Exemption No. 10757

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356

In the matter of the petition of **Embraer S.A.** for an exemption from § 25.809(a) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2012-0302**

GRANT OF EXEMPTION

By letters dated March 9, 2012, and June 28, 2012, Mr. Sergio Augusto Viana de Carvalho, Airworthiness Manager, Embraer, Av. Brigadeiro Faria Lima, 2170 - PC 179 12227-901, Sao Jose dos Campos, Brazil, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of § 25.809(a) of Title 14, Code of Federal Regulations (14 CFR). This exemption, if granted, would permit partial relief for the outside viewing requirements for the overwing exits on Embraer Model EMB-550 airplanes. The exemption is specifically for the installation of executive interiors on Embraer EMB-550 airplanes.

The petitioner requests relief from the following regulation:

> **Section 25.809 (a), Amendment 25-116 –** (a) Each emergency exit, including each flightcrew emergency exit, must be a moveable door or hatch in the external walls of the fuselage, allowing an unobstructed opening to the outside. In addition, each emergency exit must have means to permit viewing of the conditions outside the exit when the exit is closed. The viewing means may be on or adjacent to the exit provided no obstructions exist between the exit and the viewing means. Means must also be provided to permit viewing of the likely areas of evacuee ground contact. The likely areas of evacuee ground contact must be viewable during all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse.

The petitioner supports its request with the following information:

This section quotes the relevant information from the petitioner's request. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at http://regulations.gov, in Docket No. FAA-2012-0302.

> The overwing hatch [on Embraer Model EMB-550 airplanes] is located inside the lavatory and has a window that provides an effective means to assess external conditions prior to exit opening. This includes viewing of the wing surface where the evacuees would make their initial contact up to the end of the escape route on the wing considering all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse. Partial relief is being sought from the requirement since this outside viewing means does not permit viewing of the likely area of evacuee ground contact prior to exit opening during all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse.
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> Relief is necessary since literal compliance with the rule would require extensive design changes to the airplane (exit relocation) to permit viewing of the likely areas of evacuee ground contact during all lighting conditions and with the landing gear extended and in conditions of landing gear collapse. Making this type of design change would not enhance the level [of] safety provided for the occupants and it would impact introduction of the EMB-550 airplane.
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> **Background**:
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> In an emergency situation it is generally accepted that an exit should not be opened if opening it would create a more hazardous situation for the occupants of the airplane. With Amendment 25-116 14 CFR 25.809(a) now includes the requirement that an outside viewing means at emergency exits permit viewing of the likely area of evacuee ground contact and that the likely area of evacuee contact be viewable during all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse.
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> The EMB-550 airplane is an executive jet with a maximum occupancy of 12 passengers and is provided with a Type III overwing exit hatch located inside the lavatory. The hatch window provides an effective means to assess external conditions when deciding whether or not to open the exit. This includes viewing of the wing surface where the evacuees would make their initial contact up to the end of the escape route on the wing considering all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse. This also includes viewing of the ground near where the evacuees would normally be expected to make their initial contact. In addition, an emergency lighting system is provided according 14 CFR 25.812 (g)(1) and an escape route is provided according 14 CFR 25.810 (c). Since the end of the escape route on the wing terminates in a height distance from the ground of less than 6 feet there is no emergency egress assist means installed. Once the evacuees step on the wing and reach the end of the escape route on the wing they will be able to see the ground contact area considering

all lighting conditions and under all conditions of landing gear collapse. Therefore, they will get a good sense of whether or not there is a significant hazard on the ground. While the overwing exit window provide an excellent means for assessing the outside conditions, this does not allow direct viewing of the ground where the evacuees would normally be expected to make their initial ground contact. This is due to the relative distance of the exit location and the ground contact area.

Partial relief from § 25.809(a) at Amendment 25-116 is necessary because design of the EMB-550 airplane is complete and it would require extensive design changes for the overwing exit to comply with the outside viewing requirements with no material difference in the level of safety.

Public Interest:

The granting of this exemption is in the public interest because a delay in certification and introduction of the EMB-550 in order to fully comply with § 25.809(a) would cause a delay in delivery and introduction into service of the affected aircraft. While Embraer is not an American manufacturer, the suppliers of the engines and a large majority of the avionics, seats, in-flight entertainment and mechanical systems are in the United States.

A delay in delivery will cause an unnecessary loss of income to these suppliers with the associated adverse impact on the economy and the trade balance of the United States.

These effects on the American economy as a whole, with no associated increase in safety, are clearly not in the public interest.

