

ERJ 190-200 LR,
G-FBEJ

Exeter Airport, Devon

28 February 2019

Accident

Investigation Synopsis

As the thrust levers were advanced for takeoff, on an early morning scheduled passenger flight, the flight crew detected an unusual odour and observed smoke entering the cockpit. They then moved the thrust levers to the idle position and applied the parking brake. The cabin crew subsequently reported that there were smoke and fumes in the cabin. Following an assessment of the situation, the commander initiated an emergency evacuation. During the evacuation, passengers who evacuated via the overwing exits reported being unsure of how to get down from the wing to the ground and several re-entered the cabin and exited via one of the escape slides.

The smoke and fumes were subsequently attributed to an incorrectly performed engine compressor wash procedure, which was carried out by maintenance personnel the night before the occurrence flight.

As a result of the findings of this investigation, the European Union Aviation Safety Agency (EASA) has undertaken two safety actions relating to the certification requirements for overwing emergency exits. The operator has also undertaken several safety actions relating to passenger safety briefings, processes for maintenance planning, engineer training, competency and welfare and monitoring of ground equipment.

Four Safety Recommendations are made relating to the certification requirements for overwing exit markings and the height requirement for overwing exits to be equipped with an assisted means of escape.

Safety Recommendation 2020-020

Justification

Despite the presence of a marked exit route on the wing with a non-slip surface, many passengers who exited via the overwing exits reported being uncertain where to go once out of the aircraft. Overwing exit route markings are not always readily identifiable and may be even less so in darkness. Poor weather conditions or the presence of smoke could also hinder identification of an exit route. It is apparent that the issue of ambiguous overwing escape route markings that resulted in previous AAIB Safety Recommendations 2002-42 and 2010-007 still exists.

Therefore, the following safety recommendation was made:

Safety Recommendation 2020-020

It is recommended that the European Union Aviation Safety Agency amends the certification requirements relating to the design, contrast and conspicuity of overwing exit escape route markings on commercial air transport aircraft, to ensure that the route to be taken from wing to ground is immediately apparent to evacuating passengers, in a range of emergency scenarios.

Date Safety Recommendation made: 10 September 2020

LATEST RESPONSE

Response received:

28 April 2023

The analysis of occurrences involving emergency evacuation from over-wing exits, including the subject incident, shows that some passengers may be confused about how to get off the wing down to the ground, because of the absence of a slide or other assisting means (typically when arriving at the wing trailing edge).

In the case of the subject incident, the flaps were not fully deployed such that the height of the wing trailing edge was in excess of 2 m i.e. higher than the certification limit of 1.8 m (as per Certification Specification (CS) 25.810(d)). This may have worsened the uncomfortable feeling of some passengers to get down from the wing. There is no complaint related to the clarity or the visibility of wing escape route markings.

The European Union Aviation Safety Agency (EASA) participated in the Emergency Evacuation Standards Aviation Rulemaking Committee (ARC) that was chartered to assist the USA Federal Aviation Administration (FAA) in carrying out the requirements of the FAA Reauthorization Act of 2018, Public Law 115-254, §337 to review aircraft evacuation certification with regard to emergency evacuation system designs and crew evacuation procedures.

The analysis of evacuation events (involving the use of over-wing exits) and of existing regulations led to the consideration of the following options:

1. Amend FAR (Federal Aviation Regulation) 25.813(c)(3)(ii)/CS 25.813(c)(5)(ii) to specify that if the exit is over a wing, and the aeroplane design does not include an off-wing assist means per FAR/CS 25.810(d), the placards must also indicate the direction of the evacuation route on the wing.
2. Review over-wing evacuation path marking requirements (FAR/CS 25.810(c)) and consider options for improving marking visibility/design to facilitate better recognition by passengers evacuating through over-wing exits of proper direction to exit from wing.
3. Reassess the requirement under FAR/CS 25.810 to define conditions that would require an escape slide. Other factors may drive different recommendations for over-wing exits (FAR/CS 25.810(d)) versus non-over-wing exits governed by FAR/CS 25.810(a).

EASA believes that the main action to investigate is the above option 3 related to the conditions that require an escape slide, as the reported concerns appear to be focused on aeroplanes not equipped with escape slides to support the evacuation from over wing exits.

