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**Part II**

**Department of  
Transportation**

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**Federal Aviation Administration**

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**14 CFR Parts 27 and 29  
Rotorcraft Load Combination Safety  
Requirements; Final Rule**

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

[Docket No. 29277; Amendment No. 27-36 and 29-43]

RIN 2120-AG59

**Rotorcraft Load Combination Safety Requirements****AGENCY:** Federal Aviation Administration (FAA), DOT.**ACTION:** Final rule.

**SUMMARY:** This final rule amends the airworthiness standards to provide improved safety standards for rotorcraft load combination (RLC) certification. Several accidents occurred in the past 15 years involving the carriage of humans external to the rotorcraft. These amendments provide an increased level of safety in the carriage of humans. Also, significant changes in equipment employed in external load operations have occurred. This document addresses those advances in technology and is harmonized to international standards.

**EFFECTIVE DATE:** October 5, 1999.

**FOR FURTHER INFORMATION CONTACT:** Mike Mathias, Rotorcraft Directorate, Aircraft Certification Service, Regulations Group, FAA, Fort Worth, Texas 76193-0111, telephone (817) 222-5123, fax 817-222-5959.

**SUPPLEMENTARY INFORMATION:****Availability of Final Rules**

Using a modern and suitable communications software, an electronic copy of this document may be downloaded from the FAA regulations section of the Fedworld electronic bulletin board service (telephone: 703-321-3339), or the Government Printing Office's (GPO) electronic bulletin board service (telephone: 202-512-1661).

Internet users may reach the FAA's web page at <http://www.faa.gov/avr/arm/nprm/nprm.htm> or the GPO's web page at <http://www.access.gpo.gov/nara> for access to recently published rulemaking documents.

Any person may obtain a copy of this final rule by submitting a request to the FAA, Office of Rulemaking, ARM-1, 800 Independence Avenue, SW, Washington DC 20591, or by calling (202) 267-9680. Communications must identify the amendment number or docket number of this final rule.

Persons interested in being placed on a mailing list for future Notices of Proposed Rulemaking (NPRM's) and final rules should request from ARM-1

a copy of Advisory Circular (AC) No. 11-2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedures.

**Small Entity Inquiries**

If you are a small entity and have a question, contact your local FAA official. If you do not know how to contact your local FAA official, you may contact Charlene Brown, Program Analyst Staff, Office of Rulemaking, ARM-27, Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, 1-888-551-1594. Internet users can find additional information on SBREFA in the "Quick Jump" section of the FAA's web page under "Rulemaking (ARM)" at <http://www.faa.gov> and may send electronic inquiries to the following Internet address: 9-AWA-SBREF@faa.gov.

**Background**

On November 27, 1991, following an announcement in the *Federal Register* (56 FR 63546, December 4, 1991), the ARAC charged the External Load Working Group to recommend new or revised airworthiness standards for Class D rotorcraft external loads. The Working Group assigned to this task included technical specialists knowledgeable in all areas of external load design and operational requirements. This broad participation is consistent with FAA policy to involve all known interested parties early in the rulemaking process.

The working group researched a wide range of data developed by the FAA, the military, and other nations' airworthiness authorities. Copies of the research documents are included in the docket.

Although rotorcraft external load operations are routinely conducted in a safe manner, several preventable accidents and incidents have occurred during the preceding 15 years. For example, several preventable inadvertent releases of humans carried external to the rotorcraft have occurred. Also, significant changes in the equipment employed in external load operations have occurred such as new rigging devices. Rotorcraft are now more diverse in design, more maneuverable, and more powerful.

A study of the issues prompted the Working Group to recommend updated requirements for modern external load equipment and operational practices. The working group proposed requirements to (1) decrease the potential for future accidents and incidents; (2) provide that external cargo load carrying devices, their release

mechanisms, their load carrying systems, and their flight performance reflect modern operational needs; (3) provide separate and increased levels of safety for nonhuman external cargo (NHEC) and human external cargo (HEC) RLC's; and (4) provide updated standards that harmonize with the Joint Airworthiness Regulations (JAR).

