

Technical report

IN-053/2021

Incident involving a Boeing 737-8AS aircraft, registration number EI-DLH, on 10 December 2021 at Santiago Airport (La Coruña, Spain)

Please note that this report is not presented in its final layout and therefore it could include minor errors or need type corrections, but not related to its content. The final layout with its NIPO included (Identification Number for Official Publications) will substitute the present report when available.



Notice

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances of the accident and its causes and consequences.

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.6 of Regulation (UE) nº 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1 and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidences in a judicial process.

Consequently, any use of this report for purposes other than that of preventing future accidents may lead to erroneous conclusions or interpretations.

This report was originally issued in Spanish. This English translation is provided for information purposes only.

CONTENTS

Notice	ii
CONTENTS.....	iii
ABBREVIATIONS.....	iv
Synopsis.....	v
1. THE FACTS OF THE INCIDENT	7
1.1. Summary of the incident	7
1.2. Injuries to persons	7
1.3. Damage to the aircraft	7
1.4. Other damage.....	7
1.5. Information about the personnel	7
1.6. Information about the aircraft	7
1.7. Meteorological information.....	11
1.8. Aids to navigation	11
1.9. Communications.....	11
1.10. Information about the aerodrome	11
1.11. Flight recorders	11
1.12. Aircraft wreckage and impact information.....	11
1.13. Medical and pathological information	11
1.14. Fire.....	12
1.15. Survival aspects	12
1.16. Tests and research	12
1.17. Organisational and management information	14
1.18. Additional information.....	14
1.19. Special investigation techniques	14
2. ANALYSIS	15
2.1. Analysis of the safety of integrated airstairs on aircraft	15
2.2. Analysis of Ryanair's disembarkation procedure.....	15
2.3. Analysis of the passenger's actions while disembarking	16
3. CONCLUSIONS.....	16
3.1. Findings.....	16
3.2. Causes/contributing factors	16
4. OPERATIONAL SAFETY RECOMMENDATIONS	17

ABBREVIATIONS

° ‘ “	Sexagesimal degrees, minutes and seconds
°C	Degrees Celsius
%	Per cent
AC	Advisory Circular
AENOR	Spanish Association for Standardisation and Certification
AMC	Acceptable Means of Compliance
ARP	Aerospace Recommended Practice
ATPL(A)	Airline Transport Pilot Licence (aircraft)
EASA	European Aviation Safety Agency
FAA	United States Federal Aviation Administration
FAR	Federal Aviation Regulations
ft	Feet
h	Hours
hPa	Hectopascals
IFR	Instrument Flight Rules
kg	Kilogrammes
km	Kilometres
kt	Knots
LEST	ICAO code for Santiago Airport
LEVC	ICAO code for Valencia Airport
m	Metres
METAR	Aviation routine weather report (in aeronautical meteorological code)
ICAO	International Civil Aviation Organisation
QNH	Altimeter subscale setting that indicates elevation while on the ground
SAE	Society of Automotive Engineers
SAIB	Special Airworthiness Information Bulletin
SB	Service Bulletin
TAF	Terminal Aerodrome Forecast
UNE	A Spanish standard
UTC	Coordinated Universal Time

Technical report

IN-053/2021

Operator	Ryanair Designated Activity Company
Aircraft:	Boeing 737-8AS, registration number EI-DLH (Ireland)
Date and time of incident:	10 December 2021, 13:25 h ¹
Site of incident:	Santiago Airport (La Coruña)
Persons on board:	6 (crew members), 174 (passengers)
Type of flight:	Commercial air transport - Scheduled - Domestic - With passengers
Phase of flight:	-
Type of operation:	IFR
Date of approval:	30 March 2022

Synopsis

Summary:

On Friday, 10 December 2021, the Boeing 737-8AS aircraft bearing registration number EI-DLH departed from Valencia Airport (LEVC), landed at Santiago Airport (LEST) and was parked on stand 11 of the apron. At approximately 13:25 h, the passengers began to disembark via the aircraft's forward stairs. One of the passengers, who was carrying a suitcase in one hand and a coat in the other, fell down the last three steps of the staircase.

The passenger landed face down, with the lower half of his body on the stairs and the upper half on the apron. He suffered several abrasions on the palms of both hands and his right knee and nose, in addition to cuts on his nose and lips.

Assistance from a nurse was requested; however, as no nurses were available at the airport at that time, an ambulance was called and arrived some 30 minutes later. The passenger was taken to the hospital, where he received stitches for his cuts.

