



DUTCH
SAFETY BOARD

Loss of control after opening of canopy, near Kornhorn



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The Hague, February 2023

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The Dutch Safety Board

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Dutch Safety Board

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N.B: This report is published in the English language, with a separate summary in the Dutch language. If there is a difference in interpretation between the Dutch and English texts, the English text will prevail.

Summary	5
Recommendations.....	7
Abbreviations.....	8
General overview	10
1 Introduction	11
2 Factual information.....	12
2.1 History of the flight.....	12
2.2 Injuries to persons	14
2.3 Wreckage and impact information	14
2.4 Personnel information.....	15
2.5 Aircraft information	16
2.6 Meteorological information.....	21
2.7 Aerodrome information.....	21
2.8 Medical and pathological information	21
2.9 Fire.....	22
2.10 Organization and management information	22
2.11 Additional information.....	26
3 Investigation and Analysis	30
3.1 The accident	30
3.2 Technical Investigation	31
3.3 Design of the latching and locking system.....	32
3.4 Information flow.....	33
3.5 Risk assessment for MLA.....	34
4 Conclusions	37
5 Recommendations.....	39
Appendix A Responses to the draft report.....	40

On 13 February 2021, at approximately 15.00 hrs local time, the Aerospool Dynamic WT9, a microlight aircraft, registered PH-4E7, departed from Drachten Airport for a local VFR flight. The pilot was the only occupant. Near Kornhorn the aircraft lost altitude and impacted the ground. Shortly thereafter the aircraft caught fire. The pilot was fatally injured and the aircraft was destroyed as a result of the crash and the post-impact fire.

The investigation revealed that the canopy opened during the flight, followed by a pitch down movement of the aircraft. The pilot lost control and was unable to recover from the subsequent rapid descent during to the relatively short time before impacting the ground. Why the pilot was unable to recover remains unknown.

Due to extensive damage, only a limited technical investigation of the aircraft wreckage was possible. This investigation did not reveal any technical abnormalities that could have been a contributing factor to the cause of the accident. It is most likely that the canopy was not properly closed before the aircraft took off.

Pre-existent cardiac abnormalities were found with the autopsy. A relationship with the cause of the accident could not be determined. There are no indications that the loss of control was caused by a physical problem.

Further investigation revealed that inadvertent opening of the canopy during flight with this type of aircraft had occurred at least twelve times in the past. After the manufacturer knew of the possibility of the canopy not being closed properly, he issued a Mandatory Service Bulletin in 2008 requiring a change in the Pilot's Operating Handbook. This change addressed emergency procedures to be followed by the pilot in case of inadvertent opening of the canopy during various phases of flight.

Additionally, the manufacturer issued a Recommended Service Bulletin in 2019 to install a canopy lock with safety latch and sensor to prevent unintentional opening of the canopy. This new canopy lock would indicate the insufficient plug-in of the main latch by means of a yellow check light in the cockpit. It would also hold the main latch – and therefore the canopy closed – after the plug-out from the canopy lock socket. The accident aircraft did not have this new and recommended lock and check light installed.

When the aircraft was purchased in 2009, the Pilot's Operating Handbook did not contain the changed information as required in the Mandatory Service Bulletin of 2008. The flying club, holder of the aircraft, was not aware of the Mandatory Service Bulletin. Holders themselves are responsible for checking the manufacturer's website regularly. The recommendation to install a new lock with safety latch and sensor was considered unnecessary by the flying club.

Regular maintenance and inspection of the aircraft and its documentation did not bring to light that the required incorporation of the mandatory service bulletin in the pilot's operating handbook had not taken place. A previous canopy incident with this aircraft encountered by a member of the flying club did not lead to a raise in awareness due to unclear safety practices within the club and the lack of robust safety reporting. At that time the tasks and responsibilities, especially in the areas of maintenance, instruction and safety, within the flying club were not adequately assigned.

Microlight aircraft (MLA) are not certified in accordance with international standards and airworthiness requirements, but must comply with national requirements. The responsibility for MLA-oversight rests with the national Civil Aviation Authorities (CAA). Oversight and monitoring compliance with the regulations for MLA is delegated to the Dutch Human Environment and Transport Inspectorate (ILT, Inspectie Leefomgeving en Transport) as part of the CAA. This oversight and monitoring is virtually non-existent. The issue and renewal of a Special Certificate of Airworthiness is an administrative procedure based on self-declaration. Therefore, the safety level of MLA depends almost exclusively on the holders and pilots of these MLA. Active oversight will only be carried out if ILT finds reason to do so. Risk assessment for MLA is optional, according to ILT the risk is assumed to be low.

In response to a recommendation of the Dutch Safety Board in June 2020, the Minister of Infrastructure and Water Management responded that oversight of MLA has not been a priority for the Dutch CAA in the past. The Minister stated that ILT will evaluate whether reassessment of the MLA risk is required and that the oversight program will be looked at in order to capture issues in the MLA sector. Despite these commitments, there have been little or no improvements on the oversight of MLA by ILT.

RECOMMENDATIONS

The investigation shows that operating the latching and locking system of the canopy of the Dynamic WT9 is sensitive to errors, which may result in the opening of the canopy in flight. This has led to a number of occurrences in the past, including two with fatal consequences.

In 2019, the manufacturer had developed a new locking system to prevent the canopy from opening in flight, which included a canopy lock with safety latch and sensor. Installation of this system is not mandatory but recommended.

Because the safety risks for MLA flying is assumed to be low, there is hardly any oversight by the government. The Special Certificate of Airworthiness is issued without establishing that the MLA is actually airworthy. Therefore, the safety level of MLA aviation depends almost exclusively on the holders, private persons as well as flying schools, flying clubs and pilots of these MLA. In the opinion of the Safety Board responsibility for the flight safety of MLA is a shared responsibility between the holders, pilots and the government. Because it is not obvious that all holders and pilots are aware of this responsibility, it is a task of the government to draw their attention to this responsibility.

To increase the safety of MLA flying, in particular with Dynamic WT9 aircraft, the Dutch Safety Board therefore makes the following recommendations:

To the manufacturer Aerospool:

1. To make the installation of the canopy lock with safety latch and sensor mandatory for all Dynamic WT9 aircraft.

To the minister of Infrastructure and Water Management:

2. Make organizations involved in MLA flying, holders and pilots of MLA aware that they are largely responsible for the safety of MLA flying themselves and that this requires compliance with the regulations and an active fulfillment of this responsibility.



S. Zouridis
Vice Chairperson Dutch Safety Board



C.A.J.F. Verheij
Secretary Director

ABBREVIATIONS

AMIA	Aviation and Maritime Investigation Authority of Slovakia
BEA	Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (French air accident investigation authority)
CAA	Civil Aviation Authority
CAA SK	Civil Aviation Authority of Slovakia
DAeC	Deutscher Aero Club e.V.
EASA	European Union Aviation Safety Agency
EHDR	Drachten Airport
ft	Feet
GA	General aviation
GPS	Global positioning system
hrs	Hours
IBRA	ILT-brede risico analyse (ILT's wide risk analysis)
ILT	Inspectie Leefomgeving en Transport (Dutch Human Environment and Transport Inspectorate)
KNMI	Royal Dutch Meteorological Institute
kts	Knots
LAPL	Light aircraft pilot license
LOC-I	Loss of control in flight
LSA	Light sports aircraft
MLA	Microlight aircraft
POH	Pilot's operating handbook
RPL(A)	Recreational pilot license (Aeroplane)

S-CofA	Special certificate of airworthiness
SMS	Safety management system
VFR	Visual flight rules

GENERAL OVERVIEW

Identification number:	2021003
Classification:	Accident
Date, time of occurrence:	13 February 2021, approximately 15.05 hrs ¹
Location of occurrence:	Kornhorn, the Netherlands
Registration:	PH-4E7
Aircraft type:	Aerospool Dynamic WT9
Aircraft category:	Microlight aircraft
Type of flight:	Pleasure
Phase of operation:	En route
Damage to aircraft:	Destroyed
Flight crew:	One
Passengers:	None
Injuries:	Pilot, fatally injured
Other damage:	Several branches of trees broken
Light conditions:	Daylight

¹ All times in this report are local times, unless otherwise specified.

