

TECHNICAL REPORT

A-022/2022

**Accident occurring on 26 April 2022
during disembarkation of a Boeing 737-
800 aircraft bearing the registration EL-
ENK, operated by RYANAIR, at Almería
Airport (Spain)**

NOTICE

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission regarding the circumstances of the accident that is the object of the investigation, its probable causes, and its consequences.

In accordance with the provisions in Article 5.4.1 of Annexe 13 of the International Civil Aviation Convention; and with Articles 5.6 of Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010; Article 15 of Law 21/2003 on Air Safety; and Articles 1 and 21.2 of RD 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent their recurrence. The investigation is not intended to attribute any blame or liability, nor to prejudge any decisions that may be taken by the judicial authorities. Therefore, and according to the laws specified above, the investigation was carried out using procedures not necessarily subject to the guarantees and rights by which evidence should be governed in a judicial process.

As a result, the use of this report for any purpose other than the prevention of future accidents may lead to erroneous conclusions or interpretations.

CONTENTS

NOTICE.....	1
CONTENTS.....	2
ABBREVIATIONS	3
SYNOPSIS	4
1.FACTUAL INFORMATION	5
1.1. Overview of the accident	5
1.2. Injuries to persons	5
1.3. Damage to the aircraft	5
1.4. Other damage	5
1.5. Information about the personnel	5
1.5.1. Captain	5
1.5. 2. Co-pilot	5
1.5.3. Cabin crew	6
1.6. Information about the aircraft	6
1.7.Meteorological information	8
1.8.Aids to navigation	8
1.9.Communications	8
1.10.Information about the aerodrome	8
1.11.Flight recorders	8
1.12. Aircraft wreckage information	8
1.13.Medical and pathological information	8
1.14.Fire	8
1.15.Survival aspects	8
1.16.Tests and research	9
1.17.Organisational and management information.....	9
1.18.Additional information	9
1.18.1. FAA regulations that apply to built-in stairs on commercial air transport aircraft	9
1.18.2. EASA regulations that apply to built-in stairs on commercial air transport aircraft.....	9
1.19. Useful or effective investigation techniques	9
2. ANALYSIS	10
3. CONCLUSION	11
3.1. Findings	11
3.2. Causes/Contributing factors	11
4. RECOMMENDATIONS	12

ABBREVIATIONS

° ‘ “	Degrees, minutes, seconds
°	Sexagesimal degrees
%	Per cent
AAIB	United Kingdom Air Accidents Investigation Branch
AIP	Aeronautical Information Publication
ATC	Air Traffic Control
ATPL (A)	Air transport pilot licence (aircraft)
CPL(A)	Commercial pilot licence (aircraft)
E	East
EASA	European Union Aviation Safety Agency
EGCC	ICAO code for Manchester Airport (UK)
FAA	United States Federal Aviation Administration
ft	Feet
h	Hour
IAA	Irish Aviation Authority
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IR(A)	Instrument rating (aircraft)
FI(A)-SEP	Flight instructor rating for single-engine piston aircraft
kg	Kilogram
LEAM	ICAO code for Almería Airport
LEIB	ICAO code for Ibiza Airport (Balearic Islands)
LEST	ICAO code for Santiago de Compostela Airport (La Coruña)
LEVC	ICAO code for Valencia Airport
m	Metre
MEP(land)	Multi-engine piston aircraft rating
ME/IR(MPA)	Instrument flight rating for multi-engine, multi-pilot aircraft
ME/IR(SPA)	Instrument flight rating for multi-engine, single-pilot aircraft
N	North
No.	Number
SE(IR)	Single engine Instructor rating
SEP(Land)	Single engine piston rating

TECHNICAL REPORT

A-022/2022

AIRCRAFT

Owner and Operator: RYANAIR

Aircraft: BOEING 737-800, registration EI-ENK.

Date and time of the accident: 26 April 2022, 19:08 h (local time¹).

Location of the accident: Almería Airport.

Persons on board: One hundred and twenty-two (122): six (6) crew members and one hundred and sixteen (116) passengers.

