://www.jigsaw.com/id55718/md_helicopters_company.xhtml (Average of range of $100-$250 million)

Cost is based on one helicopter certification during the analysis period.

(G) http://www.utc.com/about_utc/fast_facts.lhtml

(H) Robinson Helicopters is not included because it produces only metallic helicopters and is not expected to produce composite helicopters in the future.

8/10/2009

Part 29 Helicopter Manufacturers

Size Standards

Size standards for part 29 manufacturers are the same as the size standards for part 27 manufacturers.

Table R2 shows there are four U.S. part 29 helicopter manufacturers currently producing helicopters. None of these manufacturers qualify as a small entity. Therefore, this final rule will not have a significant economic impact on a substantial number of part 29 helicopter manufacturers.

Table R2

U.S. Part 29 Helicopter Manufacturers

Manufacturer					Annual		
No.	Name	Ultimate Owner	Employees	Small Entity	Revenues (AR)	Proposal Costs (PC)	% PC of AR
1	Agusta (A)	Finmeccanica	73,000	No	€ 15,037,000	N.A.	N.A.
2	Bell Helicopter (B)	Textron	42,000	No	$ 14,200,000,000	N.A.	N.A.
3	Eurocopter (C)	EADS	118,000	No	€ 43,300,000,000	N.A.	N.A.
4	Sikorsky (D)	UTC	223,100	No	$ 58,700,000,000	N.A.	N.A.
5	Erickson Air Crane (E)						

Notes:

(A)	http://www.finmeccanica.com
(B)	http://www.Textron.com/about/company
(C)	http://www.eads.com
(D)	http://www.utc.com/about_utc/fast_facts.lhtml
(E)	Erickson Air Crane is not included because it produces only one metallic helicopter, the S-64, and is not
	expected to produce composite helicopters in the future.

6/29/2011

For the initial regulatory flexibility analysis we made the same determination that this rule would not have a significant economic impact on a substantial number of small entities and we did not receive any comments regarding our analysis or determination regarding small entities. Consequently, the FAA Administrator certifies that this final rule will not have a significant economic impact on a substantial number of part 27 or part 29 rotorcraft manufacturers.

C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103–465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, establishing standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such as the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

The FAA has assessed the potential effect of this proposed rule and determined that it would impose the same costs on domestic and international entities and thus has a neutral trade impact.

D. Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (adjusted annually for inflation) in any 1 year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $140.8 million in lieu of $100 million. This proposed rule does not contain such a mandate.

E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. According to the 1995 amendments to the Paperwork Reduction Act (5 CFR 1320.8(b)(2)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose any information collection requirement unless it displays a currently valid Office of Management and Budget (OMB) control number.

This final rule will impose the following new information collection requirements. As required by 44 U.S.C. 3507(d) of the Paperwork Reduction Act of 1995, the FAA has submitted requirements associated with this rule to OMB for its review. Notice of OMB approval for this information collection will be published in a future **Federal Register** document.

Summary: This rule adds new certification standards for normal and transport category rotorcraft to address advances in structural damage tolerance and fatigue substantiation technology for composite rotorcraft structures. The rule increases the current minimum safety standards to require compliance with certain current industry practices and FAA policies that would result in higher safety standards, and result in harmonized international standards. The rule helps ensure that if damage occurs to composite structures during manufacturing or within the operational life of the rotorcraft, the remaining structure can withstand fatigue loads that are likely to occur, without failure, until the damage is detected. The damaged structure must be repaired or the part must be replaced to restore ultimate load capability. Sections 27.573 and 29.573 require that applicants get FAA approval of their proposed methods for complying with the certification requirements for damage tolerance and fatigue evaluation of composite structures.

Public comments: No public comments were received on the information collection requirements discussed in the NPRM.

Use: The required damage tolerance and fatigue evaluation information will be determined for principal composite structural elements or components,

detail design points, and fabrication techniques and will be collected from rotorcraft certification applicants. The FAA will use the approval process for the applicant's submitted compliance methodology to determine whether the proposed methods are sufficient to comply with the certification requirements for damage tolerance and fatigue evaluation of composite structures. The FAA also will use the approval process for the applicant's submitted compliance methodology to determine if the rotorcraft has any unsafe features in the composite structures.

Respondents (including number of): The likely respondents to this damage tolerance and fatigue evaluation information are applicants requesting type certification of composite structures. We anticipate about 16.5 normal and transport category rotorcraft certification applicants (including supplemental type certificate applicants) over the 27 year analysis period or about 0.6 per year.