1 INTRODUCTION

On 13 February 2021, the Aerospool Dynamic WT9, a microlight aircraft, registered PH-4E7, impacted the ground and caught fire near Kornhorn, 11 kilometres northeast of Drachten Airport. The pilot was fatally injured. The aircraft was destroyed as a result of the crash and the post-impact fire.

The Dutch Safety Board, representing the State of Occurrence, was responsible for conducting the investigation and instituted an investigation into the circumstances of the accident.

The Slovakian Aviation and Maritime Investigation Authority (AMIA) was notified and provided assistance, as Slovakia is the state of design and the state of manufacture of the Dynamic WT9 aircraft. The European Union Aviation Safety Agency (EASA) was also notified and appointed a technical adviser.

Initial investigation into the accident revealed that the canopy of the aircraft had opened during the flight. Further investigation answers the following three questions:

1. What factors contributed to the accident?
2. How are Dutch holders and pilots of microlight aircraft informed about known aircraft safety issues?
3. How is oversight on microlight aircraft in the Netherlands organized?

This investigation followed Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 and the Dutch Safety Board's Kingdom Act. Air safety investigators of the Dutch Safety Board visited the scene of the accident and carried out the initial investigation of the wreckage. The wreckage was stored at a secured location where it was further examined. Investigators spoke with witnesses to the accident and other involved persons. The Dutch Aviation Police provided the Dutch Safety Board with additional witness statements and pictures of the accident site.

In Chapter 2 the factual information, gathered and considered relevant, is provided. In Chapter 3 further investigations are described and analyzed. In Chapter 4 the findings and conclusions from the previous chapter are combined and listed. Chapter 5 contains the recommendations.

2 FACTUAL INFORMATION

2.1 History of the flight

In the afternoon of Saturday 13 February 2021, the pilot of the Dynamic WT9 microlight aircraft with registration PH-4E7, arrived at the flying club at Drachten Airport to perform a flight. He had made a reservation to use the aircraft from 15.00 until 17.00 hrs for a local flight. He had prepared his flight at home, using navigation software on his iPad, which he always took with him in the aircraft, placed with a mount on the inside of the canopy.

Prior to the accident flight, the aircraft had performed two uneventful local flights that day. The pilot of the second flight had performed an aircraft inspection before his flight. After he had returned around 14.25 hrs, he refueled the aircraft for the next flight. He was met by the pilot of the accident flight, who supervised the refueling. After handing over the aircraft, he witnessed the pilot of the accident flight perform a preflight inspection of the aircraft exterior.

Just before 15.00 hrs, the pilot of PH-4E7 contacted the airport employee by radio and announced that he was ready for takeoff. The pilot stated he was the sole person on board and intended to perform a local flight. The airport employee witnessed the aircraft take off normally and confirmed the pilot to be the only occupant of the aircraft. The pilot reported leaving the traffic circuit, as is customary. The airport employee did not receive any further radio communication.

The Dutch Safety Board reconstructed the flightpath using two devices: a Garmin navigation device that had been mounted in the cockpit and was found on the crash site and the pilot's iPad, which was later found in a field along the flight track of the aircraft (see Figure 1). Both devices used satellite navigation (GPS) to determine altitude and groundspeed.

The aircraft took off at 14.59 hrs and performed a continuous climb. About 2 minutes later, it reached an altitude of around 1,300 ft², leveled off and maintained an airspeed of around 80-90 kts.³ The aircraft flew in a northeasterly direction towards the pilot's residence. Around 15.04 hrs, the aircraft descended slowly, reaching an altitude of around 700 ft. During this descent, the airspeed was around 80 kts. At 15.05 hrs, the aircraft was flying at an altitude of 670 ft and an airspeed of 80 kts, then climbed to an

² The altitude as recorded by devices in the cockpit, is noted in metres; these values are converted to feet.

³ All speeds as recorded by the devices are groundspeeds. These speeds are converted to airspeed.

altitude of approximately 760 ft, decreasing the airspeed to 70 kts. From the altitude of 760 ft, the aircraft descended until the end of the recordings. The airspeed during the descent increased to around 90 kts. The last recordings of the speed are not considered reliable (see Figure 2).

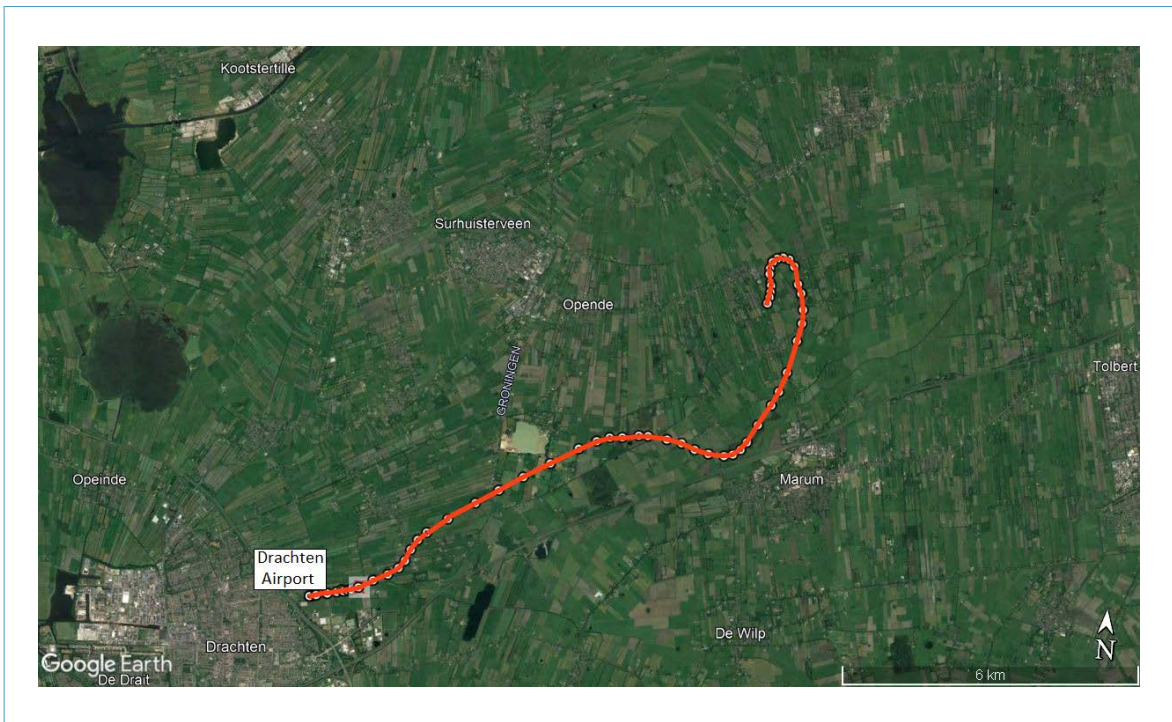


Figure 1: Reconstructed flightpath. (Source: Google and Dutch Safety Board)