The FAA evaluated the ARAC recommendations and proposed external load standards for rotorcraft certificated under 14 CFR parts 27 and 29 in NPRM 98-6 published on July 13, 1998 (63 FR 37745). The FAA received comments from four commenters. All commenters were generally in favor of the proposals but offered the following comments:

**Discussion of Comments***14 CFR 27.865(b) and 29.865(b)*

A commenter recommended that §§ 27.865(b), 29.865(b), 27.865(b)(3)(ii), and 29.865(b)(3)(ii) be expanded to better define the lightning requirements for external loads. The commenter further recommended that operational limitations be required, particularly when environmental forecasts involve lightning. The FAA believes that the commenter's concerns are fully and adequately addressed by the current certification regulations and these proposals. The level of protection from lightning provided by the current certification regulations, §§ 27.610 and 29.610, and proposals §§ 27.865(b)(3)(ii) and 29.610(b)(3)(ii), clearly defines a reasonable level of safety for the entire RLC from random lightning strikes during operations. Any specific operational restriction for a given RLC that clearly relates to potential lightning strikes will become a flight manual limitation under current §§ 27.1583, 29.1583, and 133.45.

Another commenter states that the wording in proposed §§ 27.865(b)(3)(i) and 29.865(b)(3)(i) implies that the quick release system (QRS) must only be capable of releasing the rated load at 1G. The commenter recommended an improvement to the wording to require that the QRS be certified to the full limit load capability. The FAA intends that the QRS must function up to the applicable limit load defined by the vertical limit load factors and their application proposed in §§ 27.865(a) and 29.865(a). The proposal in §§ 27.865(b)(3)(i) and 29.865(b)(3)(i) is identical to current §§ 27.865(b)(3) and 29.865(b)(3). The wording is commonly understood and is defined in current advisory material as the maximum external limit load. However, the FAA agrees that the wording could be

improved and will insert the word "limit" in §§ 27.865(b)(3)(i) and 29.865(b)(3)(i).

*14 CFR 27.865(c) and 29.865(c)*

A commenter stated that § 29.865(c)(5) would require special procedures and abnormal piloting techniques and should be removed. The FAA disagrees. Special procedures are not required for any external load operation involving human external cargo. The only procedures necessary for external load operations (current or proposed) are those now required under current regulations such as §§ 29.1585 and 133.45. No abnormal piloting techniques are intended or foreseen.

A commenter stated that the requirement for performance information in the proposed § 29.865(c)(6) would be better placed in § 29.1587, *Performance information*. The FAA disagrees. Placing the performance criteria as proposed by the commenter was considered during formulation of the proposals and rejected. Specific external loads performance criteria is most readily available and useful in §§ 27.865(c)(6) and 29.865(c)(6). The FAA considers the proposed placement best for clarity, efficiency, and commonality with 14 CFR part 133 (part 133).

Two commenters recommended creating a new § 27.865(c)(6). The first commenter noted that part 27 has recently been amended (Amendment 27-33) to add a Category A performance provision and recommended that § 27.865(c)(6) be added to part 27. The second commenter recommended revising § 29.865(c)(6) to include multi-engine rotorcraft having Category A engine isolation design features and adding an identical § 27.865(c)(6) requirement. The second commenter also recommended that § 133.45(e)(1) be revised to include Class D operations with multi-engine part 27 rotorcraft having Category A engine isolation design features. The FAA agrees in principle that a multi-engine part 27 Category A rotorcraft could provide an adequate level of performance that would permit a safe Class D operation; however, changing § 133.45(e)(1) to permit this is beyond the scope of the proposals. The FAA will consider these changes for future rulemaking.

*14 CFR 27.865(d) and 29.865(d)*

One commenter was concerned that the proposed wording of §§ 27.865(d) and 29.865(d) would mandate flight testing of each critical configuration and airspeed for each proposed external load. The FAA did not intend such a requirement. When deemed sufficient,

analysis alone or analysis supported by bench tests may be used for a given critical configuration and airspeed without the necessity for flight tests.

