Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
Loads and Dynamics Harmonization Working Group

Task 12 – Braked Roll Conditions

Task Assignment

Aviation Rulemaking Advisory Committee; Transport Airplane and Engine Issues

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of new task assignments for the Aviation Rulemaking Advisory Committee.

SUMMARY: Notice is given of new task assignments for the Loads and Dynamics Harmonization Working Group of the Aviation Rulemaking Advisory Committee (ARAC). This notice informs the public of the activities of the ARAC.

FOR FURTHER INFORMATION CONTACT: Michael H. Borfitz, Assistant Executive Director, Aviation Rulemaking Advisory Committee, Transport Airplane and Engine Issues, FAA Engine & Propeller Directorate, 12 New England Executive Park, Burlington, Massachusetts 01803; telephone (617) 238–7110, fax (617) 238–7199.

SUPPLEMENTARY INFORMATION: On January 22, 1991 (56 FR 2190), the Federal Aviation Administration (FAA) established the Aviation Rulemaking Advisory Committee (ARAC). The committee provides advice and recommendations to the FAA Administrator, through the Associate Administrator for Regulation and Certification, on the full range of the FAA's rulemaking activities with respect to aviation-related issues..

In order to develop such advice and recommendations, the ARAC may choose to establish working groups to which specific tasks are assigned. Such working groups are comprised of experts from those organizations having an interest in the assigned tasks. A working group member need not be a representative of the full committee. One of the working groups established by the ARAC is the Loads and Dynamics Harmonization Working Group.

The FAA announced at the Joint Aviation Authorities (JAA)-Federal Aviation Administration (FAA) Harmonization Conference in Toronto, Canada June 2–5, 1992, that it would consolidate within the ARAC structure an ongoing objective to "harmonize" the Joint Aviation Requirements (JAR) and the Federal Aviation Regulations (FAR).

Tasks

The Loads and Dynamics Harmonization Working Group's tasks are as follows:

Task 1—Interaction of Systems and Structure: Review existing special conditions for fly-by-wire airplanes and existing requirements for control systems, including automatic and/or power-operated systems, and recommend to the ARAC any new revised general requirements needed for flight control systems and structures affected by those systems (§§ 25.302, 25.671, 25.1329, part 25 appendix K).

Task 2—Continuous Turbulence Loads: Review the requirement for the continuous turbulence standard in light of the ARAC proposal for a tuned discrete gust requirement in order to determine whether the continuous turbulence requirement should be revised or removed from the FAR/JAR for better consistency with the new proposed tuned discrete gust criteria (§ 25.305(d)).

Task 3—Strength and Deformation: Review the recent requirements adopted in the FAR by Amendment 25–77 (for the design of transport airplanes against buffet and forced structural vibrations) and consider appropriate changes for the JAR and FAR to harmonize these rules (§§ 25.305 (e) and (f)).

Task 4—Design Flap Speeds: Review the current flap design loads requirements to resolve differences in interpretation between the FAA and JAA concerning the structural design stall speeds on which the flap design speeds are based. Recent measurements of gust speeds at low altitudes, where flaps are normally extended, indicate a more severe gust environment may be present. Review all aspects of the flap design load requirements, including the design airspeeds, vertical and head-on design gust criteria, and the effects of automatic retraction and load relief systems (§ 25.335(e)).

Task 5—Residual Strength Loads for Damage Tolerance: Review the differences in residual strength design load requirements between the FAR and JAR and resolve differences to harmonize this rule. Prepare a Notice of Proposed Rulemaking or make recommendations to other ARAC efforts concerning FAR § 25.571, so that they can be included in rulemaking that may be forthcoming from those efforts (§ 25.571(b)).

Task 6—Shock Absorption Tests: Review the changes recently introduced into the JAR that have resulted in differences between the FAR and JAR in regard to the requirement for shock absorption tests. Review those changes in view of harmonizing the FAR and JAR (§ 25.723(a)).

Task 7—Rough Air Speed: The ARAC has proposed a new § 25.1517 concerning rough air speed design standards in its proposal for a tuned discrete gust requirement. This action is harmonized with the current JAR 25.1517; however, further changes in the rough air speed requirement may be needed in both the FAR and JAR. Review JAR 25.1517 and the new proposed FAR 25.1517 to determine if further changes are needed. If so, prepare a Notice of Proposed Rulemaking, or, if possible, combine these changes with other rulemaking efforts (§ 25.1517).

Task 8—Taxi, Takeoff, and Landing Roll: Prepare an advisory circular that establishes criteria that may be used to calculate rough runway and taxiway loads, as required by §§ 25.491, 25.235, and 25.305.

Task 9—Braked Roll Conditions: Review the provisions of § 25.493 of the FAR and JAR concerning the braked roll condition and finalize a harmonized Notice of Proposed Rulemaking.

