Dated: March 9, 2011.

Karen G. Mills,

Administrator.

[FR Doc. 2011–5876 Filed 3–15–11; 8:45 am]

BILLING CODE 8025–01–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM400 Special Conditions No. 25–11–09–SC]

Special Conditions: Boeing Model 747–8/–8F Airplanes, Interaction of Systems and Structures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This notice proposes to amend Special Conditions No. 25–388–SC for the Boeing Model 747–8/–8F airplanes. These special conditions were previously issued July 29, 2009, and became effective September 10, 2009. These special conditions are being amended to include additional criteria addressing the Outboard Aileron Modal Suppression System. The 747–8/–8F will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. These design features include their effects on the structural performance. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards. Additional special conditions will be issued for other novel or unusual design features of the 747–8/–8F airplanes.

DATES: Comments must be received on or before April 15, 2011.

ADDRESSES: Comments on this proposal may be mailed in duplicate to: Federal Aviation Administration, Transport Airplane Directorate, Attention: Rules Docket (ANM–113), Docket No. NM400, 1601 Lind Avenue SW., Renton, Washington 98057–3356; or delivered in duplicate to the Transport Airplane Directorate at the above address. All comments must be marked Docket No. NM400. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT: Carl Niedermeyer, FAA, Airframe & Cabin Safety Branch, ANM–115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057–3356; telephone (425) 227–2279; e-mail *Carl.Niedermeyer@faa.gov.*

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. The most helpful comments reference a specific portion of the proposed special conditions, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive as well as a report summarizing each substantive public contact with FAA personnel concerning these proposed special conditions. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this notice between 7:30 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring expense or delay. We may change the proposed special conditions based on comments we receive.

If you want the FAA to acknowledge receipt of your comments on this proposal, include with your comments a pre-addressed, stamped postcard on which the docket number appears. We will stamp the date on the postcard and mail it back to you.

Background

On November 4, 2005, The Boeing Company, PO Box 3707, Seattle, WA 98124, applied for an amendment to Type Certificate Number A20WE to include the new Model 747–8 passenger airplane and the new Model 747–8F freighter airplane. The Model 747–8 and the Model 747–8F are derivatives of the 747–400 and the 747–400F, respectively. Both the Model 747–8 and the Model 747–8F are four-engine jet transport airplanes that will have a maximum takeoff weight of 970,000 pounds and new General Electric GEnx –2B67 engines. The Model 747–8 will have two flight crew and the capacity to carry 605 passengers. The Model 747–8F will have two flight crew and a zero passenger capacity, although Boeing has submitted a petition for exemption to allow the carriage of supernumeraries.

These special conditions were originally issued July 29, 2009, and published in the **Federal Register** on August 12, 2009 (74 FR 40479).

Type Certification Basis

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.101, Boeing must show that Model 747–8 and 747–8F airplanes (hereafter referred as 747–8/–8F) meet the applicable provisions of part 25, as amended by Amendments 25–1 through 25–117, except for earlier amendments as agreed upon by the FAA. These regulations will be incorporated into Type Certificate No. A20WE after type certification approval of the 747–8/–8F.

In addition, the certification basis includes other regulations, special conditions and exemptions that are not relevant to these proposed special conditions. Type Certificate No. A20WE will be updated to include a complete description of the certification basis for these model airplanes.

If the Administrator finds that the applicable airworthiness regulations (*i.e.,* 14 CFR part 25) do not contain adequate or appropriate safety standards for the 747–8/–8F because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same or similar novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the 747–8/–8F must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36.

Special conditions, as defined in § 11.19, are issued under § 11.38, and become part of the type certification basis under § 21.101.

Novel or Unusual Design Features

The Boeing Model 747–8/–8F is equipped with systems that affect the airplane's structural performance, either directly or as a result of failure or malfunction. That is, the airplane's systems affect how it responds in maneuver and gust conditions, and thereby affect its structural capability. These systems may also affect the

aeroelastic stability of the airplane. Such systems represent a novel and unusual feature when compared to the technology envisioned in the current airworthiness standards. A special condition is needed to require consideration of the effects of systems on the structural capability and aeroelastic stability of the airplane, both in the normal and in the failed state.

