

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



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BME FIRE TANK EXAMINATION

Specialist's Factual Report

February 23, 2022

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A. ACCIDENT

Location: Leesburg, FL
Date: May 25, 2021
Time: 1745 Eastern daylight time (EDT)
2145 Universal coordinated time (UCT)
Helicopter: BHI H60 Helicopters LLC, UH-60A / N9FH

B. BME FIRE TANK EXAMINATION GROUP

Specialist	Van S. McKenny IV NTSB / AS40 Washington, DC
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C. DETAILS OF THE EXAMINATION

The purpose of the examination was to document the remaining production firefighting water tank, manufactured by Leading Edge, Coatesville, PA, and in the possession of Firehawk Helicopters. The specific area of interest was the design, fabrication, assembly, and general stiffness/rigidity of the snorkel support structure and coupler. The tank that was examined was Production Tank No.1; this was the tank that underwent the flight testing as part of the Supplemental Type Certificate (STC) application process. The tank that was installed in the accident helicopter was Production Tank No. 2.

1. Production Tank No. 1, installed in sikorsky helicopter model S70A-27 (UH-60A Black Hawk) registration number N135BH was documented.
2. The tank snorkel attachment assembly & construction was documented.
3. Manual loads were placed on the attached snorkel assembly and tank structure deformation was measured at the snorkel to tank interface.

Tank Description and Installation:

The water tank, snorkel, and water release gate are combined into a single system that can be placed in the cabin area of a UH-60 helicopter (Figures 1 and 2). It is secured in place by a square tube steel external frame that attaches to the helicopter's existing upper cargo tie down points and to the existing floor tie-down points (Figures 3 and 4). The tank is constructed of half inch honeycomb panel with two ply carbon face sheet and Nomex core. The molded front section that contains the snorkel attachment port, motorized water gate assembly (Trotter Controls), and vent was designed and manufactured by Leading Edge Composites. Leading Edge Composites also assembled the tank side panels, integrated the molded front section to the tank, installed the water gate assembly, and associated controls.



Figure 1. Left side of the helicopter showing the water tank installation and snorkel configuration.



Figure 2. Right side of the helicopter showing the back of the water tank.



Figure 3. Water tank exterior frame right forward upper tie down attachment (typical of the top 4 corners).



Figure 4. Water tank external frame attached to floor deck tie downs.

The 15-foot, 6-inch diameter snorkel hose is attached to the water tank using a metal port attached to the tank via a carbon fiber flange with an attached flapper valve by eight AN4 bolts fastened to a nut plate (Figures 5 & 6). The snorkel connects to the tank port using two lever cam-locks. The water pump is attached to the free end of the snorkel. The snorkel hose and pump assembly weighs 137.5 pounds. The snorkel hose is not secured by any other means other than the tank attachment point nor is it retractable