Reports

For each task listed, the Loads and Dynamics Harmonization Working Group should develop and present to the ARAC:

1. A recommended work plan for completion of the task, including the rationale supporting such plan, for consideration at the meeting of the ARAC to consider transport airplane and engine issues held following publication of this notice;

2. A detailed conceptual presentation on the proposed recommendation(s), prior to proceeding with the work stated in item 3. below;

3. A draft Notice of Proposed Rulemaking, with supporting economic and other required analyses, and/or any other related guidance material or collateral documents the working group determines to be appropriate; or, if new or revised requirements or compliance methods are not recommended, a draft report stating the rationale for not making such recommendations; and

4. A status report at each meeting of the ARAC held to consider transport airplane and engine issues.

Participation in Working Group Task

An individual who has expertise in the subject matter and wishes to become a member of the working group should write to the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire, describing his or her interest in the task(s), and stating the expertise he or

she would bring to the working group. The request will be reviewed with the assistant chairman and working group leader, and the individual will be advised whether or not the request can be accommodated.

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

Issued in Washington, DC, on June 3, 1994.

Chris A. Christie,

Executive Director, Aviation Rulemaking Advisory Committee.

[FR Doc. 94–14147 Filed 6–9–94; 8 45 am]

BILLING CODE 4910–13–M

Recommendation Letter

Gerald R. Mack
Director
Airplane Certification

Boeing Commercial Airplane Group
P.O. Box 3707, #MS 67-UM
Seattle, WA 98124-2207

November 6, 1995
B-T01B-ARAC-95-008

Mr. Anthony J. Broderick (AVR-1)
Associate Administrator for Regulations and Compliance
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington DC 20591

BOEING

Dear Mr. Broderick:

On behalf of the Aviation Rulemaking Advisory Committee, I am pleased to submit the enclosed draft NPRM on the following subject:

NPRM **Braked Roll Conditions**

The enclosed package is in the form of a Notice of Proposed Rule Making, including preamble, draft rule, economic analysis and legal analysis. The package was developed by the Loads & Dynamics Harmonization Working Group (WG) chaired by Vic Card of the Civil Aviation Authority. The membership of the group is a good balance of interested parties in the U.S., Europe and Canada. The group is currently focusing on other issues tasked to the WG, but can be available if needed for docket review.

The members of ARAC appreciate the opportunity to participate in the FAA Rulemaking process and fully endorse this recommendation.

Sincerely,

G. R. Mack

Gerald R. Mack
Assistant Chairman
Transport Airplane & Engine Issues Group
Aviation Rulemaking Advisory Committee

Enclosure

cc:	M. Borfitz	(617) 238-7199
	V. Card	44-1- 293-573974
	S. Miller	227-1320

Recommendation

[4910-13] **DRAFT**

DEPARTMENT OF TRANSPORTATION **10/26/95**

Federal Aviation Administration

14 CFR Part 25

[Docket No. ; Notice No.]

RIN 2120-

Braked Roll Conditions

AGENCY: Federal Aviation Administration, DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to amend the requirements for landing gear braking on transport category airplanes to require that the airplane be designed to withstand main landing gear maximum braking forces during ground operations. This action would ensure that the landing gear and fuselage are capable of withstanding the dynamic loads associated with the maximum dynamic braking condition, and would also relieve a burden on industry by eliminating differences between the Federal Aviation Regulations (FAR) and European Joint Aviation Requirements (JAR).

DATES: Comments must be received on or before [insert date 90 days after date of publication in the Federal Register].

ADDRESSES: Comments on this proposal should be mailed in triplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC-10), Docket No. , 800 Independence Avenue SW., Washington, DC 20591. Comments delivered must be marked Docket No. . Comments may be examined in Room 915G weekdays, except Federal holidays, between 8:30 a.m. and 5:00 p.m. In addition, the FAA is maintaining an information docket of comments in the Office of the Assistant Chief Counsel (ANM-7), FAA, Northwest Mountain Region, 1601 Lind Avenue SW., Renton, Washington 98055-4056. Comments in the information docket may be examined in the Office of the Assistant Chief Counsel weekdays, except Federal holidays, between 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: Iven D. Connally, FAA, Airframe and Propulsion Branch (ANM-112), Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98055-4056; telephone (206) 227-2120.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments relating to the environmental, energy, or economic impact that might result from adopting the proposal contained in this notice are invited. Substantive comments should be accompanied by cost estimates. Commenters should identify the regulatory docket or notice number and submit comments in triplicate to the Rules Docket address specified above. All comments received on or before the closing date for comments will be considered by the Administrator before taking action on this rulemaking. The proposal contained in this notice may be changed in light of comments received. All comments will be available in the Rules Docket, both before and after the closing date for comments, for examination by interested persons. A report summarizing each substantive public contact with FAA personnel concerning this rulemaking will be filed in the docket. Commenters wishing the FAA to acknowledge receipt of their comments must submit with those comments a self-addressed, stamped postcard on which the following statement is made: "Comments to Docket No. ." The postcard will be date stamped and returned to the commenter.