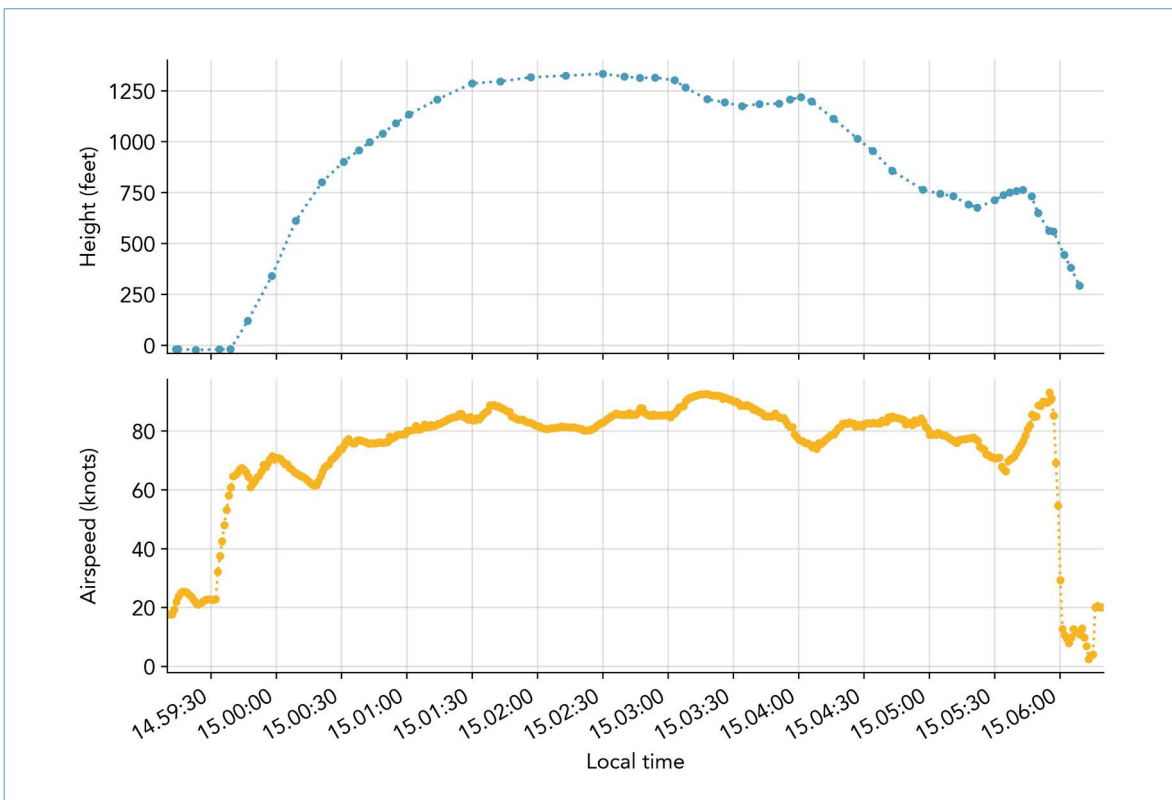


Figure 2: Graph with height in feet and airspeed in knots (kts) during the flight. (Source: Dutch Safety Board)

Eye-witnesses observed the aircraft flying near Kornhorn, about 11 kilometres northeast of Drachten Airport. Several witnesses stated the aircraft pitched down and up, followed by a dive towards the ground. Witnesses saw objects flying out of the cockpit and one witness stated the canopy of the aircraft appeared to be open. Light items, like papers, were found in the wide surroundings along the last part of the flight path. Heavier items, like the iPad, keys and aircraft logbook, were found close to the flight path, around 600 metres before the crash site (see Figure 3).

A witness made a film recording on which the last part of the flight can be seen in the background. When the aircraft appears on screen, it is in a steep dive with an estimated angle of 45 degrees. Slightly later, the nose down pitch decreases slightly after which the aircraft disappears from view. The aircraft is visible in the recording for around four seconds.

The aircraft hit several trees and impacted the ground in a field, fatally injuring the pilot. The aircraft broke up into several parts and the engine was destroyed in the post-impact fire.

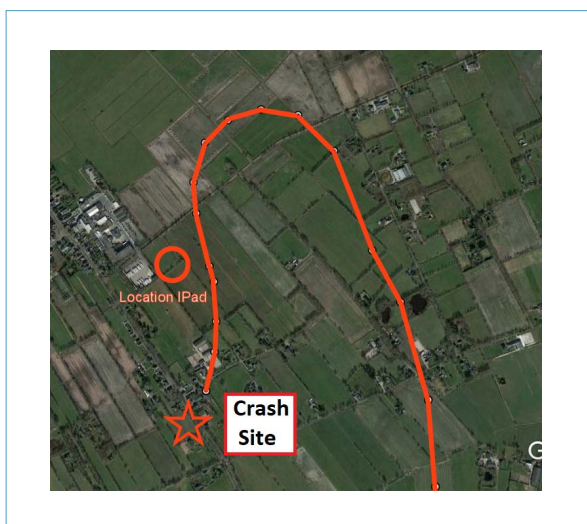


Figure 3: Last part of the flightpath. (Source: Google and Dutch Safety Board)

2.2 Injuries to persons

The pilot suffered fatal injuries as a result of the accident.

2.3 Wreckage and impact information

2.3.1 Aircraft

The aircraft was destroyed as a result of the crash and the post-impact fire. Part of the wing was found in a ditch near where the aircraft struck the trees. A large part of the tail-section was found together with the branches that were broken as a result of the impact. A large part of the canopy frame was found near the tail section. Several other aircraft

parts were scattered across the meadow. The engine was found several meters beyond the main aircraft wreckage (see Figure 4).



Figure 4: Crash-site. (Source: Aviation Police)

2.3.2 Other damage

Several branches of trees were broken off by the aircraft, just before it impacted the ground.

2.4 Personnel information

The Dutch pilot was a 75 year old male. He held a Recreational Pilot License (RPL(A)) and possessed a valid Medical Certificate, class Light Aircraft Pilot License (LAPL) issued 11 January 2021. He had logged around 394 hrs total time. The pilot had flown most of these hours on aircraft of the flying club: A Tecnam P92E and the Dynamic WT9 (PH-4E7) His last flight on PH-4E7 was on 23 November 2020, which was a local flight from Drachten Airport. His last flight before the accident was on 30 January 2021 on the Tecnam P92E.

Table 1: Flight hours of the pilot.

	All aircraft	Dynamic WT9
Total flight time	394 hours	168 hours
Last 365 days	24.40 hours	13.10 hours
Last 90 days	2.50 hours	1.50 hours
Last annual check flight		3 August 2020

2.5 Aircraft information

2.5.1 General

The Aerospool Dynamic WT9 is a single engine microlight aircraft (MLA) with fixed tricycle landing gear. The airframe consists of composite sandwich shells where the main construction element is carbon fiber. The aircraft is powered by a Rotax 912 UL, which is a 4 cylinder, 4 stroke, 59.6 kW rated engine. The aircraft has a basic empty weight of 288 kilograms and a maximum takeoff weight of 450 kilograms.



Figure 5: Archive photo of PH-4E7. (Source: M. de Bruin)

The Special Certificate of Airworthiness⁴ of PH-4E7 was issued, based on the certification of this type of aircraft in Germany by the Deutscher Aero Club e.V. (DAeC). The certification was in accordance with the German Certification Regulations and Airworthiness Requirements for ultra light aircraft of the DAeC.⁵ The Type Certificate No. 61179 was issued on 23 October 2001. See further Section 2.10.2.

⁴ A Special Certificate of Airworthiness is a certificate of airworthiness for aircraft that fall outside the framework of EU Regulation 2018/1139 and also do not meet the requirements for airworthiness under the ICAO Convention (Source: ILT).

⁵ BFU des DAeC, Ausgabe 10/95.

The same type of aircraft with the same specifications is also available as Light Sports Aircraft (LSA), certified in accordance with international standards and airworthiness requirements.

The flying club purchased the aircraft via the Aerospool representative in the Netherlands in October 2009 and received a certificate of registration from ILT on 27 October 2009. The Pilot's Operating Handbook (POH) for PH-4E7, serial number DY-318/2009, issue date 15 October 2009, was delivered by the representative together with the aircraft. The last revision date of this POH was on 28 November 2007. When asked, the representative could not remember how the delivery of the aircraft and the issue of the POH had taken place.

The flying club applied for renewal of the Special Certificate of Airworthiness of PH-4E7 on 7 January 2021. In the application form a staff member of the flying club declared on behalf of the holder, that:

- the aircraft was still in airworthy condition;
- the applicable airworthiness requirements and maintenance instructions had been complied with, and;
- the aircraft had been maintained in accordance with the designer's instructions.

The application was accompanied by a log entry with the statement of a certified aircraft technician that the instruments and systems had been checked in accordance with the instructions and are ready to use.

Since 7 January 2021, nine flights with a total flying time of 7.45 hrs had been made with PH-4E7. No discrepancies were noted in the aircraft's logbook.

Table 2: Some relevant data of the aircraft.

State of manufacturing	Slovak Republic
Date of manufacturing	26 August 2009
Certificate of registration	27 October 2009
Last 100-hours inspection	8 September 2020
Last 50-hours inspection	10 November 2020
Renewal Special Certificate of Airworthiness	26 January 2021

The cockpit canopy of the Aerospool Dynamic WT9 consists of one part. The plexiglas is glued on the composite frame. It hinges on two pins at the front of the fuselage and opens upward and forward, assisted by two gas struts on either side of the canopy (see Figure 6).