Flight rules: IFR.

Type of flight: Commercial air transport - Scheduled - With passengers.

Date of Approval: 25 May 2022

SYNOPSIS

Summary:

The BOEING 737-800 aircraft on registration EI-ENK landed at Almería Airport at 19:00 h and made its way to stand 23.

At 19:08 h, during disembarkation, one of the passengers descending the stairs at the aircraft's front door fell down the last few steps onto the apron. The passenger suffered serious injuries and had to be taken to hospital for medical treatment.

The investigation has determined that the fall occurred by chance.

¹ UTC can be calculated by subtracting two units from the local time.

1. FACTUAL INFORMATION

1.1. Overview of the accident

The BOEING 737-800 aircraft on registration EI-ENK departed from Manchester Airport (EGCC) in the UK and landed at Almería Airport at 19:00 h, where it made its way to stand 23.

At 19:08 h, during disembarkation, one of the passengers descending the stairs at the aircraft's front door fell down the last few steps onto the apron, suffering serious injuries.

Initially, the injured passenger was given first aid by the senior flight attendant; however, the latter was hindered in his work by another passenger, who was trying to film the scene.

The captain immediately alerted Air Traffic Control (ATC), who in turn alerted the medical services, which took the injured passenger to hospital.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal	0	0	0	0
Serious	0	1	1	0
Minor	0	0	0	0
Unharmed	6	115	121	0
TOTAL	6	116	122	0

1.3. Damage to the aircraft

N/A

1.4. Other damage

N/A

1.5. Information about the personnel

1.5.1. Captain

The 40-year-old captain had held a commercial air transport pilot licence (ATPL(A)) since 10 January 2012.

He was rated to fly BOEING 737 300-900 series aircraft and had an instrument flight rating for multi-engine, multi-pilot aircraft (ME/IR(MPA)). His English proficiency level was six (6).

He had total flight experience of 9,813:58 h, of which 9,669:28 h were on type. His licence and corresponding Class 1 medical certificate were valid.

1.5.2. Co-pilot

The 39-year-old co-pilot had held a commercial aircraft pilot licence (CPL(A)) since 13 October 2018. He had completed the theory part of the commercial air transport pilot licence (ATPL(A)) examination.

He was rated to fly BOEING 737 300-900 series aircraft and had an instrument flight rating for multi-engine, multi-pilot aircraft (ME/IR(MPA)). He also had an ME/IR(SPA) instrument flight rating for multi-engine aircraft, an MEP(land) instrument flight rating for multi-engine piston aircraft, an SE/IR instrument flight rating for single-engine aircraft and an SEP(land) rating for single-engine piston aircraft. His language proficiency level was six (6) for both English and Swedish.

He had total flight experience of 1,900 h, of which 1,670 h which were on type. His licence and corresponding Class 1 medical certificate were valid.

1.5.3. Cabin crew²

The 29-year-old senior flight attendant was the holder of cabin crew attestation, and had 2,951:46 h of experience in type.

The 23-year-old attendant no. 2 was the holder of cabin crew attestation, and had 885:24 h of experience in type.

The 23-year-old attendant no. 3 was the holder of cabin crew attestation, and had 253:56 h of experience in type.

The 21-year-old attendant no. 4 was the holder of cabin crew attestation, and had 239:15 h of experience in type.

1.6. Information about the aircraft

The BOEING B-737-8AS is a transport aircraft with a wingspan of 34.3 m, a length of 39.5 m and a total height of 12.57 m. It is fitted with two CFM CFM56-7B26E engines. Its unladen weight is 66.990 kg and its maximum take-off weight is 79,015 kg.

The model involved in the accident bore the registration EI-ENK and was manufactured with the serial number 40303. It had a valid airworthiness certificate (number 2703), issued by the Irish Aviation Authority (IAA) on 20 January 2011.

According to the information provided by BOEING, the retractable stairs built into the front of the aircraft are an option that was only included on the 737 NG and 737 MAX models. Ryanair was the first airline to incorporate these models into its fleet.

These types of stairs have narrower steps and thinner and lighter handrails than the external stairs that are normally provided by airport handling services³.

