

Safety Investigation Report

Ref. AAIU-2020-02-16-01

Issue date: 23 July 2020

Status: Final

About this report

As per Annex 13 and EU regulation EU 996/2010, each safety investigation shall be concluded with a report in a form appropriate to the type and seriousness of the accident and serious incident. For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report.

It is not the purpose of the Air Accident Investigation Unit to apportion blame or liability. The sole objective of the investigation and the reports produced is the determination of the causes, and, where appropriate define recommendations in order to prevent future accidents and incidents.

INTRODUCTION

| | | | |
|--------------------------------|--|-----------------------------|--|
| Classification: | Serious Incident | Occurrence category: | Ground handling (RAMP) |
| Level of investigation: | Limited | Type of operation: | Commercial Air Transport - Passengers |
| Date and time: | 16 February 2020 21:39 UTC | Phase: | Standing |
| Location: | Charleroi Airport (EBCI) | Operator: | Ryanair |
| Aircraft: | B737-8AS | Aircraft damage: | No damage |
| Aircraft category: | Fixed Wing – Aeroplane – Large Aeroplane (MTOW > 5700 kg) | Injuries: | Crew: None Passengers: 1 |

Synopsis:

During disembarkation, a passenger fell on the airstairs when exiting the aircraft.

Summary of factors:

| | |
|----------------|--|
| Organisational | Not determined |
| Aircraft | Aircraft structures – Doors – Entrance stairs |
| Human | Not determined |
| Environmental | Conditions/weather/phenomena/ - Light condition – Dark Conditions/weather/phenomena/ - Precipitation - Rain |

1 FACTUAL INFORMATION

1.1 Description of the event

On 16 February 2020, flight FR 1303 from Naples International Airport (LIRN), Italy to Charleroi (Brussels South Charleroi Airport - EBCI) with 180 passengers on board, scheduled to arrive at 21:30 UTC, landed at 21:26 UTC.

The airplane parked at stand 58 (North side) of EBCI.

At 21:39, after a male passenger exited the airplane and was climbing down the airstairs, he slipped, tumbled down the stairs, seemed to grab the railing on one hand, causing him to spin around and continue the fall on his back, eventually landing head first backwards.

The passenger carried a small bag in one hand and appears on the video to hold the safety railing with the right hand before the fall. He was not the first to exit the airplane.

The passenger suffered a severe concussion and a head wound that required stitching. He was evacuated to the hospital.



Figure 1: aerial view of aircraft stand 58 at EBCI
© Google Earth 2018



Figure 2: aircraft and surroundings from EBCI CCTV

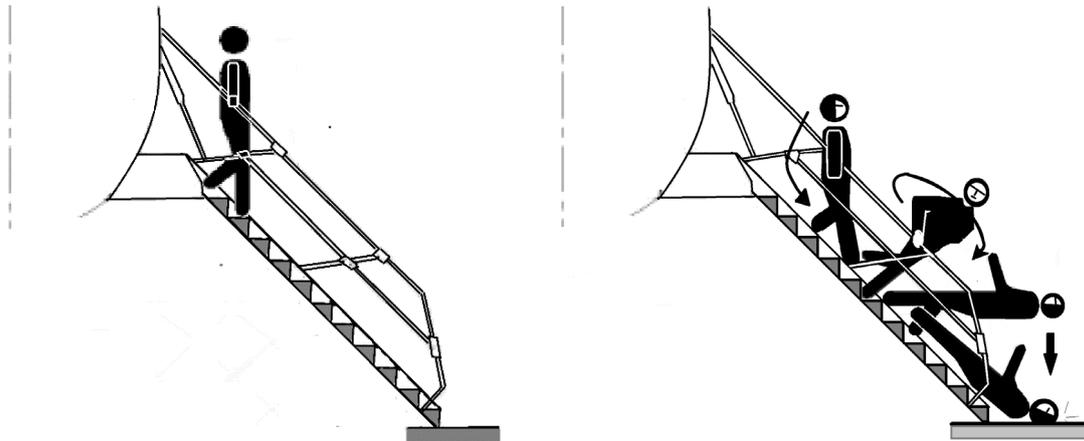


Figure 3: Fall sequence

1.2 Personnel information

The passenger is a male, 38 years old.

The passenger is of average height and weight. He has a healthy physical activity and his professional activity is not sedentary.

He travels regularly to Italy, flying with this Operator, most of the time. He was travelling with a relative who followed him to exit the aircraft.

He stated that, when exiting the airplane, he carried a small bag, weighing around 10kg, with his left hand and held the railing with his right hand. He has no memory of the fall itself.

He was wearing fairly new leather ankle boots.