*General Comments*

A commenter stated that a number of the proposed requirements could benefit from an indication of what an "acceptable means of compliance" would be. The commenter recommended that AC 25.1309-1A be revised to include these elements. The FAA disagrees. Advisory Circular (AC) 25.1309-1A contains advisory material for part 25 airplanes. The AC's for parts 27 and 29 contain an acceptable means of compliance for rotorcraft.

The FAA adopts the proposals as proposed in NPRM 98-6 except for adding the word "limit" to §§ 27.865(b)(3)(i) and 29.865(b)(3)(i) as previously discussed.

**Paperwork Reduction Act**

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), there are no requirements for information collection associated with this final rule.

**International Compatibility**

The FAA has reviewed corresponding International Civil Aviation Organization international standards and recommended practices and JAA regulations, where they exist, and has identified or discussed similarities and differences in these amendments and foreign regulations.

**Regulatory Evaluation Summary**

Changes to federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. 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). In conducting these analyses, which are summarized below (and available in the docket), the FAA has

determined that this final rule will generate benefits exceeding its costs and is not "a significant regulatory action" as defined in Executive Order 12866 and the Department of Transportation's Regulatory Policies and Procedures. In addition, this final rule will not have a significant impact on a substantial number of small entities, will not constitute a barrier to international trade, and will not result in the expenditure by State, local or tribal governments, in the aggregate, or by the private sector, of \$100 million or more annually.

The FAA invited the public to provide comments (and related data) on the assumptions made in the regulatory evaluation for the NPRM. No comments were received on the preliminary regulatory evaluation.

*Costs and Benefits*

*Costs*

The costs of the rule, which will be borne by manufacturers and operators, are evaluated for the time period extending from its implementation date through the operating lives of 75 rotorcraft assumed to be produced under 4 new type certificates (involving 15-year production runs of 5 rotorcraft per year total under all 4 new type certificates) and placed into part 133 service. Over the course of this evaluation period, incremental costs will total approximately \$679,000 (1998 dollars) or \$449,000 discounted to present value (using an interest rate of 7 percent and letting "present" be the date of initial type certification application). Of the \$679,000 total cost, \$447,000 is attributable to incremental design, analysis, test, and other certification costs, \$30,000 to incremental production costs (75 rotorcraft at \$400 each), and \$202,500 to incremental weight penalty fuel costs (\$180 per year per rotorcraft over 15-year operating lives of 75 rotorcraft). On a per-rotorcraft basis, costs will average approximately \$9,000 or \$6,000 discounted. These incremental costs will be offset to some extent by potential cost savings associated with harmonizing these airworthiness standards with the JAA, streamlining certification approvals for part 133 operators, and relaxing some of the requirements for parts 27 and 29 manufacturers (see Benefits section, below).

*Benefits*

To estimate the safety benefits of the rule, the FAA reviewed records of accidents involving part 133 operators that occurred between mid-1983 and

1998 that could have been prevented or the losses reduced if the changes in the rule had been in effect. During this 15-year period, there were 22 such accidents involving fatal and/or non-fatal injuries or damage to equipment or both. Ten of the accidents resulted in harm to persons (either inside or outside of the rotorcraft), totaling nine fatalities and two serious injuries. Twenty of the 22 accidents involved either substantial damage (8) or destruction of the rotorcraft (12).

To provide a basis for comparing the safety benefits and costs of rulemaking actions, the FAA currently uses a minimum statistical value of \$2.7 million for fatality avoided and \$521,800 for a serious injury avoided. Applying these standards to the casualty losses summarized above and making allowances for the costs of rotorcraft damage, the total cost of the 22 accidents was approximately \$31.1 million.

The FAA estimates that the final rule could prevent at least 50 percent of the type of accidents summarized above. Applying it retrospectively yields dollar benefits of approximately \$15.5 million (One-half of \$31.1 million). Over the 15-year accident evaluation period, the part 133 fleet averaged approximately 300 active rotorcraft. Therefore, the benefits averaged approximately \$3,400 per year per rotorcraft (\$15.5 million/15years/300 operating part 133 rotorcraft per year). Applying this per-rotorcraft safety benefit to the cumulative number of complying rotorcraft results in total safety benefits of \$3.8 million (or \$1.1 million discounted to present value). On a per-rotorcraft basis, these benefits average approximately \$51,000 or \$14,300 discounted to the present.