Figure 6: Opened canopy with gas struts. (Source: Dutch Safety Board)

The latching and locking system is located in the middle and upper rear section of the canopy. It consists of a handle used to push or pull the canopy towards the open or closed position. This handle has a red ring that indicates whether the canopy is closed properly (see Figure 7a). Further, the locking system consists of the spring-loaded handle which pulls a locking pin (see Figures 7b and 8a) forward and out of the fuselage socket (see Figure 8b) to unlock the canopy or pushes the locking pin rearward into the fuselage socket to lock the canopy. Finally two guiding pins at the rear and to the side of the canopy position the canopy correctly into two slots in the fuselage when in the closed position (see Figures 9a and 9b).

The Aerospool Dynamic WT9 MLA is equipped with the same latching and locking system as the LSA version certified by the European Union Aviation Safety Agency (EASA).



Figures 7a and 7b: Open/closing handle with red ring and locking pin of PH-4E7. (Source: Dutch Safety Board)



Figure 8a: Locking pin and Figure 8b: Locking socket. (Source: Dutch Safety Board)

Figure 9a: Guiding pin and Figure 9b: Guiding slot. (Source: Dutch Safety Board)

The Pilot's Operating Handbook (issued on 20 January 2015)⁶ lists examples of correctly and incorrectly closed canopies (see Figure 10). If the red ring is not (entirely) against the guide, this is an indication that the locking pin is not (entirely) in the fuselage socket to lock the canopy. Furthermore, it is possible that the canopy is not tightly closed at all, whereby the locking pin is extended but is not placed in the socket but rests on the fuselage itself. In this situation, the red ring seems to be in the right position but the canopy is unlatched and a gap of around 8 -12 mm (according to the POH) between the canopy and the fuselage remains.

The latching and locking system (handle and indication) is positioned above and behind the pilot's head. The pilot must look up and to the back to check that the handle is in the correct position.

⁶ These examples are not listed in the POH with issue date 15 October 2009.

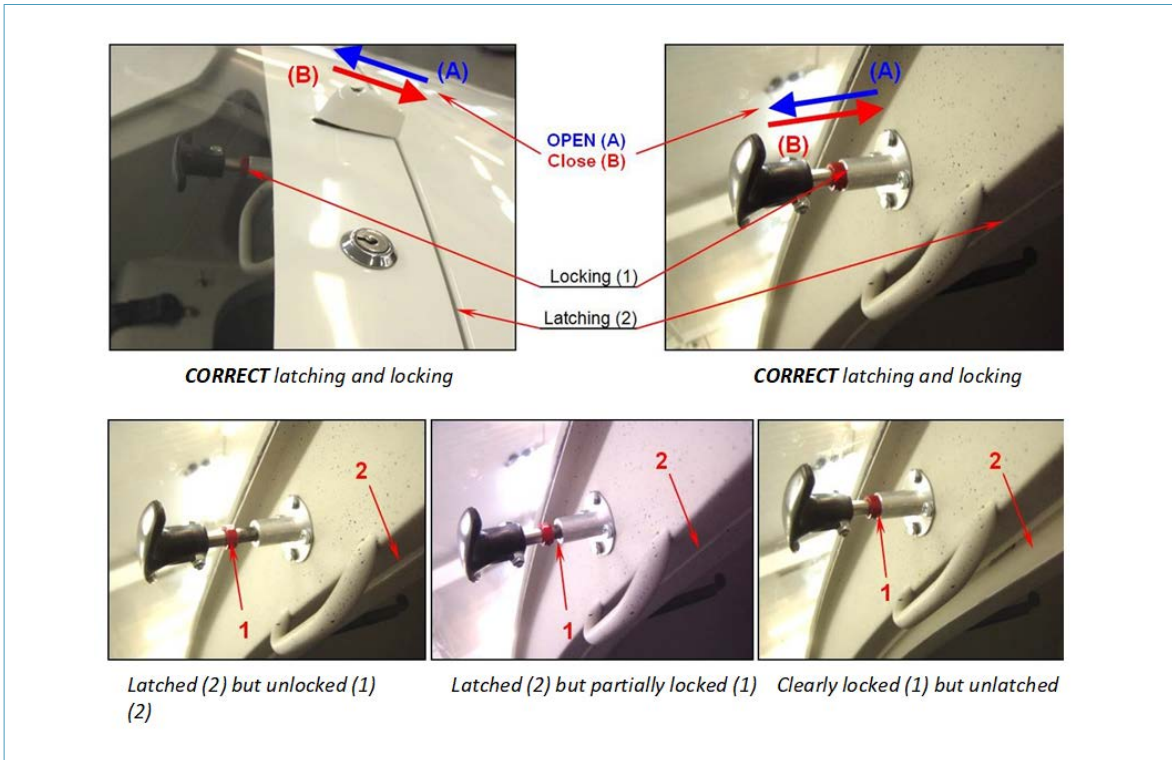


Figure 10: Examples of correctly and incorrectly closed canopies. (Source: POH Aerospool WT9, issued 20 January 2015)

According to Pilot's Operating Handbook Normal Procedures, checking if the canopy is properly closed is mentioned twice in the checklists:

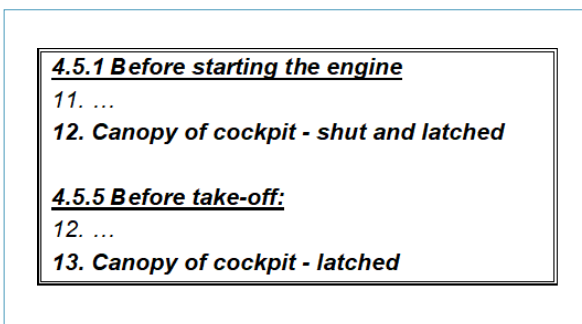


Figure 11: Relevant parts of the checklists. (Source: POH Aerospool WT9 issued 15 October 2009)

2.5.2 Technical investigation

After the wreckage of PH-4E7 was transported to a hangar, a technical investigation was performed. Due to the fragmentation and the fire, only a limited investigation was possible. It could not be determined whether the flight controls had functioned properly. The engine's crankshaft could be turned and traces of oil and fuel were found. The three-blade propeller was found broken into pieces. Electronic equipment was saved for further data-investigation.

The canopy frame and the relevant part of the fuselage were found damaged. Investigation revealed that the latching and locking system was undamaged and functioned without problems.

A repair was found around one of the guiding pins in the canopy frame. A plastic card was used for this repair as a mold for the resin and the card was still in place. It turned out that the repair was carried out, after the pin had been found loose after the incident on 5 December 2020 (see Section 2.11.1), by a member of the flying club on his own initiative and without consultation of the responsible persons. This repair was not included in the technical administration of PH-4E7.

2.6 Meteorological information

The Royal Netherlands Meteorological Institute (KNMI) provided a weather report. The prevailing weather conditions were:

General situation

A high pressure area located over the south of Norway, resulted in a continental polar air mass bringing cold, dry and stable air from the southeast.

Weather circumstances

During the time of the accident, the weather conditions along the route Drachten – Kornhorn were good, visibility more than 10 kilometres and no clouds.

Table 3: Wind and temperature along the route Drachten – Kornhorn between 14.45-15.10 hrs.

Wind and temperature	Wind (degrees/knots)	Temperature (°C)
Ground	110/14-16	-2
500 feet	130/15-20	-7
1,500 feet	140/20-25	-7
2,000 feet	140/20-25	-8

2.7 Aerodrome information

Drachten Airport (EHDR) is available for national and international civil air traffic with business-like purposes with all types of aircraft up to 6,000 kilograms, including a limited use by MLA. The runway has a total length of 730 meters.

2.8 Medical and pathological information

The Dutch Forensic Institute conducted a post-mortem examination on the body of the pilot on behalf of the Dutch Safety Board. According to the autopsy report, the pilot was likely fatally injured as the result of high-energy trauma.

The pathology report stated that pre-existent cardiac abnormalities were found during the autopsy. A relationship with the cause of the accident cannot be excluded, according to the report. There are no indications that the loss of control was caused by a physical problem. No other physical particulars that could have played a role in the accident were found.

2.9 Fire

Shortly after the aircraft impacted the ground, the engine caught fire and burnt out.