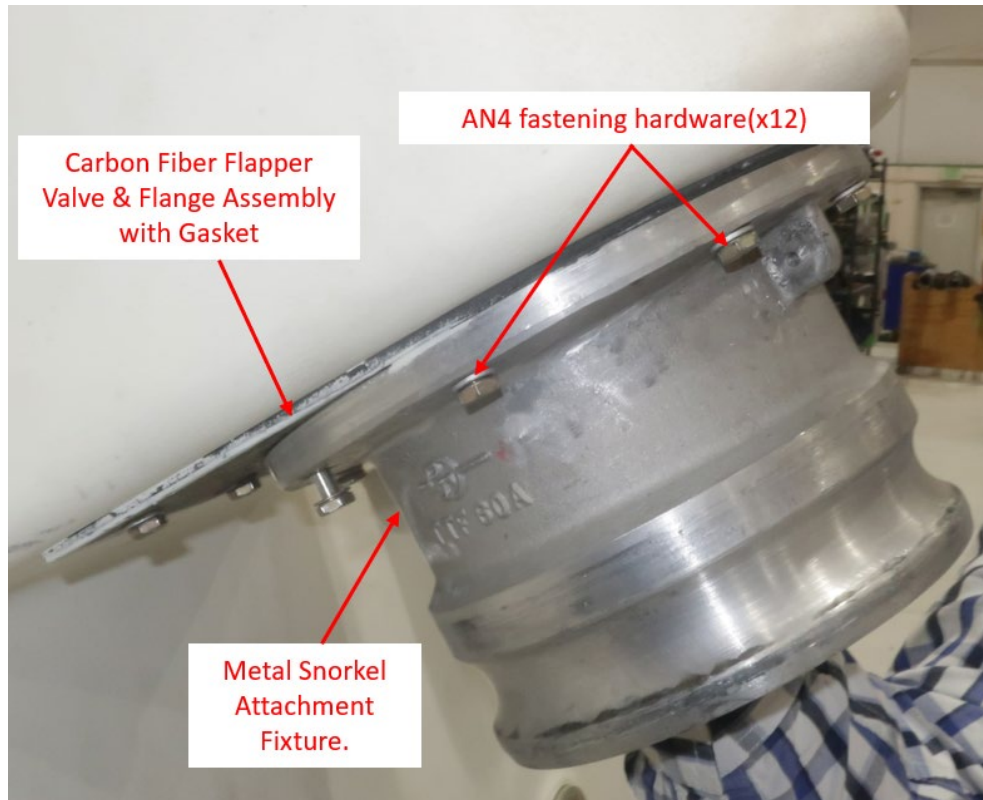


Figure 5. Snorkel attachment fixture

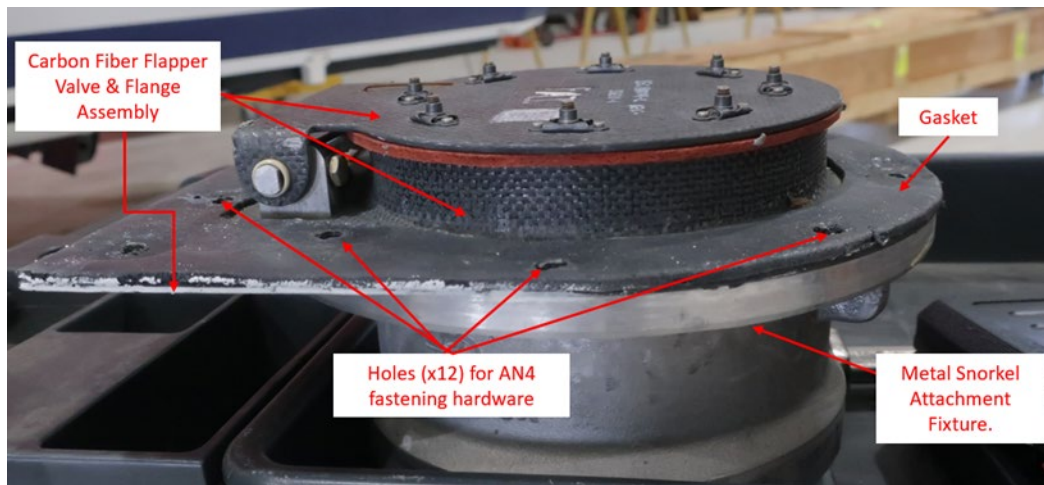


Figure 6. Carbon fiber flapper valve and flange assembly removed from water tank.

Testing:

The tank port had been fastened in place with 12 AN4 bolts and torqued. The snorkel was attached to the tank using the snorkel fixture cam-locks as designed. A dial gauge was positioned at various points around the tank port (Figure 8). The snorkel was placed on a wheeled dolly and manually pulled in one of 3 directions (forward, lateral, and aft (Figure 7 and Table 1). The deflection of the tank port structure was measured using a dial gauge (Figure 9) as the snorkel was manually pulled away from the port and then released back to a static position.