In addition to improving safety, the final rule provides some cost-relief in certain respects. New production rotorcraft will be delivered with standardized procedures for external load operations, and these procedures could result in a small savings to part 133 operators. Further, changes to the preceding regulations that relate to the primary and backup quick-release devices will reduce production costs for parts 27 and 29 rotorcraft manufacturers. The changes will also increase harmonization and commonality between U.S. and European airworthiness standards. Harmonization will eliminate unnecessary differences in airworthiness requirements, thus reducing manufacturers' certification costs.

#### *Comparison of Costs and Benefits*

The rule will generate benefits in the form of increased safety and cost relief (see preceding paragraph—the potential production cost relief has not been included in the cost/benefit calculation). On a per-rotorcraft basis, the life-cycle safety benefits will average approximately \$14,300 (discounted) and the costs will average approximately \$6,000 (discounted), yielding a benefit-to-cost ratio of 2.4 to 1. On this basis alone, the rule is cost-beneficial; additional quantified efficiency and harmonization benefits will increase this ratio.

#### *Regulatory Flexibility Determination*

The Regulatory Flexibility Act of 1980 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 Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act 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 determination is that it will, the agency must prepare a regulatory flexibility analysis (RFA) as described in the Act.

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

The entities that will be affected by this rule consist of rotorcraft manufacturers (included in Standard Industrial Classification (SIC) 3721, Aircraft and Aircraft Parts Manufacturers) and external load operators (SIC 4512, 3413, 4522). Manufacturers will incur additional development, certification, and production costs. In addition to indirectly incurring all or part of these costs in the form of higher rotorcraft acquisition costs, operators will incur increased fuel costs resulting from

weight penalties. Although the certification costs (non-recurring) will be either fully absorbed by the manufacturer(s), passed on in-total to operator(s) (purchasers), or more likely, absorbed in some proportion by both, the FAA in this analysis adopts a conservative approach and allocates total certification costs to each category in assessing significant economic impact. Incremental per-unit production costs, however, are assumed to be fully passed on to purchasers (operators.)

For manufacturers, a small entity is one with 1,500 or fewer employees. Only 5 rotorcraft manufacturers have 1,500 or fewer employees and therefore qualify as small entities. However, three of these are not currently producing new type-certificated rotorcraft, and a fourth does not produce rotorcraft used for external loads. The fifth small manufacturer produces specialized smaller rotorcraft, a minority of which are configured for external load operations. This producer does not compete with the larger manufacturers. The annualized certification costs imposed by the rule are estimated to be \$10,800 per manufacturer for each certification and are not considered significant within the meaning of the RFA.

There are numerous external load operators. The FAA has not determined how many of these are small operators and if a substantial number will potentially be impacted by the rule. However, most external load operations involve specialized activities such as logging, offshore oil drilling, or emergency rescue operations. The demand for such operations is highly price-inelastic; the operators can readily pass on the incremental costs to their customers. Notwithstanding, the maximum annualized cost per rotorcraft will most likely not be greater than \$618 (discounted) (includes manufacturers' certification and production costs passed on to the purchaser and increased fuel costs but excludes potential offsetting cost-savings). This amount probably equates to less than the cost of 4 hours' operating time (representing a de minimus portion of annual revenues) and is not considered significant within the meaning of the Act. In addition, no small manufacturer or small operator will bear a disproportionate cost burden nor have a greater likelihood of failing in business compared to larger entities.

Based on the findings delineated above and consistent with the objectives and requirements of the RFA as amended, the FAA certifies that this final rule will not have a significant

economic impact on a substantial number of small entities.