2.10 Organization and management information

2.10.1 Manufacturer bulletins

The manufacturer of the WT9 has been publishing mandatory service bulletins and recommendation bulletins for this type of aircraft on its website. After the incorrect closure of the canopy was determined to be a factor in an aircraft crash in Slovakia in 2008, the manufacturer issued Mandatory Service Bulletin ZB WT9 10A/2008. This bulletin was issued on 3 December 2008 and was immediately compliant. This bulletin applies to WT9 Dynamic aircraft in both the MLA as well as the LSA-categories and pertains changes in the POH regarding an unsecured cockpit canopy.

Following the bulletin two pages in Chapter 3 'Emergencies' had to be replaced. In Section 3.8.4 is mentioned: *'If the "Before Take-off" checklist is performed insufficiently (cockpit canopy -latched), there is a possibility of partial cockpit canopy latching. The canopy is equipped with a lock on the upper rear section of the frame and it is secured by the lock lever shot backwards. The lock pin is projected as latch with compression spring. The gap ca. 8-12 mm will rise between fuselage and cockpit canopy, which is constant during straight line flight without side-slipping due to the air flow and the function of the gas struts. Partial cockpit canopy latching will stack up by the noise increase due to the agitated air through the gap between fuselage and cockpit canopy. Partial cockpit canopy latching is possible to close safely during straight-line flight without side slipping by the following way according to appropriate stage of flight.'*

This Section also contains pilot procedures on how to close the canopy after inadvertent opening during takeoff, climb or level flight and the following warning:

WARNING

During side-slipping flights with partial cockpit canopy latching (incorrect turn – slipping turn, skidding turn, and side slipping for landing) due to asymmetrical flow over fuselage by the air flow, the cockpit canopy will be carved through the gap and subsequently will be full open by help of the gas struts. The cockpit canopy will become the braking shield, what will cause abnormal airplane descent due to increased total drag.

As from 3 December 2008, the manufacturer required holders of an Aerospool Dynamic WT9 to change the Pilot's Operating Handbook and to include emergency procedures in case of inadvertent opening of the canopy during flight according to the mandatory bulletin. This bulletin was published on the website of the manufacturer. Manufacturer's representatives were informed about this mandatory bulletin.

The manufacturer's Mandatory Service Bulletin ZB WT9 10A/2008 was not incorporated in the POH of PH-4E7. This was not noticed by staff of the flying club at the time of the airworthiness renewal inspections on 12 December 2019 and on 7 January 2021 and during other regular maintenance and other inspections inspections by staff of the flying club.

Manufacturer Recommendation DV WT9 10B/2019 was issued on 4 April 2019. This recommendation applies to all WT9 Dynamic MLA.⁷ It recommends to install a new canopy lock with an additional safety latch and sensor, which holds the main latch after plug-out from the canopy lock socket and a check lamp on the instrument panel as an indication of insufficient plug-in of the main latch (see Figure 12).



Figure 12: New lock with an additional safety latch. (Source: Aerospool)

The installation of the canopy lock with safety latch and sensor as recommended by the manufacturer had not been installed on the aircraft at the time of the accident. The board of the flying club was of the opinion that implementation of this recommendation was not necessary. Why and when this decision was made could not be determined.

2.10.2 Regulatory framework for MLA

MLA are not certified in accordance with international standards and airworthiness requirements, but they must comply with national requirements. In the Netherlands, no national airworthiness requirements for MLA exist, however the national airworthiness requirements of Germany, the United Kingdom or the Czech Republic are considered

⁷ According to the manufacturer, the bulletin is exclusively related to the MLA version of the aircraft. For WT9 Dynamic LSA aircraft, this modification of the canopy closing and locking mechanism is not approved.

acceptable and MLA complying with these requirements are allowed to be registered in the Dutch aircraft register.

According to Article 2.3d of the European Basic Regulation (EU) 2018/1139, the European regulatory framework for aviation safety is not applicable to all aircraft. *“In particular, in light of their limited risk to civil aviation safety, aircraft that are of simple design or operate mainly on a local basis, and those which are home-built or particularly rare or only exist in a small number, should remain under the regulatory control of the Member States”*.⁸ Therefore, MLA are subject to national legislation. The responsibility for MLA-oversight rests with the national civil aviation authorities, which in the Netherlands is the Human Environment and Transport Inspectorate (ILT) of the Ministry of Infrastructure and Water Management. The priorities for the oversight by ILT depend amongst others on an ILT-wide risk assessment (in Dutch: IBRA). Currently, oversight consists of monitoring the MLA sector through information received from organizations working in the field of aviation, like the ILT’s Aviation occurrences Analysis Bureau (Analysebureau luchtvaart-voorvallen) and the Dutch Safety Board. In line with the European Basic Regulation (EU) 2018/1139, ILT considers the MLA risk to be low and prioritizes resources for tasks involving higher societal risk and cost, such as commercial air transport.

On 13 October 2020, in response to the Dutch Safety Board’s recommendations in the ‘Fatal loss of control accident with a Pipistrel Alpha Electro near Stadskanaal airport’⁹ report, the Ministry of Infrastructure and Water Management acknowledged oversight of MLA has not been a priority for the Dutch CAA in the past. The ministry writes that the Dutch CAA will evaluate whether reassessment of the MLA risk is required and that the oversight program will be looked at in order to capture issues in the MLA sector.

In the scope of this Pipistrel investigation, the Dutch ministry expressed that it is in favour of extending the European regulatory framework for recreational aviation to include MLA, but negotiations to bring MLA under the European aviation safety regulations and oversight have not been successful yet.

It is noted, however, that contrary to the statement above to better regulate MLA, the Dutch ministry recently decided to increase the maximum takeoff weight of MLA from 450 to 600 kg. Thereby increasing the number of aircraft for which the European regulatory framework does not necessarily apply. Also, the oversight program for MLA has not been amended or intensified and there is currently no intention to change this.

National requirements for airworthiness of MLA are stipulated in the National Aircraft Safety Requirements Regulation (RNVL, in Dutch: *Regeling nationale veiligheidsvoorschriften luchtvaartuigen*).¹⁰

8 European Basic Regulation (EU) 2018/1139, preamble 4.

9 <https://www.onderzoeksraad.nl/en/page/12366/fatal-loss-of-control-pipistrel-alpha-electro-near-stadskanaal>

10 <https://wetten.overheid.nl/BWBR0043696/2020-10-01>

When registering an MLA for the first time and applying for a Special Certificate of Airworthiness (S-CofA), the holder must submit the following documents, among others:

- a document issued by the aviation authorities of Germany, United Kingdom or the Czech Republic demonstrating that the relevant type and MLA configuration complies with the relevant airworthiness requirements.
- a statement by the holder that the aircraft complies with all mandatory airworthiness directives issued by the aviation authority of one of the countries referred to in the previous paragraph, as well as the Dutch airworthiness directives, and all mandatory maintenance directives.
- a statement from the holder stating that the MLA configuration is identical to the approved configuration.

When applying for an extension of the S-CofA, the holder must submit a declaration stating:

- that the aircraft remains in airworthy condition.
- that the aircraft complies with applicable (special) airworthiness directives.
- that any modifications have been applied in accordance with approved procedures.
- that the aircraft has been maintained in accordance with the instructions of the designer.
- the total number of aircraft flight hours.

The application for an S-CofA shall be accompanied by a log entry, demonstrating that the maintenance instructions for aviation equipment included in the Maintenance Directives have been complied with and shall be countersigned by a maintenance technician or by a staff member appointed by an approved maintenance organization which is authorized to carry out an S-CofA renewal inspection.

ILT normally approves the application for the S-CofA (initial and renewal) based on the declaration of the holder that the aircraft is airworthy. Unless ILT has reason to suspect the aircraft is not airworthy, a physical check or audit is not part of the approval process.

Furthermore, according to Article 36 of the RNVL, the maintenance of an MLA may be carried out by or under the supervision of the aircraft holder, with the exception of the maintenance of the mandatory instruments, radio communication, navigation and identification equipment.

The minister has placed several restrictions on the use of an MLA. An MLA may be used only recreationally and for RPL(A) training. These operational restrictions are laid down in Article 46 of the RNVL.

2.11 Additional information

2.11.1 The flying club

PH-4E7 was owned by a non-commercial flying club, established in 1990. This club owned three microlight aircraft, including PH-4E7, and facilitated members who own and fly an aircraft. Interviews by the Dutch Safety Board revealed that club- and safety practices were interpreted differently by its members. The club had an informal atmosphere. Tasks and responsibilities were not clearly defined and carried out; the maintenance of club-owned aircraft was not properly and structurally arranged.

