**B**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2023-0137; Special Conditions No. 25-836-SC]**

**Special Conditions: The Boeing Company Model 777-9 Airplane; Installation of Large Non-Structural Glass in the Passenger Compartment**

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

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

**SUMMARY:** These special conditions are issued for the The Boeing Company (Boeing) Model 777-9 series airplane. This airplane 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 the installation of large, non-structural glass in the passenger cabin. 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 Boeing on [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Send comments on or before [INSERT DATE 45 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** Send comments identified by Docket No. FAA-2023-0137 using any of the following methods:

- *Federal eRegulations Portal:* Go to https://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:* Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in title 14, Code of Federal Regulations (14 CFR), § 11.35, the FAA will post all comments received without change to https://www.regulations.gov/, including any personal information you provide. The FAA will also post a report summarizing each substantive verbal contact received about these special conditions.

*Confidential Business Information:* Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to these special conditions contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to these special conditions, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as "PROPIN." The FAA will treat such marked submissions as confidential under the FOIA, and the indicated comments will not be placed in the public docket of these special conditions. Send submissions containing CBI to the individual listed in the **FOR FURTHER INFORMATION CONTACT** section below. Comments the FAA receives, which are

not specifically designated as CBI, will be placed in the public docket for these special conditions.

*Docket:* Background documents or comments received may be read at https://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:** Shannon Lennon, Human Machine Interface Section, AIR-626, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 2200 South 216th Street, Des Moines, Washington 98198; telephone and fax 206-231-3209; email Shannon.Lennon@faa.gov.

**SUPPLEMENTARY INFORMATION:** The substance of these special conditions has been published in the Federal Register for public comment in several prior instances with no substantive comments received. Therefore, the FAA finds, pursuant to 14 CFR 11.38(b), that new comments are unlikely, and notice and comment prior to this publication are unnecessary.

**Comments Invited**

The FAA invites 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.

The FAA will consider all comments received by the closing date for comments, and will consider comments filed late if it is possible to do so without incurring delay. The FAA may change these special conditions based on the comments received.

**Background**

On August 19, 2022, Boeing applied for an amendment to Type Certificate No. T00001SE to include the new Model 777-9 series airplane. The Boeing Model 777-9 series airplane, which is a derivative of the Model 777-300ER currently approved under Type Certificate No. T00001SE, is a twin-engine, transport category airplane, with capacity for 495 passengers, and a maximum takeoff weight of 775,000 pounds.

**Type Certification Basis**

Under the provisions of title 14, Code of Federal Regulations (14 CFR), § 21.101, Boeing must show that the Model 777-9 airplane meets the applicable provisions of the regulations listed in Type Certificate No. T00001SE, 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 (e.g., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Boeing Model 777-9 series 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 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, the Boeing Model 777-9 series 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 777-9 series airplane will incorporate the following novel or unusual design feature:

This design feature is the installation of large, non-structural glass in the passenger cabin. Possible installations of large non-structural glass items include, but are not limited to, the following items:

- Glass partitions
- Glass floor installations
- Glass attached to the ceiling
- Glass parts integrated in the stairway
- Wall or Door mounted mirrors and glass panels
- Mirrors as part of a door blow out panel
- Glass plate installed in a doorframe
- Washstand with glass-panel

The installation of these glass items in the passenger compartment, which can be occupied during taxi, take-off and landing (TT&L), is a novel or unusual design feature with respect to the installed material. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for these design features.

**Discussion**

The use of glass results 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. Glass, in its basic form as annealed, untreated sheet, plate, or float glass, when compared to metals, is extremely notch-sensitive, has a low fracture resistance, has a low modulus of elasticity, and can be highly variable in its

properties. While reasonably strong, it 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 which have been known to be lethal. Thus, the use of glass traditionally was limited to windshields, and instrument or display transparencies. The regulations in 14 CFR 25.775 only address, and likewise only recognize, the unique use of glass in windshield or window applications where no other material will serve. This regulation does address the adverse properties of glass, but pilots occasionally are injured from shattered glass windshields.