#### *International Trade Impact Assessment*

Consistent with the Administration's belief in the general superiority, desirability, and efficacy of free trade, it is the policy of the Administrator to remove or diminish, to the extent feasible, barriers to international trade, including both barriers affecting the export of American goods and services to foreign countries and those affecting the import of foreign goods and services into the United States.

In accordance with that policy, the FAA is committed to develop as much as possible its aviation standards and practices in harmony with its trading partners. Significant cost savings can result from this, both to United States' companies doing business in foreign markets, and foreign companies doing business in the United States. This final rule is a direct action to respond to this policy by increasing the harmonization of the U.S. Federal Aviation Regulations with the European JAR. The result will be a positive step toward removing impediments to international trade.

#### **Federalism Implications**

The regulations herein will not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this rule will not have sufficient federalism implications to warrant the preparation of a federalism assessment.

#### **Unfunded Mandates Reform Act**

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

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

The FAA determines that this final rule does not contain a significant intergovernmental or private sector mandate as defined by the Act.

#### **Energy Impact**

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

#### **Environmental Analysis**

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental assessment or environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this rulemaking action qualifies for a categorical exclusion.

#### **List of Subjects**

##### *14 CFR Part 27*

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

##### *14 CFR Part 29*

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

#### **The Amendments**

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

#### **PART 27—AIRWORTHINESS STANDARDS: NORMAL CATEGORY ROTORCRAFT**

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

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

2. Amend § 27.25 by revising paragraph (c) to read as follows:

#### **§ 27.25 Weight limits.**

\* \* \* \* \*

(c) *Total weight with jettisonable external load.* A total weight for the rotorcraft with a jettisonable external load attached that is greater than the maximum weight established under paragraph (a) of this section may be established for any rotorcraft-load combination if—

(1) The rotorcraft-load combination does not include human external cargo.

(2) Structural component approval for external load operations under either § 27.865 or under equivalent operational standards is obtained.

(3) The portion of the total weight that is greater than the maximum weight established under paragraph (a) of this section is made up only of the weight of all or part of the jettisonable external load.

(4) Structural components of the rotorcraft are shown to comply with the applicable structural requirements of this part under the increased loads and stresses caused by the weight increase over that established under paragraph (a) of this section, and

(5) Operation of the rotorcraft at a total weight greater than the maximum certificated weight established under paragraph (a) of this section is limited by appropriate operating limitations under § 27.865(a) and (d) of this part.

3. The undesignated center heading preceding § 27.865 is revised as set forth below; and in § 27.865 the section heading, paragraph (a) introductory text and paragraph (b) are revised; paragraphs (c) and (d) are redesignated as (e) and (f) and revised; and new paragraphs (c) and (d) are added to read as follows:

#### **External Loads**

##### **§ 27.865 External loads.**

(a) It must be shown by analysis, test, or both, that the rotorcraft external load attaching means for rotorcraft-load combinations to be used for nonhuman external cargo applications can withstand a limit static load equal to 2.5, or some lower load factor approved under §§ 27.337 through 27.341, multiplied by the maximum external load for which authorization is requested. It must be shown by analysis, test, or both that the rotorcraft external load attaching means and corresponding personnel carrying device system for rotorcraft-load combinations to be used for human external cargo applications can withstand a limit static load equal to 3.5 or some lower load factor, not less than 2.5, approved under §§ 27.337 through 27.341, multiplied by the maximum external load for which

authorization is requested. The load for any rotorcraft-load combination class, for any external cargo type, must be applied in the vertical direction. For jettisonable external loads of any applicable external cargo type, the load must also be applied in any direction making the maximum angle with the vertical that can be achieved in service but not less than 30°. However, the 30° angle may be reduced to a lesser angle if—

\* \* \* \* \*

(b) The external load attaching means, for jettisonable rotorcraft-load combinations, must include a quick-release system to enable the pilot to release the external load quickly during flight. The quick-release system must consist of a primary quick release subsystem and a backup quick release subsystem that are isolated from one another. The quick-release system, and the means by which it is controlled, must comply with the following:

(1) A control for the primary quick release subsystem must be installed either on one of the pilot's primary controls or in an equivalently accessible location and must be designed and located so that it may be operated by either the pilot or a crewmember without hazardously limiting the ability to control the rotorcraft during an emergency situation.