The dimensions of the stairs are defined in the BOEING document titled “Airplane Characteristics for Airport Planning”. The height of the stairs can vary, ranging from 1.85 m to 2 m, with a length of 3.53 m. Consequently, the gradient of the slope ranges from 62% to 69%, respectively.

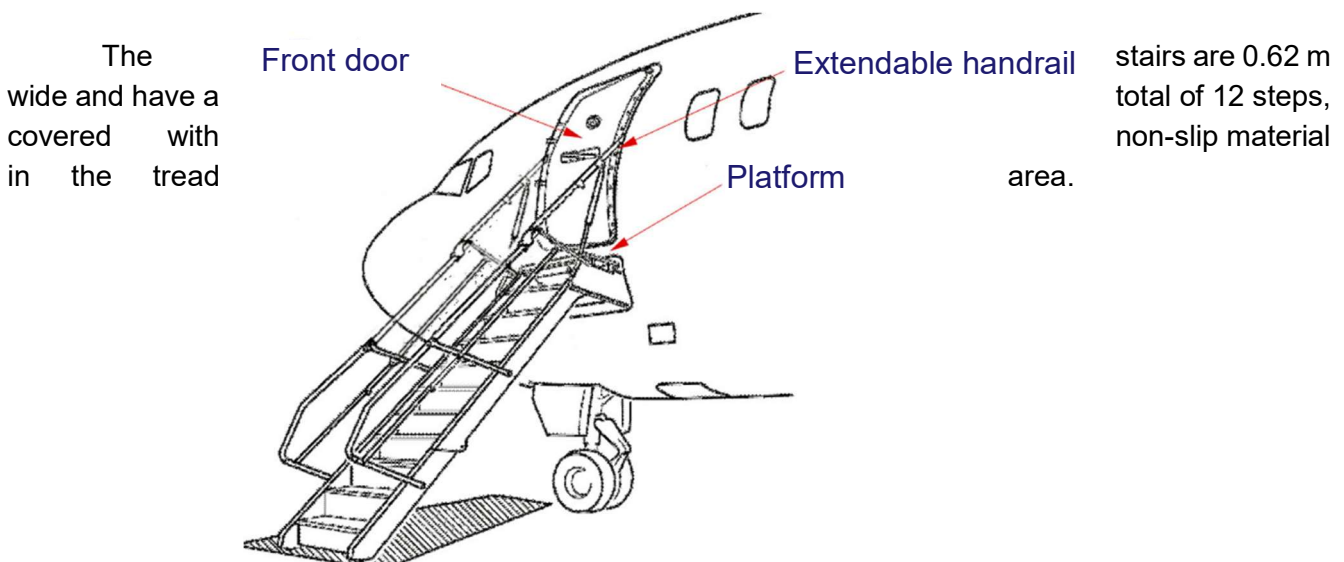


Figure 1. Extendable front stairs on the Boeing 737-8SA

² The senior flight attendant and attendant no. 4 operated at the front of the aircraft, while the other two attendants operated at the rear.

³ The Resolution of 15 January 2014 issued by the Directorate-General for Industry and Small and Medium Enterprises specifies the UNE standards approved by the Spanish Association for Standardisation and Certification (AENOR). The standard that regulates these types of stairs is UNE-EN 12312-1:2013, “Ground Equipment for Aircraft: Specific Requirements. Part 1: Passenger Stairs”.