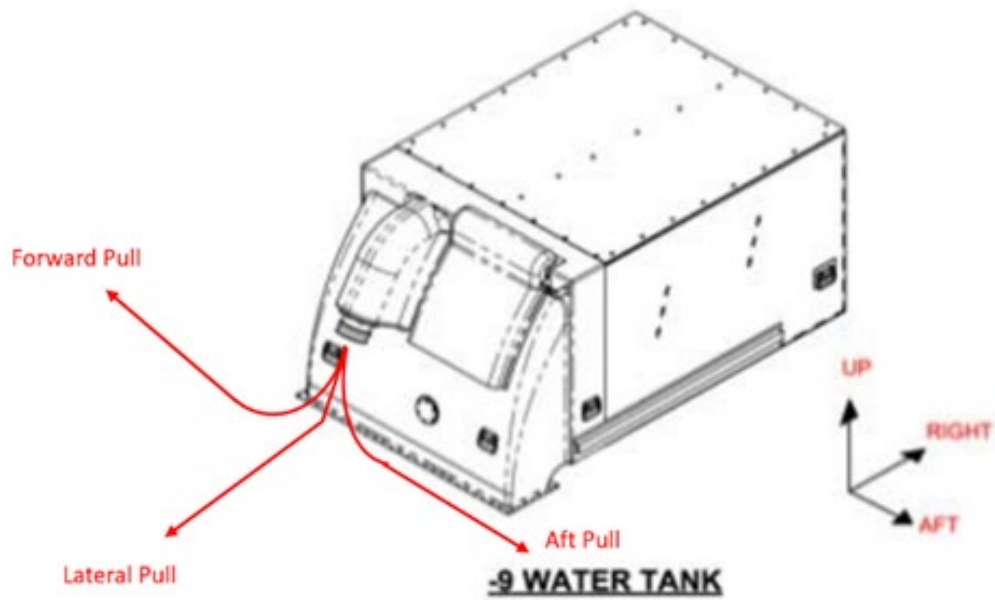


Figure 7. Illustration depicting the direction the snorkle was pulled during the test.

Dial Gauge Positions:

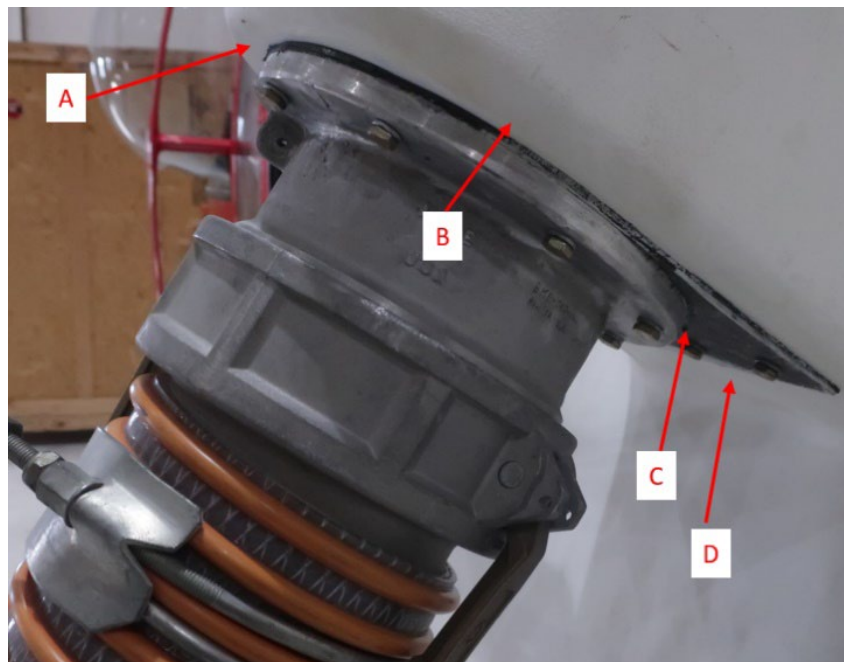


Figure 8. Dial gauge positions.

Table 1. Measurement location descriptions¹.

Position A	Tank structure at the helicopters 9 o'clock position.
Position B	Tank structure at the helicopters 6 o'clock position.
Position C	Carbon fiber flange at the helicopters 3 o'clock position.
Position D	Tank structure at the helicopters 3 o'clock position.

Measured Deflection at Each Position: Table 2 provides the deflection amount at each position.



Figure 9. Dial gauge placement at position B.

¹ Location clock positions are relative to the axis of the helicopter, helicopter nose is 12 o'clock and tail is 6 o'clock.

Table 2. Table of deflection measurements at each position.

Location	Pull Direction	Deflection (inch)
Position A	Aft	0.001
	Lateral	0.01
	Forward	0
Position B	Aft	0.006
	Lateral	0.003
	Forward	0.005
Position C	Lateral	0.05
	Forward	0.003
Position D	Lateral	0.03

Average water tank flange thickness is 0.142 inches.

Submitted by:

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