



Accident to the ELA 07 R100 gyroplane identified **62-AYF** and the Crossfire 2-109 parachute on 30 April 2015 at Lens - Bénifontaine aerodrome (Pas-de-Calais)

⁽¹⁾Unless otherwise stated, all times given in this report are in local time. Two hours should be subtracted to obtain UTC time.

Time	At 18:50 ⁽¹⁾
Operator	62-AYF : School Parachute: Private
Type of flight	General aviation
Persons on board	62-AYF : Instructor and student pilot Parachutist
Consequences and damage	Instructor and student pilot slightly injured, parachutist fatally injured, gyroplane and parachute destroyed
<i>This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in August 2017. As accurate as the translation may be, the original text in French is the work of reference.</i>	

Collision between a parachute and a gyroplane in climb out, in training flight

1 - FACTUAL INFORMATION

1.1 History of the flight

The instructor and student pilot were flying traffic circuits in a gyroplane at the Lens - Bénifontaine aerodrome (Pas-de-Calais). At the same time, the CERPL⁽²⁾, the Lens - Bénifontaine regional parachute school, was carrying out parachute drops at 1,500 metres and then at 4,000 metres. An initial group of three parachutists was dropped at 4,000 metres. While they were descending under their canopies, the gyroplane was on final for runway 21 to perform a touch-and-go. After a brief stop just after the runway threshold, the gyroplane took off. Shortly after the intersection of runways 03/21 and 09/27, the gyroplane and one of the parachutists collided at a height of around 30 metres. The parachute canopy and lines were severed, causing the parachutist to fall to the ground. The tail of the gyroplane was damaged. Having lost yaw control, the instructor tried to perform an emergency landing on the runway. The gyroplane struck the ground and came to a halt after rolling over several times.

⁽²⁾Center regional school of parachutist of Lens-Bénifontaine

1.2 Injuries to persons

	Injuries		
	Fatal	Serious	Minor/None
Instructor and student pilot	-	-	2
Parachutist	1	-	-

1.3 Damage to aircraft

The main Crossfire 2-109 canopy was cut into two by the blades of the gyroplane.

The structure, landing gear and rotor of the gyroplane were heavily damaged. This damage was linked to the collision with the parachute and then the ground.

1.4 Other damage

None.

1.5 Personnel information

1.5.1 Instructor

The instructor had a microlight licence since 18 June 1999. He had been an instructor since 30 June 2011 and had various class ratings including the gyroplane rating since 18 November 2011. He had logged 2,000 flight hours of which 1,156 hours on a gyroplane. In the previous three months, he had logged 50 flight hours of which 45 hours on a gyroplane.

1.5.2 Student pilot

The student pilot had a Private Pilot License (Aeroplanes) and had logged 340 flight hours of which 19 hours on a gyroplane.

1.5.3 Parachutist

The parachutist had a parachuting licence since 2007. He held A, B, B2 and B4 certificates. He had obtained this last certificate on 25 October 2014.

He had made around 650 jumps of which 17 in the previous month. Given his qualification levels and the number of jumps he had made, the CERPL rated him as an “experienced” parachutist.

He was in the habit of parachute jumping at Lens Bénifontaine with the CERPL (33 jumps in 2015).

He held a medical certificate with no contra-indications dated 18 February 2015. That day, he had arrived in the afternoon and made his first jump of the day.

1.6 Aircraft information

The parachutist used a yellow Crossfire 2-109 type canopy with blue and black outer cells. The 07 R 100 microlight was a two-seat tandem gyroplane.

1.7 Meteorological information

The conditions estimated by Météo France were:

- ☐ visibility above 10 km with a wind from 270° at 11 kt. The CERPL ground control staff estimated the wind as being south westerly at 11 kt.

The sun's position corresponded to an azimuth of 269° and a height of 20.25°.

1.8 Aids to navigation

Not applicable.

1.9 Communications

The gyroplane pilots used the aerodrome's A/A frequency to transmit their position.

1.10 Aerodrome information

The aerodrome has two intersecting runways. It is operated by the Lens - Liévin intercommunal structure.

Different aircraft can fly simultaneously: aeroplanes, helicopters, microlights and parachutes.

The VAC chart, on the following page, specifies the aerodrome circuits which certain aircraft have to comply with. A "*parachute jumping target*"⁽³⁾, positioned at the north-east intersection of the runways and approved by the DGAC along with a model aircraft area are also indicated on the chart. The special instructions specify that the parachuting activities take place up to 1,500 ft with a possible extension up to FL140. Aerobatic activities above the runways are also mentioned.

There is no air traffic service available on the aerodrome but it has been assigned an A/A frequency of 123.350 MHz. In this respect, and in compliance with the provisions of paragraphs 3.8, 4.3.2.1 and 4.3.2.2 of appendix 1 of the French decree of 17 July 1992⁽⁴⁾, the A/A reports indicating the positions and intentions must be transmitted on this frequency by aircraft equipped with radio-communication equipment.

It is not compulsory to carry radio-communication equipment on this aerodrome.

⁽³⁾Symbol name on VAC charts. The appendix to the French decree of 28 February 2008 regarding the regulatory provisions of the Sports Code uses the term "*landing zone*".

⁽⁴⁾French decree of 17 July 1992 relating to general air traffic procedures for the use of aerodromes by aircraft.