(2) A control for the backup quick release subsystem, readily accessible to either the pilot or another crewmember, must be provided.

(3) Both the primary and backup quick release subsystems must—

(i) Be reliable, durable, and function properly with all external loads up to and including the maximum external limit load for which authorization is requested.

(ii) Be protected against electromagnetic interference (EMI) from external and internal sources and against lightning to prevent inadvertent load release.

(A) The minimum level of protection required for jettisonable rotorcraft-load combinations used for nonhuman external cargo is a radio frequency field strength of 20 volts per meter.

(B) The minimum level of protection required for jettisonable rotorcraft-load combinations used for human external cargo is a radio frequency field strength of 200 volts per meter.

(iii) Be protected against any failure that could be induced by a failure mode of any other electrical or mechanical rotorcraft system.

(c) For rotorcraft-load combinations to be used for human external cargo applications, the rotorcraft must—

(1) For jettisonable external loads, have a quick-release system that meets the requirements of paragraph (b) of this section and that—

(i) Provides a dual actuation device for the primary quick release subsystem, and

(ii) Provides a separate dual actuation device for the backup quick release subsystem;

(2) Have a reliable, approved personnel carrying device system that has the structural capability and personnel safety features essential for external occupant safety;

(3) Have placards and markings at all appropriate locations that clearly state the essential system operating instructions and, for the personnel carrying device system, the ingress and egress instructions;

(4) Have equipment to allow direct intercommunication among required crewmembers and external occupants; and

(5) Have the appropriate limitations and procedures incorporated in the flight manual for conducting human external cargo operations.

(d) The critically configured jettisonable external loads must be shown by a combination of analysis, ground tests, and flight tests to be both transportable and releasable throughout the approved operational envelope without hazard to the rotorcraft during normal flight conditions. In addition, these external loads must be shown to be releasable without hazard to the rotorcraft during emergency flight conditions.

(e) A placard or marking must be installed next to the external-load attaching means clearly stating any operational limitations and the maximum authorized external load as demonstrated under § 27.25 and this section.

(f) The fatigue evaluation of § 27.571 of this part does not apply to rotorcraft-load combinations to be used for nonhuman external cargo except for the failure of critical structural elements that would result in a hazard to the rotorcraft. For rotorcraft-load combinations to be used for human external cargo, the fatigue evaluation of § 27.571 of this part applies to the entire quick release and personnel carrying device structural systems and their attachments.

#### **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. Amend § 29.25 by revising paragraph (c) to read as follows:

#### **§ 29.25 Weight limits.**

\* \* \* \* \*

(c) *Total weight with jettisonable external load.* A total weight for the rotorcraft with a jettisonable external load attached that is greater than the maximum weight established under paragraph (a) of this section may be established for any rotorcraft-load combination if—

(1) The rotorcraft-load combination does not include human external cargo,

(2) Structural component approval for external load operations under either § 29.865 or under equivalent operational standards is obtained,

(3) The portion of the total weight that is greater than the maximum weight established under paragraph (a) of this section is made up only of the weight of all or part of the jettisonable external load,

(4) Structural components of the rotorcraft are shown to comply with the applicable structural requirements of this part under the increased loads and stresses caused by the weight increase over that established under paragraph (a) of this section, and

(5) Operation of the rotorcraft at a total weight greater than the maximum certificated weight established under paragraph (a) of this section is limited by appropriate operating limitations under § 29.865 (a) and (d) of this part.