Prior to the incident that is the subject of this report, there had been another four instances of passengers falling while disembarking via the forward stairs of Boeing 737 aircraft operated by Ryanair in Spain. One of them occurred on 12 May 2021 at Alicante Airport and was investigated by the CIAIAC (reference A-020/2021) due to the severity of the passenger's injuries. Another occurred on 13 June 2021 at Malaga Airport and

¹ All times referenced in this report are local time. The UTC is 1 hour less.

was also investigated by the CIAIAC (reference A-025/2021) due to the severity of the passenger's injuries. The other two falls 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.

While this incident was being investigated, another passenger fell while disembarking the forward stairs of a Boeing 737 aircraft operated by Ryanair in Spain. The fall occurred on 14 February 2022 at Alicante Airport; however, it did not meet the criteria to be considered an accident or serious incident under Regulation (EU) 996/2010.

The investigation has determined that the cause of the incident was the passenger descending the stairs with a suitcase in one hand and a coat in the other, which was not in accordance with the operator's disembarkation instructions .

Given that safety recommendations have already been issued in relation to the event covered by the A-020/2021 report, no further safety recommendations are issued in relation to the findings of this report.

1. THE FACTS OF THE INCIDENT

1.1. Summary of the incident

On Friday, 10 December 2021, the Boeing 737-8AS aircraft bearing registration number EI-DLH departed from Valencia Airport (LEVC) and landed at Santiago Airport (LEST). As its passengers were disembarking, one of them fell down the stairs and was injured.

The passenger was taken by ambulance to a hospital so that his condition could be assessed.

1.2. Injuries to persons

<i>Injuries</i>	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor		1	1	
Unharmed	6	173	179	
TOTAL	6 ²	174	180	

1.3. Damage to the aircraft

The aircraft did not sustain any damage.

1.4. Other damage

There was no other damage.

1.5. Information about the personnel

1.5.1. Information about the crew

The 51-year-old captain had an ATPL (Airline Transport Pilot Licence), issued on 14 November 2018, with a B737 300-900 rating valid until 31 March 2022. His Class 1 medical certificate was valid until 14 January 2022.

The 30-year-old co-pilot had an ATPL (Airline Transport Pilot Licence), issued on 6 December 2019, with a B737 300-900 rating valid until 28 February 2022. His Class 1 medical certificate was valid until 23 July 2022.

1.6. Information about the aircraft

- Make: Boeing
- Model: 737-8AS

² The crew comprised 2 flight crew and 4 cabin crew.

- Year of manufacture: 2005
- Serial number: 33590
- Registration number: EI-DLH
- Maximum take-off weight: 66,990 kg
- Number of engines: 2
- Type of engines: CFM56-7B26
- Information about the owner and operator: The aircraft has been registered in the Irish Aircraft Register in the name of Ryanair Designated Activity Company since 6 March 2006.

The aircraft has an Airworthiness Certificate and an Airworthiness Review Certificate, which was valid at the time of the event.

1.6.1. Description of the stairs on the Boeing 737 aircraft

Some Boeing 737 series aircraft, including the one involved in this incident, have retractable stairs on the forward left side of the cabin to allow for the boarding and disembarking of passengers without the need for additional ground support equipment. The stairs have a handrail on each side. These types of stairs have narrower steps and thinner and lighter handrails than the external stairs provided by airport handling services³.

The following figure, taken from the Boeing document titled “Airplane Characteristics for Airport Planning”, shows the dimensions of the stairs. The height of the stairs on the 800 model ranges from a minimum of 1.85 m to a maximum of 2 m, with a length of 3.53 m. Thus, the slope varies from 69% to 62%, respectively. The width of the stairs is approximately 0.62 m.

³ In Spain, the Resolution of 15 January 2014 issued by the Directorate-General for Industry and Small and Medium Enterprises contains the UNE standards approved by AENOR. These include the UNE-EN 12312-1:2013 standard titled “Ground Equipment for Aircraft: Specific Requirements. Part 1: Passenger Stairs”.