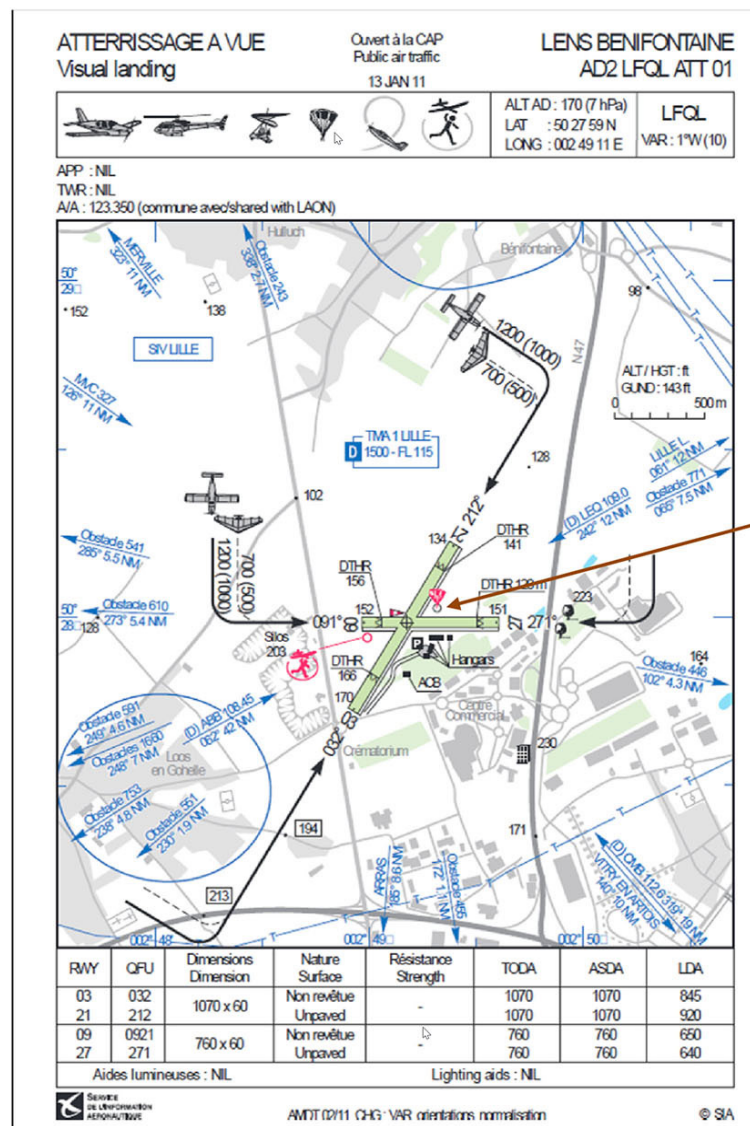


Figure 1: VAC chart of aerodrome

1.11 Flight recorders

The microlight was not equipped with a flight recorder. It is not a regulatory requirement.

1.12 Wreckage and impact information

The canopy was cut into two by the blades of the gyroplane. The gyroplane damage was linked to the collisions with the parachute and then the ground.

1.13 Medical and pathological information

Blood samples were taken from the parachutist. No substance likely to impair his capabilities was found when they were analysed. His autopsy did not reveal any element likely to explain the accident.

There was no medical examination of the instructor and student.

1.14 Fire

None.

1.15 Survival aspects

The parachutist died as a result of his injuries a few hours after the accident.

1.16 Tests and research

One of the parachutists of the group was equipped with a Go-Pro camera, the images of which were analysed.

After the accident and based on the conditions of that day, the school produced the theoretical circuit to be followed to land in the “*student and experienced parachutist landing zone*”, shown below.