6. The undesignated center heading preceding § 29.865 is revised as set forth below; and in § 29.865 the section heading, paragraph (a) introductory text and paragraph (b) are revised; paragraphs (c) and (d) are redesignated as (e) and (f) and revised; and new paragraphs (c) and (d) are added to read as follows:

#### **External Loads**

##### **§ 29.865 External loads.**

(a) It must be shown by analysis, test, or both, that the rotorcraft external load attaching means for rotorcraft-load combinations to be used for nonhuman external cargo applications can withstand a limit static load equal to 2.5, or some lower load factor approved under §§ 29.337 through 29.341, multiplied by the maximum external load for which authorization is requested. It must be shown by analysis, test, or both that the rotorcraft external load attaching means and corresponding personnel carrying device system for rotorcraft-load combinations to be used for human external cargo applications can withstand a limit static load equal to 3.5 or some lower load factor, not less than 2.5, approved under §§ 29.337

through 29.341, multiplied by the maximum external load for which authorization is requested. The load for any rotorcraft-load combination class, for any external cargo type, must be applied in the vertical direction. For jettisonable external loads of any applicable external cargo type, the load must also be applied in any direction making the maximum angle with the vertical that can be achieved in service but not less than 30°. However, the 30° angle may be reduced to a lesser angle if—

\* \* \* \* \*

(b) The external load attaching means, for jettisonable rotorcraft-load combinations, must include a quick-release system to enable the pilot to release the external load quickly during flight. The quick-release system must consist of a primary quick release subsystem and a backup quick release subsystem that are isolated from one another. The quick release system, and the means by which it is controlled, must comply with the following:

(1) A control for the primary quick release subsystem must be installed either on one of the pilot's primary controls or in an equivalently accessible location and must be designed and located so that it may be operated by either the pilot or a crewmember without hazardously limiting the ability to control the rotorcraft during an emergency situation.

(2) A control for the backup quick release subsystem, readily accessible to either the pilot or another crewmember, must be provided.

(3) Both the primary and backup quick release subsystems must—

(i) Be reliable, durable, and function properly with all external loads up to and including the maximum external limit load for which authorization is requested.

(ii) Be protected against electromagnetic interference (EMI) from external and internal sources and against lightning to prevent inadvertent load release.

(A) The minimum level of protection required for jettisonable rotorcraft-load combinations used for nonhuman external cargo is a radio frequency field strength of 20 volts per meter.

(B) The minimum level of protection required for jettisonable rotorcraft-load combinations used for human external cargo is a radio frequency field strength of 200 volts per meter.

(iii) Be protected against any failure that could be induced by a failure mode of any other electrical or mechanical rotorcraft system.

(c) For rotorcraft-load combinations to be used for human external cargo applications, the rotorcraft must—

(1) For jettisonable external loads, have a quick-release system that meets the requirements of paragraph (b) of this section and that—

(i) Provides a dual actuation device for the primary quick release subsystem, and

(ii) Provides a separate dual actuation device for the backup quick release subsystem;

(2) Have a reliable, approved personnel carrying device system that has the structural capability and personnel safety features essential for external occupant safety;

(3) Have placards and markings at all appropriate locations that clearly state the essential system operating instructions and, for the personnel carrying device system, ingress and egress instructions;

(4) Have equipment to allow direct intercommunication among required crewmembers and external occupants;

(5) Have the appropriate limitations and procedures incorporated in the

flight manual for conducting human external cargo operations; and

(6) For human external cargo applications requiring use of Category A rotorcraft, have one-engine-inoperative hover performance data and procedures in the flight manual for the weights, altitudes, and temperatures for which external load approval is requested.

(d) The critically configured jettisonable external loads must be shown by a combination of analysis, ground tests, and flight tests to be both transportable and releasable throughout the approved operational envelope without hazard to the rotorcraft during normal flight conditions. In addition, these external loads—must be shown to be releasable without hazard to the rotorcraft during emergency flight conditions.

(e) A placard or marking must be installed next to the external-load attaching means clearly stating any operational limitations and the maximum authorized external load as demonstrated under § 29.25 and this section.

(f) The fatigue evaluation of § 29.571 of this part does not apply to rotorcraft-load combinations to be used for nonhuman external cargo except for the failure of critical structural elements that would result in a hazard to the rotorcraft. For rotorcraft-load combinations to be used for human external cargo, the fatigue evaluation of § 29.571 of this part applies to the entire quick release and personnel carrying device structural systems and their attachments.

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