In addition, a design change at this point to fully comply with 25.809(a) will increase weight of the airplane with an associated increase in fuel consumption. In addition to the adverse impact this would have on the operator or his customers who would have to compensate for this increased cost of operation, the increased fuel consumption will result in increased emissions, which would be counter to the public interest.

Justification:

During an airplane emergency evacuation, there is the potential for an external hazard that could pose an immediate threat to the occupants of the airplane if an exit was opened. While fire is the principle external hazard, there are other types of hazards such as water or large obstructions that could make not opening an exit the preferred course of action. However, due to the viewing area provided by the overwing hatch window during all lighting conditions and with the landing gear extended and in any conditions of landing gear collapse, it is very likely that any severe external hazard that could create an immediate hazard to the occupants could be detected prior to deciding whether or not to open the overwing exit. Therefore, there is no appreciable difference between the level of safety provided by the outside viewing means provided for the EMB-550 overwing exit and that intended by the new regulation.

Conclusions:

For the EMB-550 airplane the overwing hatch window provides an effective means to assess external conditions when deciding whether or not to open the overwing hatch. This includes viewing of the wing area where the evacuees would make their initial contact after opening the exit considering all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse. This also includes viewing of the ground near where the evacuees would normally be expected to make their initial contact. The overwing hatch window provides an external viewing means equivalent to that intended by the new regulation, which Embraer believes was the FAA's stated intent when codifying the requirement for an outside viewing means at the emergency exits. Passenger and crew safety will not be degraded by a grant of this exemption petition.

***Federal Register* publication**

A summary of the petition was published in the Federal Register on September 5, 2012 (77 FR 54650). One comment was received from the Agência Nacional de Aviação Civil (ANAC) Brazilian Civil Aviation Authority. The following quotes the commenter's relevant information.

> The purpose of the outside viewing means is to enable a person to ascertain whether to open an exit, and whether it would be safe to evacuate through the exit, based on an assessment of the outside conditions.
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> For the overwing emergency exit of the EMB-550, the proposed means would involve the exit opening to allow the evacuee to reach the end of the escape path on the wing and obtain visualization of the contact area on the ground. This scenario is not considered acceptable by the ANAC because of the following reasons: The emergency exit opening triggers the evacuation process which involves a number of occupants who tend to use that exit to leave the aircraft. In one critical scenario, the occupants leave the aircraft to ascertain the conditions on the ground. If the ground conditions are not adequate for egress, the occupants involved needs to return to the aircraft using the same exit. The return to the cabin may not be easily feasible and the interaction between occupants intending to leave the airplane and those proceeding to return to the cabin using the same emergency exit may create a hazardous condition.
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> The ANAC believes that the visualization of the likely area of the evacuees ground contact must be performed by the means provided inside the cabin, prior to opening the emergency exit. Such means must be available to the occupant designated to perform the opening of the exit. In addition, when the occupant assumes the position to initiate the emergency exit opening procedure, there should be no obstacles which prevent this occupant from having the direct visual contact with the aircraft exterior and the ground contact area through the cabin viewing means.
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> In the case of EMB-550, the overwing emergency exit window allows visualization of the wing surface and the escape route but not of the evacuees' ground contact area, thus the occupant must rely on the adjacent passenger windows located at the cabin. However,

there is the divider between the lavatory compartment and the passenger window that does not allow direct compliance to RBAC 25.809(a) at Amendment 25-116 as this feature may be considered an obstruction.

On the other hand, the relocation of the exit to the passenger cabin may affect the airplane design, introduce the redesign burden and also raise safety issues not foreseen in the original design.

Therefore, the ANAC believes that the Embraer proposal may be in the public interest for the reasons previously stated by the petitioner. Nevertheless, the ANAC understands that additional requirements in order to establish an adequate level of safety.

The ANAC suggests the following additional requirements:

- Once positioned standing in front of the toilet seat and toward the emergency exit, the occupant must have a direct visual contact with windows in the passenger cabin that provides visualization of the airplane exterior covering the vision of the area of evacuating on the ground. Any point inside a circular area on the ground with a radius of about 2 meters measured from the evacuee ground contact point must be visible to the occupant. The direct visual contact between the occupant and passenger cabin windows that provides viewing means of external conditions may not be obstructed by the divider which separates the lavatory compartment from the passenger cabin. Slight movements of head and torso to gain visual contact with the window are considered acceptable.

- The requirement above must be demonstrated through a subjective test conducted in the airplane. The test must be performed by 5th percentile female and 95th percentile male subjects. The test can be conducted in day light conditions. The view means will be considered acceptable if an object (e.g. traffic cone) placed in the evacuee ground contact or adjacent area is visible to the subjects looking through the windows.