The Boeing 747–8F airplane exhibits an aeroelastic mode of oscillation that is self-excited and does not completely damp out after an external disturbance. The sustained oscillation (also known as a limit cycle oscillation or limit cycle flutter) is caused by an unstable aeroelastic mode that is prevented from becoming a divergent oscillation due to one or more nonlinearities that exist in the airplane.

While the sustained oscillation is not divergent, the FAA considers it to be an aeroelastic instability. Boeing has proposed the addition of an Outboard Aileron Modal Suppression (OAMS) system to the fly-by-wire (FBW) flight control system to reduce, but not eliminate, the amplitude of the sustained oscillation and control the aeroelastic instability.

Section 25.629 requires the airplane to be free of any aeroelastic instability, including flutter. It also requires the airplane to remain flutter free after certain failures. The regulations do not anticipate the use of systems that control flutter modes but do not completely suppress them. The use of the OAMS system is a novel and unusual design feature that the airworthiness standards do not adequately address. The FAA believes such systems can be used to ensure that limit cycle (non-divergent) flutter is kept to safe levels. Therefore, the FAA proposes a special condition that addresses this particular sustained oscillation characteristic and provides the necessary standards that permit the use of such active flutter control systems.

Applicability

As discussed above, this proposed special condition is applicable to Boeing Model 747–8/–8F airplanes. Should Boeing apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, this proposed special condition would apply to that model as well under the provisions of § 21.101.

Conclusion

This action affects only certain novel or unusual design features of the Boeing Model 747–8/–8F airplanes. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for this proposed Special Condition is as follows:

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

The Proposed Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration (FAA) proposes the following amendment to Special Conditions 25–388–SC as part of the type certification basis for the 747–8/–8F airplanes. The standards in Section A have been modified to incorporate the reference to Section C and remove "flutter control systems" from the applicability of this special condition. Section B was already adopted in Special Conditions 25–388–SC and is included for reference. Comments are invited on the amended Section A and the proposed text of Section C, Outboard Aileron Modal Suppression System.

A. General

The Boeing Model 747–8/–8F airplanes are equipped with automatic control systems that affect the airplane's structural performance, either directly or as a result of a failure or malfunction. The influence of these systems and their failure conditions must be taken into account when showing compliance with the requirements of Subparts C and D of part 25. Except as provided in Section C of this special condition, the following criteria must be used for showing compliance with this special condition for airplanes equipped with flight control systems, autopilots, stability augmentation systems, load alleviation systems, fuel management systems, and other systems that either directly or as a result of failure or malfunction affect structural performance. If this special condition is used for other systems, it may be necessary to adapt the criteria to the specific system.

1. The criteria defined here only address the direct structural consequences of the system responses and performances and cannot be considered in isolation; however, they should be included in the overall safety evaluation of the airplane. These criteria may in some instances duplicate standards already established for this evaluation. These criteria are only applicable to structural elements whose failure could prevent continued safe flight and landing. Specific criteria that define acceptable limits on handling characteristics or stability requirements when operating in the system degraded or inoperative mode are not provided in this special condition.

2. Depending on the specific characteristics of the airplane, additional studies may be required that go beyond the criteria provided in this special condition in order to demonstrate the capability of the airplane to meet other realistic conditions such as alternative gust or maneuver descriptions for an airplane equipped with a load alleviation system.

3. The following definitions are applicable to this special condition.

(a) *Structural performance:* Capability of the airplane to meet the structural requirements of part 25.

(b) *Flight limitations:* Limitations that can be applied to the airplane flight conditions following an in-flight occurrence and that are included in the airplane flight manual (AFM) (*e.g.,* speed limitations, avoidance of severe weather conditions).

(c) *Operational limitations:* Limitations, including flight limitations that can be applied to the airplane operating conditions before dispatch (*e.g.,* fuel, payload and Master Minimum Equipment List (MMEL) limitations).

