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**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**Docket No. FAA-2015-3368; Special Conditions No. 25-603-SC**

**Special Conditions: Embraer Model EMB-545 and EMB-550 Airplanes; Occupant Protection For Side-Facing Seats Forward of Aft-Facing Seats**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions; request for comments.

**SUMMARY:** These special conditions are issued for Embraer Model EMB-545 and EMB-550 airplanes. These airplanes will have a novel or unusual design feature associated with a seat configuration of side-facing seats positioned forward of aft-facing seats, and with a structural armrest between the side-facing and aft-facing seats. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. 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 **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. We must receive your comments by **[INSERT DATE 45 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

**ADDRESSES:** Send comments identified by docket number FAA-2015-3368 using any of the following methods:

- *Federal eRegulations Portal:* Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202-493-2251.

*Privacy:* The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

*Docket:* Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Jayson Claar, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, Washington, 98057-3356; telephone (425) 227-2194, facsimile (425) 227-1232.

**SUPPLEMENTARY INFORMATION:**

The FAA has determined that notice of, and opportunity for, prior public comment on these special conditions are impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected airplane. The FAA therefore finds that good cause exists for making these special conditions effective upon issuance.

**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 will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

**Background**

On October 14, 2010, Embraer S.A. applied for an amendment to type certificate no. TC000621B to include the new Embraer Model EMB-545 airplane. These special conditions allow installation of side-facing seats forward of aft-facing seats in Embraer Model EMB-545 and EMB-550 airplanes.

The Embraer Model EMB-545 airplane is a derivative of the Model EMB-550 airplane currently approved under type certificate no. TC000621B. As compared to the Model EMB-550,

the Model EMB-545 fuselage is one meter shorter. The Model EMB-545 airplane is designed for an eight-passenger configuration and a maximum of nine passengers (including lavatory seat).

### **Type Certification Basis**

Under the provisions of 14 CFR 21.101, Embraer must show that the Model EMB-545 and EMB-550 airplanes meet the applicable provisions of the regulations listed in type certificate no. TC00062IB, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA. The regulations listed in the type certificate are commonly referred to as the “original type certification basis.” The regulations incorporated by reference in type certificate no. TC00062IB are as follows:

Title 14, Code of Federal Regulations part 25, effective February 1, 1965, including Amendments 25-1 through 25-129, in their entirety. In addition, the certification basis includes certain special conditions, exemptions, or later amended sections of the applicable part that are not relevant to these special conditions.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for Embraer Model EMB-545 and EMB-550 airplanes because of a novel or unusual design feature, special conditions are prescribed under § 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 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 feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, Embraer Model EMB-545 and EMB-550 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.

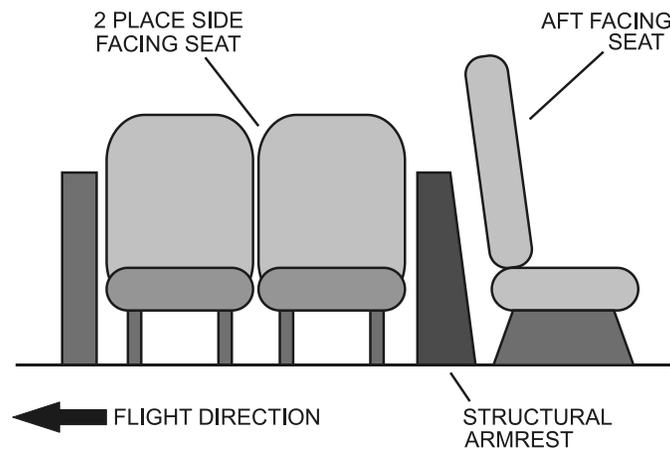
The FAA issues special conditions as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.101.

### **Novel or Unusual Design Features**

Embraer Model EMB-545 and EMB-550 airplanes will incorporate the following novel or unusual design feature: side-facing seats installed forward of aft-facing seats.