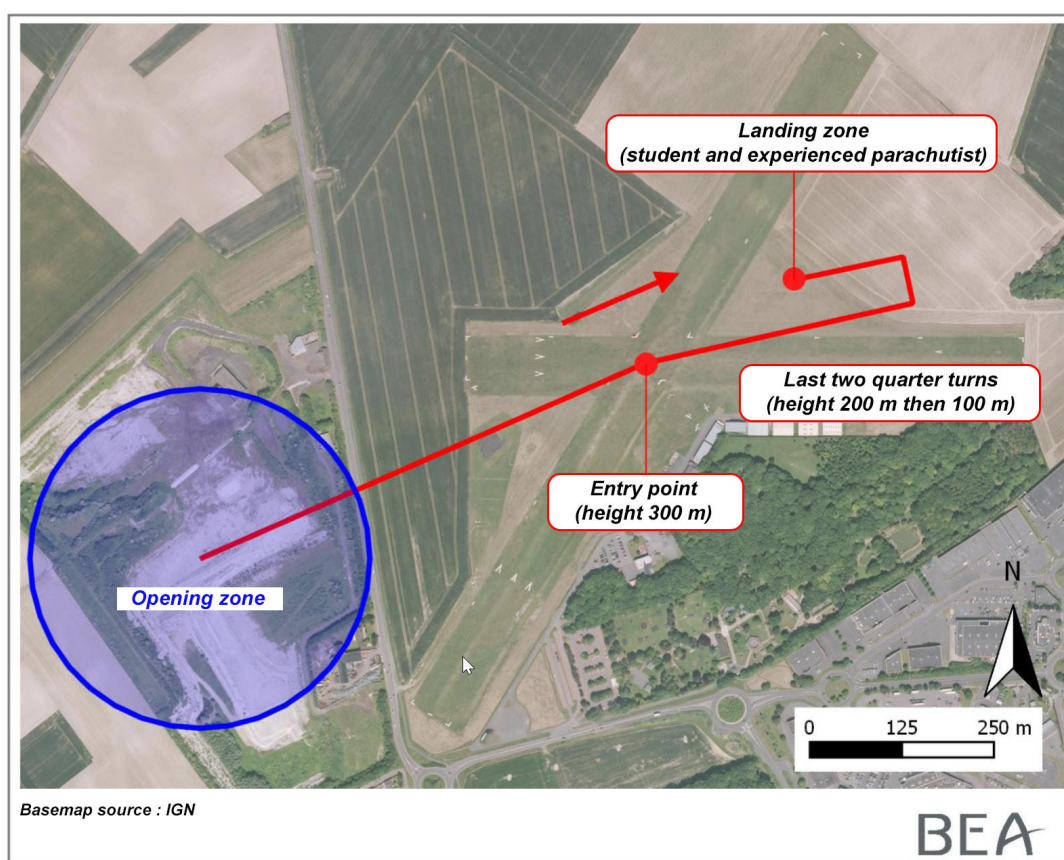


Figure 2: theoretical circuit to be followed by parachutists to land in the “*student and experienced parachutist landing zone*”

The circuit followed by the two instructors who landed in the “instructor and +1,000 jump landing zone” the day of and a short time after the accident was the following:

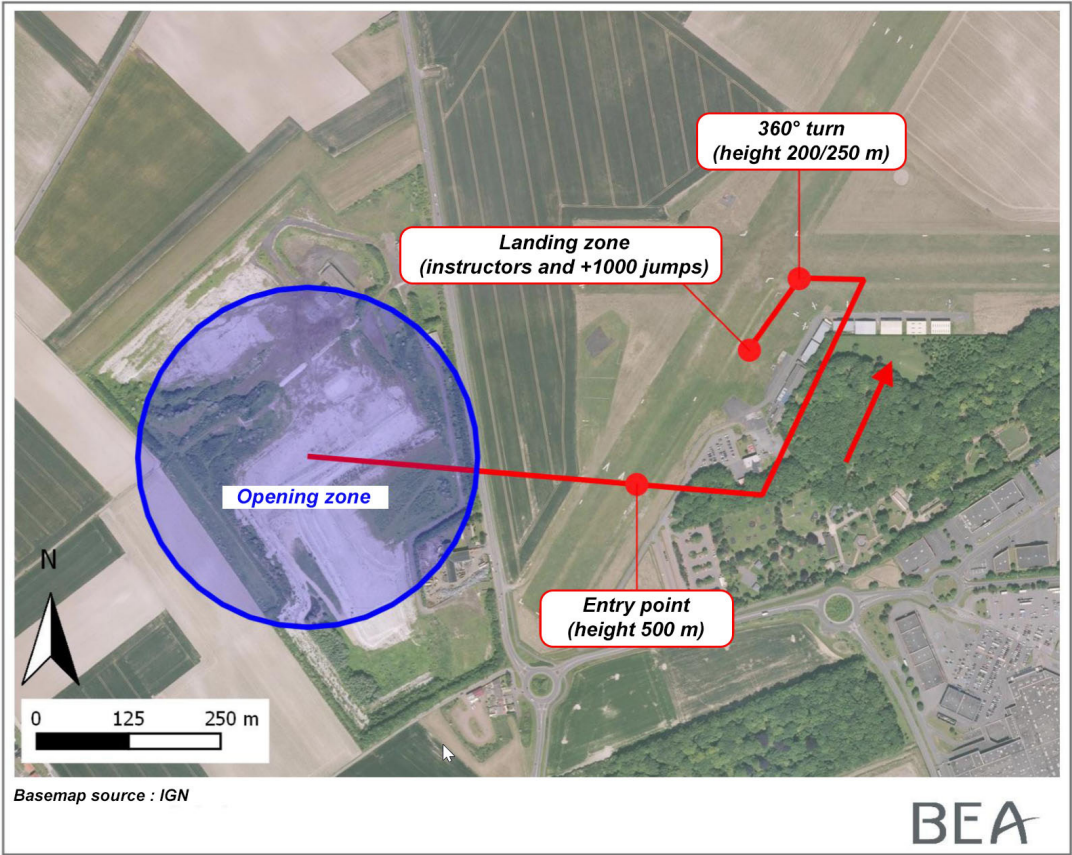


Figure 3: circuit followed by two instructors to join the “instructor and +1,000 jump landing zone”

The analysis of the video made it possible to determine the paths of the gyroplane and parachutist involved in the accident. These are shown below.