Availability of the NPRM

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Public Affairs, Attention: Public Inquiry Center, APA-230, 800 Independence Avenue SW., Washington, D.C. 20591, or by calling (202) 267-3484. Communications must identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future rulemaking documents should also request a copy of Advisory

Circular No. 11-2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

Background

The current 14 CFR part 25 airworthiness standards, § 25.493, and its predecessor rule, Civil Air Regulations (CAR) 4b.235(b), prescribe conditions that the airplane structure and landing gear must be designed to withstand during airplane taxiing with a constant (steady) application of brakes ("braked roll" condition). Both rules treat the braked roll condition as a static equilibrium condition that accounts for the airplane weight and the added nose down force caused by steady braking. Neither rule accounts for the additional dynamic loads on the nose gear and fuselage caused by the initial pitching motion of the airplane due to sudden application of main landing gear brakes. Adequate strength has been achieved on existing airplanes by application of other part 25 design requirements and by the manufacturers' need to comply with the more stringent British Civil Airworthiness Requirements (BCAR).

For many years the BCAR have included a dynamic braking condition that requires that consideration be given to the maximum likely combination of dynamic vertical reaction and sudden increase in drag load that could occur on the nose gear as a result of sudden main gear braking while encountering obstacles. The BCAR addresses obstacles such as overruns onto semi-prepared surfaces during rejected takeoffs, running off the edge then back on to the runway during avoidance maneuvers, running over displaced or lowered edges of runway paving, and inadvertent use of runways under repair. In application of the BCAR requirement, it was found that U.S. designed airplanes generally have had adequate strength to meet this condition without requiring any modifications. However, this may not always be the case, especially if new airplane designs are significantly different from past conventional configurations in vertical and longitudinal mass distributions of fuel, payload, engine location, etc. As the takeoff weight increases with respect to landing weight, the dynamic braked roll condition can become more

critical for the nose gear and fuselage. Without a specific dynamic braked roll condition, the current braked roll requirements do not guarantee that such strength will always be present.

In 1988, the FAA, in cooperation with the JAA and other organizations representing the American and European aerospace industries, began a process to harmonize the airworthiness requirements of the United States and the airworthiness requirements of Europe. The objective was to achieve common requirements for the certification of transport airplanes without a substantive change in the level of safety provided by the regulations. Other airworthiness authorities such as Transport Canada also participated in this process.

In 1992, the harmonization effort was undertaken by the Aviation Rulemaking Advisory Committee (ARAC) to harmonize the loads requirements. A working group of industry and government structural loads specialists from Europe, the United States, and Canada was chartered by notice in the Federal Register (58 FR 13819, March 15, 1993). On June 10, 1994 (58 FR 30081), the Loads & Dynamics Harmonization Working Group was assigned the additional task of reviewing and harmonizing the braked roll condition. That harmonization effort has now progressed to the point where a specific proposal has been developed by the working group and recommended to the FAA by letter dated [insert date of submittal of recommendation to the FAA].

Discussion

The European Joint Aviation Authorities (JAA) consider the BCAR braked roll condition too severe a condition to be considered for an airplane design requirement. For instance, it is unlikely that maximum braking will occur at the same instant the gear runs off the runway or during an avoidance maneuver. Nevertheless, the JAA has recognized that sudden application of main gear maximum braking during ground operations is a likely event that the airplane should be able to withstand; and since October 1988, the European Joint Aviation Requirements (JAR-25) have included a dynamic braked roll condition, which now supersedes the previously cited BCAR requirement.

The FAA agrees with the JAA that the sudden application of main gear maximum braking force during ground operations is a likely operational event that the airplane must be able to withstand, and that the BCAR requirement that combines high vertical loads with extreme drag load is an unrealistic condition for the nose gear. However, the current braked roll condition of § 25.493 of the FAR does not ensure that the nose landing gear and fuselage structure are capable of withstanding the loads developed from sudden application of main gear maximum braking force.

The FAA considers the JAA proposed dynamic braked roll condition to be a realistic method to account for dynamic loads that could exceed the static load requirements of § 25.493(b) on future designs. The proposed rule would amend the current FAR braked roll conditions, which address only the loads produced by airplane weight and steady braking forces, to add a requirement to include the effects of dynamic braking. This would account for the effects of airplane pitch inertia on the nose gear and fuselage. The proposed new § 25.493(e) provides a mathematical expression, in terms of airplane weight, geometry, coefficient of friction, and dynamic response factor, that may be used in lieu of a more rational analysis to account for the total nose gear loading, including the effects of dynamic braking. Regardless of the FAR requirements, the existing JAR requirement will be imposed on U.S. manufactured airplanes seeking approval to the JAR. It is therefore proposed to harmonize the FAR with the JAR by incorporating the dynamic braked roll condition in the FAR.

