MANDATORY MAINTENANCE INSPECTION

Fluid Wings, LLC.
1636 Old Daytona Street
DeLand Fl. 32724
888.24FLUID (888.243.5843)

Date: March 12, 2024.
Document: 24-400-001.
Models Affected: All Fluid Wings Parachutes with 400 lb. suspension line.
Time of Compliance: Immediate and before the next parachute jump.

NOTICE: An **i**ncomplete review of all the information in this document may cause errors. Read the entire Service Letter to ensure a complete understanding of the requirements.

Purpose:

To address concerns regarding lines on Fluid Wings Parachutes.

The way lines are cared for can significantly affect their durability. Lines in the 300-400 lb. range have a reduced lifespan when exposed to harsh conditions. Sand and abrasive materials can be disastrous for line durability.

This Instruction for continued airworthiness is intended to provide guidelines for in-field evaluation of lines to determine the airworthiness of Fluid Wings Parachutes with 400 lb. suspension line.

Terminology:

Nominal strength (or named strength) refers to a line's rated strength.
For example, the nominal strength for a 400 lb. line would be 400 lb. (pounds).

Ultimate strength is the maximum tensile strength at tested failure.
For 400 lb. lines, this is typically in the 500 lb. (pound) range.

Materials:

The materials used in high-performance parachutes are subject to very specific and demanding conditions. These materials are generally isolated to a few suitable fibers. These fibers include Vectran, Technora, and Spectra. All of these fibers are proprietary branded fibers. The fibers must be spun/braided into a usable line. Typically, the fibers are all purchased from a single source, and then braiders/finishers will supply a line of material on rolls to parachute manufacturers.

Parachute manufacturers generally purchase their line materials from one of only a few available suppliers, as the number of line braiders is very limited. In the USA, one supplier provides most

of the lines to parachute manufacturers (both sport and military). Lines are tested for tensile strength multiple times during the manufacturing process, and each batch has a tensile test associated with it. These lines are all traceable materials at Fluid Wings, and tensile testing data is maintained for each parachute line used in manufacturing.

For Vectran, the fiber is produced by a single manufacturer in Japan and we are aware of only a single supplier of the braided line in the USA. Multiple parachute manufacturers utilize this same product. Fluid Wings is aware of at least one other sports manufacturer that uses the 400lb Vectran product.

The notion that a single parachute company would have substandard lines is unlikely in practice because of the limited number of sources for the material. If material (fiber or weave) deficiencies were the culprit for line failures, we would expect to see widespread evidence of this.

Based on the information currently available (as of this writing), the use and wear of the line material appears to be the most probable cause of the reported failures.

Background:

Parachute lines are woven with a predetermined number of carriers (groups of filaments). The carriers are most easily described as the groups of fibers that are woven into the braid. These multiple groups of fibers serve to distribute the load throughout the line as a whole and will stretch, and the fibers reorient to allow the stress within the line to redistribute when the fibers are loaded. This is done via strain compatibility of the fibers. If one of the groups of fibers becomes damaged, the weave as a whole is no longer able to uniformly redistribute the loading, and localized load/stress concentrations within the line fibers can occur. This can lead to a cascading failure as each fiber/filament/carrier is overloaded.

Lines, where the carriers (filament damage) have observable damage and significant portions of the fibers, are broken or abraded (no longer continuous) will not support the loading for use and are considered unairworthy.

Lines do not have any guaranteed or expected service life, and their condition entirely dictates their suitability for continued use.

Lines should be replaced based on an accurate assessment of their condition. Typically, this is done through a visual inspection.

The following examples can assist the jumper/rigger in making an airworthiness decision.