(d) *Probabilistic terms:* The probabilistic terms (probable, improbable, extremely improbable) used in this special condition are the same as those used in § 25.1309.

(e) *Failure condition:* The term failure condition is the same as that used in § 25.1309, however this special condition applies only to system failure conditions that affect the structural performance of the airplane (*e.g.,* system failure conditions that induce loads, change the response of the airplane to inputs such as gusts or pilot actions, or lower flutter margins). The system failure condition includes consequential or cascading effects resulting from the first failure.

B. Effects of Systems on Structures

1. *General.* The following criteria will be used in determining the influence of a system and its failure conditions on the airplane structural elements.

2. *System fully operative.* With the system fully operative, the following apply:

(a) Limit loads must be derived in all normal operating configurations of the system from all the limit conditions specified in subpart C (or used in lieu of those specified in subpart C), taking into account any special behavior of

such a system or associated functions or any effect on the structural performance of the airplane that may occur up to the limit loads. In particular, any significant nonlinearity (rate of displacement of control surface, thresholds or any other system nonlinearities) must be accounted for in a realistic or conservative way when deriving limit loads from limit conditions.

(b) The airplane must meet the strength requirements of part 25 (*i.e.,* static strength, residual strength), using the specified factors to derive ultimate loads from the limit loads defined above. The effect of nonlinearities must be investigated beyond limit conditions to ensure the behavior of the system presents no anomaly compared to the behavior below limit conditions. However, conditions beyond limit conditions need not be considered when it can be shown that the airplane has design features that will not allow it to exceed those limit conditions.

(c) The airplane must meet the aeroelastic stability requirements of § 25.629.

3. *System in the failure condition.* For any system failure condition not shown to be extremely improbable, the following apply:

(a) At the time of occurrence, starting from 1-g level flight conditions, a realistic scenario including pilot corrective actions, must be established to determine the loads occurring at the time of failure and immediately after failure.

(1) For static strength substantiation, these loads multiplied by an appropriate factor of safety that is related to the probability of occurrence of the failure are ultimate loads to be considered for design. The factor of safety (F.S.) is defined in Figure 1.

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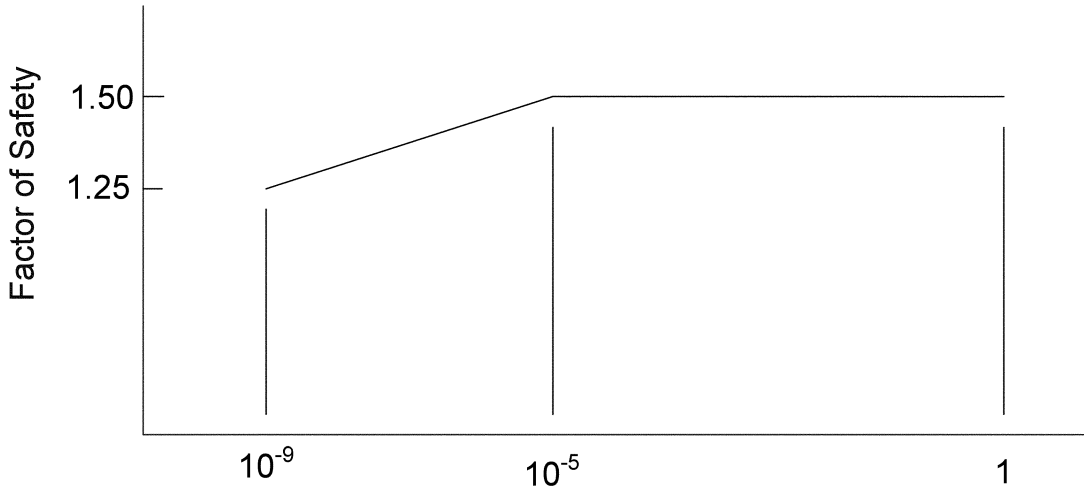
Figure 1

Factor of Safety at the Time of Occurrence



(2) For residual strength substantiation, the airplane must be able to withstand two thirds of the ultimate loads defined in subparagraph 3(a)(1). For pressurized cabins, these loads must be combined with the normal operating differential pressure.