Regarding option 1, the direction of the evacuation path on the wing is normally indicated by the passenger safety briefing material (to comply with Commission Regulation (EU) 965/2012, Annex IV (Part-CAT), point CAT.OP.MPA.170). EASA does not believe that adding this information on the placard located close to the overwing exit would add significant benefit. It may only be noticed by passengers seating close to the exits but not necessarily by other passengers.

Regarding option 2 (subject of this safety recommendation), EASA considers that the current certification specifications contained in CS 25.810(c) already ensure that wing escape routes are adequately designed. Therefore, EASA will not propose to modify the marking requirements provided for in CS 25.810(c).

Safety Recommendation Status

Closed

AAIB Assessment

Not Adequate

Action Status

No Planned Actions

Feedback rationale

EASA has reviewed the current certification specifications contained in CS25.810(c) and believes that they provide adequate identification of wing escape routes and will therefore not modify the marking requirements provided for in CS 25.810(c). (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 11 December 2020

The European Union Aviation Safety Agency (EASA) will assess this recommendation within the frame of the Best Intervention Strategy (BIS) for Emergency Evacuation. BIS are fundamental components of the Safety Risk Management (SRM) programming cycle used to assess the criticality of an issue, and identify the relevant actions for the European Plan for Aviation Safety (EPAS). A BIS report contains the assessment and rationale to determine relevant and proportionate actions.

The first draft of this BIS is planned for Q1/2021. The BIS will identify the need for action(s) and, if necessary, will define the adequate relevant one(s) to be included in the EPAS after consultation with the Advisory Bodies.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2020-021

Justification

Despite the presence of a marked exit route on the wing with a non-slip surface, many passengers who exited via the overwing exits reported being uncertain where to go once out of the aircraft. Overwing exit route markings are not always readily identifiable and may be even less so in darkness. Poor weather conditions or the presence of smoke could also hinder identification of an exit route. It is apparent that the issue of ambiguous overwing escape route markings that resulted in previous AAIB Safety Recommendations 2002-42 and 2010-007 still exists.

Therefore, the following safety recommendation was made:

Safety Recommendation 2020-021

It is recommended that the Federal Aviation Administration amends the certification requirements relating to the design, contrast and conspicuity of overwing exit escape route markings on commercial air transport aircraft, to ensure that the route to be taken from wing to ground is immediately apparent to evacuating passengers, in a range of emergency scenarios.

Date Safety Recommendation made: 10 September 2020

LATEST RESPONSE

Response received: 21 March 2023

The FAA evaluated the Emergency Evacuation Standards Aviation Rulemaking Committee's (ARC) Final Report and associated recommendations, and Title 14, Code of Federal Regulations § 25.810, Emergency Egress Assist Means and Escape Routes, including §§ 25.810 (a) and (d).

Based on this evaluation, we are in the process of developing parameters for a study to investigate passenger awareness and understanding of the escape route markings from over-wing exits to assist the evacuation of passengers to the ground, under certain emergency conditions. Specifically, this study is intended to review § 25.810 and assess the adequacy of existing over-wing exit escape route markings, and assess the 6 foot (1.8 meter) threshold for assist means cited in §§ 25.810 (a) and (d). This study is expected to start in Fiscal Year 2025 due to funding availability.

The ARC's final report is available at the following website:

https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/5488

We anticipate providing a follow-on response updating you on our actions no later than March 31, 2024.

Safety Recommendation Status Open

AAIB Assessment Partially Adequate

Action Status Planned Action Ongoing Update Due 31 March 2024

Feedback rationale

The AAIB recognises the actions that are being undertaken by the FAA and requests an update on progress by 31 March 2024. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 22 February 2021

The FAA chartered the Emergency Evacuation Standards Aviation Rulemaking Committee (ARC) to review various regulatory standards, and in-service events, that apply to emergency evacuations. The ARC also evaluated several issues cited by the National Transportation Safety Board, the United States Congress, and from public inquiries to the FAA, 2 related to recent emergency evacuations. This review included the emergency evacuation of the Embraer ERJ 190-200 LR (E195) aircraft on February 28, 2019, that led the UK AAIB to issue these safety recommendations.