After a new board was installed in 2018, an attempt was made to establish tasks and responsibilities by appointing persons responsible for, among other things, maintenance and safety. In the field of safety, it had become apparent to the new board that insufficient attention was paid to the safety management system (SMS). Unsafe situations were not reported by the members of the flying club and two of the five instructors did not acknowledge the importance of an SMS.

A first action of the new board in the field of maintenance was to have the technical condition of the club aircraft and the technical administration assessed. On 14 November 2019, the flying club hired a certified aircraft maintenance engineer to inspect the club aircraft. The engineer noted, among other things, that all three aircraft had defects and overdue maintenance and that the technical administration was below standard, with only very brief information. In addition, the flying club either did not have a maintenance program or an incomplete, not up-to-date, maintenance program for the three club aircraft. The engineer recommended appointing a person to implement a scheduled maintenance program in which mandatory bulletins and recommendations issued by the manufacturer are checked and implemented. The board adopted this recommendation. In 2020 a maintenance program was introduced and a person became responsible for the technical administration of the club aircraft. Maintenance was done by two designated members of the flying club.

The noted defects were repaired and the aircraft could be used again after some weeks.

Not all flying club members supported the new policy of the board. Some were of the opinion that the new policy was too expensive and unnecessary. These members believed that everything could remain as it was. This caused a division among the members in the flying club.

Early 2021, this division still existed. It resulted in the resignation of the chairman and few other new board members in 2021. Their positions were taken over by others. This situation remained unchanged until the date of the accident.

2.11.2 Other similar occurrences

In 2008, a non-fatal crash occurred in Slovakia, whereby the canopy opened during a sideslip manoeuvre before landing. This accident was reason for the manufacturer to publish Mandatory Service Bulletin ZB WT9 10A/2008.

The manufacturer stated that he was informed of three cases¹¹, but information from other investigative bodies indicated that there had been more occurrences where it was known that the canopy opened in flight.

On 17 May 2017, the French BEA investigated the fatal crash of an Aerospool Dynamic WT9 and determined the opening of the canopy likely contributed to the loss of control in flight.¹² The holder of the aircraft later stated that he had experienced the unintentional opening of the canopy during another flight. He then managed to close the canopy. The BEA identified eighteen accidents that occurred between 2005 and 2018 whereby the canopy of aircraft opened inadvertently. Three of these accidents were fatal, all three concerned MLA. These MLA were not of the make of Aerospool Dynamic WT9.

The Austrian Austro Control GmbH investigated the fatal crash of an Aerospool Dynamic WT9 on 14 June 2018. According to the, non-public, report the cause of the crash was the not properly closing and latching/locking of the canopy resulting in a loss of control in flight. Austro Control GmbH identified six other Aerospool Dynamic WT9 inadvertent canopy opening occurrences between 2016 and 2018. In all these occurrences, the flight crew managed to close the canopy in flight or hold it until a safe landing could be made. None of these six occurrences were known to the manufacturer.

On 5 December 2020, a pilot and a passenger flying PH-4E7 experienced an inadvertent opening of the canopy, while performing asymmetrical maneuvers. This dangerous situation was brought under control because the pilot was able to recover from the resulting aircraft's nose down movement while the passenger held the canopy closed. After the flight, the pilot noticed the left guiding pin on the side of the canopy was bent. He informed maintenance staff of the flying club, filed a safety report and wrote up this defect in the aircraft's journal. The safety report was to be discussed during a flight safety awareness meeting in de flying club but the meeting had not taken place due to the COVID-19 restrictions. The occurrence was also not reported to the Civil Aviation Authorities, the Dutch Safety Board and the manufacturer.

During the investigation, another member of the flying club told he had experienced an inadvertent canopy opening in flight with another Aerospool Dynamic WT9 aircraft. The canopy opened approximately 2 centimetres but he was able to land the aircraft safely. He stated that he did not check the canopy closure thoroughly.

¹¹ Slovakia 2008, Czech Republic 2014, Austria 2018.

¹² https://bea.aero/fileadmin/uploads/tx_elydbrapports/BEA2017-0269.pdf

Table 4: List of known canopy occurrences.

Date	Country	Registration	Injuries	Peculiarities	Source
2008	Slovakia	OM-COMP	None	This was the reason for the Mandatory Bulletin ZB WT9 10A/200810A	Manufacturer
10-6-2014	Austria	OE-AFZ	None	The canopy held by hand, pilot report	Mentioned in the report Austro Control
19-6-2014	Czech Republic	OM-PPL	Severely injured		Manufacturer
2016	Austria	Unknown	None	The canopy held by hand, pilot report	Mentioned in the report Austro Control
17-5-2017	France	68-US	One fatal	The owner himself had also experienced the unintentional opening of the canopy during takeoff. He managed to close the canopy in flight	
2017	Austria	Unknown	None		Mentioned in the report Austro Control
24-6-2017	Austria	OE-7145	None	The canopy held by hand	Mentioned in the report Austro Control
2018	Austria	OE-7136	None	The canopy held by hand	Mentioned in the report Austro Control
14-6-2018	Austria	OE-7136	One fatal		Manufacturer Report Austro Control
5-12-2020	Netherlands	PH-4E7	None	The canopy held by hand	Interview
Unknown	Netherlands	Unknown	None	The canopy held by hand	Interview
Unknown	Austria	Unknown	None	The canopy held by hand	Mentioned in the report Austro Control

2.11.3 Reaction Dutch Civil Aviation Authority

On 4 March 2021, after the initial findings of the investigation became known, the Human Environment and Transport Inspectorate (ILT) sent a mailing to the fourteen other holders of Dynamic WT9 aircraft registered in the Netherlands. ILT drew attention to the mandatory service bulletin (SB) and any other applicable SBs. When asked if they were aware of this mandatory SB and if it had been implemented, seven of the fourteen holders responded.

Five of them were already familiar with the mandatory SB and indicated to have processed it. One holder indicated that he was not yet familiar with this SB. One holder indicated that he was familiar with this SB, had not yet processed it, but would do so. On 29 March 2021, a reminder was sent to those holders who had not yet responded to the two questions in the mail.

3 INVESTIGATION AND ANALYSIS

3.1 The accident

The pilot prepared his flight as he usually did. After he had arrived at Drachten Airport, he attended the refueling of the aircraft and inspected the aircraft. The aircraft made two earlier flights that day without problems. There were no indications that the flight could not be carried out safely.

In general, after a pilot is seated in the cockpit of an aircraft, he performs the preflight procedure. Checking whether the canopy is closed, was mentioned twice in the checklist, once before starting the engine and the second time before takeoff. In this case, it is unknown if or how accurately the pilot followed the items on the preflight checklist.

In the radio communication before, during and after the takeoff, the pilot did not report any abnormalities, indicating that the flight was proceeding normally at that time.

Based on the flight data as presented in Section 2.1, the pilot initially proceeded to his residence, as he often did. Shortly after completing a 180 degrees turn, the aircraft flew in a nose up attitude, followed by a steep descent. As the film recording shows, the nose down pitch of the aircraft decreased during the steep descent. It is not known whether this was caused by pilot input or by the increase in airspeed during the dive. The dive was not recovered after which the aircraft impacted the ground.

Throughout the flight the airspeed of PH-4E7 remained above the stall speed. Although the Pilot's Operating Handbook (POH) does not specify a stall speed, this is assumed to be around 37 kts. This is based on the requirement that the stalling speed of an MLA in landing configuration may not exceed 35 kts (calibrated airspeed) and that according to POH, the normal operational airspeed is at least 37 kts. The lowest measured airspeed during the last part of the flight was 69 kts. This leads to the conclusion that the steep descent was not due to a stall situation.

As stated by eye witnesses, some moments before the aircraft crashed, the canopy was slightly open and items were blown out of the cockpit. According to the mandatory service bulletin, inadvertent opening of the canopy may happen during flight if the canopy is not well closed and locked. It included a warning that this can happen, particularly during a flight with side slip and will cause abnormal aircraft descent.

