



National Transportation Safety Board

Washington, DC 20594

Safety Recommendation

Date: January 15, 2014

In reply refer to: A-14-001

The Honorable Michael P. Huerta
Administrator
Federal Aviation Administration
Washington, DC 20591

We are providing the following information to urge the Federal Aviation Administration (FAA) to take action on the safety recommendation issued in this letter. This recommendation addresses the need to require the retrofit of existing Robinson R44 helicopters with improved fuel tanks. The recommendation is derived from the National Transportation Safety Board's (NTSB) and the Australian Transport Safety Bureau's (ATSB) investigations of R44 accidents in which the impact forces were survivable for the occupants, but fatal or serious injuries occurred because of a postcrash fire that resulted from an impact-related breach in the fuel tanks. Information supporting this recommendation is discussed below.

On November 25, 2012, a Robinson R44 II helicopter, N4204A, collided with a structure at Corona Municipal Airport, Corona, California. The pilot/owner, who was operating the helicopter under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91, died as a result of his injuries. The helicopter was substantially damaged from impact forces and a postcrash fire. Although this accident is still under investigation, preliminary evidence indicates that the accident was survivable and that the pilot succumbed to injuries related to the postcrash fire.¹

The NTSB has investigated, since 2008, three other R44 helicopter accidents in which the fuel tanks were breached, resulting in leaking fuel and a postcrash fire.² In addition, since 2011, three similarly equipped R44 helicopters were involved in accidents in Australia.³ Analysis of data from the US and Australian accidents showed that they should all have been survivable with minor or no injuries to the occupants.⁴ However, the accidents in the United States, including the Corona accident, resulted in two fatalities and two serious thermal injuries, and the accidents in

¹ Additional information about this accident, WPR13FA054, can be found at the [NTSB's website](http://www.nts.gov), which can be accessed at <http://www.nts.gov>.

² For more information, see DFW08LA122, WPR10LA458, and CEN12CA643 at the [NTSB's website](http://www.nts.gov).

³ For more information, see AO-2011-016, AO-2012-021, and AO-2013-055 at the [ATSB's website](http://www.atsb.gov.au), which can be accessed at <http://www.atsb.gov.au>.

⁴ Two of the occupants involved in these accidents survived with minor or no injuries. For DFW08LA122, the pilot received minor injuries (but the passenger received fatal injuries). For CEN12CA643, the pilot (the only occupant) was not injured.

Australia resulted in eight fatalities and one serious injury.⁵ All of the accident helicopters were equipped with all-aluminum main and auxiliary fuel tanks installed above the engine firewall and on each side of the main rotor gearbox.

On December 20, 2010, Robinson Helicopter Company issued Service Bulletin SB-78, which advised owners, operators, and maintenance personnel of R44 helicopters with all-aluminum main and auxiliary fuel tanks to retrofit those helicopters with bladder-type tanks to improve the R44 fuel system's resistance to a postaccident fuel leak.⁶ The bladder-type fuel tank, as shown in the figure (on page 3), was designed to contain fuel and prevent it from spilling out of the tank after a survivable impact. Fuel might still leak out through vent lines, supply lines, or other fuel system components; however, in that situation, the fuel would leak out at a much slower rate than it would if a fuel tank ruptured, which would allow helicopter occupants time to escape.

Service Bulletin SB-78 advised that the fuel tank retrofit should occur as soon as possible but no later than December 31, 2014. On September 28, 2012, Robinson Helicopter Company issued a revised service bulletin (SB-78B) to move up the date for the fuel tank retrofit to April 30, 2013.⁷ The FAA issued Special Airworthiness Information Bulletin SW-13-11 on December 26, 2012, to alert R44 helicopter owners and operators about the revised service bulletin and the availability of the bladder-type fuel tanks.

⁵ The report on this accident did not specify whether the serious injury was related to the impact, postcrash fire, or both. The surviving occupant (the pilot) was able to exit the helicopter through a "large opening" in the wreckage. The pilot reported that, shortly after the helicopter came to rest, a fire began that "rapidly engulfed the helicopter."