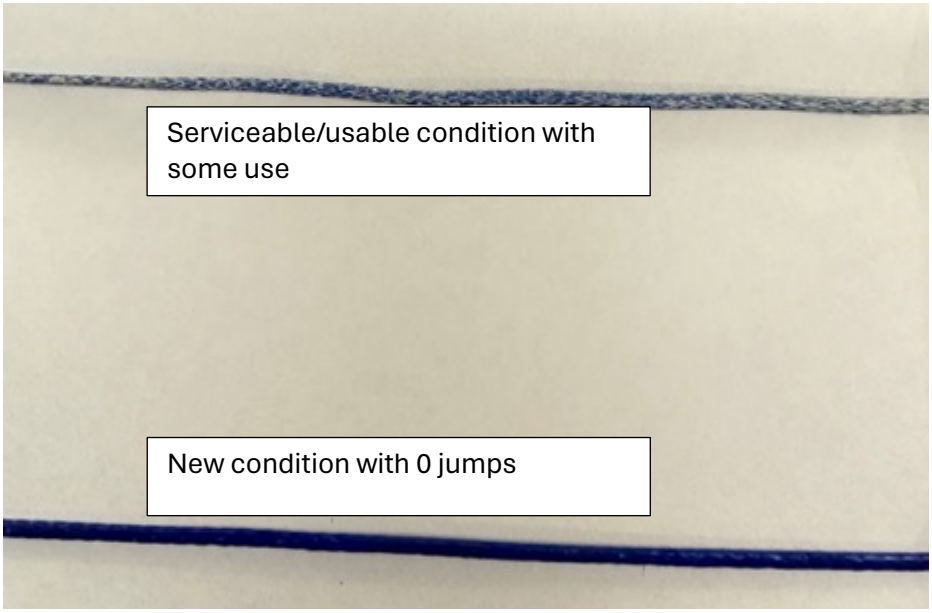

Figure 1. 400 lb. (nominal) lines in new and serviceable condition. Note the lack of broken fibers and continuity filaments in carriers. Both examples would be considered suitable for continued use.

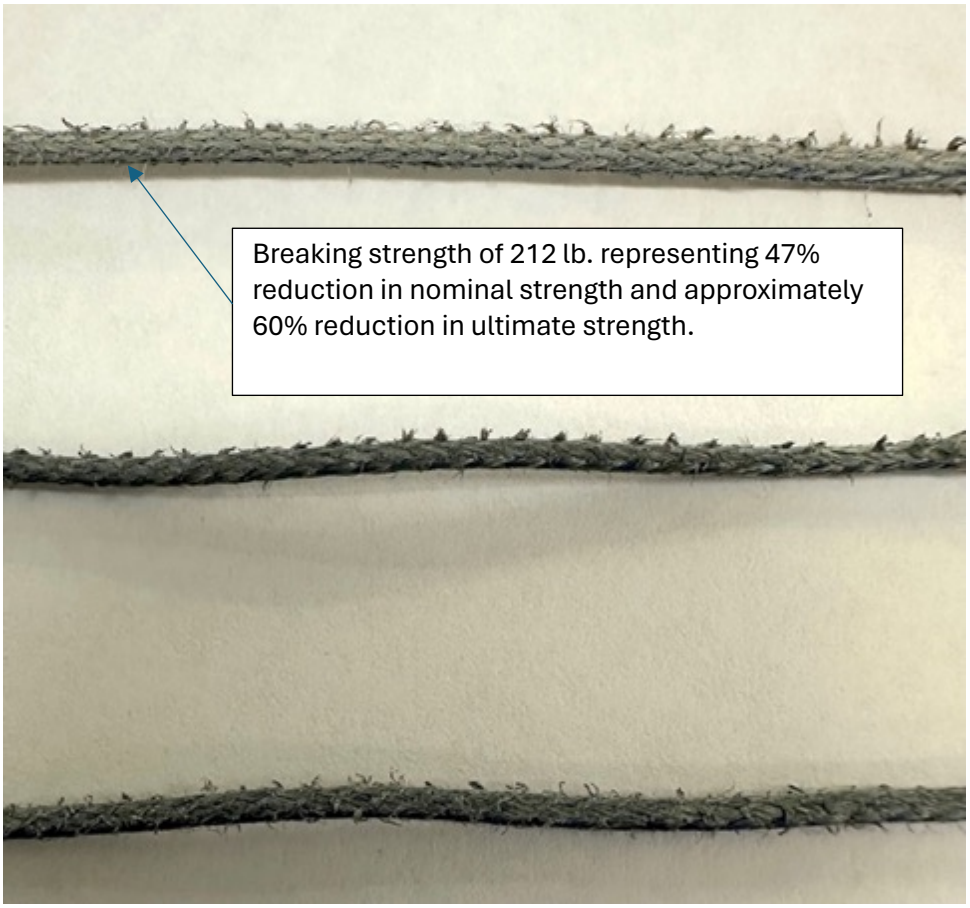

Figure 2. 400lb lines all in in unairworthy condition. Note discontinuity filaments/carriers.