Based on a review of the evacuation events through overwing exits, the ARC determined that some evacuees do not understand how or where to egress from a wing when no escape slide is provided. A review of the applicable regulations and guidance reveals potential for improvement, recognizing escape route markings alone do not always appear to provide enough instructions to guide evacuees to the location where they should exit from the wing.

The FAA will review the ARC recommendations upon their completion and determine what actions may be warranted by the safety benefit to be gained in relation to the cost of implementing any recommendations.

In conjunction with other aviation authorities, the FAA will review the requirements in Title 14, Code of Federal Regulations § 25.810, Emergency Egress Assist Means and Escape Routes for Marking the Escape Routes, from overwing exits.

We will determine what actions may be effective to improve passenger recognition and enable safe transition from the wing to the ground. This action will include reassessing the 6 foot (1.8 meter) threshold for assist means cited in §§ 25.810 (a) and (d). We will provide a follow-on response updating you on our actions no later than January 31, 2022.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2020-022

Justification

Emergency exits that do not meet the 1.8 m maximum height criteria of FAR/CS 25.810 are not required to be equipped with an evacuation slide. This applies equally to overwing and non-overwing exits. Jumping from heights of up to 1.8 m can be challenging for many passengers and has the potential to cause injury. Similar findings were documented in a 2009 EASA study and prior to that, an NTSB safety study, which made a Safety Recommendation to the FAA on this subject.

Therefore, the following safety recommendation was made:

Safety Recommendation 2020-022

It is recommended that the European Union Aviation Safety Agency, re-evaluate and reduce the 1.8 m height criteria in CS 25.810(a) and (d), for the provision of an assisted means of escape at emergency exits, to minimise passenger injuries and reduce egress time during emergency evacuations.

Date Safety Recommendation made: 10 September 2020

LATEST RESPONSE

Response received: 28 April 2023

The analysis of occurrences involving emergency evacuation from over-wing exits, including the subject incident, shows that some passengers may be confused about how to get off the wing down to the ground, because of the absence of a slide or other assisting means (typically when arriving at the wing trailing edge).

In the case of the subject incident, the flaps were not fully deployed such that the height of the wing trailing edge was in excess of 2 m i.e. higher than the certification limit of 1.8 m (as per EASA Certification Specification (CS) 25.810(d)). This may have worsened the uncomfortable feeling of some passengers to get down from the wing.

The European Union Aviation Safety Agency (EASA) participated in the Emergency Evacuation Standards Aviation Rulemaking Committee (ARC) that was chartered to assist the USA Federal Aviation Administration (FAA) in carrying out the requirements of the FAA Reauthorization Act of 2018, Public Law 115-254, §337 to review aircraft evacuation certification with regard to emergency evacuation system designs and crew evacuation procedures.

The analysis of evacuation events (involving the use of over-wing exits) and of existing regulations led to the consideration of the following options:

1. Amend FAR (Federal Aviation Regulation) 25.813(c)(3)(ii)/CS25.813(c)(5)(ii) to specify that if the exit is over a wing, and the aeroplane design does not include an off-wing assist means per FAR/CS 25.810(d), the placards must also indicate the direction of the evacuation route on the wing.
2. Review over-wing evacuation path marking requirements (FAR/CS25.810(c)) and consider options for improving marking visibility/design to facilitate better recognition by passengers evacuating through over-wing exits of proper direction to exit from wing.

3. Reassess the requirement under FAR/CS 25.810 to define conditions that would require an escape slide. Other factors may drive different recommendations for over-wing exits (FAR/CS25.810(d)) versus non-over-wing exits governed by FAR/CS25.810(a).

EASA believes that the main action to investigate is the above option 3 related to the conditions that require an escape slide, as the reported concerns appear to be focused on aeroplanes not equipped with escape slides to support the evacuation from over wing exits.

It should nevertheless be noted that the large aeroplane types for which EASA is the primary certification authority are not primarily concerned by the issue at stake, because:

- All aeroplanes with low wings configurations (Airbus, Fokker) are equipped with slides to assist the evacuation from the wing down to the ground,
- Business jets (Dassault) are not equipped with slides to assist the evacuation from the wing down to the ground. However, the height of the terminal point of the escape route is well below 1.8 m (6 feet) and the number of occupants to evacuate is very limited,
- Turboprop aeroplanes (e.g. ATR, Saab, Fokker) either do not have over-wing escape route because of high wing configuration, or the height of the terminal point of the escape route is well below 1.8 m (6 feet).