Since there is no evidence to suggest that the current fleet of transport category airplanes does not have adequate strength to withstand the proposed dynamic braked roll condition, the FAA does not consider it necessary to apply this requirement retroactively.

Regulatory Evaluation Summary

Preliminary Regulatory Evaluation, Initial Regulatory Flexibility Determination, and Trade Impact Assessment

Proposed 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 effects 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. In conducting these analyses, the FAA has determined that this proposal: (1) would generate benefits that justify its costs; (2) is not a "significant regulatory action" as defined in the Executive Order and is not "significant" as defined in DOT's Regulatory Policies and Procedures; (3) would not have a significant economic impact on a substantial number of small entities; and (4) would not constitute a barrier to international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary

The proposed amendment would codify current industry practice and would not impose additional costs on manufacturers of transport category airplanes. By conforming § 25.493 of the FAR with § 25.493 of the JAR, the proposed amendment would increase harmonization between American and European airworthiness standards and reduce duplicate certification costs.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis, in which alternatives are considered and evaluated, if a rule is expected to have "a significant economic impact on a substantial number of small entities." FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, prescribes standards for complying with RFA review requirements in FAA rulemaking actions. The Order

defines "small entities" in terms of size thresholds, "significant economic impact" in terms of annualized cost thresholds, and "substantial number" as a number which is not less than eleven and which is more than one-third of the small entities subject to the proposed or final rule.

The proposed amendment would affect manufacturers of transport category airplanes produced under new type certificates. For airplane manufacturers, Order 2100.14A specifies a size threshold for classification as a small entity as 75 or fewer employees. Since no part 25 airplane manufacturer has 75 or fewer employees, the proposed amendment would not have a significant economic impact on a substantial number of small airplane manufacturers.

International Trade Impact Assessment

The proposed amendment would not constitute a barrier to international trade, including the export of American airplanes to foreign countries and the import of foreign airplanes into the United States. Instead, by harmonizing standards of the FAR with those of the JAR, it would lessen restraints on trade.

Federalism Implications

The regulation proposed herein would not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

Because the proposed changes to the braked roll condition are not expected to result in substantial economic cost, the FAA has determined that this proposed rule would not be significant under Executive Order 12866. Because this is an issue that has not prompted a great deal of public concern, the FAA has determined that this action is not significant as defined in Department of Transportation Regulatory Policy and Procedures (44 FR 11034, February 25, 1979). In addition, since there are no small entities affected by this proposed rulemaking, the

FAA certifies, under the criteria of the Regulatory Flexibility Act, that this proposed rule, if adopted, would not have a significant economic impact, positive or negative, on a substantial number of small entities. An initial regulatory evaluation of the proposed rule, including a Regulatory Flexibility Determination and Trade Impact Analysis, has been placed in the docket. A copy may be obtained by contacting the person identified under the caption, "FOR FURTHER INFORMATION CONTACT."

List of Subjects

14 CFR part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The Proposed Amendment

Accordingly, the Federal Aviation Administration (FAA) proposes to amend 14 CFR part 25 of the Federal Aviation Regulations (FAR) as follows:

PART 25--AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

1. The authority citation for part 25 continues to read as follows:

Authority: 49 U.S.C. 1344, 1354(a), 1355, 1421, 1423, 1424, 1425, 1428, 1429, 1430; 49 U.S.C. 106(g); and 49 CFR 1.47(a).

2. By amending § 25.493 by revising paragraph (c), and by adding new paragraphs (d) and (e) to read as follows:

§ 25.493 Braked roll conditions.

* * * * *

(c) A drag reaction lower than that prescribed in this section may be used if it is substantiated that an effective drag force of 0.8 times the vertical reaction cannot be attained under any likely loading condition.

(d) An airplane equipped with a nose gear must be designed to withstand the loads arising from the dynamic pitching motion of the airplane due to sudden application of maximum braking force. The airplane is considered to be at design takeoff weight with the nose and main gears in

contact with the ground, and with a steady-state vertical load factor of 1.0. The steady-state nose gear reaction must be combined with the maximum incremental nose gear vertical reaction caused by the sudden application of maximum braking force as described in paragraphs (b) and (c) of this section.

(e) In the absence of a more rational analysis, the nose gear vertical reaction prescribed in paragraph (d) of this section must be calculated according to the following formula:

$$V_N = \frac{W_T}{A+B}\left[B + \frac{f\mu AE}{A+B+\mu E}\right]$$

Where: V_N= Nose gear vertical reaction.
W_T= Design takeoff weight.
A = Horizontal distance between the c.g. of the airplane and the nose wheel.
B = Horizontal distance between the c.g. of the airplane and the line joining the centers of the main wheels.
E = Vertical height of the c.g. of the airplane above the ground in the 1.0 g static condition.
μ = Coefficient of friction of 0.80.
f = Dynamic response factor; 2.0 is to be used unless a lower factor is substantiated.