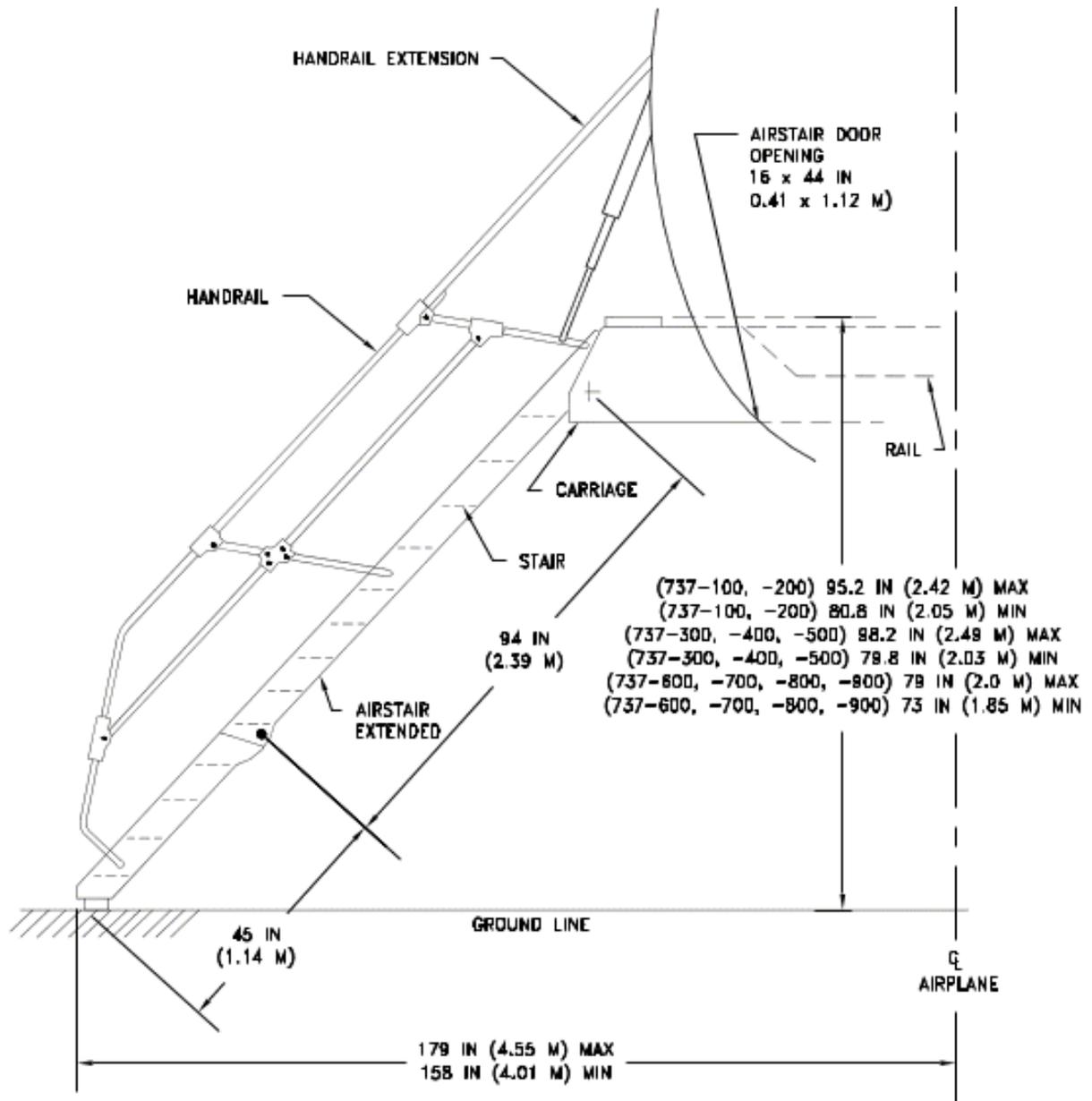
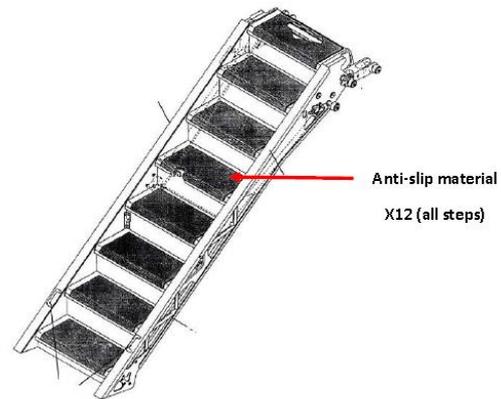


Figure 1: Dimensions of the stairs on the Boeing 737 aircraft

Over the years, Ryanair has introduced additional safety measures for the integrated stairs on its Boeing 737 aircraft, in order to reduce the risk of passengers falling, especially small children. These measures include the following:

1. The stair treads are covered with a non-slip material: specifically, 3M Safety Walk 710 - Coarse⁴.

Although Ryanair's manuals also allow the use of the 3M Safety Walk 610 - General Purpose non-slip material⁵, the stairs of the aircraft in question are equipped with the former.



2. The aircraft involved in this event (see the photograph on the right) had warning signs advising that passengers travelling with small children should hold their hands when walking up or down the stairs, as per Special Airworthiness Information Bulletin (SAIB) NM-07-47⁶ issued by the FAA in September 2007.