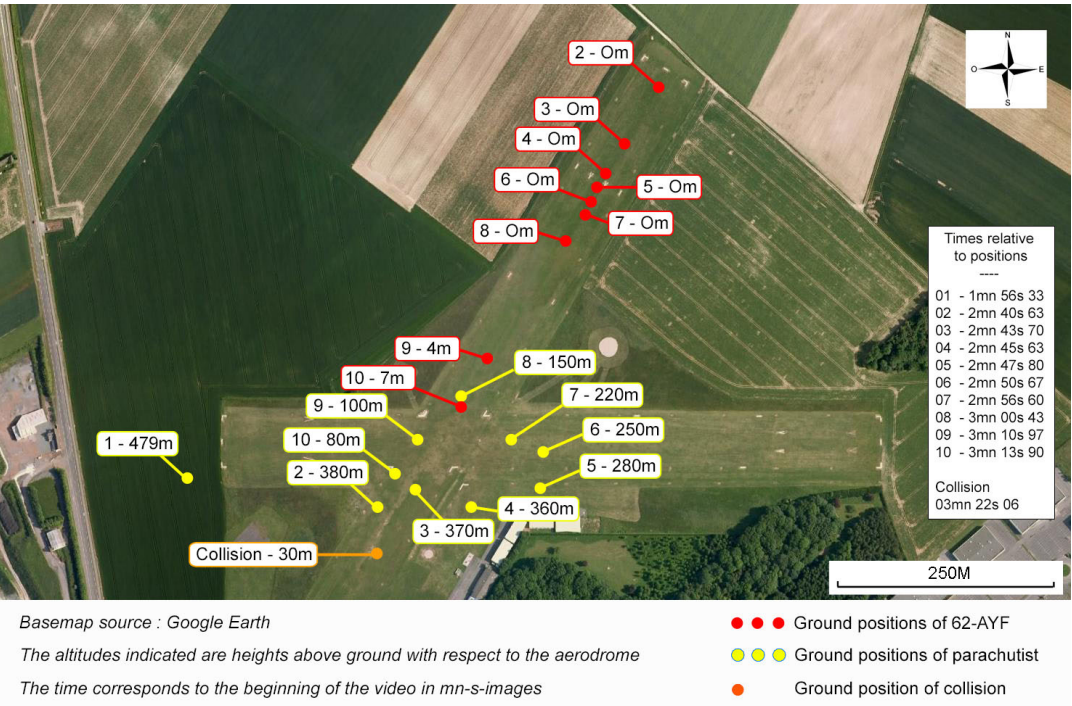


Figure 4: reconstituted flight paths of gyroplane and parachutist involved in the accident

After the free fall and opening of the parachute which took place normally, the parachutist headed towards the intersection of the runways from the west. He passed over points "1", then "2" and "3" under his open canopy without any visible steering difficulty. He was at point "4" after cutting across the runway 03/21 centreline at a height of around 370 metres. It was then possible to observe a controlled, fast descending tightening turn and a loss of height of 80 metres in two seconds, normal for this type of manoeuvre. At point "5", the parachutist, while continuing a standard descent, returned to the runway 03/21 centreline and cut across it at around 3 min 00 s at a height of between 150 metres and 200 metres. Up to point "8", the path followed allowed him to have visual contact with the gyroplane. Then the parachutist turned left to fly a heading of 210° over the runway and to the right of the runway centreline. The following of this path shows that the parachutist was not trying to land on the *"student and experienced parachutist landing zone"*. From point "8" up to the collision, the gyroplane was behind the parachutist and the latter could not see it. Just before the collision, the parachutist had started a left turn.

1.17 Organizational and management information

1.17.1 CERPL

1.17.1.1 Management of parachuting activity

The school, based at Lens Bénifontaine, has a Pilatus PC-6 and carries out, notably, introductory free-fall jumps accompanied by instructors and free-fall training courses.

To carry out its parachuting activities, it relies on a certain number of texts and documents, in particular: the French Sports Code, the FFP (French parachuting federation) document *"Premiers sauts et perfectionnement"* (First jumps and skill development), its Manual of Specific Activities and the Parachuting activity memorandum of agreement between the North regional approach and control centre⁽⁵⁾ and the school.

For each jump session, the school ground control staff is adapted to the type of activity, level and number of parachutists in compliance with the Sports Code provisions.

1.17.1.2 FFP document concerning first jumps and skill development

The CERPL uses this document in the parachutist training courses.

It provides the schematic diagram, given hereafter, of the holding area, the entry point and the landing circuit to be adapted according to the meteorological conditions (wind) and the characteristics of the aerodrome.

⁽⁵⁾DGAC/DSNA/
SNA Nord.

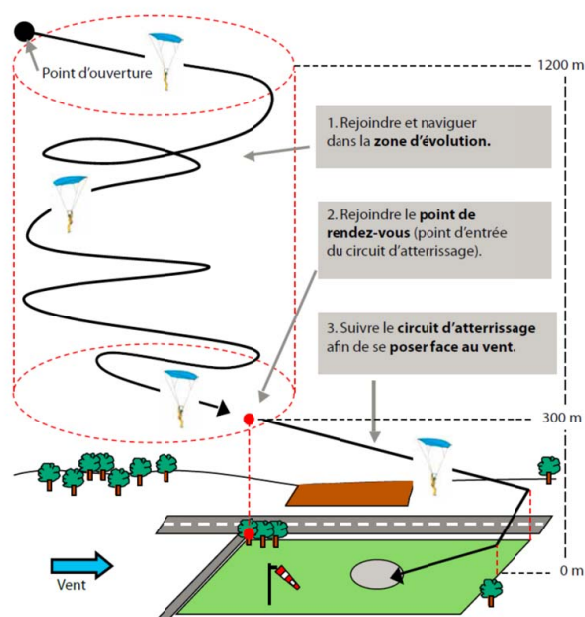


Figure 5: schematic diagram of manoeuvres under the canopy up to landing

The FFP document indicates that the landing circuit starts at the entry point, between a height of 200 and 300 m. The U-shaped landing circuit is the one the most used in parachuting:

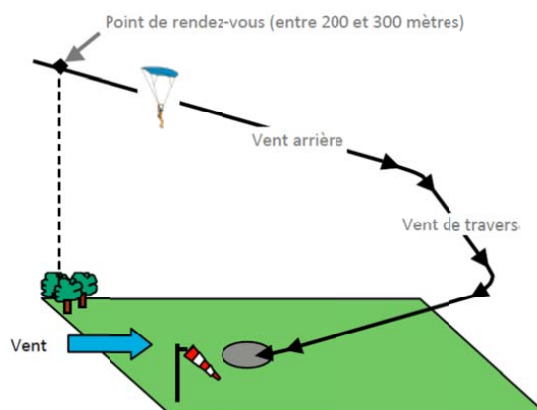


Figure 6: landing circuit

The rules concerning collision risks are centred on the actions to be adopted and the instructions to be complied with to prevent in-flight collisions between parachutists, in both free fall and under the canopy.

The danger with respect to other aircraft is mentioned in the FFP document:

- ☐ In addition to other parachutists, the airspace is shared with aeroplanes, gliders, helicopters, microlights, etc. A novice aeroplane pilot will not expect to see a parachutist suddenly appear and may not necessarily be able to perform an evasive manoeuvre.

The document does not mention instructions linked to the separation or monitoring of other aircraft.

1.17.1.3 Manual of Specific Activities

The Manual of Specific Activities, registered with the civil aviation authority on 30 June 2008 by the CERPL, mainly deals with the activities related to the drop plane when the latter is operating for the school.

Two “targets” for parachutists can be seen in an aerial photo:

- ❑ the “STUDENT PARACHUTIST TARGET” which corresponds to the “parachute jumping target” shown on the VAC chart;
- ❑ the “EXPERIENCED PARACHUTIST TARGET” which is situated close to the south-east runway intersection.

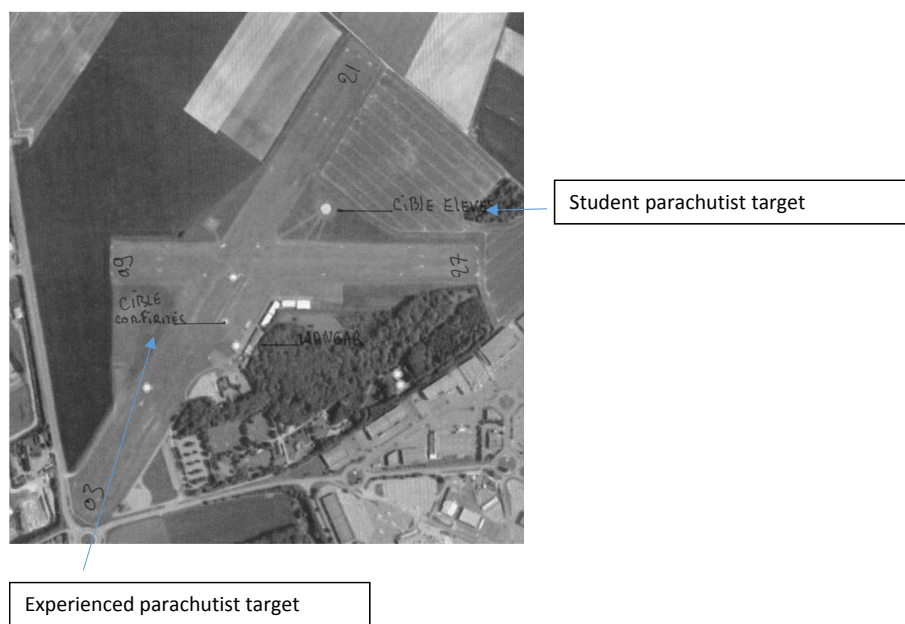


Figure 7: photo of “targets” present in the Manual of Specific Activities of 30 June 2008

The Manual of Specific Activities specifies in paragraph 1-2-1-3 - Parachutist manoeuvres close to the aerodrome, that parachutists are to land in the airfield grounds. However, the following areas are prohibited for landing: on the runways and taxiways, near the fuel pumps and near parked aeroplanes. It states that special attention must be paid, when taking off and landing, and to the possibility of people walking across the runway.

Paragraph 1-2-3-1 - Standard parachuting volume, specifies the airspace dimensions used by parachutists manoeuvring and in descent under the canopy as follows:

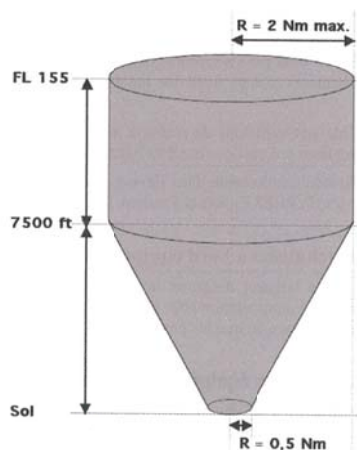


Figure 8: airspace dimensions used by parachutists during their jumps

1.17.1.4 Information given to parachutists

No school document specifies the instructions to be followed by the parachutists.