In the absence of other information, the dynamic response factor f may be defined by the equation:

$$f = 1 + \exp\left(\frac{-\pi\xi}{\sqrt{1-\xi^2}}\right)$$

Where: ξ is the effective critical damping ratio of the rigid body pitching mode about the main landing gear effective ground contact point.

Issued in Washington, D.C. on

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11/4/94:ps:revised per IC comments
12/30/94:revised by ns/ic
1/4/95:revised by ns/ic
1/6/95:revised by ns/ic
1/23/95:ps:revised to accept ns/ic revisions approved by Doug this date.
3/14/95:ps:revised to correct error in amendatory language describing chg. to 25.571.
5/22/95:ps:revised to add reg eval summary
6/14/95:ps:ARAC discussion revised to include current task
10/26/95:ps:revised to add latest WG revisions from TAE mtg.

U.S. Department
of Transportation

**FEDERAL AVIATION
ADMINISTRATION**
Washington, D.C. 20591

PRELIMINARY REGULATORY EVALUATION, INITIAL REGULATORY FLEXIBILITY DETERMINATION, AND TRADE IMPACT ASSESSMENT

for Notice of Proposed Rulemaking:

BRAKED ROLL CONDITIONS

**OFFICE OF AVIATION POLICY AND PLANS
AIRCRAFT REGULATORY ANALYSIS BRANCH, APO-320**

Arnold J. Hoffman

May 1995

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Executive Summary

This regulatory evaluation examines the impacts of a proposal to amend the requirements for landing gear braking on transport category airplanes. The amendment would ensure that airplanes are designed to withstand main landing gear maximum braking forces.

The proposed amendment would codify current industry practice and would not impose additional costs on manufacturers of transport category airplanes. By conforming § 25.493 of the Federal Aviation Regulations (FAR) with § 25.493 of the European Joint Airworthiness Requirements (JAR), the proposed amendment would increase harmonization between American and European airworthiness standards and reduce duplicate certification costs.

The proposed amendment would not have a significant economic impact on small entities. In addition, it would not constitute a barrier to international trade, including the export of American airplanes to foreign countries and the import of foreign airplanes into the United States. Instead, by harmonizing standards of the FAR with those of the JAR, it would lessen restraints on trade.

REGULATORY EVALUATION OF NOTICE OF PROPOSED RULEMAKING: BRAKED ROLL CONDITIONS

I. Introduction

This regulatory evaluation examines the impacts of a proposed amendment to the braked roll conditions of § 25.493 of the Federal Aviation Regulations (FAR) to include the effects of dynamic braking. This would account for the additional dynamic loads on the nose gear and fuselage caused by the pitching motion of the airplane due to sudden application of main landing gear brakes. Current § 25.493 addresses only the loads produced by airplane weight and steady braking forces. This proposed rule would harmonize the FAR with the European Joint Aviation Requirements (JAR-25), which have included a dynamic braked roll requirement since 1988.

II. Background

Current § 25.493 of the FAR prescribes conditions that the airplane structure and landing gear must be designed to withstand during airplane taxiing with a constant (steady) application of brakes ("braked roll" condition). The braked roll condition is treated as a static equilibrium condition that accounts for the airplane weight and the added nose down force caused by steady braking; it does not account for the additional dynamic loads on the nose gear and fuselage caused by the initial pitching motion of the airplane due to sudden application of main landing gear brakes. Adequate strength has been achieved on existing airplanes through other part 25 design

requirements and manufacturers' needs to comply with the more stringent British Civil Airworthiness Regulations (BCAR) in order to sell airplanes overseas.

For many years the BCAR have included a dynamic braking condition that requires that consideration be given to the maximum likely combination of dynamic vertical reaction and sudden increase in drag load that could occur on the nose gear as a result of sudden main gear braking while encountering obstacles. U.S. designed airplanes generally have had adequate strength to meet this condition without requiring modifications. However, this may not always be the case, especially if future airplane designs are significantly different from past and current configurations in vertical and longitudinal mass distributions of fuel, payload, engine location, etc. As the takeoff weight increases with respect to landing weight, the dynamic braked roll condition can become more critical for the nose gear and fuselage due to the relocation of items of mass away from the airplane center of gravity. Without a specific dynamic braked roll condition, the current braked roll requirements do not ensure that such strength will always be present.

The European Joint Aviation Authorities (JAA) considered the BCAR braked roll condition too severe of an airplane design requirement. Nevertheless, the JAA recognized that sudden application of main gear maximum braking is an event that the airplane should be able to withstand. Since October 1988, JAR-25 has included a dynamic braked roll condition, differing from the BCAR requirement.

