

## Double-back winch pulley tow systems for Hang- and Paragliders



The following regulations for type-testing of double-back winch pulley tow systems are valid until inclusion in the next revision of the LTF airworthiness requirements paragraph 7, winch tow systems for hang- and paragliders (Nfl II 91/09).

## **Additional requirements for double-back pulley systems for use with stationary winch towing equipment for hang- and paragliders.**

*Note: every type-tested double-back pulley system may be freely combined with all type-tested stationary winch systems.*

### **Design and construction**

1. The double-back pulley system must provide a safe tow of the aircraft in every designed mode of operation. Paragraphs 7.1.2 and 7.1.3 are to be observed and implemented as paragraph 7.1.13 in the general sense.
2. The double-back pulley system must be fitted with a protected emergency guillotine which can be activated at any time by the winch operator. The emergency guillotine must activate automatically, should radio contact between winch and double-back pulley fail. Operation must only be possible when an automatic guillotine is fitted. Paragraph 7.1.12 is not affected by these regulations.
3. The winch operator must be warned with a clear signal when the tow line reaches an angle of 60° to the horizontal plane of the double-back pulley.
4. Durability and load testing must be documented from practical tests.
5. Should the maximum tow rope length of the winch tow be exceeded, then exactly the same rope must be used for the extension. Extensions must be spliced in accordance with the manufacturer's winch tow handbook, and must be removed at the end of double-back pulley operation.

### **Test procedure**

To 1. (analogue to p. 7.1.2): Tow rope guidance systems must be capable of guiding the tow rope through the double-back pulley to a maximum vertical angle of 90° with minimum resistance.

Side wind positioning: Side winds may introduce towing angle deviations of up to 60°. Accordingly, side load testing is to be performed with a force of 195 daN applied at a 60° angle (analogue to the max. load testing requirements under 7.1.10 of 130 daN x 1,5).

The double-back pulley system must be constructed such that the tow rope is always guided and not able to fall off the side of the pulley. The pulley diameter must not be less than 100 mm.

*Note: pulleys with larger diameters reduce wear on the tow rope and are preferable.*

The total loading of the double-back pulley system must be documented (analogue to 7.1.2) with a load of 400 daN. Tests are to be conducted using a rope sling around the pulley, and forces applied in the direction of the winch tow system. The double-back pulley must not fail or detach from ground anchor points.

To 1. (analogue to 7.1.3): System stability (ground anchor, trailer or trailer connected to vehicle) must be tested with a load of 195 daN (analogue to the max. load testing requirements under 7.1.10 of 130 daN x 1,5) with tow rope angles of 45° to the side and upwards of the system. Double-back pulleys do not require additional earthing, as this is already required for the winch tow system.

To 1. (analogue to 7.1.3): Warning lights must be tested such that they can be switched on and off by the winch operator and are sufficiently bright.

To 2. The guillotine must be tested for functionality and safety guards. A minimum of 3 successful guillotine cuts must be performed, one of these must be in response to a simulated radio link failure. After the tests have been performed, the cutting plate should be examined for signs of wear and fatigue.

To 3.: the functionality and correct operation of the tow rope warning system must be tested. The tow rope warning system must provide a loud acoustic or optical/acoustic warning signal which can be easily heard over background noise, to the operator when the tow rope angle to the horizontal exceeds 60°

To 4.: Documentation must be supplied by the manufacturer. A minimum of 500 tow launches must be performed and documented for the system by the manufacturer.

The above regulations are to be used in the LTF airworthiness requirements for hang- and paragliders under 10.1 and 10.2.