### **Discussion**

This issuance of special conditions for side-facing seats installed forward of aft-facing seats requires dynamic seat testing. Such tests are required of all applicants who plan to install side-facing and oblique seating in passenger airplanes.



**Figure 1: Side-facing seats installed forward of aft-facing seats**

The intent of the dynamic seat testing is to evaluate airplane seats, restraints, and related interior systems to demonstrate their structural strength and their ability to protect an occupant from serious injuries in a survivable crash. The current regulations (14 CFR 25.561, 25.562, and

25.785) address occupant-injury protection for forward- and aft-facing seats. The FAA has issued special conditions no. 25-495-SC for Embraer Model EMB-545 and EMB-550 airplanes to address the additional occupant-injury protection concerns raised by for side-facing seats. However, the aft occupant of the side-facing seat (see Figure 1 in these special conditions) may interact with the aft-facing seat, a scenario that the regulations do not specifically address.

The aft-facing seat back could deform during the dynamic-test event, and could contact the occupant in the aft side-facing seat. The point that the seat back contacts the occupant could be in an area of the body that has no defined, acceptable, injury-evaluation method, such as the shoulder. This type of contact is addressed in the above-mentioned side-facing-seat special conditions, which prohibit body-to-body contact.

The applicant proposed installing a structural armrest between the side-facing seat and the aft-facing seat to help prevent contact between the aft-facing seat and the aft occupant of the side-facing seat. The FAA believes that this contact would be likely to occur if the structural armrest failed to perform as intended in an emergency landing. Therefore, the purpose of these special conditions is to define the specific structural requirements of the proposed structural armrest, and the additional requirements necessary to protect the seated occupant from both the side-facing seat and the adjacent aft-facing seat.

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.

## **Applicability**

These special conditions are applicable to Embraer Model EMB-545 and EMB-550 airplanes. Should Embraer apply at a later date for a change to the type certificate to include another 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 feature, these special conditions would apply to the other model as well.

## **Conclusion**

This action affects only certain novel or unusual design features on Embraer Model EMB-545 and EMB-550 airplanes. It is not a rule of general applicability, and it affects only those airplanes listed on amended type certificate no. TC00062IB.

## **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 Embraer Model EMB-545 and EMB-550 airplanes with side-facing seats installed forward of aft-facing seats.

The applicant must propose a certification strategy for the structural armrest. This strategy must address the structural integrity of the structural armrest, and occupant protection, after a survivable crash. The strategy must define how the applicant will ensure that the installation,

when deformed due to the application of static, dynamic, and interaction (with aft-facing seat) loads, and while complying with the applicable 14 CFR 25.561 and 25.562 requirements:

1. The proposed structural armrest will not touch the side-facing seat's aft occupant, and the occupant will not act as a "human cushion;"
2. The backrest of the aft-facing seat will not touch the side-facing seat's aft occupant;
3. The proposed structural armrest will not impose loads to the side-facing seat structure, and;
4. The seat back of the aft-facing seat will not, as a result of contact with the structural armrest, result in damage or deformation of the seat back that could be injurious to the occupant of the aft-facing seat.

In addition, the applicant must:

1. Test the structural armrest with pitch and roll of the seat track to ensure that the armrest continues to protect the occupant of the side-facing seat.
2. Conduct at least two 16G forward-structural tests with the combination of the side-facing seat, structural armrest, and the aft-facing seat. For these tests, the applicant must account for all structural requirements and post-test conditions.
3. Document any load sharing between the side-facing seat, structural armrest, and the aft-facing seat.
4. Address the worst-case floor deformation that:
  - a. produces the maximum load into the structural armrest. This includes the load caused by the floor deformation and the load from the aft-facing seat back.

- b. allows the aft-facing seat back the most forward dynamic deformation in the area of the side-facing seat's aft occupant. No contact between the aft-facing seat and the side-facing seat aft occupant is acceptable.

Issued in Renton, Washington, on October 27, 2015.

Michael Kaszycki  
Acting Manager, Transport Airplane Directorate  
Aircraft Certification Service  
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