In 1988, the FAA and the JAA began a process to harmonize the airworthiness requirements of the United States and Europe. The objective was to achieve common certification standards without a substantive change in the level of safety provided by the regulations.

The FAA chartered the Aviation Rulemaking Advisory Committee (ARAC) in 1991 to provide advice and recommendations concerning the FAA's rulemaking program, including most harmonization rulemakings. ARAC's Loads and Dynamics Harmonization Working Group, which includes industry and government structural loads specialists from Europe, the United States, and Canada, was chartered in 1993 (58 FR 13819, March 15, 1993).

A proposal has been recommended to the FAA to add a requirement to include the effects of dynamic braking. The FAA considers the proposal to be a realistic method to account for dynamic loads that could exceed the static load requirements of current § 25.493(b). The proposed new § 25.493(e) provides a mathematical expression, in terms of airplane weight, geometry, coefficient of friction, and dynamic response factor, that may be used in the absence of a more rational analysis to account for the total nose gear loading, including the effects of dynamic braking.

III. Costs and Benefits

The proposed amendment would codify current industry practice and would not impose additional costs on manufacturers of transport category airplanes. By conforming § 25.493 of the FAR with § 25.493 of the JAR, the proposed amendment would increase harmonization between American and European airworthiness standards and reduce duplicate certification costs.

IV. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis, in which alternatives are considered and evaluated, if a rule is expected to have "a significant economic impact on a substantial number of small entities." FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, prescribes standards for complying with RFA review requirements in FAA rulemaking actions. The Order defines "small entities" in terms of size thresholds, "significant economic impact" in terms of annualized cost thresholds, and "substantial number" as a number which is not less than eleven and which is more than one-third of the small entities subject to the proposed or final rule.

The proposed amendment would affect manufacturers of transport category airplanes produced under new type certificates. For airplane manufacturers, Order 2100.14A specifies a size threshold for classification as a small entity as 75 or fewer employees. Since no

part 25 airplane manufacturer has 75 or fewer employees, the proposed amendment would not have a significant economic impact on a substantial number of small airplane manufacturers.

V. International Trade Impact Assessment

The proposed amendment would not constitute a barrier to international trade, including the export of American airplanes to foreign countries and the import of foreign airplanes into the United States. Instead, by harmonizing standards of the FAR with those of the JAR, it would lessen restraints on trade.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. 28643; Amdt. No. 25–97]

RIN 2120–AF83

Braked Roll Conditions

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment to the airworthiness standards for transport category airplanes adds a new design standard that requires that the airplane be designed to withstand main landing gear maximum braking forces during ground operations. This amendment will ensure that the landing gear and fuselage are capable of withstanding the dynamic loads associated with the maximum dynamic braking condition. It also relieves a burden on industry by eliminating differences between the Federal Aviation Regulations (FAR) and European Joint Aviation Requirements (JAR), while maintaining a level of safety provided by the current regulations and industry practices.

EFFECTIVE DATE: June 26, 1998.

FOR FURTHER INFORMATION CONTACT: Jim Haynes, FAA, Airframe and Airworthiness Branch (ANM–115), Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98055–4056; telephone (425) 227–2131; facsimile (425) 227–1320.

SUPPLEMENTARY INFORMATION:

Availability of Final Rule

An electronic copy of this document may be downloaded using a modem and suitable communications software from the FAA regulations section of the FedWorld electronic bulletin board service (telephone: 202–512–1661) or the FAA's Aviation Rulemaking Advisory Committee Bulletin Board service (telephone: 800–FAA–ARAC).

Internet users may reach the FAA's web page at http://www.faa.gov or the Federal Register's webpage at http://www.access.gpo.gov/su—docs for access to recently published rulemaking documents.

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

Persons interested in being placed on the mailing list for future notices of proposed rulemaking and final rules should request from the above office a copy of Advisory Circular (AC) No. 11–2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

Small Entity Inquiries

The Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) requires the FAA to report inquiries from small entities concerning information on, and advice about, compliance with statutes and regulations within the FAA's jurisdiction, including interpretation and application of the law to specific sets of facts supplied by a small entity.

The FAA's definitions of small entities may be accessed through the FAA's web page (http://www.faa.gov.avr/arm/sbrefa.htm), by contacting a local FAA official, or by contacting the FAA's Small Entity Contact listed below.

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 at http://www.faa.gov and may send electronic inquiries to the following internet address: 9–AWA–SBREFA@faa.dot.gov.

Background

This amendment is based on Notice of Proposed Rulemaking (NPRM) 96–10, which was published in the Federal Register on August 5, 1996 (61 FR 40710). The notice was based on a need to protect the airframe structure from damage during hard application of the brakes.