(3) Freedom from aeroelastic instability must be shown up to the speeds defined in § 25.629(b)(2). For failure conditions that result in speeds beyond V_C/M_C, freedom from aeroelastic instability must be shown to increased speeds, so that the margins intended by § 25.629(b)(2) are maintained.

(4) Failures of the system that result in forced structural vibrations (oscillatory failures) must not produce loads that could result in detrimental deformation of the affected structural elements.

(b) For continuation of flight, for an airplane in the system failed state and considering any appropriate reconfiguration and flight limitations, the following apply:

(1) The loads derived from the following conditions (or used in lieu of the following conditions) at speeds up to V_C/M_C, or the speed limitation prescribed for the remainder of the flight, must be determined:

(i) the limit symmetrical maneuvering conditions specified in § 25.331 and in § 25.345.

(ii) the limit gust and turbulence conditions specified in § 25.341 and in § 25.345.

(iii) the limit rolling conditions specified in § 25.349 and the limit unsymmetrical conditions specified in §§ 25.367 and 25.427(b) and (c).

(iv) the limit yaw maneuvering conditions specified in § 25.351.

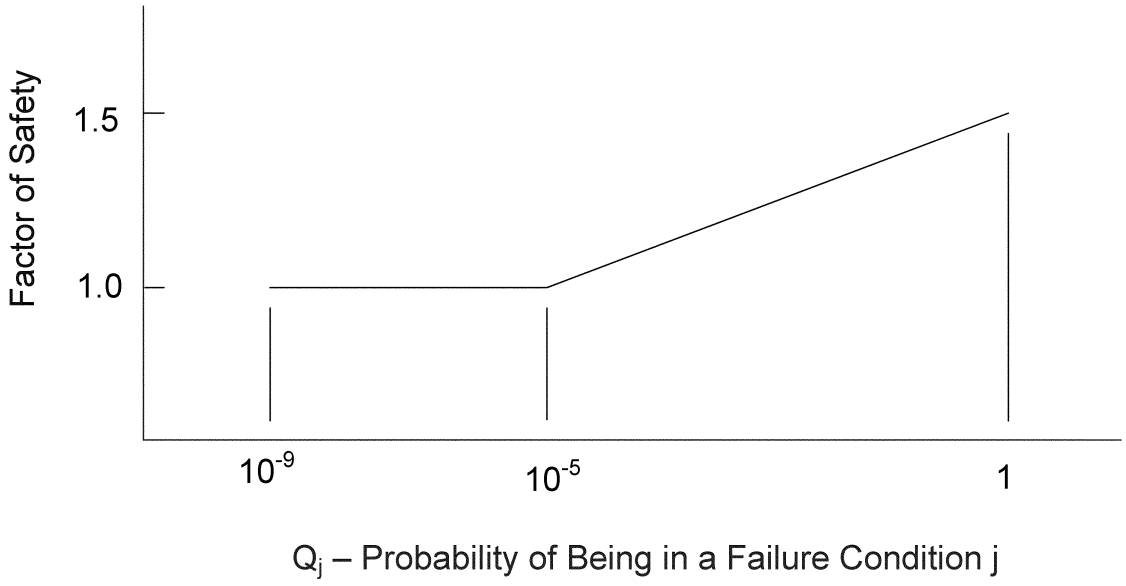
(v) the limit ground loading conditions specified in §§ 25.473, 25.491 and 25.493.

(2) For static strength substantiation, each part of the structure must be able to withstand the loads in paragraph (3)(b)(1) of the special condition multiplied by a factor of safety depending on the probability of being in

this failure state. The factor of safety is defined in Figure 2.