⁶ According to Robinson Helicopter Company, the retrofit also included (1) reinforced fuel filler caps to retain fuel under internal pressure loads and (2) rollover vent valves to minimize fuel spillage if the helicopter came to rest at an attitude at which fuel could reach a fuel tank vent opening. In addition, two previous service bulletins (issued in November 2008 and March 2009) had advised owners and operators of R44 helicopters to replace rigid fuel lines and clamps with flexible hardware to reduce the possibility of a postaccident fuel leak.

⁷ Robinson Helicopter Company Service Bulletin SB-78A, issued on February 21, 2012, had previously moved the compliance date to December 31, 2013.

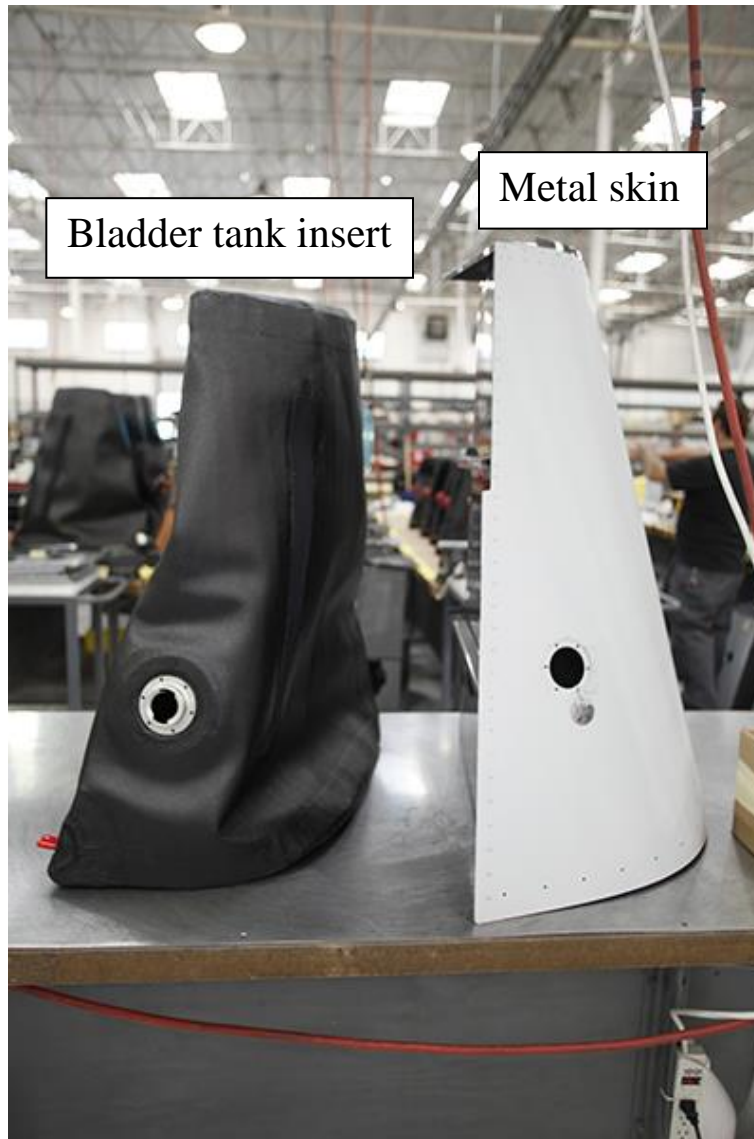


Figure. R44 main fuel bladder and outer skin.

Source: Robinson Helicopter Company.