The current 14 CFR part 25 airworthiness standards, § 25.493, and its predecessor rule, § 4b.235(b) of the Civil Air Regulations (CAR), prescribe braked roll conditions that the airplane structure and landing gear must be designed to withstand during airplane taxiing with a constant (steady) application of brakes ("braked roll" condition). The taxi condition is generally the most critical condition regarding nose gear and forward fuselage loading during the braking event, due to the increased braking coefficient of friction at low speeds and the lack of lift on the wings and lack of aerodynamic damping. Both rules treat the braked roll condition as a static equilibrium condition. Neither rule accounts for the dynamic loads on the nose gear and fuselage associated with pitch inertia of the airplane due to rapid application of main landing gear brakes. Adequate strength has been achieved on existing airplanes by application of other part 25 design requirements and by the manufacturers' need to comply with the more stringent British Civil Airworthiness Requirements (BCAR).

For many years the BCAR have included a dynamic braking condition that requires that consideration be given to the maximum likely combination of dynamic vertical reaction and sudden increase in drag load that could occur on the nose gear as a result of sudden main gear braking while encountering obstacles. The BCAR address obstacles such as overruns onto semi-prepared surfaces during rejected takeoffs, running off the edge then back on to the runway during avoidance maneuvers, running over displaced or lowered edges of runway paving, and inadvertent use of runways under repair. In application of the BCAR requirement, it was found that U.S. designed airplanes generally have had adequate strength to meet this condition without requiring any modifications. However, this may not always be the case, especially if new airplane designs are significantly different from past conventional configurations in vertical and longitudinal mass distributions of fuel, payload, engine location, etc. As the takeoff weight increases with respect to landing weight, the dynamic braked roll condition can become more critical for the nose gear and fuselage. This amendment will ensure that all future airplanes will be provided with adequate strength in the fuselage and nose landing gear to carry these loads.

In 1988, the FAA, in cooperation with the JAA and other organizations representing the American and European aerospace industries, began a process to harmonize the airworthiness requirements of the United States and the airworthiness requirements of Europe. The objective was to achieve common requirements for the certification of transport airplanes without a substantive change in the level of safety provided by the regulations. Other airworthiness authorities such as Transport Canada also participated in this process.

In 1992, the harmonization effort was undertaken by the Aviation Rulemaking Advisory Committee (ARAC). A working group of industry and government structural loads specialists of Europe, the United States, and

Canada was chartered by notice in the **Federal Register** (58 FR 13819, March 15, 1993) to harmonize the design loads sections of Subpart C of part 25. The harmonization effort on the braked roll rule was accomplished and a specific proposal was recommended to the FAA by letter dated November 6, 1995. The FAA concurred with the recommendation, and published Notice 96–10 in the **Federal Register** on August 5, 1996, for public comment.

Interested persons have been given an opportunity to participate in this rulemaking and due consideration has been given to all matters presented. Comments received in response to Notice 96–10 are discussed below.

Discussion of Comments

The FAA received three comments in response to Notice 96–10. Two of these commenters support the proposal, one with comment, while the third commenter objects to the proposal.

One commenter, representing the aviation industry, supports the proposal but expresses concern about possible interpretation of the rule. This commenter states that it is industry's belief that the proposed rule represented a harmonized position on both the rule and the interpretative advisory material; specifically, the commenter supports JAA interpretation and advisory material which allows use of a coefficient of friction less than 0.80, when substantiated, in the formula of § 25.493(c). The commenter requests that this interpretation be clarified. The coefficient of friction of 0.80 between the tire and ground surface has been used for structural design of the landing gear and structure since it was codified in the Civil Air Regulations (CAR Part 4b). The FAA has allowed a lower drag reaction in those cases where it can be substantiated that an effective drag force of 0.80 times the vertical reaction cannot be attained under any likely loading condition. This has generally been interpreted to mean that a lower drag force may be used where maximum brake torque is the limiting factor. This allowance is provided in the current regulation and is unchanged by this amendment. A value of 0.80 remains as the value of the coefficient of friction in the regulatory formula of § 25.493(e).

One commenter, an aircraft manufacturer, believes the proposed regulation is unnecessary because the braked roll condition is not the loading condition that determines the design of the nose gear and fuselage. The commenter states that a three point landing is typically the load condition which determines the design of the landing gear structure, which is far more severe than the braked roll conditions addressed in the notice. The FAA agrees that this may be true for most airplane designs; however, it is not always the case. The FAA considers the rule necessary to ensure proper landing gear designs for those airplanes that are affected by the braked roll condition.

In view of the above, part 25 is amended as proposed in Notice 96–10.

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

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effects 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 rule is not "a significant regulatory action" under section 3(f) of Executive Order 12866 and therefore was not reviewed by the Office of Management and Budget. The rule is not considered significant under Department of Transportation Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). In addition, for the reasons stated under the "Regulatory Flexibility Determination," the "International Trade Impact Assessment," and the "Unfunded Mandates Assessment," the FAA certifies that this rule will not have a significant economic 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.