Figure 2

Factor of Safety for Continuation of Flight



$Q_j = (T_j)(P_j)$

where:

T_j = Average time spent in failure condition j (in hours)

P_j = Probability of occurrence of failure mode j (per hour)

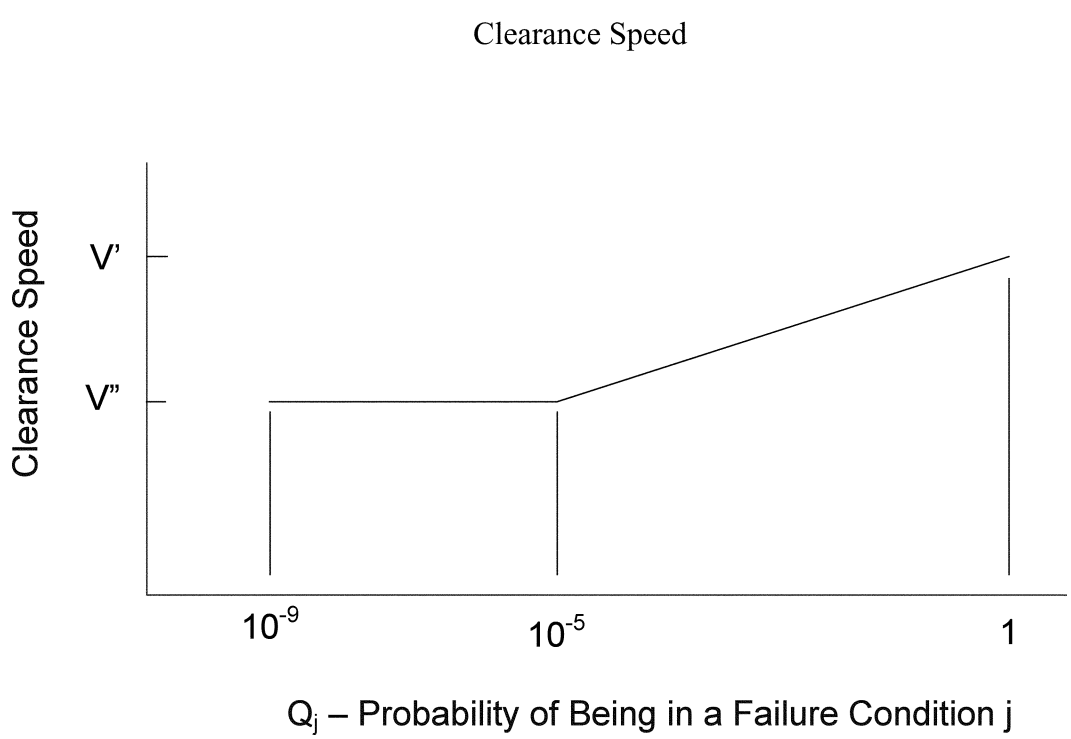
Note: If P_j is greater than 10^{-3} per flight hour then a 1.5 factor of safety must be applied to all limit load conditions specified in Subpart C.

(3) For residual strength substantiation, the airplane must be able to withstand two thirds of the ultimate loads defined in paragraph (3)(b)(1) of the special condition. For pressurized cabins, these loads must be combined with the normal operating differential pressure.

(4) If the loads induced by the failure condition have a significant effect on fatigue or damage tolerance then their effects must be taken into account.

(5) Freedom from aeroelastic instability must be shown up to a speed determined from Figure 3. Flutter clearance speeds V′ and V″ may be based on the speed limitation specified for the remainder of the flight using the margins defined by § 25.629(b).

Figure 3



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V′ = Clearance speed as defined by § 25.629(b)(2).

V″ = Clearance speed as defined by § 25.629(b)(1).

$Q_j = (T_j)(P_j)$

where:

T_j = Average time spent in failure condition j (in hours)

P_j = Probability of occurrence of failure mode j (per hour)

Note: If P_j is greater than 10^{-3} per flight hour, then the flutter clearance speed must not be less than V″.

(6) Freedom from aeroelastic instability must also be shown up to V' in Figure 3 above, for any probable system failure condition combined with any damage required or selected for investigation by § 25.571(b).