The school uses, in the student briefing rooms, maps taken from Google Earth on which two areas are identified with names (given below) which are different from those in the Manual of Specific Activities:

- ☐ "student and experienced parachutist landing zone";
- ☐ "instructor and +1,000 jump landing zone".

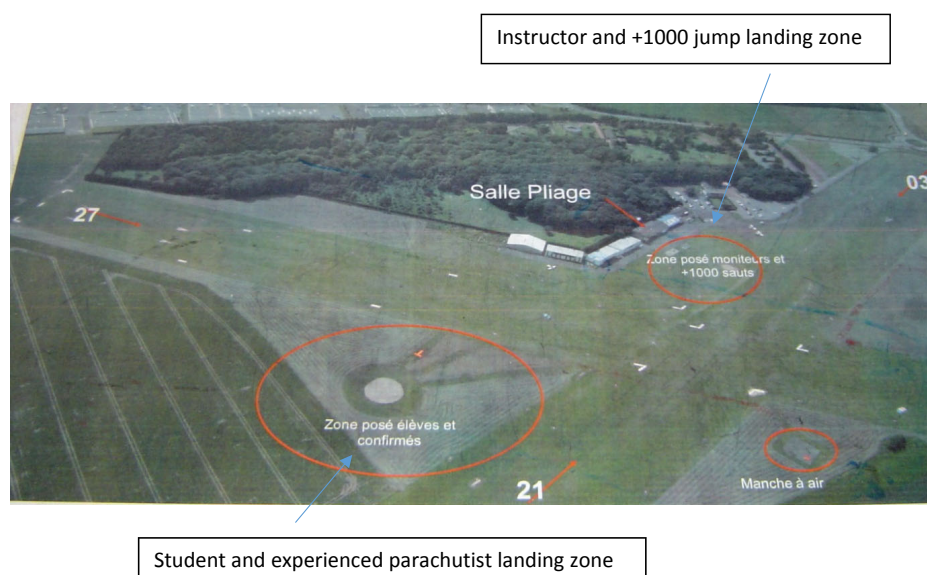


Figure 9: view used by the CERPL in briefing rooms

No theoretical circuit or entry point to be followed by the parachutists, under the canopy, according to the various possible winds and runways in use are shown on these charts.

The school indicated that:

- ☐ the entry point for the "student and experienced parachutist landing zone" is known by tradition as being situated at a height of 300 metres over the runway intersection;
- ☐ for the "student" jumps, the landing circuits and entry point are specified for the student parachutists in the briefing before the jump;
- ☐ for the "experienced parachutist" and "instructors and +1,000 jumps", the parachutists determine themselves the entry point and landing circuit according to the conditions at the time.

1.17.2 Civil aviation authority oversight

On 8 October 2014, the Nord Pas-de-Calais delegation indicated by letter addressed to the operator of the Lens - Bénifontaine aerodrome, "serious safety deficiencies", in particular the existence of a second "unapproved" parachute landing zone due to its proximity with the petrol station and parked aircraft, some with their engines running. This letter was followed up on 5 December 2014.

On 30 December 2014, the Lens - Liévin intercommunal structure asked each organization, including the CERPL and aircraft owners to put an end to these deficiencies.

On 13 January 2015, the Nord Pas-de-Calais delegation indicated that the “*unapproved*” parachute landing zone still existed and parachutists were still landing on it.

On 21 May 2015, the Nord Pas-de-Calais delegation asked the operator:

- ☐ to intervene and ensure that this landing zone is no longer used, and to remove any marks encouraging its use.

1.18 Additional information

1.18.1 Regulatory texts

Various texts deal with parachuting activities.

- ☐ **Parachuting activity memorandum of agreement of 9 July 2013 between the North regional approach and control centre and the CERPL**

The purpose of this agreement is to define the conditions in which the parachuting activity takes place on the Lens - Bénifontaine aerodrome between 1,500 ft and FL 140. Below 1,500 ft, the school can carry out its parachuting activities without informing the North regional approach and control centre of this.

- ☐ **Codes of transport and civil aviation**

According to these two codes, the parachute is an aircraft.

Article D. 131-1-4 specifies that the location of parachuting activities is defined by a joint decision between the Minister responsible for civil aviation and the Minister of defence. The Lens - Bénifontaine location was thus created by joint decision and published in section ENR 5.5 of the Aeronautical Information Publication (AIP) under the name of parachuting zone No. 264. The publication does not include a definition of the landing zones.

- ☐ **Directive of 29 July 1981 concerning parachuting activities**

This directive defines in particular, the conditions in which parachuting can be carried out, notably on an uncontrolled aerodrome:

The pilot of the drop plane must keep other users informed using the frequency indicated on the VAC chart (AFIS, OPE, A/A, club, information service).

The drop must not take place all the while there is a risk for the air traffic which has checked in and is manoeuvring on or near the aerodrome. Lastly, the competent authority can refuse that parachuting activities take place on uncontrolled aerodromes, insofar as the activities carried out would give rise to significant risks for all the users (extensive aero club activities simultaneous with extensive parachuting activities, interference between parachute landing zone and strip).

❑ French decree of 4 April 1996 with respect to air shows

This decree does not apply in the context of this event but it specifies certain rules when there are parachuting activities simultaneous with other aircraft activities.