Regulatory Evaluation Summary

As stated in the preamble to the notice, the rule change will codify current industry practice (thus maintaining at least the current level of safety) and will not impose additional costs on manufacturers of transport category airplanes. Adequate strength has been achieved on existing airplanes by application of other part 25 design requirements and by manufacturers' needs to comply with the more stringent BCAR in order to sell airplanes overseas. Moreover, by conforming § 25.493 of the FAR with § 25.493 of the JAR, the new amendment will increase harmonization between American and European airworthiness standards and potentially reduce duplicate certification costs.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis, in which alternatives are identified and evaluated, if a rule is expected to have "a significant economic impact on a substantial number of small entities." The Small Business Administration (SBA) has established standards for complying with RFA review requirements in Federal rulemaking actions; the standards specify small entity size by Standard Industrial Classification (SIC). The rule change will affect manufacturers of transport category airplanes produced under new type certificates. The SBA specifies a size threshold for classification as a small entity as 1,500 or fewer employees. Since the rule will impose no incremental costs on airplane manufacturers (and, additionally, no part 25 airplane manufacturer has 1,500 or fewer employees), the rule change 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 barriers affecting the export of American goods and services to foreign countries and barriers 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 rule is a direct action to respond to this policy by increasing the harmonization of the U.S. Federal Aviation Regulations with the European Joint Aviation Requirements. The result will be a positive step toward removing impediments to international trade.

Unfunded Mandates Assessment

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 has determined that this rule does not contain a significant intergovernmental or private sector mandate as defined by the Act.

Federalism Implications

The regulation amended herein will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this regulation will not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

International Civil Aviation Organization (ICAO) and Joint Aviation Regulations

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with ICAO Standards and Recommended Practices to the maximum extent practicable. The FAA has determined that this rule does not conflict with any international agreement of the United States.

Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), there are no reporting or recordkeeping requirements associated with this rule.

Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying regulations in Title 14 of the CFR in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish such regulatory distinctions as he or she considers appropriate. Because this final rule applies to the certification of future designs of transport category airplanes and their subsequent operation, it could affect intrastate aviation in Alaska. The Administrator has considered the extent to which Alaska is not served by transportation modes other than aviation, and how the final rule could have been applied differently to intrastate operations in Alaska. However, the Administrator has determined that airplanes operated solely in Alaska would present the same safety concerns as all other affected airplanes; therefore, it would be inappropriate to establish a regulatory distinction for the intrastate operation of affected airplanes in Alaska.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

Adoption of the Amendment

In consideration of the foregoing, the Federal Aviation Administration (FAA) amends 14 CFR part 25 of the Federal Aviation Regulations (FAR) as follows:

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

1. The authority citation for part 25 continues to read:

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

2. Section 25.493 is amended by revising paragraph (c) and by adding new paragraphs (d) and (e) to read as follows:

§ 25.493 Braked roll conditions.

* * * * *

(c) A drag reaction lower than that prescribed in this section may be used if it is substantiated that an effective drag force of 0.8 times the vertical reaction cannot be attained under any likely loading condition.

(d) An airplane equipped with a nose gear must be designed to withstand the loads arising from the dynamic pitching motion of the airplane due to sudden application of maximum braking force. The airplane is considered to be at design takeoff weight with the nose and main gears in contact with the ground, and with a steady-state vertical load factor of 1.0. The steady-state nose gear reaction must be combined with the maximum incremental nose gear vertical reaction caused by the sudden application of maximum braking force as described in paragraphs (b) and (c) of this section.

(e) In the absence of a more rational analysis, the nose gear vertical reaction prescribed in paragraph (d) of this section must be calculated according to the following formula:

$$V_N = \frac{W_T}{A+B}\left[B + \frac{f\mu AE}{A+B+\mu E}\right]$$

Where:

V_N=Nose gear vertical reaction.

W_T=Design takeoff weight.

A=Horizontal distance between the c.g. of the airplane and the nose wheel.

B=Horizontal distance between the c.g. of the airplane and the line joining the centers of the main wheels.

E=Vertical height of the c.g. of the airplane above the ground in the 1.0 g static condition.

μ=Coefficient of friction of 0.80.

f=Dynamic response factor; 2.0 is to be used unless a lower factor is substantiated. In the absence of other information, the dynamic response factor f may be defined by the equation:

$$f = 1 + \exp\left(\frac{-\pi\xi}{\sqrt{1-\xi^2}}\right)$$

Where:

ξ is the effective critical damping ratio of the rigid body pitching mode about the main landing gear effective ground contact point.

Issued in Washington, DC, on May 18, 1998.

Jane F. Garvey,

Administrator.

[FR Doc. 98–13999 Filed 5–26–98; 8:45 am]

BILLING CODE 4910–13–P