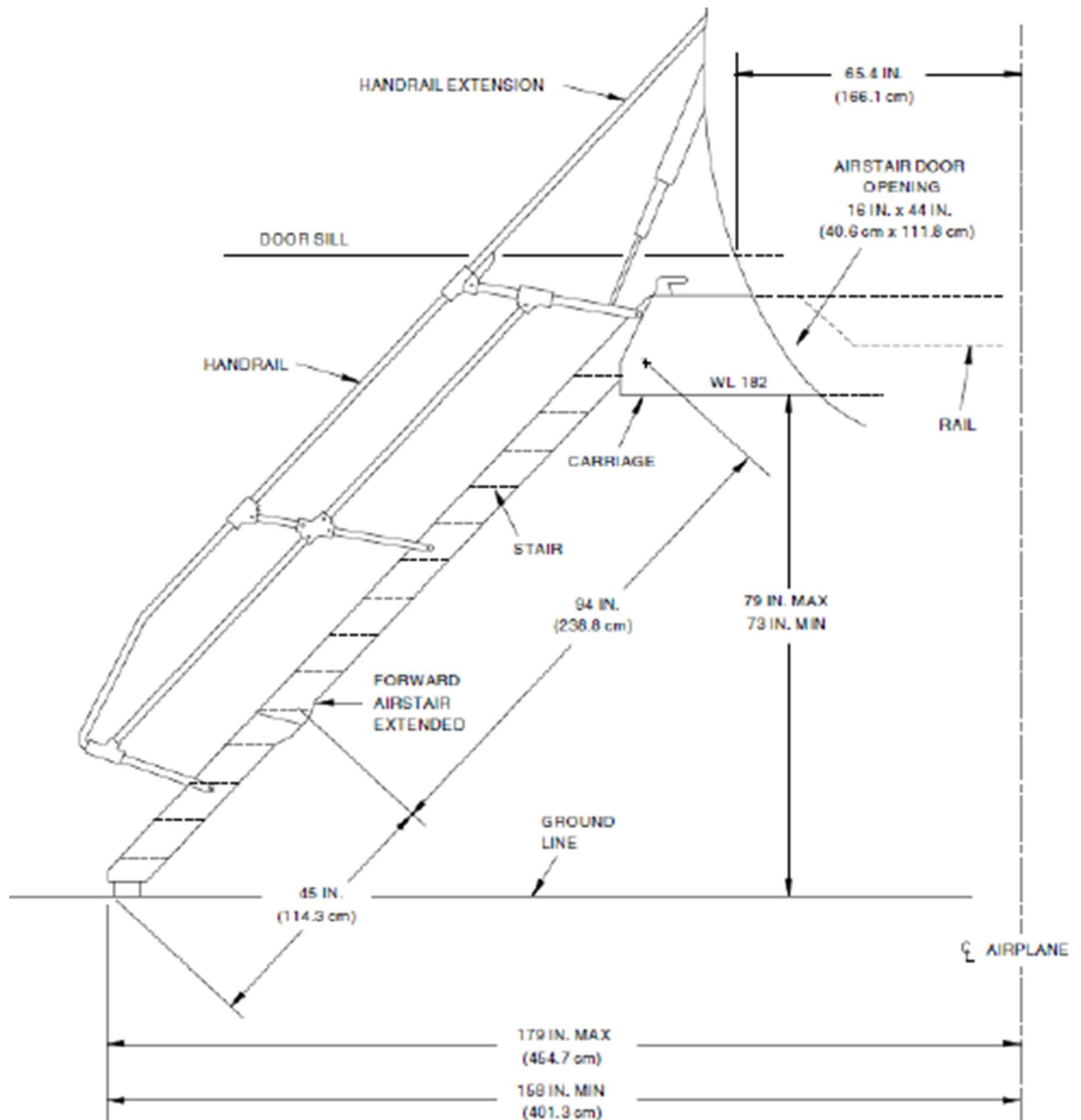


Figure 2. Dimensions of the extendable front stairs on the Boeing 737-8SA

In recent years, Ryanair has introduced the following safety measures to the built-in stairs on its BOEING 737-8SA aircraft, in order to reduce the risk of passengers falling.

1. The steps are covered with a non-slip material: specifically, 3M Safety Walk 710 - Coarse⁴ and 3M Safety Walk 610 - General Use⁵.
2. In June 2010, retractable, high-visibility safety barriers were installed in the lower part of the forward bulkhead and the lower part of the side wall of the cabin.
3. In December 2010, the built-in stairs were fitted with detachable rails, which serve as an additional visual aid for the handrails on the stairs. They are installed during boarding and disembarkation via the front door; the ends of the rail are attached to the support strut, which is located on the cabin floor by the doorway, and to the stairs themselves.
4. The aircraft involved in this accident had been fitted with warning signs as per Special Airworthiness Information Bulletin (SAIB) NM-07-47⁶, issued by the FAA in September 2007.