These warning signs also advised passengers to hold onto the handrail with their other hand.

In the photograph, the warning signs can be seen on the step risers.



⁴ The 3M Safety Walk Coarse Tapes and Treads - 700 Series non-slip material is 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 The 3M Safety Walk Slip-Resistant General Purpose Tapes and Treads – 600 Series non-slip material is 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://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/0/cab005ca55f1abd78625734e006eb6b7/\\$FILE/NM-07-47.pdf](https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/0/cab005ca55f1abd78625734e006eb6b7/$FILE/NM-07-47.pdf)

1.7. Meteorological information

According to the airport's METAR, issued at 12:00 UTC and 12:30 UTC, it was not raining at the time the passengers were disembarking and nor were the conditions windy.

METAR LEST 101200Z 31006KT 270V350 9999 SCT014 BKN030 12/09 Q1024 NOSIG=⁷

METAR LEST 101230Z 32008KT 290V010 9999 SCT018 BKN030 11/07 Q1024 NOSIG=⁸

1.8. Aids to navigation

N/A.

1.9. Communications

N/A.

1.10. Information about the aerodrome

The aircraft landed at Santiago/Rosalía de Castro Airport, whose ICAO code is LEST. The airport is located 10 km to the north-east of the city of Santiago. Its elevation is 369 m and it has one runway, 3,140 m long by 45 m wide, designated 17/35.

At the time of the incident, the aircraft had already landed at the airport and was parked on stand 11 of the apron.

1.11. Flight recorders

N/A.

1.12. Aircraft wreckage and impact information

N/A.

1.13. Medical and pathological information

N/A.

⁷ The METAR issued at 12:00 UTC warned of wind with a speed of 6 knots and a direction of 310°, varying between 270° and 350°. Visibility was greater than 10 km. The clouds were scattered, with the base of the clouds at a height of 1,400 ft. The base of the cloud cover was at a height of 3,000 ft. The temperature was 12°C and the dew point was 9°C. The QNH was 1024 hPa. No significant changes were expected.

⁸ The METAR issued at 12:30 UTC warned of wind with a speed of 8 knots and a direction of 320°, varying between 290° and 10°. Visibility was greater than 10 km. The clouds were scattered, with the base of the clouds at a height of 1,800 ft. The base of the cloud cover was at a height of 3,000 ft. The temperature was 11°C and the dew point was 7°C. The QNH was 1024 hPa. No significant changes were expected.

1.14. Fire

N/A.

1.15. Survival aspects

The incident was captured by the airport's cameras. However, it is not clear from the footage exactly how the passenger fell:



Figure 2: Passenger descending the stairs moments before the fall

After the passenger fell, at 13:28 h the airport nurse was asked to attend the scene. However, as the nurse was not available, an ambulance was called. The ambulance arrived at the stand at 13:57 h; consequently, the action time was 29 minutes. Subsequently, at 14:20 h, the ambulance took the injured passenger to the hospital.

During the investigation, the manager of Santiago Airport indicated that the time period in which the nurses are available to provide medical care is H18/2, i.e. morning-to-afternoon shifts from 06:30 to 15:30 and from 15:30 to 00:30, local time. If a nurse is absent due to illness, leave, etc. their shift is not covered. In the morning and early afternoon of 10 December, the nurse was absent and so the airport was unable to provide medical care.

1.16. Tests and research

1.16.1. FAA regulations applicable to integrated stairs on commercial air transport aircraft

Part 25 of the Airworthiness Standards: The FAR (Federal Aviation Regulations) issued by the FAA (United States Federal Aviation Administration) that apply to Boeing 737 Transport

Category Airplanes do not contain any requirements regarding integrated stairs for commercial air transport aircraft.

However, in September 2007, after four incidents in which small children were injured due to falling down the stairs, the FAA issued Special Airworthiness Information Bulletin (SAIB) NM-07-47 to owners and operators of Boeing 737 aircraft equipped with integrated stairs. It recommended the implementation of Service Bulletin (SB) 737-52-1157 issued by Boeing and Service Bulletin 870700-52-2130 issued by Monogram Systems (the staircase manufacturer), which was referred to in the aforementioned Boeing service bulletin. 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, the Circular indicated that they must comply with the requirements of ARP (Aerospace Recommended Practices) 836 issued by the SAE (Society of Automotive Engineers). However, as indicated by Boeing during the investigation, this only applies to the external stairs provided by airport handling services and not to the integrated airstairs in Boeing 737 aircraft.