The FAA divides other uses of glass in the passenger cabin into four groups. These groups were created to address the practical and functional uses of glass. The four groups are as follows:

The first group is glass items installed in rooms or areas in the cabin that are not occupied during taxi, takeoff, and landing (TT&L), and a person does not have to enter or pass through the room or area to get to any emergency exit.

The second group is glass integrated into a functional device the operation of which is dependent upon the characteristics of glass, such as instrument or indicator protective transparencies, or monitor screens such as liquid crystal displays or plasma displays. This group may be installed in any area in the cabin regardless of occupancy during TT&L. Acceptable means of compliance for these items may depend on the size and specific location of the device containing the glass.

The third group is small glass items installed in occupied rooms or areas during TT&L, or rooms or areas that a person does not have to enter or pass through to get to any emergency exit. The FAA defines a small glass item as less than 8.8 lbs (4 kg) in mass.

The fourth group is large glass items, the subject of these special conditions, installed in occupied rooms or areas during TT&L, or rooms or areas that a person must enter or pass through to get to any emergency exit. A large glass item is defined as 8.8 lbs (4 kg) or greater in mass. Groups of glass items that collectively weigh 4 kg or more would also be included. The mass is based on the amount of glass that becomes hazardous in high inertial loads.

The glass items in groups one, two, and three are restricted to applications where the potential for injury is either highly localized, such as flight-instrument faces, or the location is such that injury due to failure of the glass is unlikely, for example mirrors in lavatories, because these installations necessitate the use of glass. These glass items typically are addressed in a method-of-compliance issue paper for each project based on existing part 25 regulations, or in established policy. These issue papers identify specific tests that could include abuse loading and ball-impact testing. In addition, these items are subject to the inertia loads contained in § 25.561, and maximum positive-differential pressure for items like video monitors to meet § 25.789.

The items in group four are much larger and heavier than previously approved, and raise additional safety concerns. These large, heavy glass panels, primarily installed as architectural features, were not envisioned in the regulations. The unique aspects of glass, with the potential to become highly injurious or lethal objects during emergency landing, minor crash conditions, or in flight, warrant a unique approach to certification that addresses the characteristics of glass that prevented its use in the past. These special conditions were developed to ensure that airplanes with large glass features in passenger cabins provide the same level of safety as airplanes using traditional, lightweight materials. The FAA reiterates this intention in the text of the special conditions by qualifying their use for group four glass items.

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 the Boeing Model 777-9 airplane. 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 apply to the other model as well.

**Conclusion**

This action affects only a certain novel or unusual design feature on one model series of airplanes. It is not a rule of general applicability.

**List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

**Authority Citation**

The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(f), 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 The Boeing Company Model 777-9 series airplanes.

For large glass items (a single item, or a collective group of glass items, that weigh 4 kg or more in mass) installed in passenger- occupied rooms or areas during taxi, takeoff, and landing, or installed in rooms or areas that occupants must enter or pass

through to access any emergency exit, the glass installations on the Boeing Model 777- 9 series airplanes must meet the following conditions:

1. Material Fragmentation- The glass used must be tempered or otherwise treated to ensure that when fractured, it 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 by impact and puncture testing and testing to failure.

2. Strength - The glass component must be strong enough to meet 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. In addition, 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. The effect of design details such as geometric discontinuities or surface finish e.g., embossing, etching, etc., must be assessed.

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. Both the directional loading and rebound conditions must be assessed. The effect of design details such as geometric discontinuities or surface finish e.g., embossing, etching, etc., must be assessed.

4. Instructions for Continued Airworthiness - The instructions for continued airworthiness must reflect the 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 Washington, D.C., on date March 23, 2023.

Gregg Nesemeier III,
Acting Manager, Technical Innovation Policy Branch,
Policy and Innovation Division,
Aircraft Certification Service.
[FR Doc. 2023-06395 Filed: 3/28/2023 8:45 am; Publication Date: 3/29/2023]