[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM463; Special Conditions No. 25-443-SC]

Special Conditions: Dassault Falcon Model 900 and 900EX airplanes; interaction of systems and structures.

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Dassault Falcon Model 900 and 900EX airplanes. These airplanes, as modified by Aviation Partners Incorporated (API), will have a novel or unusual design feature associated with the interaction of systems and structures regarding installation of an automated wing-load-alleviation system. The applicable airworthiness regulations in Title 14, Code of Federal Regulations (14 CFR) 25.303 and 25.1309 do not contain adequate or appropriate safety standards for this design feature. For the Dassault 900 and 900EX models with winglets, failure of the wing-load-alleviation system can result in a factor of safety (FS) below 1.5 as required by § 25.303. These 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.

DATES: The effective date of these special conditions is August 29, 2011. We must receive your comments by October 6, 2011.

ADDRESSES: You must mail two copies of your comments to: Federal Aviation Administration, Transport Airplane Directorate, Attn: Rules Docket (ANM-113), Docket No.

NM463, 1601 Lind Avenue SW., Renton, Washington, 98057-3356. You may deliver two copies to the Transport Airplane Directorate at the above address. You must mark your comments: Docket No. NM463. You can inspect comments in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: Todd Martin, Airframe/Cabin Safety Branch, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057-3356; telephone (425) 227-1178; facsimile (425) 227-1232.

SUPPLEMENTARY INFORMATION:

The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions is impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected aircraft. In addition, the substance of these special conditions has been subject to the public-comment process in several previous instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon issuance. However, the FAA is requesting comments to allow interested persons to submit views that may not have been submitted in response to the prior opportunities for comment described above.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the 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 about these special conditions. You can inspect the docket 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 preamble between 7:30 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive by 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 these special conditions based on the comments we receive.

If you want us to acknowledge receipt of your comments on these special conditions, include with your comments a self-addressed, stamped postcard on which you have written the docket number. We will stamp the date on the postcard and mail it back to you.

Background

On February 14, 2007, API applied for a supplemental type certificate for winglets on the Dassault Falcon Model 900 and 900EX airplanes. These airplanes have Allied Signal engines, a maximum passenger capacity of 19, and a maximum takeoff weight of up to 49,000 lbs.

The Falcon 900 and 900EX airplanes, as modified by API, feature a wing-load-alleviation system that precludes deployment of the air brakes at certain airspeeds, thereby reducing wing loading. Special conditions have been applied on past airplane programs with similar wing-load-alleviation systems to require consideration of the effects of those systems on structures. For the Dassault 900 and 900EX models with winglets, failure of the wing-load-alleviation system can result in a FS below 1.5 as required by § 25.303. Sections 25.303 and 25.1309 do not take into account the effects of system failures on aircraft loads. A special condition is needed to account

for these effects. These special conditions define the necessary requirements for assessing the effects of the air-brake wing-load-alleviation system on structures in the case of a system failure.

Type Certification Basis

Under the provisions of 14 CFR 21.101, API must show that the Falcon 900 and 900EX airplanes, as changed, continue to meet the applicable provisions of the regulations incorporated by reference in Type Certificate No. A46EU or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the "original type-certification basis." The regulations incorporated by reference in A46EU are as follows:

14 CFR part 25 at Amendment 25-56 for the Falcon 900, at Amendment 25-77 for the Falcon 900EX, and at other amendment levels for various commercial designations. In addition, the certification basis includes certain special conditions, exemptions, equivalent levels of safety, and later or earlier amended sections of part 25 that are not relevant to these special conditions.

In addition, if the regulations incorporated by reference do not provide adequate standards regarding the change, the applicant must comply with certain regulations in effect on the date of application for the change. The FAA has determined that the Falcon 900 and 900EX, as modified, must also comply with some sections of part 25, as amended by Amendment 25-119.

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 Falcon 900 and 900EX airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of 14 CFR 21.16.

In addition to the applicable airworthiness regulations and special conditions, the Falcon 900 and 900EX airplanes 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.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under 14 CFR 21.101.

Special conditions are initially applicable to the model for which they are issued. Should the applicant apply for a supplemental type certificate to modify any other model included on the same type certificate to incorporate the same novel or unusual design feature, the special conditions would also apply to the other model.

Novel or Unusual Design Features

The Dassault Falcon Model 900 and 900EX airplanes, as modified by API, will incorporate the following novel or unusual design feature:

The Airbrakes 2 inhibit system will be incorporated to retract, or prevent the deployment of, the Airbrakes 2 above 320 knots indicated airspeed (KIAS) to alleviate wing aerodynamic loading.

Applicability

As discussed above, these special conditions are applicable to the Dassault Falcon Model 900 and 900EX airplanes as modified by API. Should API apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. A16EU, to incorporate the same novel or unusual design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only one novel or unusual design feature on one model series of airplanes. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of this feature on the airplane.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

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

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type-certification basis for Dassault Falcon Model 900 and 900EX airplanes modified by Aviation Partners Incorporated.

1. General. The following criteria will be used in determining the influence of a system and its failure conditions on the airplane structure.
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 part 25 subpart C (or defined by special condition or equivalent level of safety in lieu of those specified in part 25 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 (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 that 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 do 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.