The latching and locking system of the canopy was found undamaged and functioned without problems. Due to the construction of the latching and locking system, the canopy cannot unlock and open on its own when properly closed and locked. It is highly unlikely

that the pilot opened the canopy intentionally during the flight. Therefore it is most likely that the canopy was not properly closed before the aircraft took off. Although it is mentioned twice in the checklist that the latching and locking of the canopy should be checked before takeoff, apparently the pilot did not notice that the canopy was not properly closed.

In straight and level flight, aerodynamic forces on the canopy result in the canopy staying in the closed position, even when the canopy is not properly closed and locked. The POH states that a side slip may cause the non-locked canopy to open as a result of asymmetric flight. The pilot made a turn above his residence after which the canopy opened and this likely occurred due to asymmetric flight. After the opening of the canopy, the pilot lost control resulting in a steep dive. Due to the low altitude, the pilot could not restore this situation.

The investigation did not determine why the pilot lost control. The sudden, inadvertent opening of the canopy accompanied with a strong air flow in the cockpit, may have caused a startle effect. The fact that the iPad, which was placed on a mount in the cockpit, was found under the flight path, indicates that the opened canopy caused an airflow in the cockpit that was strong enough to blow the device out of the cockpit. A relationship between a physical problem of the pilot and the accident could not be established.

The accident can be classified as a loss of control in-flight (LOC-I) accident. Loss of Control In-flight is the most frequent and most deadly type of accident in general aviation.¹³

It is most likely that the canopy was not locked properly before the aircraft took off. After the inadvertent opening of the canopy during flight, the pilot lost control of the aircraft. Due to the low altitude, the pilot was unable to regain control. Why the pilot lost control, could not be determined.

3.2 Technical Investigation

The crash and subsequent fire destroyed most of the aircraft including most of the cockpit instruments and engine. The limited investigation of the remaining parts did not reveal any technical defects that could have contributed to the cause of the accident. The repair around one of the guiding pins in the canopy frame had no influence on the cause of the accident. The pin was found still tightened and straight during the investigation after the accident. In addition, several flights were made with PH-4E7 without complaints about the pin repair or about difficulty in closing and locking of the canopy following the repair in December 2020.

¹³ <https://www.easa.europa.eu/domains/general-aviation/flying-safely/loss-of-control>

The technical investigation did not reveal a technical problem that could have been a contributing factor to the cause of the accident.

3.3 Design of the latching and locking system

The manufacturer had designed a system that would indicate that the canopy is not properly closed by means of a red indication ring on the locking lever. However, the handle with the red ring is outside of the pilot's primary view. Due to the positioning of this ring, above and behind the pilot's head, the pilot must make some effort to properly assess the correct position of the red indication ring. It is also possible that the indication ring is in the correct position while the canopy is not properly closed, as shown in the POH. The gap of 8-12 mm between the canopy and the fuselage can be overlooked if insufficient attention is paid to it.

The only effective way to have the canopy properly latched and locked, is to closely follow the checklists and to check that the canopy cannot be pushed open.

Inadvertent opening of the canopy during flight had been established as probable cause of several incidents and accidents. This leads to the conclusion that operating the latching and locking system of the canopy is sensitive to errors.

From the fact that there are at least twelve cases where the canopy of this type of aircraft opened during flight, it is clear that operating the latching and locking system of the canopy of the canopy is sensitive to errors.

In response to the an occurrence in 2008, the manufacturer took action by publishing a mandatory service bulletin on 3 December 2008. The mandatory bulletin provided for an adjustment of the POH with procedures to follow if the canopy should open during flight. Although this bulletin presented instructions to minimize the consequences, it did not address the cause of the problem, i.e. the design of the latching, locking and control system.

After two more occurrences, the manufacturer issued a non-mandatory recommendation on 4 April 2019, to further minimize the risk of inadvertent opening of the canopy during flight. It recommends installation of a canopy lock with safety latch and sensor. Therefore, a more adequate solution was available to prevent a pilot from taking off while the canopy is not properly closed or keeping the canopy closed in case of an inadvertent opening. However, it is not mandatory to install this provision as it is a recommendation. It is up to aircraft holders to decide on implementation of this recommendation.

Inadvertent opening of the canopy during flight has led to multiple incidents and fatal accidents with this type of aircraft. This risk was known to the manufacturer who in response published a mandatory service bulletin and a recommendation bulletin. The mandatory service bulletin, containing operational measures, does not prevent aircraft from taking off with a canopy that is not closed properly.

3.4 Information flow

The aircraft was registered to the holder on 27 October 2009 and as such, the holder became responsible under Dutch regulations for the airworthiness and maintenance requirements of the aircraft. This included, amongst other things, incorporating manufacturer mandatory bulletins.

The POH of the Dynamic WT-9 supplied by the representative to the holder of PH-4E7 was dated 15 October 2009. It did not contain the emergency procedures or warning as stipulated in Mandatory Service Bulletin ZB WT9 10A/2008 dated on 3 December 2008. Because the last revision found in PH-4E7's POH was dated on 29 November 2007, the most recent updated version of the POH was not provided by the representative to the holder when the aircraft was delivered. When asked, the representative could not remember how the delivery of the aircraft and the POH had taken place.

According to the manufacturer, changes to the POH and mandatory and recommended service bulletins were communicated to the local representative in each country where the manufacturer was represented. When delivering an aircraft, the local representative had to supply new customers with up-to-date documentation specific to that aircraft. The manufacturer also placed this information on its website, so existing holders could stay up-to-date regarding issued (mandatory) bulletins in order to keep the aircraft airworthy. Holders were themselves responsible for checking the website regularly.

The flying club had extracted what it thought were the relevant and applicable mandatory and recommended bulletins from the manufacturer's website. The club had missed though several mandatory bulletins, including the aforementioned bulletin regarding the emergency procedures after inadvertent opening of the canopy. This was not noticed during inspections in 2017 and 2019 preceding the application for renewal of the Special Certificate of Airworthiness. Monitoring the implementation of manufacturer's directives is however a mandatory component of inspections. This could have been caused by the fact that the tasks and responsibilities within the flying club were not adequately assigned. Although the new board had started to restructure the flying club's organisation, this took effort and time and was still not effective. In addition, the prevailing informal culture within the flying club, where tasks and responsibilities were not clearly defined and carried out, allowed potential dangerous situations to arise. This may have played a role.

ILT also did not notice the missing mandatory service bulletins during the application and extension of the aircraft's S-CofA. ILT did not actually check an MLA and its documentation, as the issuance of a certificate was only based on a declaration of the

holder. As an approval was issued by ILT, it might appear to holders and pilots that an actual check of information and completeness had been performed.

Relevant information regarding the possibility of opening of the canopy during flight did not reach the users of the aircraft. This was caused by the involved parties not taking the actions for which they are responsible:

- the aircraft was delivered by the representative with a POH that was not up-to-date and did not include the changes as stated in the 2008 mandatory service bulletin.
- neither the holder nor those responsible for maintenance noticed this mandatory service bulletin had not been incorporated for several years.
- ILT did not actually check whether the information as stated in the application form for an S-BvL extension had been filled in truthfully.

By not inserting the contents of the mandatory service bulletin in the POH, the pilots were unaware of the emergency procedures in case of an inadvertent canopy opening. The recommendation to install a new canopy lock was extracted from the manufacturer's website, but not performed on PH-4E7, because this recommendation was found not to be necessary by the board of the flying club.

Mandatory and important safety information was not implemented in the Pilot's Operating Handbook and therefore did not reach the pilots. The implementation of a non-obligatory design solution to prevent inadvertent opening of the canopy was not considered necessary by the flying club. Oversight by ILT did not capture the missing mandatory service bulletin, as the issuance of a special certificate of airworthiness was based on a declaration of the holder only.

3.5 Risk assessment for MLA

Historically, MLA have been considered to pose a low risk for aviation safety, both at a pan-European level¹⁴ as well as a national level in the Netherlands. This is based, among other things, on the premise that MLA are aircraft of simple design or operate mainly on a local basis. The European policy for aviation safety follows a risk-based approach, which includes simple and proportionate rules for sport and recreational activities. MLA are considered aircraft for which the design, production, maintenance and operation involve low risk for aviation safety. Therefore, the established general European regulatory framework for aviation safety does not apply. For the operation and certification of MLA national law applies. In this context, aviation safety refers mainly to the safety of third parties, paying passengers and people on the ground.