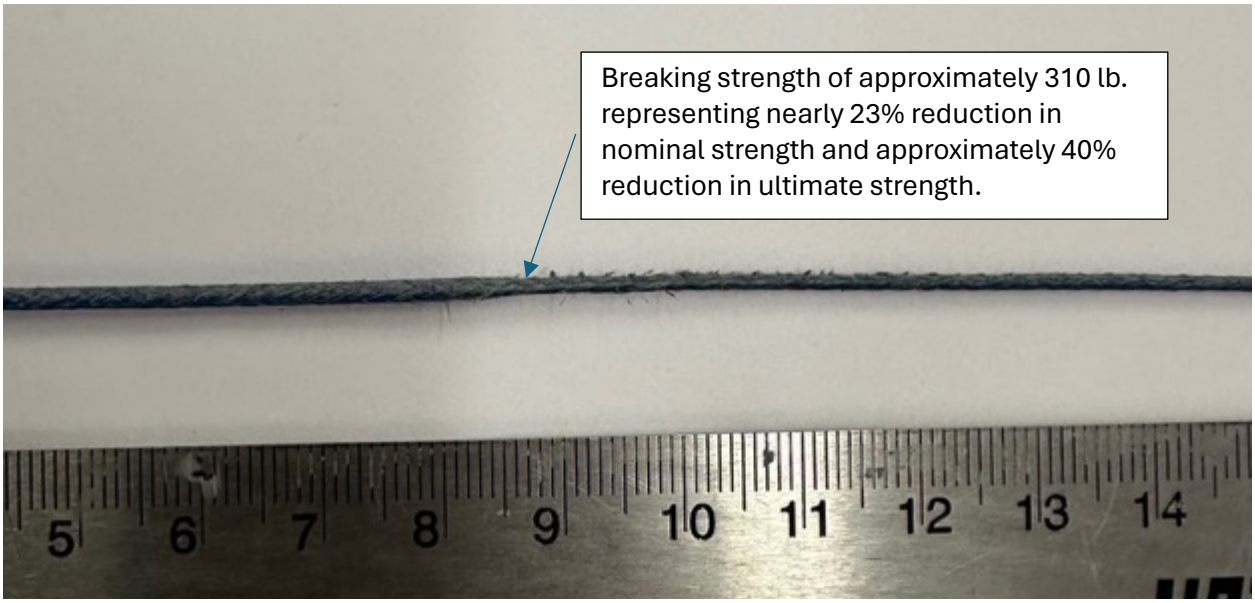

Figure 3. 400lb line with visible wear.

At times, the wear is not as straightforward as in the above examples, and judgment must be used.

Evaluation of lines:

The determination of airworthiness generally is the sole responsibility of the jumper or rigger placing the item in service. Main parachutes have no regulatory airworthiness requirements; therefore, airworthiness can be a subjective decision that is the sole responsibility of the pilot using the parachute.

We recommend that where visible wear and broken carriers are noted, the lines be further evaluated by a rigger or other qualified personnel. The consequence of a failure may also be considered when making a decision. For example, a center A line may have a higher chance of catastrophic failure than a C or D line. A detailed discussion of these scenarios is outside the scope of this document. However, it is important to note that the scrutiny should be evaluated on a continuum based on the severity of the consequences of failure, with an emphasis on conservative safety assessments.

Fluid Wings strongly recommends that riggers and jumpers utilize a conservative and proactive mindset in the evaluation of line conditions.

Service Instructions:

1. Fluid Wings Parachutes with suspension lines exhibiting visible broken carriers/filaments should be removed from service and the lines replaced immediately. Evaluation under magnification is suggested (1.5x to 2x with a direct bright light).

2. Fluid Wings parachutes should be evaluated by the jumper using them or a qualified rigger on every jump. To ensure continued airworthiness, a detailed inspection should be performed periodically (every 20-30 jumps or every 2 weeks).

3. Special attention should be given to areas with severe failure consequences, such as the lower portion of the A-line groups.

4. Questions regarding the evaluation lines may be directed to the Fluid Wings Maintenance Department at maintenance@fluidwings.com.

Additional line-wear information:

https://parachutist.com/Article/Know-Your-Lines
https://www.skydivemag.com/new/gear-wisdom-line-sets/
https://www.fluidwings.com/_files/ugd/5a932f_05ae884b12ba4c8d9e78150d0c72c044.pdf

US parachute Regulations:

https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-105

Specifically:

"§ 105.43 Use of single-harness, dual-parachute systems.

No person may conduct a parachute operation using a single-harness, dual-parachute system, and no pilot in command of an aircraft may allow any person to conduct a parachute operation from that aircraft using a single-harness, dual-parachute system, unless that system has at least one main parachute, one approved reserve parachute, and one approved single person harness and container that are packed as follows:

(a) The main parachute must have been packed within 180 days before the date of its use by a certificated parachute rigger, the person making the next jump with that parachute, or a non-certificated person under the direct supervision of a certificated parachute rigger."