(c) Consideration of certain failure conditions may be required by other sections of part 25 regardless of calculated system reliability. Where analysis shows the probability of these failure conditions to be less than 10^{-9}, criteria other than those specified in this paragraph may be used for structural substantiation to show continued safe flight and landing.

4. *Failure indications.* For system failure detection and indication, the following apply:

(a) The system must be checked for failure conditions, not extremely improbable, that degrade the structural capability below the level required by part 25 or significantly reduce the reliability of the remaining system. As far as reasonably practicable, the flight crew must be made aware of these failures before flight. Certain elements of the control system, such as mechanical and hydraulic components, may use special periodic inspections, and electronic components may use daily checks, in lieu of detection and indication systems to achieve the objective of this requirement. These Certification Maintenance Requirements (CMRs) must be limited to components that are not readily detectable by normal detection and indication systems and where service history shows that inspections will provide an adequate level of safety.

(b) The existence of any failure condition, not extremely improbable, during flight that could significantly affect the structural capability of the airplane and for which the associated reduction in airworthiness can be minimized by suitable flight limitations, must be signaled to the flight crew. For example, failure conditions that result in a factor of safety between the airplane strength and the loads of subpart C below 1.25, or flutter margins below V", must be signaled to the crew during flight.

5. *Dispatch with known failure conditions.* If the airplane is to be dispatched in a known system failure condition that affects structural performance, or affects the reliability of the remaining system to maintain structural performance, then the provisions of this special condition must be met, including the provisions of paragraph 2 for the dispatched condition, and paragraph 3 for subsequent failures. Expected operational limitations may be taken into account in establishing Pj as the probability of failure occurrence for determining the safety margin in Figure 1. Flight limitations and expected operational limitations may be taken into account in establishing Qj as the combined probability of being in the dispatched failure condition and the subsequent failure condition for the safety margins in Figures 2 and 3. These limitations must be such that the probability of being in this combined failure state and then subsequently encountering limit load conditions is extremely improbable. No reduction in these safety margins is allowed if the subsequent system failure rate is greater than 10^{-3} per hour.

C. Outboard Aileron Modal Suppression System

1. In general, this special condition applies to fly-by-wire active flutter suppression systems that are intended to operate on a certain type of aeroelastic instability. This type of instability is characterized by a low frequency, self-excited, sustained

oscillation of an aeroelastic vibration mode that is shown to be a stable limit cycle oscillation (LCO), with the system operative and inoperative. (An LCO is considered "stable" if it maintains the same frequency and amplitude for a given excitation input and flight condition.) In addition, the type of sustained oscillation covered by this special condition must not be a hazard to the airplane nor its occupants with the active system failed. These systems must be shown to reduce the amplitude of the sustained oscillation to acceptable levels and effectively control the aeroelastic instability.

Specifically, the following criteria address the existence of such a sustained oscillation on the Boeing Model 747–8/–8F airplanes and the Outboard Aileron Modal Suppression (OAMS) system that will be used to control it.

2. In lieu of the requirements contained in § 25.629, the existence of a sustained, or limit cycle, oscillation that is controlled by an active flight control system is acceptable, provided that the following requirements are met:

(a) OAMS System Inoperative

(1) The sustained, or limit cycle, oscillation must be shown by test and analysis to be stable throughout the nominal aeroelastic stability envelope specified in § 25.629(b)(1) with the OAMS system inoperative. This should include the consideration of disturbances above the sustained amplitude of oscillation

(b) Nominal Conditions:

(1) With the OAMS system operative it must be shown that the airplane remains safe, stable, and controllable throughout the nominal aeroelastic stability envelope specified in § 25.629(b)(1) by providing adequate suppression of the aeroelastic modes being controlled. All applicable airworthiness and environmental requirements should continue to be complied with. Additionally, loads imposed on the airplane due to any amplitude of oscillation must be shown to have a negligible impact on structure and systems, including wear, fatigue and damage tolerance. The OAMS system must function properly in all environments that may be encountered.

