



U.S. Department
of Transportation
**Federal Aviation
Administration**

Small Airplane Directorate
901 Locust
Kansas City, MO 64106

June 14, 2009

Exemption No. 9550A
Regulatory Docket No. FAA-2007-28080

Mr. Sergio Augusto Viana de Carvalho
Senior Certification Manager
Embraer Aircraft Company
Av. Brig. Faria Lima, 2170, 12227-901
S. Jose dos Compos – SP
Brazil

Dear Mr. Sergio Augusto Viana de Carvalho,

This letter is to inform you that we have granted your request for an amendment to exemption number 9550. We realize that you requested a reconsideration of the petition. The requested amendment modified the conditions and limitations of the original exemption by:

- Specifying the exact definition of the reduced operating envelope and aircraft configurations in which the Dutch Roll requirements of 14 CFR § 23.181 will be met.
- Incorporating Embraer Model 505's matured system design that utilizes both a yaw damper and a ventral rudder.

Since we did not deny your original exemption request, and this request would only revise some of the requirements, we are able to issue an amendment. By amending your exemption instead of "reconsidering" it, we have been able to save time on issuing the new exemption. This letter transmits our decision, explains its basis, and gives you the revised conditions and limitations of the exemption.

The Basis for Our Decision

By letter dated November 1, 2007 (copy enclosed), we granted your petition of April 23, 2007. You requested, on behalf of Embraer Aircraft Company, an exemption from § 23.181(b) of Title 14, Code of Federal Regulations (14 CFR) to the extent necessary to allow Embraer to certify the Embraer Model 505 to be type certificated at a reduced level of dynamic lateral-directional stability after a yaw damper system failure.

The FAA has determined that good cause existed for not publishing a summary of the amended petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to Embraer.

The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grant of Exemption No. 8323 (copy enclosed), the FAA found that, in the case of Dutch Roll, some existing aircraft meet Dutch Roll damping requirements at low altitude and low speed but not at high altitude and high speed. This is the situation with the Embraer Model 505. In these cases, the FAA has allowed continued flight following a yaw damper failure provided the airplane is controllable and can safely transition to a reduced flight envelope in which Dutch Roll damping requirements are met.

Regarding public interest, we believe that granting the exemption is in the public interest. To require the airframe to be modified to inherently provide the required damping would result in a much larger airplane that would not be as fuel efficient as a design that was optimized for the high altitude, high speed environment. To require a less efficient design when the necessary level of safety can otherwise be provided is not in the public interest. Likewise, to require a more complex and expensive yaw damper system design is not in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They do not differ materially from those presented by the petitioners in the enclosed grants of exemption;
- The reasons stated by the FAA for granting the enclosed exemptions also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

Under the authority contained in 49 U.S.C. 40113 and 44701, as amended, which the FAA Administrator has delegated to me, I hereby grant Embraer Aircraft Company an amendment to exemption 9550 from 14 CFR § 23.181(b) to the extent necessary to permit type certification of the Model 505 airplane, subject to the conditions and limits described below.

Conditions and Limitations

1. Except for takeoff and landing, any combined lateral-directional oscillations ("Dutch roll") occurring between the stalling speed and the maximum allowable speed appropriate to the configuration of the airplane must be damped to amplitude in (1) 7 cycles below 18,000 feet, and (2) 13 cycles from 18,000 feet to the certified maximum altitude with the primary controls (1) free, and (2) in a fixed position.
2. The EMB-505 yaw damper system should be disabled and ventral rudder must be on for takeoff and landing. For these flight phases instead of demonstration of a minimum damping,

Embraer will demonstrate that the airplane is safely controllable with satisfactory handling qualities.

3. After a yaw damper and ventral rudder failure, Embraer will demonstrate that the airplane is safely controllable and the resulting stability characteristics allow continued safe flight and landing. The procedure to guarantee safe flight must be published in the Aircraft Flight Manual.

4. Following landing with a failed yaw damper and ventral rudder, the airplane may be relocated if necessary to make the repairs; however, the relocation flight must be restricted to operation in a reduced operating envelope (altitude and/or airspeed). This envelope and the related operational procedures must assure that the aircraft can be operated safely with adequate level of stability characteristics.

Issued in Kansas City, Missouri on May 14, 2009.

Sincerely,



Scott Horn
Acting Manager, Small Airplane Directorate
Aircraft Certification Service