1.16.2. EASA regulations applicable to integrated stairs on commercial air transport aircraft

In its 2009 Study on CS-25 Cabin Safety Requirements, EASA addressed the possibility of establishing requirements for integrated airstairs and recommended the following:

Recommendation 48 – Recommendation for incorporating industry standards for general occupant safety (e.g. slip, trip and fall prevention) into AMC

Whilst many of the slip, trip, and fall accidents inside or from the cabin involved non-compliance with standard operating procedures or complacency, there may be aircraft design features that can reduce its risk. This may be particularly relevant to features like staircases within very large twin-deck aircraft such as the A380. Additionally, there are no regulations governing the height, angle or slip resistance of the steps, or the provision of handrails for integrated airstairs. Industry standards (SAE publications) on these subjects are available. It is recommended that further deliberation be given by EASA to investigate the feasibility of the incorporation of (or referral to) such standards into airworthiness requirements.

However, the current European regulations contain no requirements in this regard.

1.16.3. Ryanair's disembarkation procedure

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

"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 indicated that this announcement is made in English.

According to the statement given by the passenger who was injured in this incident, he neither heard nor understood any instructions on how to disembark.

1.17. Organisational and management information

N/A.

1.18. Additional information

N/A.

1.19. Special investigation techniques

N/A

2. ANALYSIS

Various factors related to this incident were analysed, including the safety of the integrated airstairs, Ryanair's disembarkation procedure, and the passenger's actions while disembarking.

2.1. Analysis of the safety of integrated airstairs on aircraft

The FAA airworthiness standards that apply to do not contain any requirements regarding integrated. Nor has EASA deemed it necessary to regulate these types of stairs in its standards.

However, in September 2007, the FAA issued a Special Airworthiness Information Bulletin (SAIB) recommending, among other things, that non-slip material be installed on the stairs' upper platform and side handrails. The measures recommended by the FAA had been implemented on the aircraft involved in this incident. Additionally, the stair treads of the aircraft involved in the incident are covered with a non-slip material: specifically, 3M Safety Walk 710 - Coarse.

In 2010, the aircraft's operator decided to install retractable, high-visibility safety barriers and removable rails on its aircraft in order to make the stairs safer.

Therefore, we can conclude that the aircraft's operator implemented the measures available to it in order to improve the safety of the integrated stairs on its aircraft.

2.2. Analysis of Ryanair's disembarkation procedure

Ryanair's procedures stipulate that, before proceeding to disembark the passengers, the following, among other things, must be communicated to them: *"All passengers should use the handrail provided when walking down the stairs"*. This announcement is made in English only. Although English is an international language commonly used in the world of aviation, this announcement should also be made in the official language of the aircraft's departure and destination countries. Therefore, a recommendation to this effect was issued to Ryanair in Report A-020-2021.

Moreover, during the investigation, we contacted the passenger who fell down the stairs. He indicated that he neither heard nor understood any instructions on how to disembark the aircraft.

We believe that the disembarkation procedure should be made more rigorous: during disembarkation, the cabin crew should make sure that passengers have one hand free to hold on to the handrail when descending the forward stairs of the aircraft. A recommendation along these lines was issued to Ryanair in Report A-020-2021.

According to the passenger's statement, he does not remember whether or not the cabin crew warned him, prior to beginning his descent, to take care when walking down the stairs.

2.3. Analysis of the passenger's actions while disembarking

Even though the aircraft has warning signs on the stair risers and door frame advising passengers to hold onto the handrail when walking down the stairs, and despite the fact that Ryanair communicated this advice in English before proceeding to disembark the passengers, the injured passenger - who is of Spanish nationality - walked down the stairs while holding a suitcase in one hand and a coat in the other, and therefore did not hold onto the handrail.

As both of his hands were full, he was unable to grasp the handrail upon losing his balance.

3. CONCLUSIONS

3.1. Findings

- The aircraft's operator implemented some of the measures available to it in order to improve the safety of the integrated stairs on its aircraft.
- The FAA airworthiness standards that apply to air transport aircraft (and, therefore, to Boeing 737 aircraft) do not contain any requirements regarding integrated airstairs on commercial air transport aircraft.
- The passengers had been advised, in English, on how to descend the integrated airstairs.
- The passenger descended with a suitcase in one hand and a coat in the other.
- The passenger descended without holding onto the handrail of the forward stairs.

3.2. Causes/contributing factors

The investigation has determined that the cause of the incident was the passenger descending the stairs with a suitcase in one hand and a coat in the other, which was not in accordance with the operator's disembarkation instructions..

4. OPERATIONAL SAFETY RECOMMENDATIONS

No safety recommendations are issued, as those issued in Technical Report A-020/2021 are considered sufficient to prevent this type of occurrence.