Article 33 specifies that:

All the while parachutists and paragliders are manoeuvring, no aircraft on the ground must be moving and no propeller engine be in operation on the landing zone extended by an additional 10 metre strip

No aircraft in flight other than the drop aircraft must be within the specified dropping volume

❑ French decree of 17 July 1992 relating to general air traffic procedures for the use of aerodromes by aircraft

Article 2 defines the “general air traffic procedures” which cannot apply to parachutes.

Article 3 defines the additional general procedures specific to the different types of aircraft but those regarding parachutes are not included.

❑ French Sports Code - decree of 28 February 2008

With respect to jump sessions, article A.322-152 specifies that a solo parachutist within a structure must have shown that s/he has the following skills, notably that s/he can control the free fall and the canopy opening height, can control her/his canopy and landing and can adapt to the aeronautic environment.

With respect to the landing zones, article A.322-155 indicates that the parachutists receive specific information about the dropping area and its characteristics: prevailing winds, landing instructions, safety areas, obstacles to be avoided.

The landing zones are clear of obstacles and measure at least 100 metres (student parachutists) or at least 50 metres (for other parachutists) in diameter. Their environment allows landings outside the safety areas.

1.18.2 Witness statements

The two other parachutists who jumped with the parachutist involved in the accident indicated that they had planned to carry out a “Track”⁽⁶⁾ jump with him. They had not carried out a specific briefing and had not discussed the landing zone as they systematically used the “student” landing zone. When they were under the canopy, their aim was to reach the entry point which is situated over the runway intersection at a height of 300 metres while monitoring each other to avoid a collision. They then flew their approach circuit: flight over runway 09 then left turn to line up for the final approach to the student parachutist landing zone at a heading of 270. They saw the gyroplane while it was still on the ground and then when it took off but there was no risk of collision as they had crossed the runway 03/21 centreline. One of the two had seen the parachutist involved in the accident quickly descending roughly over the intersection of the runways, fly towards the air sock and then fly alongside the runway 03/21 centreline at a heading of 210. They did not see the collision between the parachutist and the gyroplane.

⁽⁶⁾ A parachutist exits the aircraft on his/her back. The other parachutists must fly close by.

Two other instructor parachutists, one of whom was the Technical director jumped with a student just after the group with the parachutist involved in the accident. Under the canopy, they steered their path to reach the experienced parachutist landing zone. As they had canopies of different surface size, they were separated. They passed over runway 03/21 to the south of the runway intersection at respective heights of around 500 metres and 400 metres. They did not see the collision but did see the gyroplane on the ground and then taking off. One of the instructors saw the parachutist involved in the accident slightly south of the runway intersection, descending in a turn. In his opinion, the position of the parachutist would not have allowed him to reach either of the two landing zones bearing in mind that no theoretical circuit under the canopy had been specified as is the case for other parachuting zones.

The two gyroplane pilots specified that they knew that parachuting operations were in progress. They had heard the jump in progress calls and the A/A messages from the drop plane while they were flying the aerodrome circuits. They had also transmitted A/A messages. Before taking off, they had checked that the “take-off funnel” of runway 03/21 was clear. During the initial climb, they did not see the parachutist but heard a very loud noise, at the rear of the gyroplane, shortly after passing the intersection of the two runways at 200 ft. It was only once on the ground that they learnt of the collision with the parachutist. They were not hampered by the setting sun situated in line with the take-off path.

Pilots stated that they had already been confronted with collision risks, in the take-off or landing phases, with parachutists under the canopy as well as by those who cross the runway by foot with their parachute under their arm to get back to the school.

Parachutists said that they had landed on the runway in use without wanting to. The parachutists who land on the student parachutist landing zone cross runway 09/27 by foot to get back to the school.

These witnesses said that the two activities were simultaneous without any particular restriction.

2 - ANALYSIS

2.1 Parachutist paths

On this aerodrome where there are two intersecting runways, the parachutists and other aircraft simultaneously manoeuvre as provided for, in particular, by the AIP⁽⁷⁾ and the parachuting activity memorandum of agreement. However, while the users are informed about the parachuting activity and the existence of a parachuting zone, and while prior consent from the control to drop parachutists above 1,500 ft is required, no path is specified for the parachutists, in particular after they have opened their canopy.

No activity restriction is stipulated like those decreed for air shows.

The abovementioned French decree of 17 July 1992 specifies no parachute-related procedure.

⁽⁷⁾ Aeronautical Information Publication.

Aerodrome circuits are specified on the VAC chart for aeroplanes and helicopters with an imposed height of 1,000 ft and for microlights with an imposed height of 500 ft. On the other hand, parachutes are not required to comply with one or more defined paths although they are necessarily going to manoeuvre under the canopy close to the runways and other aircraft in flight in order to get to the landing zone.

There is no school documentation presenting the entry point(s) or various theoretical circuits to be followed by the parachutists to get to the two landing zones according to the various winds and possible runways in use.

This situation creates potential substantial risks of collision between parachutists and other aircraft.

2.2 Risks for air traffic

The directive of 29 July 1981 requires that parachutists are not dropped as long as there is a risk for air traffic, without specifying the risk level or type. Strict compliance with this directive therefore suggests that, in theory, parachuting activities should not take place at the same time as flights by other aircraft, because it is not possible for the pilot of the drop plane to know beforehand, the flight paths of the parachutists under the canopy in the minutes following the drop or what will be the positions of the other aircraft.