The FAA's analysis

The commenter makes some good points. First, if the overwing exit is used, but then evacuees return into the airplane to use the other exit, would this be possible, and how would this affect the evacuation? In this case, it is mostly likely that after evacuees inside the airplane understand that the first exit route is not useable, the evacuees inside the airplane will try the other exit. As the evacuees inside are moving to the other exit, the evacuees on the wing will be able to re-enter the airplane.

Second, the commenter proposes that when the occupant assumes the position to initiate the emergency exit opening procedure, the occupant should be able to view the ground-contact point using a passenger-cabin window, other than the window on the overwing exit. Several factors to consider in evaluating this option include, but are not limited to, the view being obstructed by seats, partitions, window shades, other passengers blocking the view, and the desired location

being able to be viewed by the range of people's heights. If all of these items can be adequately addressed, the commenter's suggestion could be an acceptable approach.

In reviewing the airplane layout, considering all of the items discussed above, the FAA does not believe that this method of viewing the ground contact point is a practicable solution for this airplane configuration. We have contacted the commenter and they have not made an evaluation on an airplane to determine if the suggested method of observing a ground-contact point, from other than the window on the overwing exit, is possible in the manner proposed.

The FAA has determined there is not an adverse impact on safety if an occupant cannot simultaneously see conditions immediately outside the exit door and the ground-contact point. The impact of the regulation, as codified, went beyond what was envisioned in the rulemaking process for the overwing exits on some airplanes.

On many overwing exits, the location where the evacuee makes first contact on the ground is a considerable distance from the point from which they exit the passenger cabin. The distance the evacuee moves either forward or aft on the wing upper surface, and then down to the ground either by escape slide, or by jumping off of the wing, or sliding down the leading or trailing edge of the wing, makes it impossible to see the ground-contact point from inside the airplane because of the distance or the wing itself blocking the view. Some commenters to the Notice of Proposed Rulemaking (Notice No. 96-9) made this point, and the FAA response was:

> With respect to the potential for the exit to be somewhat remote from the point where the evacuees would contact the ground, the FAA agrees that this may be the case. The intent of the requirement is to enable a person to ascertain whether to open an exit, and whether it is safe to evacuate through the exit, based on an assessment of the outside conditions. To the extent that the means used for determination of the former does not also allow an assessment of the ground, the FAA agrees that an additional viewing means may be necessary, and that the additional means may be somewhat remote from the exit. We have therefore reworded the amendment to allow for the dual purpose of the viewing means, and to distinguish the required locations of the two.

Our intent in this rule was that it is *not* necessary for a person to be able to view the ground contact point while in position to open an overwing exit. The rule itself refers to the ground contact view separately from the view of conditions outside the exit, but the intent of the rule was not clearly expressed in the rule language. The FAA worked with the European Aviation Safety Agency (EASA) to improve the rule language based on our experience applying this rule. EASA incorporated the improved language in their Certification Specifications (CS) at amendment 25/12, dated July 13, 2012. CS 25.809(a)(3) states:

> For non-over-wing passenger emergency exits, a means must also be provided to permit viewing of the likely areas of evacuee ground contact when the exit is closed with the landing gears extended or in any condition of collapse. Furthermore, the likely areas of evacuee ground contact must be viewable with the exit closed during all ambient lighting conditions when all landing gears are extended.

The FAA is considering rulemaking to harmonize this requirement with EASA.

The FAA considers the petitioner's proposal to be in the public interest for the following reason. The proposed configuration provides a level of safety consistent with the intent of the rule. The petition proposes that the window does allow for outside viewing to assess the outside conditions prior to opening the exit. Then the evacuee can open the exit and step out onto the wing and move along the wing to assess the conditions where they would make first contact to the ground. At that point, if the conditions were not acceptable, evacuees would search for another location from which to exit off of the wing. To enforce literal compliance that is more stringent than our original intent for the rule would result in an unnecessary burden on the petitioner.

The FAA's decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator, Embraer is hereby granted an exemption from 14 CFR 25.809(a) at Amendment 25-116. The petition is granted to the extent necessary to allow Embraer to partially comply with outside viewing for the overwing exit on the right side of the Embraer Model EMB-550 airplanes. Specifically, the exemption allows viewing the first point of contact with the ground after the exit has been opened and the evacuee is on the upper surface of the wing on Embraer EMB-550 airplanes. Embraer must demonstrate compliance with all other requirements of 14 CFR 25.809(a) at Amendment 25-116 for this airplane.

Issued in Renton Washington, on April 25, 2013.

/s/ Ali Bahrami

Ali Bahrami
Manager, Transport Airplane Directorate
Aircraft Certification Service