1.3 Aircraft information

Table 1: Aircraft data

| | |
|---------------------|-------------|
| Type | B737-800 |
| Serial number | (msn) 37538 |
| Manufacturer | Boeing |
| Year of manufacture | 2009 |

Airstairs

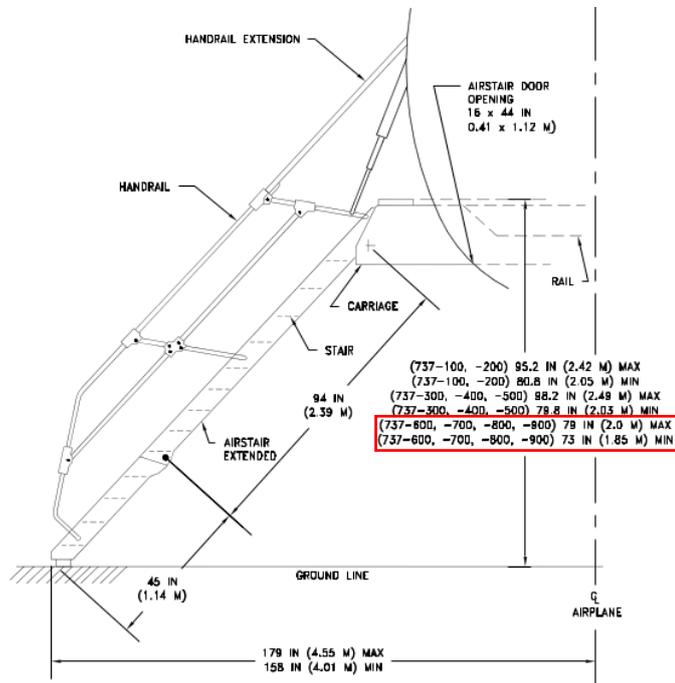


Figure 4: B737 airstairs

This aircraft is fitted with a set of retractable airstairs at the forward left cabin door, to allow the boarding and disembarkation of passengers without the need for additional ground support equipment. The airstairs include an integral two-rung handrail on either side.



Figure 5 : side view of the Boeing 737-800 airstairs



Figure 6 : front view of the Boeing 737-800 airstairs

1.4 Aircraft Operation

Extracts from the Operation Manual of the Operator

| | |
|---|----------|
| PART A – OPERATIONS MANUAL | 8 |
| 8.2.2.5.1 Aircraft Operations in High Winds on the Ground | |
| The chances of personal injury, aircraft or ground equipment damage increase as surface wind increases. Up to 20 kt the risk is relatively low. As the wind increases above 20 kt the risk increases exponentially. | |

Figure 7

| |
|--|
| <p>Wind Between 20 kt and 40 kt</p> <p>Confirm all ground/ramp equipment has been secured (i.e. parking brakes set or chocked). Do not use mobile steps unless the handling agency has equipment accepted by GOPS for use in excess of 20 kt windspeed – see above.</p> <p>The maximum windspeed for continuance of operations on the ground, including gusts, is an absolute value of 60 kts.</p> <p>Windspeed is calculated as the sum of the steady wind plus ½ the gust, e.g. wind 240/30 gusting 50 gives a total wind speed of 30 kt +10 kts (½ the gust of 20 kt); total wind = 40 kt.</p> |
|--|

Figure 8

1.5. Meteorological information

Situation in EBCI at the time of the event:

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16/02/2020 21:35:00, SPECIAL EBCI 162135Z
WIND
RWY 24 230/21KT MAX29 MNM10
RWY 06 220/14KT MAX22 MNM6
VISIBILITY 8KM
WX MODERATE RAIN
CLOUD FEW 1000FT SCATTERED 1600FT BROKEN 2800FT
TEMPERATURE 07°C DEW POINT 05°C
QNH 1008.6HPA
MET QFE 0986.3HPA
TREND TEMPO VIS 3000M MODERATE RAIN
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Table 2: detailed wind report

| Time (UTC) | Wind direction 10 min average (degrees) | Wind Speed 10 min average (kt) | Wind Max gust over the last 10 min (kt) |
|------------|---|--------------------------------|---|
| 21:37:00 | 226 | 16,7 | 29 |
| 21:39:00 | 225 | 17,6 | 29 |
| 21:41:00 | 224 | 17,8 | 29 |

1.6. Emergency response

Details of emergency response:

- The initial call was sent at 21:40 UTC
- An ambulance of the Airport Rescue and Fire Fighting (ARFF) service arrived at 21:42 UTC
- A medical team of the hospital of Gosselies (SMUR) and an ambulance of the Emergency Services of East Hainaut arrived at the aircraft at 22:05 UTC.
- The passenger was evacuated to the hospital of Gosselies at 22:23 UTC

2 AAIU(Be) COMMENTS

2.1 Previous events

In a recent investigation (EW/G2019/02/24) the AAIB (UK) identified 9 events involving the fall of passengers in airstairs in Europe since 2009, 7 of them involved children. Parts of this report are reproduced hereunder.

The integrated airstairs are optional. Not all B737 are equipped with airstairs. In Europe, predominantly, the Operator has the largest number of airstairs-equipped B737.

Typically, the airstairs-equipped Boeing B737 fleet of the Operator accumulates over 780 000 flights per year, carrying over 120 million passengers across all age groups.

Each of those events were reported to the aircraft manufacturer and analysed.