Moreover, this same directive allows the competent authority to refuse that parachuting activities take place on uncontrolled aerodromes, notably when there is extensive flying club activities simultaneous with extensive parachuting activities. The term “*extensive*” is vague and does not make it possible to rule in a lasting way.

2.3 Two landing zones of which one not approved

The existence of these two landing zones, one of which, very close to runway 03/21, is not approved, makes for a more complex and conflicting situation. This is because it multiplies the possible parachutist paths and gives rise to, for the unapproved landing zone, parachute manoeuvring paths even closer to the paths of other aircraft.

The difference in the names given in the Manual of Specific Activities and on the photo and the absence of any written instructions may create a certain amount of confusion in the parachutist’s mind about the landing zone that s/he can use.

2.4 Visual detection

The presence of the setting sun offset from the take-off alignment did not hamper the vision of the gyroplane pilots. However, the yellow colour of the parachute probably did not help with its visual acquisition by the gyroplane pilots.

3 - CONCLUSIONS

The collision between the parachutist and the gyroplane was due to the parachutist following an unusual and conflicting path with the standard path of the gyroplane.

The parachutist followed this path for unknown reasons. The final path did not allow him to reach either of the two landing zones used on the aerodrome. He had probably not identified the presence of the gyroplane during his manoeuvres.

The following factors contributed or may have contributed to the occurrence of this accident:

- ❑ Absence of instructions for parachutists regarding the entry points and the paths to be followed according to the various winds and QFU in service.
- ❑ No instructions precisely defining the simultaneous activities of parachutists and those of other aircraft, with in particular, their manoeuvring volumes and manoeuvring paths.
- ❑ No directives allowing a better assessment of the potential risk from the simultaneous activities of parachutists and those of other aircraft.
- ❑ Existence of two landing zones, one of which was not approved, which may have created a certain confusion in the parachutist's mind as to the landing zone he was cleared for.
- ❑ Yellow colour of the parachute canopy which did not facilitate its detection by the pilots.

4 - RECOMMENDATIONS

Note: in accordance with the provisions of Article 17.3 of Regulation No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation, a safety recommendation in no case creates a presumption of fault or liability in an accident, serious incident or incident. The recipients of safety recommendations report to the authority in charge of safety investigations that have issued them, on the measures taken or being studied for their implementation, as provided for in Article 18 of the aforementioned regulation.

4.1 Safety measures taken

- ❑ The CERPL no longer uses the non-approved landing zone and has removed all its markings.
- ❑ The Manual of Specific Activities was modified in collaboration with the Nord Pas-de-Calais delegation in February 2016 in order to only show the sole approved landing zone.
It also shows four circuits associated respectively with the four QFUs to be followed by the parachutists. Each circuit has its own holding area and a specific entry point (height of 300 metres). These elements were defined in discussions between the CERPL and the Nord Pas-de-Calais delegation.
These circuits are permanently displayed at the CERPL for the parachutists.
- ❑ The Nord Pas-de-Calais delegation modified the conditions of use of the Lens Bénifontaine aerodrome from 1 May 2016. The aerodrome is reserved for aircraft equipped with radio-communication equipment. An opt-out of six months maximum was granted on the express request of the users concerned.
- ❑ The French Department for Youth and Sport started a study to improve the training of parachutists with respect to other air users.

4.2 Raising awareness of parachutists of importance of complying with paths to integrate aerodrome traffic circuits

The investigation revealed that no entry point or theoretical paths to be followed by parachutists under the canopy were described in the documentation of the Lens Bénifontaine parachute school as is the case of other parachute schools or clubs in other parachuting areas. Such a situation can lead parachutists to adopting their own entry points and flying paths which may conflict with other aircraft. After this accident, safety measures were taken by the CERPL in consultation with the Nord Pas-de-Calais delegation to define the manoeuvring paths for the parachutists along with the holding areas and entry points.

In addition, parachutists crossing the runways by foot after landing can cause conflictual situations, even possible collisions with other aircraft taking off or landing.

Consequently, the BEA recommends that:

- **The Department for Sport in collaboration with the FFP use this report to persuade parachute schools and parachute clubs of the importance of defining holding area(s), entry point(s) and theoretical paths under the canopy according to the wind and QFU(s) and of defining the associated instructions, specific to each school and each club.**

[Recommendation FRAN-2017-007]

4.3 Compatibilities of parachutist activities simultaneous with the activities of other aircraft

The directive of 29 July 1981 in force regarding parachuting activities limits these simultaneous activities based on the general expression of *"risk for air traffic"*.

One can question the practice of having several simultaneous flying activities in this airspace without a prior identification and assessment of the risks involved being carried out.

This directive also allows the competent authority to prohibit parachuting activities when there is extensive flying club activities simultaneous with extensive parachuting activities on uncontrolled aerodromes. Here again, the term *"extensive"* does not provide a means for assessing suitable operating procedures.

Lastly, this directive includes provisions which need to be updated as it refers to obsolete terms such as aeronautical districts.

Consequently, the BEA recommends that:

- **The DGAC in collaboration with the Department for Sport, clarify the current texts and propose procedures for managing the cohabitation of the simultaneous activities of parachuting and those of other aircraft. These procedures can concern for example the segregation of paths in the airspace or in time or the use of the radio.**

[Recommendation FRAN-2017-008]