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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM246; Special Conditions No. 25-231-SC]

Special Conditions: Embraer Model 170-100 and 170-200 Airplanes; Sudden Engine Stoppage; Operation Without Normal Electrical Power; Interaction of Systems and Structures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for the Embraer Model 170-100 and 170-200 airplanes. These airplanes 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 are associated with engine size and torque load which affect sudden engine stoppage, electrical and electronic flight control systems which perform critical functions, and systems which affect the structural performance of the airplane. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for these design features. 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. Additional special conditions will be issued for other novel or unusual design features of the Embraer Model 170-100 and 170-200 airplanes.

EFFECTIVE DATE: April 10, 2003.

FOR FURTHER INFORMATION CONTACT: Tom Groves, FAA, International Branch, ANM-116, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW.,

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SUPPLEMENTARY INFORMATION:

Background

On May 20, 1999, Embraer applied for a type certificate for its new Model 170 airplane. Two basic versions of the Model 170 are included in the application. The Model 170-100 airplane is a 69-78 passenger twin-engine regional jet with a maximum takeoff weight of 81,240 pounds. The Model 170-200 is a lengthened fuselage derivative of the 170-100. Passenger capacity for the Model 170-200 is increased to 86, and maximum takeoff weight is increased to 85,960 pounds.

Type Certification Basis

Under the provisions of 14 CFR 21.17, Embraer must show that the Model 170-100 and 170-200 airplanes meet the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-98.

If the Administrator finds that the applicable airworthiness regulations (*i.e.*, part 25, as amended) do not contain adequate or appropriate safety standards for the Embraer Model 170-100 and 170-200 airplanes because of novel or unusual design features, special conditions are prescribed under the provisions of § 21.16.

In addition to the applicable airworthiness regulations and special conditions, the Embraer Model 170-100 and 170-200 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, and the FAA must issue a finding of regulatory adequacy pursuant to § 611 of Public Law 93-574, the "Noise Control Act of 1972."

Special conditions, as defined in 14 CFR 11.19, are issued in accordance with § 11.38 and become part of the type certification basis in accordance with § 21.17(a)(2), Amendment 21-69, effective September 16, 1991.

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 novel or unusual design feature, or should any other model already included on the same type certificate be modified to

incorporate the same novel or unusual design features, the special conditions would also apply to the other model under the provisions of § 21.101(a)(1), Amendment 21-69, effective September 16, 1991.

Novel or Unusual Design Features

The Embraer Model 170-100 and 170-200 airplanes will incorporate the following novel or unusual design features:

Engine Size and Torque Load

Since 1957, the limit engine torque load which is posed by sudden engine stoppage due to malfunction or structural failure such as compressor jamming has been a specific requirement for transport category airplanes. Design torque loads associated with typical failure scenarios were estimated by the engine manufacturer and provided to the airframe manufacturer as limit loads. These limit loads were considered simple, pure torque static loads. However, the size, configuration, and failure modes of jet engines have changed considerably from those envisioned when the engine seizure requirement of § 25.361(b) was first adopted. Current engines are much larger and are now designed with large bypass fans capable of producing much larger torque, if they become jammed.

Relative to the engine configurations that existed when the rule was developed in 1957, the present generation of engines is sufficiently different and novel to justify issuance of special conditions to establish appropriate design standards. The latest generation of jet engines is capable of producing, during failure, transient loads that are significantly higher and more complex than the generation of engines that were present when the existing standard was developed. Therefore, the FAA has determined that special conditions are needed for the Embraer Model 170-100 and 170-200 airplanes.

Electrical and Electronic Systems Which Perform Critical Functions

The Embraer Model 170-100 and 170-200 airplanes will have an electronic flight control system which performs critical functions. The current airworthiness standards of part 25 do not contain adequate or appropriate standards for the protection of this