(2) The applicant must establish by test and analysis that the OAMS system can be relied upon to control and limit the sustained amplitude of the oscillation to acceptable levels (per § 25.251) and control the stability of the aeroelastic mode. This should include the consideration of disturbances above the sustained amplitude of oscillation; maneuvering flight, icing conditions; manufacturing variations; Master Minimum Equipment List (MMEL) items; spare engine carriage; engine removed or inoperative ferry flights; and wear, repairs, and modifications throughout the service life of the airplane by:

(i) Analysis to the nominal aeroelastic stability envelope specified in § 25.629(b)(1), and

(ii) Flight flutter test to the V_{DF}/M_{DF} boundary. These tests must demonstrate that the airplane has a proper margin of damping for disturbances above the sustained amplitude of oscillation at all speeds up to V_{DF}/M_{DF}, and that there is no large and rapid reduction in damping as V_{DF}/M_{DF} is approached.

(iii) The structural modes must have adequate stability margins for any OAMS flight control system feedback loop at speeds up to the fail-safe aeroelastic stability envelope specified in § 25.629(b)(2).

(c) Failures, Malfunctions, and Adverse Conditions:

(1) For the OAMS system operative and failed, for any failure, or combination of failures not shown to be extremely improbable, and addressed by §§ 25.629(d), 25.571, 25.631, 25.671, 25.672, 25.901(c) or 25.1309 that results in LCO, it must be established by test or analysis up to the aeroelastic stability envelope specified in § 25.629(b)(2) that the LCO:

(i) is stable and decays to an acceptable limited amplitude once an external perturbing force is removed;

(ii) does not result in loads that would cause static, dynamic, or fatigue failure of structure during the expected exposure period;

(iii) does not result in repeated loads that would cause an additional failure due to wear during the expected exposure period that precludes safe flight and landing;

(iv) has, if necessary, sufficient indication of OAMS failure(s) and crew procedures to properly address the failure(s);

(v) does not result in a vibration condition on the flight deck that is severe enough to interfere with control of the airplane, ability of the crew to read the flight instruments, perform vital functions like reading and accomplishing checklist procedures, or to cause excessive fatigue to the crew;

(vi) does not result in adverse effects on the flight control system or on airplane stability, controllability, or handling characteristics (including airplane-pilot coupling (APC) per § 25.143) that would prevent safe flight and landing; and

(vii) does not interfere with the flight crew's ability to correctly distinguish vibration from buffeting associated with the recognition of stalls or high speed buffet.

(2) The applicant must show that particular risks such as engine failure, uncontained engine, or APU rotor burst, or other failures not shown to be extremely improbable, will not adversely or significantly change the aeroelastic stability characteristics of the airplane.

(3) No MMEL dispatch is allowed with the OAMS system inoperative.

Issued in Renton, Washington on March 9, 2011.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. 2011–6073 Filed 3–15–11; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2011–0231; Directorate Identifier 2011–CE–003–AD]

RIN 2120–AA64

Airworthiness Directives; Diamond Aircraft Industries GmbH Model DA 42 Airplanes

AGENCY: Federal Aviation Administration (FAA), Department of Transportation (DOT).

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: We propose to adopt a new airworthiness directive (AD) for the products listed above. This proposed AD results from mandatory continuing airworthiness information (MCAI) originated by an aviation authority of another country to identify and correct an unsafe condition on an aviation product. The MCAI describes the unsafe condition as:

Cracks have been reportedly found on DA 42 Main Landing Gear (MLG) Damper-to-Trailing Arm joints during standard maintenance. Depending on environmental-, operating- and runway conditions, the affected MLG joint, Part Number (P/N) D60–3217–23–5x (4 different lengths are available), which is made of aluminum, is susceptible to cracking.

This condition, if not detected and corrected, may lead to failure of the joint and subsequent damage or malfunction of the MLG, possibly resulting in damage to the aeroplane during landing and injury to occupants.

The proposed AD would require actions that are intended to address the unsafe condition described in the MCAI.