1.7. Meteorological information

This is not relevant to the investigation.

1.8. Aids to navigation

N/A

1.9. Communications

There is no evidence of any recorded communications.

1.10. Information about the aerodrome

Almería Airport (LEAM) in Andalusia is located 9 km east of the city and is classified 4E⁷ by the ICAO.

The airport's reference point coordinates are 36° 52' 38" N – 2° 22' 12" W and it has an elevation of 21 m (70 ft). It has one runway, designated 07/25, measuring 3,200 m long by 45 m wide.

The airport has no medical facilities.

1.11. Flight recorders

N/A

1.12. Aircraft wreckage and impact information

N/A

1.13 Medical and pathological information

N/A

1.14. Fire

N/A

1.15. Survival aspects

Almería Airport has no medical services; consequently, in the event of a medical emergency it is necessary to contact external medical services.

⁴ 3M Safety Walk Coarse Tapes and Treads – 700 Series is a non-slip material made from large abrasive particles that are bonded by a strong and durable polymer to a dimensionally stable plastic film. The reverse side is coated with a pressure-sensitive adhesive covered by a removable protective liner.

⁵ 3M Safety Walk Slip-Resistant General Purpose Tapes and Treads – 600 Series is a non-slip material made from abrasive particles that are bonded by a strong and durable polymer to a dimensionally stable plastic film. The reverse side is coated with a pressure-sensitive adhesive covered by a removable protective liner.

⁶ [https://rql.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/0/cab005ca55f1abd78625734e006eb6b7/\\$FILE/NM-07-47.pdf](https://rql.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/0/cab005ca55f1abd78625734e006eb6b7/$FILE/NM-07-47.pdf)

⁷ The number 4 indicates a minimum reference field length of 1,800 m, while the letter E indicates that aircraft must have a wingspan of between 52 m and 65 m, and a maximum outer main landing gear wheel span of between 9 m and 14 m, in order to use the airport.

The aircraft had warning signs advising the passengers to hold onto the handrail when descending the stairs. Furthermore, as part of the disembarkation procedure, the operator issued a passenger announcement in English instructing passengers to use the handrail when descending the stairs.

1.16. Tests and research

N/A

1.17. Organisational and management information

Ryanair's disembarkation procedures stipulate that, before proceeding to disembark the passengers, the following announcement must be made:

"Ladies and gentlemen, you may now disembark the aircraft using both the forward and rear doors. All passengers should use the handrail provided when walking down the stairs. For passengers travelling with children, please hold their hands as you walk down the stairs and until you are inside the terminal building. Walk around the wing and not under the wing. Thank you and good morning/afternoon/evening".

During the investigation, Ryanair clarified that this announcement is made only in English.

1.18. Additional information

1.18.1. United States FAA regulations that apply to built-in stairs on commercial air transport aircraft

In Part 25 of the Airworthiness Standards: Transport Category Airplanes, which form part of the FAR (Federal Aviation Regulations) issued by the FAA, there are no requirements regarding built-in stairs for commercial air transport aircraft.

However, in September 2007, after four (4) events in which small children were injured due to falling down the stairs, the FAA issued SAIB NM-07-47 to owners and operators of BOEING 737 aircraft equipped with built-in stairs. It recommended the implementation of Service Bulletin (SB) 737-52-1157 issued by BOEING and SB 870700-52-2130 issued by Monogram Systems (the staircase manufacturer), which was referred to in the aforementioned BOEING SB. These service bulletins recommend that warning signs should be placed on the stair risers and door frames, advising passengers travelling with small children to hold their hands when climbing or descending the stairs. They also recommend the use of anti-slip material on the upper platform and side handrails. BOEING also revised the Flight Attendant Manual, advising that special attention be paid to passengers with special needs or those travelling with small children.