As noted in a previous investigation performed by AAIU(Ireland), *‘the time that an individual passenger spends on steps/stairs is also very small (typically a minute or less) when compared to the amount of time the passenger spends on the aircraft for the rest of their flight (typically 90 minutes or more). Consequently, on a pro-rata basis, the time a passenger spends on the stairs is a time of higher risk of injury, than the remainder of their flight.’* (AAIU-Irl Report 2017-018). AAIU (Ireland) further notes that the actual number of incidents of this type is probably much higher as minor trips and slips do not get reported.

2.2 Certification of airstairs

The design of integrated airstairs for the B737 was performed during the initial certification of the B737 model. The certification was made in accordance with the Title 14 of the Code of Federal Regulations, Part 25 – Certification. This certification standard and the equivalent European CS-25, does not contain specific requirements for integral airstairs.

AAIU (Ireland) rightly commented that whilst integrated airstairs do not have to meet a particular certification specification, mobile airstairs, used at the rear of the aircraft had to meet a European standard as far back as 2009 (EN 12312-1200_A1_2009) which specifies appropriate dimensions for riser height, tread depth etc. The existence of this standard means that there is potentially a difference in safety level for passengers disembarking at the front from those disembarking at the rear of the aircraft.

2.3 Previous recommendations and safety actions

Anti-skid and warning placards.

In September 2007, the FAA issued a Special Airworthiness Information Bulletin (SAIB NM-07-47) after four reports of injuries resulting from small children falling through or over the airstairs handrails. The bulletin recommended the introduction of anti-skid material on the side beams and top stair and warning placards to advise people accompanying children to hold the child's hand whilst on the stairs.

As seen on Figure 5 and Figure 6, the anti-skid layer was present on the top platform as well as on the other stairs on the involved aircraft and appeared in good shape.

Boarding and disembarking announcement

Further to the investigation on an incident in 2009, where a small child fell from the top platform, the UK AAIB issued the Safety Recommendation 2010-18. This recommendation led to the issue of a Safety Notice (SN-2011/02) by the UK Civil Aviation Authority, entitled "Safe use of Airstairs". The notice stated, among others that operators:

"should also review announcements made by staff at the boarding gate and before disembarkation to ensure that passengers' attention is drawn to the need to exercise caution when boarding and disembarking using airstairs.(...)"

As a consequence, the operator's procedures manuals were updated and the Safety Equipment Procedures manual contains the before disembarking announcement, which contains the words:

"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."

The Operator confirms that the crew gave the disembarking announcement, although the passenger and his relative did not recall having heard it.

The Safety Notice was cancelled in 2018.

2.4 The danger of stairways

The literature on occupational and domestic hazards tells us that falls, in particular on stairways represent an important danger of injuries or death.

Statistics Belgium (FPS Economy – DG Statistics) gives the following data related to the yearly figures on the cause of death (statbel website):

Table 3: causes of death in Belgium

| Year | Yearly number of death due to external causes (excluding natural causes) | Yearly number of death caused by falls | Yearly number of death caused by falls on and from stairs and steps (W10 – ICD-10-CM codes) | Yearly death in transport accidents (reference) |
|------|--|--|---|---|
| 2015 | 6883 | 1618 | 140 | 692 |
| 2016 | 6692 | 1534 | 148 | 637 |

In particular, falls on stairways present a higher risk for fatalities or major injuries than a fall while walking on a level surface. Injuries include traumatic brain injury and hip fracture.

It should be noted that the severity of injury depends on:

- the height of the fall;
- body and surface features;
- age;
- the manner of the body's impacts against the surface. The chance of surviving increases if landing on a highly deformable surface (a surface that is easily bent, compressed, or displaced).

A study from 2019¹ analysed 114 cases that happened in the UK ranging from the year 2003 to 2014. It included falls from scaffolds/platforms, roofs, stairs, ladders, stepladders, lifting,.. The study concluded that 63% of the cases where the fall height was between 0 and 3 m resulted in only a temporary disability and 33% lead to a permanent disability (21%) or death (11%). As from heights of 6 meters these figures change drastically with 14% resulting to permanent disability and 48% to death.

¹Zlatar, T., Lago, E. M. G., Soares, W. A., Baptista, J. S., & Barkokébas Junior, B. (2019). Falls from height: analysis of 114 cases. *Production*, 29, e20180091. <https://doi.org/10.1590/0103-6513.20180091>.

3 CONCLUSION

Falling from stairways in general occurs frequently and represents a high danger of injury. Concerning specifically airstairs, there are few reports of falling from them – 10 events including this one for an activity involving over 780 000 flights per year.

The airstairs of the B737 are not more safe than any ordinary stairway, industrial or domestic but have, for the -800 model, a maximum height of 2 meters (see Figure 4). This height already reduces the risk for permanent injuries.

The passenger appears on the video to hold the safety railing with the right hand before the fall. The aircraft arrived on time and nothing indicates that the passenger tried to rush down the stairs.

The event occurred at night, with low lighting of the surroundings. The wind speed was high, although within the prescribed limits for the operation of the airstairs and it was raining. These conditions are known to increase the risk of falling from stairways.

The emergency actions taken immediately after the event were adequate and swift.

Further to the elements known of this event, AAIU(Be) concludes that the existing safety actions related to the integrated airstairs provides adequate mitigation for the inherent risk of falling on the airstairs.