Frequency: The frequency of determining the damage tolerance and fatigue evaluation methodologies will depend on how often an applicant seeks certification of a composite structure. This compliance methodology will be provided during each certification. We anticipate 16.5 certifications over the 27 year analysis period or about 0.6 per year.

Annual Burden Estimate: The compliance methodology will be required to be submitted and approved during each certification of a composite rotorcraft structure. We anticipate there will be 0.6 certifications each year and it will take 182 hours to submit and approve the compliance methodology for each certification, for a total annual time burden of 109 hours. We anticipate that submitting and approving the compliance methodology for each certification will cost $100 per hour. Therefore, the estimated total annual cost burden will be $10,900.

F. International Compatibility

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

G. Environmental Analysis

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

H. Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the FAA, when modifying its regulations in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish appropriate regulatory distinctions. In the NPRM, the FAA requested comments on whether the proposed rule should apply differently to intrastate operations in Alaska. The agency did not receive any comments, and has determined, based on the administrative record of this rulemaking, that there is no need to make any regulatory distinctions applicable to intrastate aviation in Alaska.

V. Executive Order Determinations

A. Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. The agency determined that this action will not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, does not have Federalism implications.

B. Executive Order 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it is not a ''significant energy action'' under the executive order and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

VI. How To Obtain Additional Information

A. Rulemaking Documents

An electronic copy of a rulemaking document may be obtained by using the Internet—

1. Search the Federal Docket Management System (*http://www.regulations.gov*);

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

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

Copies may also be obtained by sending a request (identified by notice, amendment, or docket number of this rulemaking) to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267–9680.

B. Comments Submitted to the Docket

Comments received may be viewed by going to *http://www.regulations.gov* and following the online instructions to search the docket number for this action. Anyone is able to search the electronic form of all comments received into any of the FAA's dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.).

C. Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. A small entity with questions regarding this document, may contact its local FAA official, or the person listed under the **FOR FURTHER INFORMATION CONTACT** heading at the beginning of the preamble. To find out more about SBREFA on the Internet, visit *http://www.faa.gov/regulations_policies/rulemaking/sbre_act/*.

List of Subjects

14 CFR Part 27

Aircraft, Aviation safety.

14 CFR Part 29

Aircraft, Aviation safety.

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends chapter I, parts 27 and 29 of Title 14, Code of Federal Regulations as follows:

PART 27—AIRWORTHINESS STANDARDS: NORMAL CATEGORY ROTORCRAFT

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

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

■ 2. Add § 27.573 to read as follows:

§ 27.573 Damage Tolerance and Fatigue Evaluation of Composite Rotorcraft Structures.

(a) Each applicant must evaluate the composite rotorcraft structure under the damage tolerance standards of paragraph (d) of this section unless the applicant establishes that a damage tolerance evaluation is impractical within the limits of geometry, inspectability, and good design practice. If an applicant establishes that it is impractical within the limits of geometry, inspectability, and good design practice, the applicant must do a fatigue evaluation in accordance with paragraph (e) of this section.

(b) The methodology used to establish compliance with this section must be submitted to and approved by the Administrator.

(c) Definitions:

(1) *Catastrophic failure* is an event that could prevent continued safe flight and landing.

(2) *Principal Structural Elements (PSEs)* are structural elements that contribute significantly to the carrying of flight or ground loads, the failure of which could result in catastrophic failure of the rotorcraft.

(3) *Threat Assessment* is an assessment that specifies the locations, types, and sizes of damage, considering fatigue, environmental effects, intrinsic and discrete flaws, and impact or other accidental damage (including the discrete source of the accidental damage) that may occur during manufacture or operation.

(d) Damage Tolerance Evaluation:

(1) Each applicant must show that catastrophic failure due to static and fatigue loads, considering the intrinsic or discrete manufacturing defects or accidental damage, is avoided throughout the operational life or prescribed inspection intervals of the rotorcraft by performing damage tolerance evaluations of the strength of composite PSEs and other parts, detail design points, and fabrication techniques. Each applicant must account for the effects of material and process variability along with environmental conditions in the strength and fatigue evaluations. Each applicant must evaluate parts that include PSEs of the airframe, main and tail rotor drive systems, main and tail rotor blades and hubs, rotor controls, fixed and movable control surfaces, engine and transmission mountings, landing gear, other parts, detail design points, and fabrication techniques deemed critical by the FAA. Each damage tolerance evaluation must include:

