



# Safety Advisory Notice

To manufacturers of constant wear lifejackets  
and certification authorities

Number: AO-2023-001-SAN-001

## Fitment of constant wear lifejackets with seatbelts in aircraft

Constant wear lifejackets, including pouch style lifejackets, must not interfere with the proper fitment of aircraft seatbelts. It is imperative that seatbelts are fitted correctly. Not wearing a seatbelt, or wearing it improperly, can significantly increase the risk of serious or fatal injury in the event of an accident.

### What happened

On 2 January 2023, Sea World Helicopters was conducting a series of short scenic flights from its base at Sea World on the Gold Coast, Queensland. The operator was using 2 Eurocopter EC130B4 helicopters which were operating from separate helipads about 220 m apart.

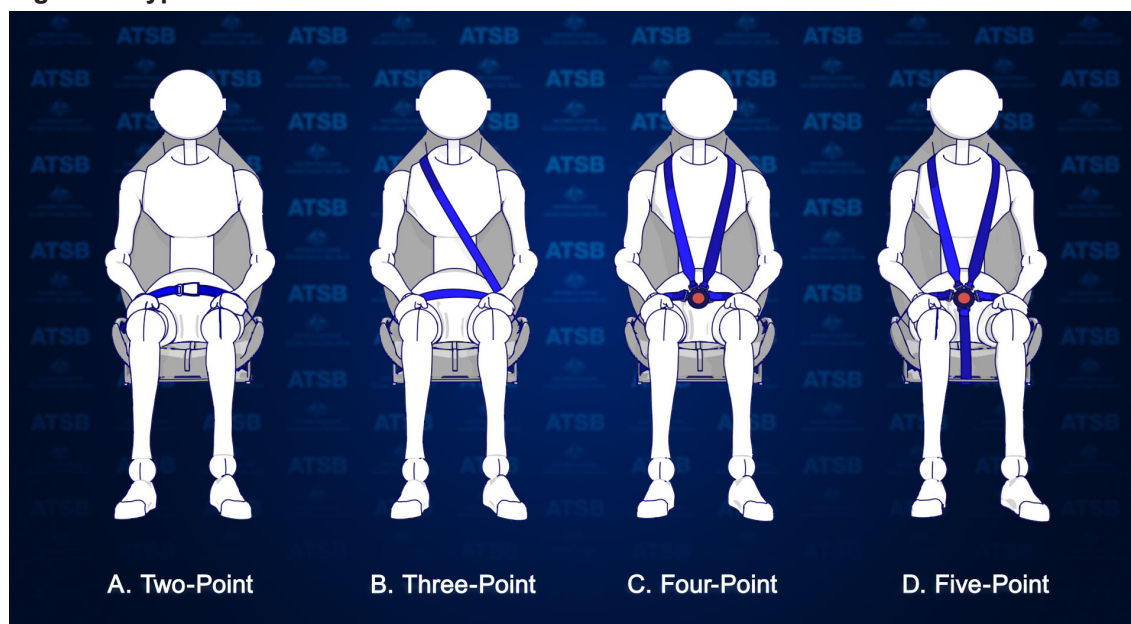
As one helicopter approached the southern helipad to land, another took off from the helipad to the north. The helicopters collided mid-air at about 130 ft. One helicopter proceeded to a controlled landing on a sandbar, the pilot and two passengers were seriously injured. The other helicopter fell uncontrolled to the edge of the sandbar. There were 3 passengers seriously injured and the pilot and three passengers were fatally injured. While some occupants of this aircraft survived, the ATSB would categorise the impact with terrain for that helicopter as likely not survivable (the occupants were not expected to survive the impact).

### Safety equipment

#### Seatbelts

There are several types of seatbelts used to restrain passengers in aircraft. The most common type that passengers are exposed to are lap belts (2-point restraints) like those used on large passenger aircraft. There are also 3-point, 4-point and 5-point restraints, which are more prevalent in light aircraft, that have an added safety harness for the upper body (Figure 1). In the case of the helicopters involved in the accident, all seats were fitted with 4-point restraints.

