



**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2016-8832; Special Conditions No. 25-638-SC]**

**Special Conditions:** Lufthansa Technik, AG, Boeing Model 737-700 Airplanes; Large, Non-Structural Glass in the Passenger Compartment

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

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

**SUMMARY:** These special conditions are issued for Boeing Model 737-700 airplanes. This airplane, as modified by Lufthansa Technik, AG (Lufthansa), will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is large, non-structural glass panels in the passenger compartment of Very Important Person (VIP) interiors of Model 737-700 airplanes modified by Lufthansa. 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:** This action is effective on Lufthansa on **[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-2016-8832 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:** John Shelden, Airframe and Cabin Safety, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057-3356; telephone 425-227-2785; facsimile 425-227-1320.

**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 airplanes.

In addition, the substance of these special conditions has been subjected to the notice and comment period in several prior instances, and has been derived without substantive change from those previously issued. The FAA made changes for clarity in response to one recent comment on similar special conditions. It is unlikely that prior public comment would result in a significant change from the substance contained herein. Therefore, because a delay would significantly affect the certification of the airplane, which is imminent, the FAA has determined that prior public notice and comment are unnecessary and impracticable, and good cause exists for adopting these special conditions upon publication in the **Federal Register**.

### **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 15, 2015, Lufthansa applied for a supplemental type certificate to install a VIP interior and cabin system, which includes installation of large, non-structural glass panels in the passenger compartment of Boeing Model 737-700 airplanes. This airplane is a twin-jet engine, transport-category airplane. The airplane seating accommodates 34 passengers, 5 cabin crewmembers, and 4 flightcrew members. Maximum takeoff weight is 171,000 lbs.

## **Type Certification Basis**

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.101, Lufthansa must show that the Boeing Model 737-700 airplane, as changed, continues to meet the applicable provisions of the regulations listed in Type Certificate No. A16WE, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

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 Boeing Model 737-700 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

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, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Boeing Model 737-700 airplane 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**

The Boeing Model 737-700 airplane, as modified by Lufthansa, will incorporate a novel or unusual design feature associated with a VIP interior and cabin system, which is the installation of large, non-structural glass panels in the passenger compartment.

### **Discussion**

No specific regulations address the design and installation of large glass components in airplane passenger cabins. Existing requirements, such as §§ 25.561, 25.562, 25.601, 25.603, 25.613, 25.775, and 25.789, provide some design standards appropriate for large glass component installations. However, additional design standards for non-structural glass augmenting the existing design are needed to complement the existing requirements. The addition of glass involved in this installation, and the potentially unsafe conditions caused by damage to such components from external sources, necessitate assuring that adequate safety standards are applied to the design and installation of the feature in Boeing Model 737-700 airplanes.

For purposes of these special conditions, a large glass component is defined as a glass component weighing 4 kg (9 lbs) or more. Groupings of glass items that individually weigh less than 4 kg, but collectively weigh 4 kg or more, also would need to be included. These special conditions also apply when showing compliance with the applicable performance standards in the regulations for the installation of these components. For example, heat-release and smoke-density testing must not result in fragmentation of the component.

The use of glass has resulted in trade-offs between the one unique characteristic of glass—its capability for undistorted or controlled light transmittance, or transparency—and the negative aspects of the material, such as extreme notch-sensitivity, low fracture resistance, low modulus of elasticity, and highly variable properties. While reasonably strong, glass is nonetheless not a desirable material for traditional airplane applications because it is heavy (about the same density as aluminum), and when it fails, it breaks into extremely sharp fragments that have the potential for injury and have been known to be lethal. Likewise, the use of glass traditionally has been limited to windshields, and instrument and display transparencies. The regulations for certification of transport-category airplanes only address, and thus only recognize, the use of glass in windshield or window applications. These regulations do address the adverse properties of glass, but even so, pilots are occasionally injured from shattered glass windshields. FAA policy allows glass on instruments and display transparencies.

Other installations of large, non-structural glass items have included the following:

- Glass panels integrated onto a stairway handrail closeout.
- Glass panels mounted in doors to allow visibility through the door when desired.
- Glass doors on some galley compartments containing small amounts of service items.

These special conditions will reduce the hazards from breakage, or from these panels' potential separation from the cabin interior.

The FAA recently received comments on proposed special conditions similar to the special conditions in this document. Notice of Proposed Special Conditions no. 25-16-03-SC, for Lufthansa modifications to the Boeing Model 747-8 airplane, was published in the **Federal Register** on February 25, 2016 (81 FR 9363). The Boeing Company provided comments to that notice by letter no. B-H020-REG-16-TLM-17, dated March 24, 2016. The first comment referred

to the first two conditions in Notice no. 25-16-03-SC, and recommended revising the text in special condition no. 2 to more clearly define how it is different from special condition no. 1. We agreed that those two conditions could be addressed with a single test, so we combined those two conditions into a single condition, special condition no. 1, for clarity. This document also reflects that change.

Boeing commented that the load conditions in special condition no. 4, in Notice no. 25-16-03-SC, which corresponds to special condition no. 3 in this document, should include all flight and landing loads, rather than only emergency landing. These special conditions are in addition to the load requirements in the certification basis for the glass installation, rather than in lieu of the load requirements. Thus, is it not necessary to repeat that all of these loads apply to this installation. The emergency-landing load condition is not normally applied to installations of this type, but for the use of large glass in the cabin, we determined that this additional safety standard is necessary. We made no changes to special condition number 3 in response to the Boeing comments.

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**

As discussed above, these special conditions are applicable to Boeing Model 737-700 airplanes modified by Lufthansa. Should Lufthansa apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. A16WE to incorporate the same novel or unusual design feature, these special conditions would apply to that model as well.

## Conclusion

This action affects only certain novel or unusual design features on one model series of airplane. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of these features 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 Boeing Model 737-700 airplanes modified by Lufthansa.

1. **Material Fragmentation** – The applicant must use tempered or otherwise treated glass to ensure that, when fractured, the glass breaks into small pieces with relatively dull edges. The glass component installation must retain all glass fragments to minimize the danger from flying glass shards or pieces. The applicant must demonstrate this characteristic by impact and puncture testing, and testing to failure. The applicant may conduct this test with or without any glass coating that may be utilized in the design.
2. **Strength** – In addition to meeting the load requirements for all flight and landing loads, including any of the applicable emergency-landing conditions in subparts C & D of 14 CFR part 25, the glass components that are located such that they are not protected from contact with cabin occupants must not fail due to abusive loading, such as impact from occupants stumbling into, leaning against, sitting on, or performing other intentional or

unintentional forceful contact with the glass component. The applicant must assess the effect of design details such as geometric discontinuities or surface finish, including but not limited to embossing and etching.

3. **Retention** – The glass component, as installed in the airplane, must not come free of its restraint or mounting system in the event of an emergency landing, considering both the directional loading and resulting rebound conditions. The applicant must assess the effect of design details such as geometric discontinuities or surface finish, including but not limited to embossing and etching.
4. **Instruction for Continued Airworthiness** – The instructions for continued airworthiness must reflect the glass-panel fastening method used, and must ensure the reliability of the methods used (e.g., life limit of adhesives, or clamp connection). Inspection methods and intervals must be defined based upon adhesion data from the manufacturer of the adhesive, or actual adhesion test data, if necessary.

Issued in Renton, Washington, on September 7, 2016.

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