(i) The identification of all PSEs;

(ii) In-flight and ground measurements for determining the loads or stresses for all PSEs for all critical conditions throughout the range of limits in § 27.309 (including altitude effects), except that maneuvering load factors need not exceed the maximum values expected in service;

(iii) The loading spectra as severe as those expected in service based on loads or stresses determined under paragraph (d)(1)(ii) of this section, including external load operations, if applicable, and other operations including high-torque events;

(iv) A threat assessment for all PSEs that specifies the locations, types, and sizes of damage, considering fatigue, environmental effects, intrinsic and discrete flaws, and impact or other accidental damage (including the discrete source of the accidental damage) that may occur during manufacture or operation; and

(v) An assessment of the residual strength and fatigue characteristics of all PSEs that supports the replacement times and inspection intervals established under paragraph (d)(2) of this section.

(2) Each applicant must establish replacement times, inspections, or other procedures for all PSEs to require the repair or replacement of damaged parts before a catastrophic failure. These replacement times, inspections, or other procedures must be included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required by § 27.1529.

(i) Replacement times for PSEs must be determined by tests, or by analysis supported by tests, and must show that the structure is able to withstand the repeated loads of variable magnitude expected in-service. In establishing these replacement times, the following items must be considered:

(A) Damage identified in the threat assessment required by paragraph (d)(1)(iv) of this section;

(B) Maximum acceptable manufacturing defects and in-service damage (i.e., those that do not lower the residual strength below ultimate design loads and those that can be repaired to restore ultimate strength); and

(C) Ultimate load strength capability after applying repeated loads.

(ii) Inspection intervals for PSEs must be established to reveal any damage identified in the threat assessment required by paragraph (d)(1)(iv) of this section that may occur from fatigue or other in-service causes before such damage has grown to the extent that the component cannot sustain the required residual strength capability. In establishing these inspection intervals, the following items must be considered:

(A) The growth rate, including no-growth, of the damage under the repeated loads expected in-service determined by tests or analysis supported by tests;

(B) The required residual strength for the assumed damage established after considering the damage type, inspection interval, detectability of damage, and the techniques adopted for damage detection. The minimum required residual strength is limit load; and

(C) Whether the inspection will detect the damage growth before the minimum residual strength is reached and restored to ultimate load capability, or whether the component will require replacement.

(3) Each applicant must consider the effects of damage on stiffness, dynamic behavior, loads, and functional performance on all PSEs when substantiating the maximum assumed damage size and inspection interval.

(e) Fatigue Evaluation: If an applicant establishes that the damage tolerance evaluation described in paragraph (d) of this section is impractical within the limits of geometry, inspectability, or good design practice, the applicant must do a fatigue evaluation of the particular composite rotorcraft structure and:

(1) Identify all PSEs considered in the fatigue evaluation;

(2) Identify the types of damage for all PSEs considered in the fatigue evaluation;

(3) Establish supplemental procedures to minimize the risk of catastrophic failure associated with the damages identified in paragraph (d) of this section; and

(4) Include these supplemental procedures in the Airworthiness Limitations section of the Instructions for Continued Airworthiness required by § 27.1529.

Appendix A to Part 27 [Amended]

■ 3. Amend the second sentence of section A.27.4 of Appendix A to Part 27 by removing the phrase ''approved under § 27.571'' and adding the phrase ''required for type certification'' in its place.

PART 29—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY ROTORCRAFT

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

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

■ 5. Add § 29.573 to read as follows:

§ 29.573 Damage Tolerance and Fatigue Evaluation of Composite Rotorcraft Structures.

(a) Each applicant must evaluate the composite rotorcraft structure under the damage tolerance standards of paragraph (d) of this section unless the applicant establishes that a damage tolerance evaluation is impractical within the limits of geometry, inspectability, and good design practice. If an applicant establishes that it is impractical within the limits of geometry, inspectability, and good design practice, the applicant must do a fatigue evaluation in accordance with paragraph (e) of this section.

(b) The methodology used to establish compliance with this section must be submitted to and approved by the Administrator.

(c) Definitions:

(1) *Catastrophic failure* is an event that could prevent continued safe flight and landing.

(2) *Principal Structural Elements (PSEs)* are structural elements that contribute significantly to the carrying of flight or ground loads, the failure of which could result in catastrophic failure of the rotorcraft.

(3) *Threat Assessment* is an assessment that specifies the locations, types, and sizes of damage, considering fatigue, environmental effects, intrinsic and discrete flaws, and impact or other accidental damage (including the discrete source of the accidental damage) that may occur during manufacture or operation.