Robinson Helicopter Company has made progress in equipping existing and new R44 helicopters with crash-resistant fuel tanks. Specifically, all R44 helicopters overhauled at Robinson's facility in Torrance, California, had bladder-type fuel tanks installed beginning in July 2009, and all field overhaul kits included bladder-type fuel tanks beginning in January 2013 (unless the owner or operator provided proof that the tanks had previously been installed).⁸ In

⁸ Robinson Helicopter Company reported that 4,954 R44 helicopters were manufactured without the bladder-type fuel tanks, including helicopters that are no longer in service. (Robinson was not able to provide an estimated number of helicopters that were no longer in service.) Robinson further reported that, as of November 15, 2013, 2,415 R44 helicopters were potentially retrofitted with bladder-type fuel tanks. (According to Robinson, 125 R44 helicopters were retrofitted at the company's factory, and 2,290 bladder fuel tank kits were shipped to R44 owners and operators for installation at a field maintenance facility.) Robinson has offered financial incentives to encourage additional owners to retrofit their helicopters.

addition, all new R44 II and I models manufactured beginning in August and October 2009, respectively, have been equipped with bladder-type fuel tanks. However, according to Robinson, some owners have been waiting until their helicopters are ready for the next 2,200-hour overhaul to accomplish the retrofit to minimize downtime and costs, and other owners cited additional financial reasons and no formal requirement as explanations for not accomplishing the retrofit.

On April 3, 2013, the ATSB issued recommendation AO-2013-055-SR-001 to the Australian Civil Aviation Safety Authority (CASA) as a result of the ATSB's investigations of the three R44 helicopter accidents that involved "low-energy impacts that resulted in the all-aluminum fuel tanks being breached and a fuel-fed fire." The recommendation asked CASA to take action to ensure that owners and operators of R44 helicopters "are aware of the relevant regulatory requirements and comply with the manufacturer's service bulletin SB-78B to replace all-aluminum fuel tanks with bladder-type tanks."

On April 29, 2013, CASA issued Airworthiness Directive (AD) AD/R44/23, "R44 Bladder Fuel Tank Retrofit," which required operators of R44 helicopters to comply with Robinson Helicopter Service Bulletin SB-78B before further flight after April 30, 2013. The background section of the AD stated that "recent post-crash fires in Australia have prompted CASA to mandate compliance with [the] manufacturer's service bulletin to reduce the risk of further post-crash fires and increase survivability of such an event." As a result of this and other safety actions taken by CASA in response to the recommendation, the ATSB closed the recommendation on April 30, 2013.⁹

The NTSB has investigated an accident involving an R44 helicopter with bladder-type fuel tanks. Specifically, on June 6, 2013, a Robinson R44 II helicopter, N915BW, rolled over after an off-airport emergency landing in Los Angeles, California. The helicopter was being operated as a postmaintenance repositioning flight under the provisions of 14 CFR Part 91. The helicopter was substantially damaged during the accident sequence, and no postcrash fire occurred. All four occupants (a flight instructor, a private pilot, and two passengers) were able to evacuate the helicopter with either minor or no injuries.¹⁰ Examination of the fuel tanks revealed that their outer metal skin surfaces had buckled and had been breached during the impact but that the fuel bladders had remained intact.

This accident is still under investigation, but the NTSB believes that the impact was strong enough that, without the fuel bladders, fuel would have leaked outside the tanks, which would have increased the possibility of a postcrash fire that could have affected survivability. The NTSB concludes that bladder-type fuel tanks would help reduce the risk of a postcrash fire in survivable accidents involving R44 helicopters.

⁹ Among other things, CASA issued Airworthiness Bulletin 02-44 on April 3, 2013, to remind "operators of Robinson R44 helicopters . . . that they must comply with Service Bulletins by their due date."

¹⁰ For more information about this accident, see WPR13FA264 at the [NTSB's website](#).

Therefore, the National Transportation Safety Board makes the following recommendation to the Federal Aviation Administration:

Require owners and operators of existing R44 helicopters to comply with the fuel tank retrofit advised in Robinson Helicopter Company Service Bulletin SB-78B to improve the helicopters' resistance to a postaccident fuel tank leak. (A-14-001)

Chairman HERSMAN, Vice Chairman HART, and Members SUMWALT, ROSEKIND, and WEENER concurred in this recommendation.

The NTSB is vitally interested in this recommendation because it is designed to prevent accidents and save lives. We would appreciate receiving a response from you within 90 days detailing the actions you have taken or intend to take to implement the recommendation. When replying, please refer to the safety recommendation by number. We encourage you to submit your response electronically to correspondence@ntsb.gov.

[Original Signed]

By: Deborah A.P. Hersman,
Chairman