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

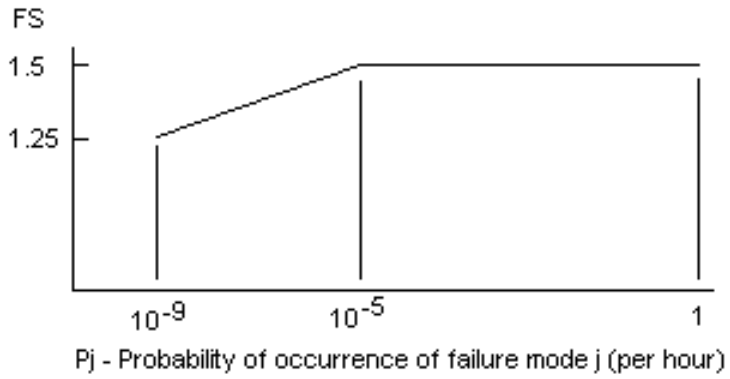

Figure 1. Factor of safety at the time of occurrence

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

iii) 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 design cruising speed/mach number (V_C/M_C), freedom from aeroelastic instability must be shown to increase speeds so that the margins intended by § 25.629(b)(2) are maintained.

iv) Failures of the system that result in forced-structural vibrations (oscillatory failures) must not produce loads that could result in detrimental deformation of primary structure.

b. For the continuation of the flight. For the airplane in the system-failed state, and considering any appropriate reconfiguration and flight limitations, the following apply:

i) The loads derived from the following conditions (or defined by special condition or equivalent level of safety 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:

(1) The limit-symmetrical-maneuvering conditions specified in §§ 25.331 and 25.345.

(2) The limit-gust-and-turbulence conditions specified in §§ 25.341 and 25.345.

(3) The limit-rolling conditions specified in § 25.349.

(4) The limit-unsymmetrical conditions specified in §§ 25.367 and 25.427(b) and (c).

(5) The limit-yaw-maneuvering conditions specified in § 25.351.

(6) The limit-ground-loading conditions specified in §§ 25.473 and 25.491.

ii) For static-strength substantiation, each part of the structure must be able to withstand the loads in paragraph 3(b)(i) of these special conditions multiplied by a FS depending on the probability of being in this failure state. The FS is defined in Figure 2.

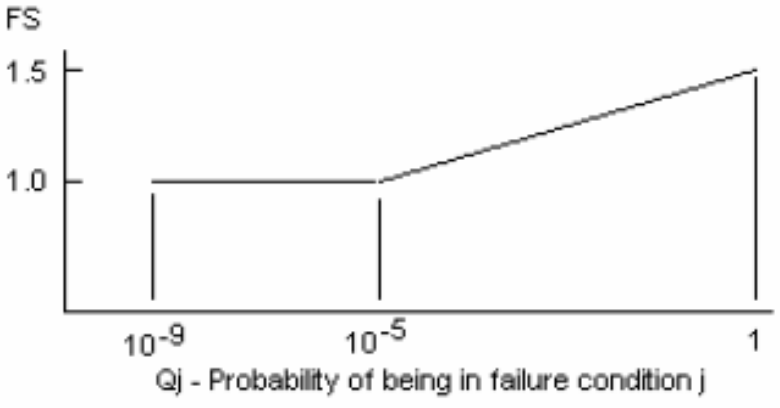

Figure 2. Factor of safety for continuation of flight

$Qj = (Tj)(Pj)$
Where:
Tj = Average time spent in failure condition j (in hours)
Pj = Probability of occurrence of failure mode j (per hour)
Note: If Pj is greater than 10^{-3} per flight hour, then a 1.5 FS must be applied to all limit-load conditions specified in part 25 subpart C.

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

iv) 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).

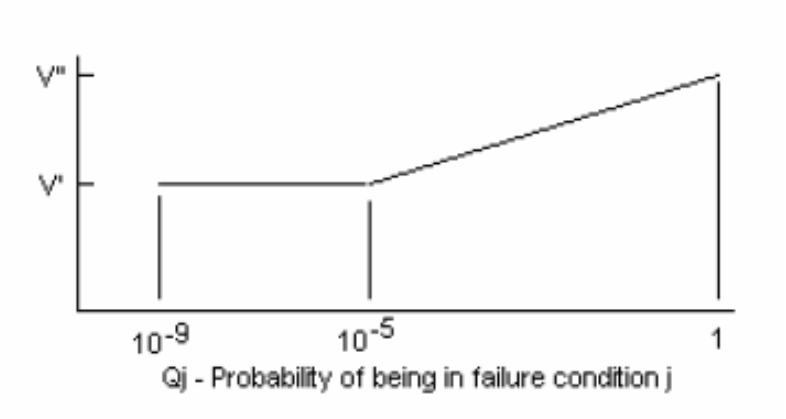

Figure 3. Clearance speed

V' = Clearance speed as defined by Sec. 25.629(b)(2).
V" = Clearance speed as defined by Sec. 25.629(b)(1).
Qj = (Tj)(Pj)
Where:
Tj = Average time spent in failure condition j (in hours)
Pj = Probability of occurrence of failure mode j (per hour)
Note: If Pj is greater than 10^{-3} per flight hour, then the flutter clearance speed must not be less than V".

v) 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). Consideration of certain failure conditions

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 that significantly reduce the reliability of the remaining system. As far as reasonably practicable, the flightcrew 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 must be limited to components that are not readily detectable by normal detection-and-indication systems and where service history shows that inspections 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 flightcrew. For example, failure conditions that result in an FS between the airplane strength and the loads of part 25 subpart C below 1.25, or flutter margins below V", must be signaled to the flightcrew 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 in these special conditions 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 $1E^{-3}$ per hour.

Issued in Renton, Washington, on August 29, 2011.

/s/ Ali Bahrami

Ali Bahrami
Manager, Transport Airplane Directorate
Aircraft Certification Service