In June 2012, the FAA issued Advisory Circular (AC) 150/5220-21C on boarding equipment used on aircraft. With regard to stairs, the Circular indicated that they must comply with the requirements of Aerospace Recommended Practices (ARP) 836 issued by the Society of Automotive Engineers (SAE). However, as indicated by BOEING during the investigation, this rule only applies to the external stairs provided by airport handling services and not to the built-in stairs on BOEING 737 aircraft.

1.18.2. EASA regulations that apply to built-in stairs on commercial air transport aircraft

The EASA does not include any requirements in its regulations. However, in its 2009 Study on CS-25 Cabin Safety Requirements, the EASA addressed the possibility of establishing requirements for built-in stairs on aircraft: specifically, in "Recommendation 48 for incorporating industry standards for general occupant safety (e.g. slip, trip and fall prevention)".

1.19. Special investigation techniques

N/A

2. ANALYSIS

The fall occurred by chance.

During the investigation, it was confirmed that the crew members acted in accordance with the established procedures and that the operator complied with its regulatory requirements.

The investigation has determined that the assistance provided by the aircraft's crew was adequate, and that the response time of the emergency medical services in the Autonomous Community in question was within the expected parameters.

3. CONCLUSIONS

3.1. Findings

- The BOEING 737-800 aircraft bearing the registration EI-ENK landed at Almería Airport at 19:00 h and made its way to stand 23.
- At 19:08, during disembarkation, one of the passengers descending the stairs at the aircraft's front door fell down the last few steps onto the apron.
- An alert was immediately issued to the emergency medical services of the Autonomous Community in question, who attended to the injured passenger and took them to hospital.

3.2. Causes/contributing factors

The investigation has determined that the fall occurred by chance.

4. RECOMMENDATIONS

The Civil Aviation Accident and Accident Investigation Commission (CIAIAC) has carried out the following investigations into similar events:

- Accident occurring on 7 June 2010 (A-017-2010): while boarding via the front stairs of a BOEING 737-800 aircraft, a young girl being carried by her father fell from the top of the stairs onto the ground, slipping through the gap between the handrail and the upper platform of the stairs. The published report noted that the girl's father had both hands full at the time the accident occurred.

No safety recommendations were issued, as the recommendations previously issued by the UK's Air Accidents Investigation Branch (AAIB)⁸ following a similar accident at an airport in London on 17 July 2009 were considered to be sufficient for the prevention of future accidents.

The aforementioned safety recommendations were as follows:

- That BOEING establish a process to inform the operators of all BOEING commercial aircraft of changes to the relevant Flight Attendants Manual⁹.
- That Ryanair review their current passenger boarding and disembarking procedures so that assistance is made available to passengers accompanied by children, and those with special needs.
- That BOEING review the design of the BOEING 737 forward airstairs with the intention of adding a removable barrier to minimise the possibility of a child falling through the gap between the extendable handrail and its upper platform.

Subsequently, a number of similar events have occurred in Europe (no similar events have been reported in the United States, according to the NTSB), in which passengers have fallen from the stairs while boarding or disembarking from a BOEING 737 aircraft. However, the respective authorities that carried out the corresponding investigations did not consider it necessary to issue any additional safety¹⁰ recommendations. In total, seventeen (17) events have occurred since 2010. Several of them occurred in Spain in 2021.

- Accident occurring on 12 May 2021 (A-020/2021), which occurred after the BOEING 737-8AS aircraft bearing the registration number EI-EGA took off from Gothenburg Airport (ESGG), landed at Alicante Airport (LEAL) and parked on stand 16 of the apron. During disembarkation, a passenger who was carrying two (2) suitcases fell from the top of the front stairs when one of the suitcases became trapped in the staircase, preventing the passenger from grabbing onto the handrail. During the fall, the passenger struck another passenger who was standing on the apron. The passenger who fell sustained serious injuries. The crew stopped the disembarkation via the front stairs and redirected the rest of the passengers towards the rear exit of the aircraft. The ground staff provided immediate assistance to the injured passenger, who was subsequently taken to hospital.