Figure 1: Types of aircraft seatbelts



Source: ATSB



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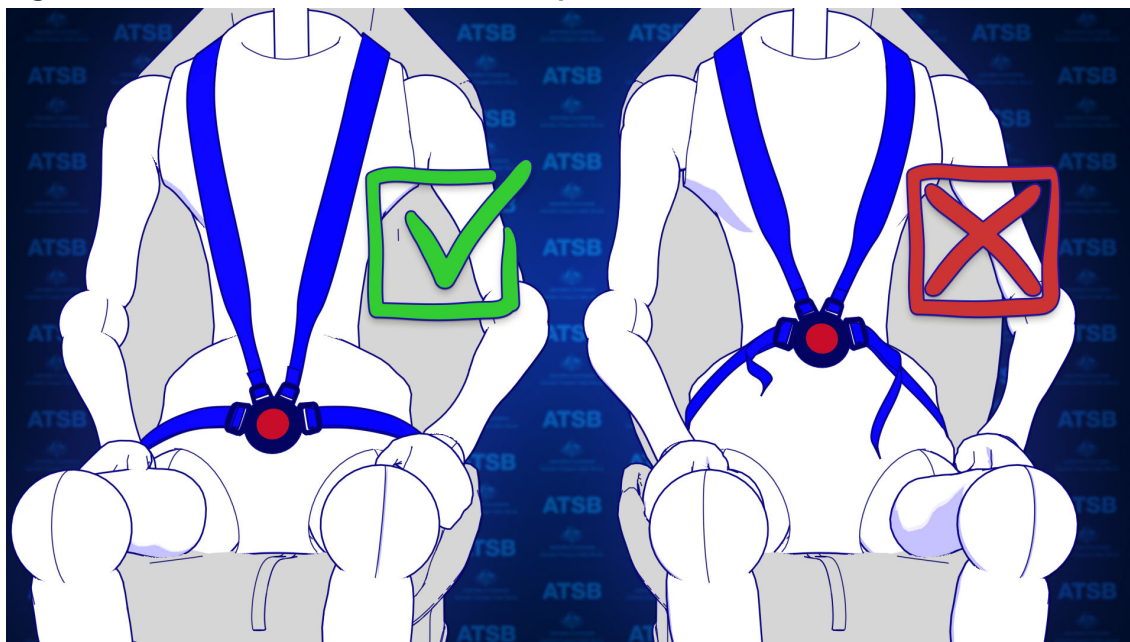
To be effective in an accident, seatbelts must be fitted correctly. Not wearing a seatbelt or wearing it improperly can result in serious injury or fatalities. For example, the fatality rate in accidents in Canada involving seaplanes has been shown to be 3 to 4 times higher for occupants who don't wear a restraint system properly over those that do.<sup>1</sup>

For seatbelts to be effective, regulatory and manufacturer guidance advise:<sup>2</sup>

- Seatbelts must not be twisted, they must be fitted without slack, and adjusted to fit as tightly as comfort allows.
- The lap portion of the seatbelt must be placed low and tight across the hips.
- Seatbelts must not be fitted across the abdomen as this can cause internal injuries or result in the person sliding out the bottom of the harness (submarining), nor should they be fitted across the thighs, or the seatbelt will not effectively prevent forward movement.

For the fitment of 4-point restraints, the lap belt portion of the restraint should be fitted and adjusted first before the shoulder harness. This is to prevent the shoulder harness from pulling the lap belt off the hips.

**Figure 2: Correct and incorrect fitment of 4-point harnesses**



Source: ATSB

## Constant wear lifejackets

Aviation lifejackets are inflatable and can be packaged in many forms. To ensure passengers have access to a lifejacket in a time limited situation, lifejacket manufacturers have produced lifejackets known as constant wear lifejackets. Constant wear lifejackets come in two packaging forms. There is a yoke style which is worn like a vest (Figure 3, right) and a pouch style which is worn around the waist (Figure 3, left) but readily pulled over the head of

<sup>1</sup> MacDonald C, Brooks C, McGowan R. Survival from Canadian seaplane water accidents: 1995 to 2019. *Aerospace Medicine and Human Performance*. (2021)

<sup>2</sup> References include:

- Airbus Helicopters Safety Information Notice (SIN) 3444-S-25 *Correct use of restraints to minimise the risk of injury*
- Civil Aviation Safety Authority Multi-Part Advisory Circular (AC) AC 133-10 – *Passenger Safety information*
- Federal Aviation Administration Advisory Circular 91-65 *Use of shoulder harnesses in passenger seats*
- Federal Aviation Administration *Seatbelts and shoulder harnesses – smart protection in small aircraft* (2020)
- Transport Canada AC 605-004 (3) *Use of safety belts and shoulder harnesses on board aircraft*
- Transport Canada AC 700 036 (1) *Brace for impact positions for all aircraft occupants*



