Exemption No. 10932

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356

In the matter of the petition of **Dassault Aviation** for an exemption from §§ 25.629(d)(9) and 25.671(c)(2) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2013-0560**

GRANT OF EXEMPTION

By letter DGT361708 Ed2, dated July 24, 2013, Mr. Jean-Marc Michelet, Dassault Aviation, 54, avenue Marcel Dassault, 33701 Merignac Cedex, France, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of Title 14, Code of Federal Regulations (14 CFR) 25.629(d)(9) and 25.671(c)(2). An exemption would provide relief from hydraulic-system failure requirements and flutter protection regarding the installation of winglets on Dassault Falcon 900LX airplanes.

The petitioner requests relief from the following regulations:

Section 25.671(c)(2) requires that an airplane be capable of continued safe flight and landing, following a dual hydraulic-system failure or any single failure in combination with a probable hydraulic failure.

Section 25.629(d)(9) identifies failure conditions, including those specified in § 25.671(c)(2), which must be considered in the flutter evaluation of the airplane.

The petitioner supports its request with the following information:

This section quotes the relevant information from the petitioner's request, with minor edits for clarity. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet, at http://www.regulations.gov, in docket no. FAA-2013-0560.

> **The extent of the sought relief and the reason for seeking this relief.**
>
> DASSAULT AVIATION is petitioning for an exemption [from] §§25.629 and 25.671 regarding flutter condition.

This exemption is requested for Falcon F900EX series airplanes equipped with winglets fitted in Production Line through F900-M5281 Change, i.e. F900LX aircraft.

DASSAULT AVIATION believes that allowing the exemption is satisfactory regarding safety aspects and that a more complex wing for F900LX could only increase the price and decrease the dispatch rate of the plane.

This request for exemption also aims at being consistent with the Certification Basis used by Aviation Partners, Inc. (API) STC STC02188SE, applicable to Falcon 900 Series modified per API, and relative to the installation of the same winglets.

The reasons why granting the request would be in the public interest; that is, how it would benefit the public as a whole.

Allowing this exemption would be in the public interest. The winglets installation improves the fuel mileage of the airplane by about 5%, reducing fuel burn by that amount on every flight. Thus, the winglets reduce the demand on crude oil from the world's supply. Therefore, they also reduce the environmental effects of CO_2 and NO_x emissions. Additionally, it does not impact the level of safety relative to the current airplane.

The reasons why granting the exemption would not adversely affect safety.

Considering that M5281 change introduces no change to the hydraulic systems nor flight controls in comparison with F900EX certification, DASSAULT AVIATION position is to show compliance with [14 CFR] 25.629 Amdt. 45 and 25.671 Amdt. 56, which allows using probabilities in the substantiation of hydraulic system failure conditions.

DASSAULT AVIATION position is that:

- DASSAULT AVIATION hydraulic system analysis shows dual hydraulic failure with total loss of fluid, with resulting loss of control system stiffness and damping to prevent flutter, to be extremely improbable.
- DASSAULT AVIATION flutter analysis (at FAA disposal upon request) shows the F900LX M5281 to be free from flutter divergence throughout the V_D/M_D domain considering that all combinations of failures not shown to be numerically extremely improbable.
- This provides the same level of safety as the baseline aircraft before addition of winglets, using updated failure scenarios and parametric studies.
- Additional DASSAULT AVIATION flutter analysis (at FAA disposal upon request) shows the flight domain is free from flutter in normal conditions up to $1.2V_D$/Mach 1.0.

The reason to exercise the privileges of the requested exemption outside the United States, if needed.

Considering the multitude of countries in which Falcon 900LX series are sold and already operated, it is very likely that this exemption should be recognized by other *countries usually agreeing with FAA position.*

Federal Register publication

A summary of the petition was published in the *Federal Register* on August 28, 2013 [78 FR 53185]. No comments were received.

The FAA's analysis

The FAA has reviewed the information provided by Dassault Aviation and has concluded that granting this exemption is in the public interest for the reasons discussed below.

Section 25.671(c)(2) requires that an airplane be capable of continued safe flight and landing, following any dual hydraulic-system failure, or any single failure in combination with any probable hydraulic failure. These failure conditions must be assumed to occur, regardless of calculated numerical probability. In addition, the FAA assumes that hydraulic failure includes loss of hydraulic fluid, unless provisions are in place to positively trap the fluid. While "probable hydraulic failure" is based on an element of probability, the "single plus probable" combination is not associated with probability. Therefore, the single-plus-probable combination must be assumed to occur.

As described above, Dassault is not able to show the baseline Falcon 900, certificated in 1986, compliant with § 25.671(c)(2) for these failure conditions. Consequently, Dassault also cannot show the derivative 900LX airplane to be compliant. This is because, in the event of hydraulic failure and loss of fluid, the airplane does not have design features that would positively trap hydraulic fluid in the aileron control system actuators and thereby provide sufficient restraint to prevent flutter. This is a characteristic of the basic airplane and is not affected by the M5281 modification (addition of winglets).

In their petition, Dassault Aviation states that they intend "to show compliance with FAR 25.629 Amdt. 45 and FAR 25.671 Amdt. 56, which allows using probabilities in the substantiation of hydraulic system failure conditions." First, the FAA doesn't agree that § 25.671 at Amdt. 25-56 allows probabilities in the substantiation of hydraulic system failure conditions. Dassault cannot meet § 25.671 for the reasons stated above, and thus, an exemption to that rule is necessary. Second, an exemption to § 25.629 is necessary because the certification basis of the airplane includes § 25.629 at Amdt. 25-77. Section 25.629 at Amdt. 25-77 references the failure conditions in § 25.671, whereas Amdt. 25-45 of § 25.629 does not.

The FAA assessed the supporting information Dassault provided and finds that the exemption would not adversely affect safety for the following reasons:

- While the regulations require that the noted hydraulic failure conditions be assumed to occur, Dassault analysis does show these failure conditions to be numerically extremely improbable.

- FAA review indicates that the service history of the Dassault Falcon 900 hydraulic system and aileron actuators has been satisfactory. Furthermore, the addition of winglets does not degrade safety relative to the baseline airplane.

The FAA also recognizes that fuel mileage will be improved on the Falcon 900 airplanes with winglets installed, and that this winglet project will result in benefit to the United States economy.

The FAA's decision

In consideration of the foregoing, I find that a grant of an exemption to Dassault Aviation is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator, Dassault is hereby granted an exemption from 14 CFR 25.629(d)(9) and 25.671(c)(2) for hydraulic-system failure conditions resulting in loss of fluid.

Issued in Renton, Washington, on February 7, 2014.

/s/ Jeffrey E. Duven

Jeffrey E. Duven
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