Regarding option 1, the direction of the evacuation path on the wing is normally indicated by the passenger safety briefing material (to comply with Commission Regulation (EU) 965/2012, Annex IV (Part-CAT), point CAT.OP.MPA.170). EASA does not believe that adding this information on the placard located close to the overwing exit would add significant benefit. It may only be noticed by passengers seating close to the exits but not necessarily by other passengers.

Regarding option 2, EASA considers that the current certification specifications contained in CS 25.810(c) already ensure that wing escape routes are adequately designed.

EASA considers that the assessment of option 3 requires research to be conducted to identify any different adequate conditions (including height) for requiring an escape slide. EASA is investigating the feasibility of funding such research.

EASA Status: Open

Safety Recommendation Status **Open**

AAIB Assessment **Partially Adequate**

Action Status **Planned Action Ongoing Update Due 31 March 2024**

Feedback rationale

The AAIB recognises the steps being taken by EASA and requests an update by 31 March 2024. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 11 December 2020

The European Union Aviation Safety Agency (EASA) will assess this recommendation within the frame of the Best Intervention Strategy (BIS) for Emergency Evacuation. BIS are fundamental components of the Safety Risk Management (SRM) programming cycle used to assess the criticality of an issue, and identify the relevant actions for the European Plan for Aviation Safety (EPAS). A BIS report contains the assessment and rationale to determine relevant and proportionate actions.

The first draft of this BIS is planned for Q1/2021. The BIS will identify the need for action(s) and, if necessary, will define the adequate relevant one(s) to be included in the EPAS after consultation with the Advisory Bodies.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2020-023

Justification

Emergency exits that do not meet the 1.8 m maximum height criteria of FAR/CS 25.810 are not required to be equipped with an evacuation slide. This applies equally to overwing and non-overwing exits. Jumping from heights of up to 1.8 m can be challenging for many passengers and has the potential to cause injury. Similar findings were documented in a 2009 EASA study and prior to that, an NTSB safety study, which made a Safety Recommendation to the FAA on this subject.

Therefore, the following safety recommendation was made:

Safety Recommendation 2020-023

It is recommended that the Federal Aviation Administration, re-evaluate and reduce the 1.8 m height criteria in FAR 25.810(a) and (d), for the provision of an assisted means of escape at emergency exits, to minimise passenger injuries and reduce egress time during emergency evacuations.

Date Safety Recommendation made: 10 September 2020

LATEST RESPONSE

Response received: 21 March 2023

The FAA evaluated the Emergency Evacuation Standards Aviation Rulemaking Committee's (ARC) Final Report and associated recommendations, and Title 14, Code of Federal Regulations § 25.810, Emergency Egress Assist Means and Escape Routes, including §§ 25.810 (a) and (d).

Based on this evaluation, we are in the process of developing parameters for a study to investigate passenger awareness and understanding of the escape route markings from over-wing exits to assist the evacuation of passengers to the ground, under certain emergency conditions.

Specifically, this study is intended to review § 25.810 and assess the adequacy of existing over-wing exit escape route markings, and assess the 6 foot (1.8 meter) threshold for assist means cited in §§ 25.810 (a) and (d). This study is expected to start in Fiscal Year 2025 due to funding availability.

The ARC's final report is available at the following website:

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Safety Recommendation Status Open

AAIB Assessment Partially Adequate

Action Status Planned Action Ongoing Update Due 31 March 2024

Feedback rationale

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In conjunction with other aviation authorities, the FAA will review the requirements in Title 14, Code of Federal Regulations § 25.810, Emergency Egress Assist Means and Escape Routes for Marking the Escape Routes, from overwing exits.

We will determine what actions may be effective to improve passenger recognition and enable safe transition from the wing to the ground. This action will include reassessing the 6 foot (1.8 meter) threshold for assist means cited in §§ 25.810 (a) and (d). We will provide a follow-on response updating you on our actions no later than January 31, 2022.

AAIB Assessment – Partially Adequate Open