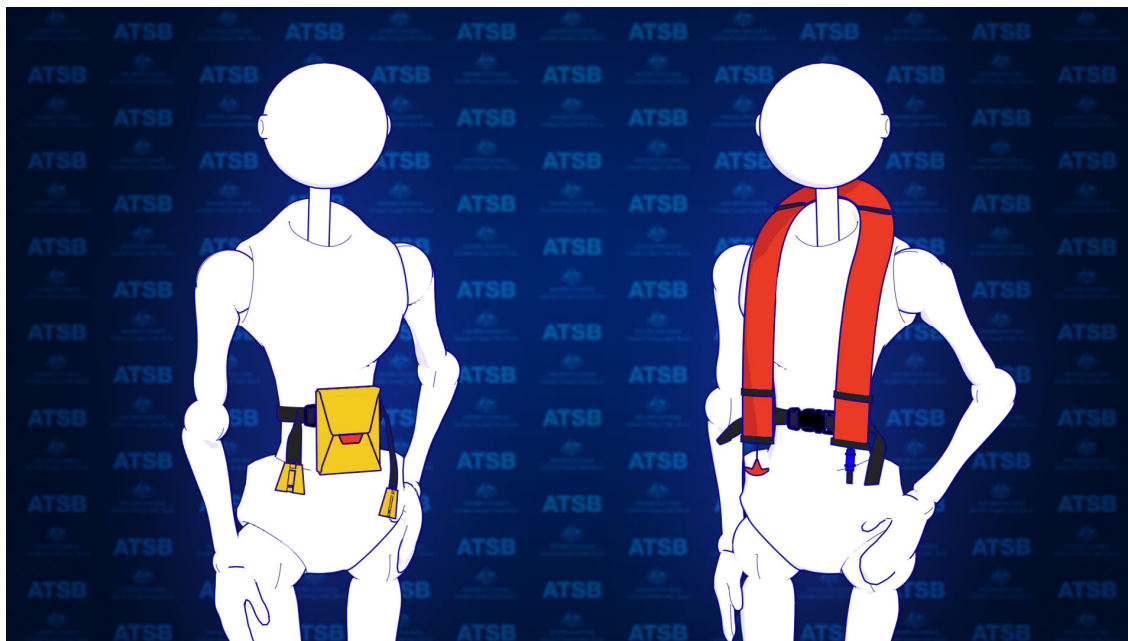
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the occupant when required. To meet the required aviation standards, operational instructions must be provided in writing and be printed on the lifejacket.

**Figure 3: Example of pouch (left) and yoke (right) style constant wear lifejackets**



Source: ATSB

## What the ATSB found

Passenger photographs and footage from inside both helicopters identified that some passenger seatbelts were not fitted correctly. This was due, in part, to interference caused by the location of the constant wear pouch style lifejackets that were being worn by passengers. The operator's pre-flight passenger safety briefing video also depicted incorrect use of the 4-point restraint while wearing the lifejacket. The operator's ground crew, who had been assigned responsibility for the fitment of passenger seatbelts, also indicated in interview that they were not aware that fitting the seatbelt over or above the lifejacket may reduce its effectiveness.

To establish the extent of the issue the ATSB conducted a review of helicopter tourism operations in Australia and around the world through social media. The ATSB found that similar practices of incorrect fitment of seatbelts with constant wear pouch style lifejackets were prevalent. Many relevant social media photos reviewed by the ATSB (see Figure 4 for some examples) showed the seatbelt buckle was positioned above the lifejacket pouch or over it. This meant that the lap belt portion of the seatbelt was not low and tight across the passenger's hips and the seatbelt buckle was positioned either over the lifejacket (creating slack) or above the lifejacket, close to the passenger's sternum increasing the risk of injury. This suggests there is a common lack of understanding in the helicopter tourism community about how to integrate constant wear lifejackets with seatbelts, so as not to reduce their effectiveness. Although social media images reviewed by the ATSB predominately showed interference caused by a 'pouch style' constant wear lifejacket, the 'yoke style' constant wear lifejacket more often used by pilots and commercial passengers, was also shown to have the potential to interfere with the aircraft seatbelt.

For constant wear lifejackets, it is reasonably foreseeable that they would be worn seated in an aircraft and while using the aircraft's seatbelt. The ATSB reviewed existing guidance from all known manufacturers of aviation constant wear lifejackets, as well as from the Civil Aviation Safety Authority and a range of international aviation regulators. Beyond stating that lifejackets should not interfere with other aircraft equipment, lifejacket manufacturers and regulatory authorities have not provided any readily available guidance to assist helicopter





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operators on how to position a pouch or yoke style constant wear lifejacket so as not to interfere with an aircraft seatbelt. Additionally, there are no requirements to provide such instructions in the relevant standards.

**Figure 4: Examples of lifejacket interference**



Sources: Safety briefing videos from YouTube and the operator, and other social media

## Safety advisory notice

**AO-2023-001-SAN-001:** The ATSB encourages manufacturers of constant wear lifejackets to provide operating instructions and/or guidance material to operators of aircraft on how to wear and use a constant wear lifejacket with a seatbelt (of any configuration) such that it does not interfere with the performance of the seatbelt during an accident.

Further, the ATSB encourages certification authorities to modify lifejacket standards to include the requirement for instructions on how to wear constant wear lifejackets while seated and wearing a seatbelt.