¹⁴ Regulation (EU) 2018/1139 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, see recital (6) and Article 2 (3(d)).

It is questionable whether the premise that MLA are aircraft of simple design or used mainly on a local basis, is still valid. Today's MLA are in many cases more advanced and have better performance than older, international certified aircraft. Additionally, MLA are increasingly used by flight schools. Besides, the operational risk that MLA pilots face is no different from pilots of other types of aircraft used for recreational aviation. This also applies to the safety of people on the ground.

For MLA, a Special Certificate of Airworthiness (S-CofA) is issued and renewed based on the declaration of the holder that the aircraft remains in airworthy condition, complies with and is maintained according to the manufacturer's specifications and that the applicable airworthiness directives and special airworthiness directives are complied with. As there is no verification on whether the declaration was filled in correctly, intentional or unintentional errors are not noticed. As a result, an S-CofA may be issued when the requirements are not met. This was also the case with PH-4E7: not all directives had been complied with and this was not noticed by ILT during the S-CofA renewal process. The issuance of an S-BvL is no guarantee that an MLA is actually airworthy.

Oversight and monitoring compliance with the MLA regulations by ILT is virtually non-existent. Therefore, the safety level of MLA depends almost exclusively on the holders and pilots of these MLA. Although the ministry of Infrastructure and Water Management declared to evaluate whether risk reassessment is required and existing oversight is effective, this has not led to a change in policy. ILT employees stated that active supervision will only be carried out if there is reason to do so. Therefore, it is not guaranteed that adjustments will be made to improve safety for the MLA sector. This is an undesirable situation because the increasing number of MLA in the Netherlands, partly due to the increase in the maximum takeoff mass and partly due to the increasing use of MLA in commercial flying schools.

Aerospool, the manufacturer of the Dynamic WT9 recognized the risk associated with the inadvertent opening of the canopy during flight in 2008 after a non-fatal crash in Slovakia. That is why he issued a mandatory bulletin requiring the holders of this type of aircraft to update the Pilot's Operating Handbook with emergency procedures and a warning regarding the canopy opening. Despite publishing this information, not all aircraft holders were aware of this risk and accidents continued to take place.

Aerospool issued a recommendation to install a new canopy locking system and safety latch in 2019, but this was not mandatory. For the MLA version of the WT9 aircraft, Aerospool did not have a requirement to comply with a demonstrated safety level under European aviation regulations, as is the case for certified aircraft. A risk assessment of whether installation of a new canopy locking system and safety latch should be mandatory or optional was therefore also not required.

However, the same latching and locking mechanism used on PH-4E7 is approved for the certified LSA-version of the Aerospool WT9 and thus complied with a demonstrated safety level for light sports aircraft.

The safety level of MLA aviation depends almost exclusively on the holders and pilots of these MLA. Oversight is virtually non-existent and only takes place if there are clear indications of unsafe situations. The issuance of an S-BvL is no guarantee that an MLA is actually airworthy.

A risk assessment for a change in aircraft design or equipment for the WT9 MLA aircraft is not required to be performed by the manufacturer.

4 CONCLUSIONS

The accident

After the sudden opening of the canopy during flight, the pilot lost control of the aircraft. Why the pilot lost control could not be determined. Canopy opening caused an upset from which the pilot was likely unable to recover.

It is most likely that the canopy was not properly closed by the pilot before the aircraft took off.

Pre-existent cardiac abnormalities were found with autopsy. A relationship with the cause of the accident cannot be excluded. There are no indications that the loss of control was primarily caused by a physical problem of the pilot.

The technical investigation of the aircraft wreckage did not reveal any technical abnormalities that could have been a contributing factor to the cause of the accident.

The canopy

Operating the latching and locking system of the canopy is sensitive to errors. It might appear that the canopy is closed when this is not the case if insufficient attention is paid to it. The gap between the canopy and the fuselage can be overlooked.

The risk of inadvertent opening of the canopy during flight, which has led to multiple fatal accidents, was known to the aircraft manufacturer. In response, a mandatory service bulletin and a recommendation bulletin were published by the manufacturer. The publication of a mandatory bulletin with operational measures did not prevent taking off when the canopy is not properly closed and locked.

A solution to prevent taking off while the canopy is not properly closed and locked, is available. It is not mandatory to install this provision.

Mandatory and important safety information was not implemented in the Pilot's Operating Handbook (POH) of PH-4E7. The aircraft was delivered by the representative with a POH that did not include the changes as stated in the mandatory service bulletin. The mandatory service bulletin was not noticed by the holder for several years.

The Dutch Human Environment and Transport Inspectorate (ILT) does not actually check whether the information as stated in the application form for a Special Certificate of Airworthiness (S-BvL) extension has been filled in truthfully. Therefore the information contained in the mandatory service bulletin on canopy opening failed to reach the pilots.

The flying club

The maintenance by the flying club of their aircraft was not properly and structurally arranged. Different interpretations of safety practices and an informal atmosphere within the flying club allowed potential dangerous situations to arise. This may have played a role.

MLA regulation and oversight

The European regulatory framework for aviation safety is not applicable for microlight aircraft (MLA) as they are considered to be a form of aviation with a limited risk. Only national requirements apply.

Oversight by ILT on MLA is virtually non-existent. The approval or extension of a special certificate of airworthiness is only based on the declaration of the holder. However, the mere issuance of such a certificate may give the impression to holders and pilots that an additional check or verification by ILT has been performed while this is not the case; the airworthiness has not been established. Therefore the safety level of MLA aviation depends almost exclusively on the holders and pilots of these MLA.

Despite the Minister's commitment to evaluate and, if necessary, adjust the oversight of MLA, the oversight program for MLA has not been amended or intensified. Despite the development and increase in MLA flying, it is considered to be a form of aviation with limited risk. Due to the scarcity of resources, no actual oversight of administrative and operational requirements is taking place.

5 RECOMMENDATIONS

The investigation shows that operating the latching and locking system of the canopy of the Dynamic WT9 is sensitive to errors, which may result in the opening of the canopy in flight. This has led to a number of occurrences in the past, including two with fatal consequences.

In 2019, the manufacturer had developed a new locking system to prevent the canopy from opening in flight, which included a canopy lock with safety latch and sensor. Installation of this system is not mandatory but recommended.

Because the safety risks for MLA flying is assumed to be low, there is hardly any oversight by the government. The Special Certificate of Airworthiness is issued without establishing that the MLA is actually airworthy. Therefore, the safety level of MLA aviation depends almost exclusively on the holders, private persons as well as flying schools, flying clubs and pilots, of these MLA. In the opinion of the Safety Board responsibility for the flight safety of MLA is a shared responsibility between the holders, pilots and the government. Because it is not obvious that all holders and pilots are aware of this responsibility, it is a task of the government to draw their attention to this responsibility.

To increase the safety of MLA flying, in particular with Dynamic WT9 aircraft, the Dutch Safety Board therefore makes the following recommendations:

To the manufacturer Aerospool:

1. To make the installation of the canopy lock with safety latch and sensor mandatory for all Dynamic WT9 aircraft.

To the minister of Infrastructure and Water Management:

2. Make organizations involved in MLA flying, holders and pilots of MLA aware that they are largely responsible for the safety of MLA flying themselves and that this requires compliance with the regulations and an active fulfilment of this responsibility.

RESPONSES TO THE DRAFT REPORT

In accordance with the Dutch Safety Board Act, a draft version of this report was submitted to the parties involved for review. The following parties have been requested to check the report for any factual inaccuracies and ambiguities:

- Ministry of Transport and Construction of the Slovak Republic, Aviation and Maritime Investigation Authority
- Ministry of Infrastructure and Water management - human environment and transport inspectorate
- European Union Aviation Safety Agency
- The relatives of the pilot
- The flying club
- The manufacturer
- The national dealer of Aerospool

Only the relatives of the pilot and the manufacturer had comments on the report. The responses received, as well as the way in which they were processed, are set out in a table that can be found on the Dutch Safety Board's website (safetyboard.nl).

The responses received can be divided into the following categories:

- Corrections and factual inaccuracies, additional details and editorial comments that were adopted by the Dutch Safety Board (insofar as correct and relevant). The relevant passages were amended in the final report.
- Not adopted responses; the reason for this decision is explained in the table.

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