(d) Damage Tolerance Evaluation:

(1) Each applicant must show that catastrophic failure due to static and fatigue loads, considering the intrinsic or discrete manufacturing defects or accidental damage, is avoided throughout the operational life or prescribed inspection intervals of the rotorcraft by performing damage tolerance evaluations of the strength of composite PSEs and other parts, detail design points, and fabrication techniques. Each applicant must account for the effects of material and process variability along with environmental conditions in the strength and fatigue evaluations. Each applicant must evaluate parts that include PSEs of the airframe, main and tail rotor drive systems, main and tail rotor blades and hubs, rotor controls, fixed and movable control surfaces, engine and transmission mountings, landing gear, other parts, detail design points, and fabrication techniques deemed critical by the FAA. Each damage tolerance evaluation must include:

(i) The identification of all PSEs;

(ii) In-flight and ground measurements for determining the loads or stresses for all PSEs for all critical conditions throughout the range of limits in § 29.309 (including altitude effects), except that maneuvering load factors need not exceed the maximum values expected in service;

(iii) The loading spectra as severe as those expected in service based on loads or stresses determined under paragraph (d)(1)(ii) of this section, including external load operations, if applicable, and other operations including high-torque events;

(iv) A threat assessment for all PSEs that specifies the locations, types, and sizes of damage, considering fatigue, environmental effects, intrinsic and discrete flaws, and impact or other accidental damage (including the discrete source of the accidental damage) that may occur during manufacture or operation; and

(v) An assessment of the residual strength and fatigue characteristics of all PSEs that supports the replacement times and inspection intervals established under paragraph (d)(2) of this section.

(2) Each applicant must establish replacement times, inspections, or other procedures for all PSEs to require the repair or replacement of damaged parts before a catastrophic failure. These replacement times, inspections, or other procedures must be included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required by § 29.1529.

(i) Replacement times for PSEs must be determined by tests, or by analysis supported by tests, and must show that the structure is able to withstand the repeated loads of variable magnitude expected in-service. In establishing these replacement times, the following items must be considered:

(A) Damage identified in the threat assessment required by paragraph (d)(1)(iv) of this section;

(B) Maximum acceptable manufacturing defects and in-service damage (i.e., those that do not lower the residual strength below ultimate design loads and those that can be repaired to restore ultimate strength); and

(C) Ultimate load strength capability after applying repeated loads.

(ii) Inspection intervals for PSEs must be established to reveal any damage identified in the threat assessment required by paragraph (d)(1)(iv) of this section that may occur from fatigue or other in-service causes before such damage has grown to the extent that the component cannot sustain the required residual strength capability. In establishing these inspection intervals, the following items must be considered:

(A) The growth rate, including no-growth, of the damage under the repeated loads expected in-service determined by tests or analysis supported by tests;

(B) The required residual strength for the assumed damage established after considering the damage type, inspection interval, detectability of damage, and the techniques adopted for damage detection. The minimum required residual strength is limit load; and

(C) Whether the inspection will detect the damage growth before the minimum residual strength is reached and restored to ultimate load capability, or whether the component will require replacement.

(3) Each applicant must consider the effects of damage on stiffness, dynamic behavior, loads, and functional performance on all PSEs when substantiating the maximum assumed damage size and inspection interval.

(e) Fatigue Evaluation: If an applicant establishes that the damage tolerance evaluation described in paragraph (d) of this section is impractical within the limits of geometry, inspectability, or good design practice, the applicant must do a fatigue evaluation of the particular composite rotorcraft structure and:

(1) Identify all PSEs considered in the fatigue evaluation;

(2) Identify the types of damage for all PSEs considered in the fatigue evaluation;

(3) Establish supplemental procedures to minimize the risk of catastrophic failure associated with the damages identified in paragraph (d) of this section; and

(4) Include these supplemental procedures in the Airworthiness Limitations section of the Instructions for Continued Airworthiness required by § 29.1529.

Appendix A to Part 29 [Amended]

■ 6. Amend the second sentence of section A.29.4 of Appendix A to Part 29 by removing the phrase ''approved under § 29.571'' and adding the phrase ''required for type certification'' in its place.

Issued in Washington, DC, on October 4, 2011.

J. Randolph Babbitt,

Administrator.

[FR Doc. 2011–30945 Filed 11–30–11; 8:45 am]

BILLING CODE 4910–13–P