⁸The report can be downloaded via the following link:

https://www.google.es/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwim_MLu3-nwAhVD-qQKHTqJAUJQFjAAegQIBBAD&url=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fmedia%2F5422ef83ed915d137100026b%2FBoeing_737-800_EI-DLJ_08-10.pdf&usq=AOvVaw2b1zHKzsonPIImov13R1OT

⁹ This recommendation was issued because Boeing had added the following warning to its Manual without ensuring all operators were informed of the update:

WARNING: As passengers are boarding or deplaning, pay particular attention to persons with small children or those with special needs. Small children on airstairs should be attended by an adult or responsible person.

¹⁰ In 2019, a boy fell from the stairs while disembarking from a Boeing 737 aircraft at an airport in London. The accident was investigated by the AAIB. The report can be downloaded via the following link:

https://www.google.es/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwi4oei-4enwAhXD26QKHVR5C18QFjAAegQIBhAD&url=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fgovernment%2Fuploads%2Fsystem%2Fuploads%2Fattachment_data%2Ffile%2F919999%2FAAIB_Bulletin_2-2020_Hi_res.pdf&usq=AOvVaw3llzi63Xe4J3owSN2mz3cy

In its report, the AAIB indicated that it had identified eight events in Europe since 2009, six of them involving children of various ages falling from the stairs of a Boeing 737 aircraft.

In 2020, an accident at Charleroi Airport was investigated by the Belgian Air Accident Investigation Unit (AAIU). In that instance, it was an adult who fell down the stairs while disembarking. The report can be downloaded via the following link: <http://www.aaiu.ie/node/1491>

The investigation determined that the accident was caused by the passenger disregarding the instruction to carry just one suitcase while disembarking, given that the stairs are not wide enough to descend with two suitcases. Moreover, anyone carrying two suitcases would be unable to grasp the handrail should they lose their balance.

Two safety recommendations were issued to Ryanair:

REC 01/22. It is recommended that Ryanair modify its disembarkation procedure and issue the warning concerning the use of the handrail when descending the stairs in the official languages of the departure and destination countries, as well as in English.

REC 02/22. It is recommended that Ryanair reinforce its disembarkation procedure to stipulate that if a member of the cabin crew observes a passenger intending to descend the forward stairs without a free hand, they should remind them that they must use the handrail when descending the stairs.

Accident occurring on 13 June 2021 (A-025/2021), in which the BOEING 737-8AS aircraft bearing the registration number EI-EVE departed from Charleroi Airport (EBCI) in Belgium, landed at Malaga Airport (LEMG) and parked on stand 48 of the apron. At 23:21, during disembarkation, one of the passengers fell from the front stairs while descending. The passenger received assistance from the airport's medical services and was taken to hospital by ambulance for subsequent treatment (the passenger's hip was broken and required surgery). It was not possible to determine the cause of the accident, and nor was it considered appropriate to issue any additional safety recommendations further to those issued during the previous investigation.

Subsequently, there were two further accidents in Spain in which passengers fell while disembarking from the front stairs of other BOEING 737 aircraft, also operated by Ryanair. They both occurred on 16 July 2021, at Malaga Airport and Valencia Airport, respectively; however, neither of them met the criteria to be considered an accident or serious incident under Regulation (EU) 996/2010.

- Accident occurring on 10 December 2021 (IN-053/2021), in which the BOEING 737-8AS aircraft bearing the registration number EI-DLH departed from Valencia Airport (LEVC) and landed at Santiago de Compostela Airport (LEST). During disembarkation, a passenger fell from the front stairs while descending with two suitcases and without using the handrail.

The passenger was assisted by the airport's medical services and taken by ambulance to hospital.

- Accident occurring on 3 March 2022 (A-013/2022), in which the BOEING 737-800 aircraft bearing the registration number EI-DHH landed at Ibiza Airport (LEIB) at 21:30 and made its way to stand 12.

At 21:45, during disembarkation, one of the passengers descending the stairs at the aircraft's front door fell down the last two steps onto the apron. The passenger suffered serious injuries and had to be taken to hospital for medical treatment.

The investigation has determined that the fall was unforeseen and occurred by chance.