Note

The DHV as a pilots' association also realises its charitable statutory purpose by promoting flight safety in paragliding and hang gliding. An essential element of flight safety is the safe condition of the flying equipment throughout its entire service life. This goal is served by the obligation to conduct inspections in accordance with § 13 Para. 2 LuftGerPV, which also applies to paragliders:

In the case of single- or two-seater air sports equipment with a maximum permissible empty mass of up to 120 kilograms, including harness and rescue equipment, the airworthiness must be checked or had checked by or on behalf of the owner in accordance with the instructions provided by the manufacturer. The owner is responsible for the timely and complete performance of the inspections. He shall immediately notify the manufacturer of any defects in the aircraft or in the test instructions.

And associated maintenance in accordance with § 12 para. 2 LuftGerPV:

Maintenance measures for the continued airworthiness of the aircraft in accordance with § 1 paragraph 1 number 7 .... of the Air Traffic Licensing Regulations are governed by § 13.

It has been shown that the "instructions given by the manufacturer" sometimes do not correspond to the current state of the art and that the safety of the equipment and its users may be impaired as a result. From its statutory task of promoting flight safety, the DHV feels compelled to publish the following "Non-binding template of a verification instruction for paragliders".

This template makes no claim to completeness and the current state of the art. It can only serve the manufacturers of the devices as a voluntary aid for the preparation of the device-related instructions for inspection and maintenance. If the manufacturer uses it, he must adapt it in every point in relation to the device. All measured values given in it are non-binding placeholders. This template alone in no way replaces or supplements the manufacturer's device-related instruction.

Instructions according to other systematics and testing methodology may be equally suitable.

Content

Non-binding template **inspection instruction for paragliders**

1. Instructions for rechecking the glider pattern

Red Wings Albatros 26, DHV GS-01-XXXX-21
In this document the manufacturer's instructions required by § 13 para 2 LuftGerPV for the verification of this glider type are issued.

2. Subject of the audit

The purpose of the inspection is to verify airworthiness at intervals.

3. Re-testing intervals

(The manufacturer may specify the intervals of retesting/operating time until retesting, e.g.).
The re-inspection shall be carried out every 24 months from the date of the routine test or after 150 hours of operation, whichever is the sooner. When retested in accordance with the requirements of this document, the retested type shall continue to be airworthy for the period until the next periodic retest, subject to intended use or an ordered retest.

4. Personnel requirements of the auditors

(The manufacturer may specify general requirements for the personnel requirements and the qualification of the examiners, e.g.)

- Age of majority
- Reliability, this is considered to be proven if the person has a valid car driving licence or a valid aviation licence. Alternatively, a certificate of good conduct from the police.
- Proof of employment of at least 3 months in a manufacturer's company for aviation sports equipment or in a verification company commissioned by a manufacturer.
- Written proof of general training in the inspections in the manufacturer's company or a company commissioned by the manufacturer.

5. Operational Prerequisites

(The manufacturer may specify general requirements for the suitability of premises, test equipment and for the required documents, e.g.)

A) Premises

- A space shall be available for the re-tests which allows the deployment of a full span L-size paraglider and the stretched deployment and measurement of all lines.
- The retest must take place at normal room temperature, approx. 15-25° Celsius.

B) Test equipment

- Dial gauge for air permeability, makes Kretschmer, HelloPorozit or JDC.
- Measuring device (www.Bettsometer.com) for measuring the further tear strength of the cloth.

- Tensile strength tester according to EN 926-1: 4.6.3, which allows to determine and document the breaking strength of full length paraglider lines (Annex 1).
- Equipment for measuring paraglider lines in full length under 5 daN load with laser measuring device and a calibrated deviation of max. +/-3 mm.
- Or installation for measuring paraglider lines in full length under 5 daN load with measuring device with steel measuring tape according to EC accuracy class 1 or 2.
- Precision spring balance with measuring range up to approx. 30 daN (approx. 30 kg) for testing the elongation and recovery values of Dyneema sliding screen lines.
- Industrial sewing machine suitable for sewing all the lines of the pattern to be tested.

C) Documents

- Verification instruction of the manufacturer
- The line length table of the sample, applicable by the manufacturer for the verification, according to which the measurement of the lengths of lines and risers shall be made.
- Air sports equipment data sheet (for the dimensions of the risers)
- Parts list (material list) of the sample
- All safety notices and airworthiness directive for the type
- Previous verification protocols (if available)
- Template verification protocol for documentation (Annex 5)
- The documentation of the requirements of the examiners required according to 4.
- Operating manuals, maintenance and calibration documents of the measuring and test equipment listed in 5.B)

All documents must be checked for validity before the examination and, if necessary, brought up to date.

D) Materials

- All line materials necessary for the replacement of the tested lines.
- Sewing thread corresponding to the original for sewing the lines to be tested.
- Alternatively, original lines obtained from the manufacturer to replace the lines to be tested or damaged.

6. Procedure

(The manufacturer may specify the procedures for verification, e.g.)

6.1 Identification of the device

The sample is identified by the inscriptions on the unit (marking, type plate).
→ If the information is incomplete or illegible, contact the manufacturer.

6.2 Visual and condition check of the cap

- The topsail and bottom sail shall be inspected from leading to trailing edge, web by web, for tears, chafe marks, stretching, damage to the coating, torn or loose seams in the cloth and line loops, execution of any repairs and for any other abnormalities.
- Stiffeners at the leading edge are checked individually for damage.

- Inside the screen, cell by cell, all ribs, cell partitions, crossports are controlled.
- The openings for draining sand and dirt are checked, foreign bodies removed
  → Holes or tears in the upper or lower sail can be repaired on both sides with adhesive sail if they are smaller than 5 cm and no seam is taped over. Apply adhesive sail to upper and lower sail with offset (not covering). Larger defects, damage to intermediate cell walls and ribs, larger scuff marks on the leading edge require consultation with the manufacturer.
  → Improperly executed repairs, damage to the interior of the glider (ribs, cell partitions), loose or torn seams, major damage to the coating and conspicuous stretch marks require consultation with the manufacturer.

6.3 Visual and condition check of the lines

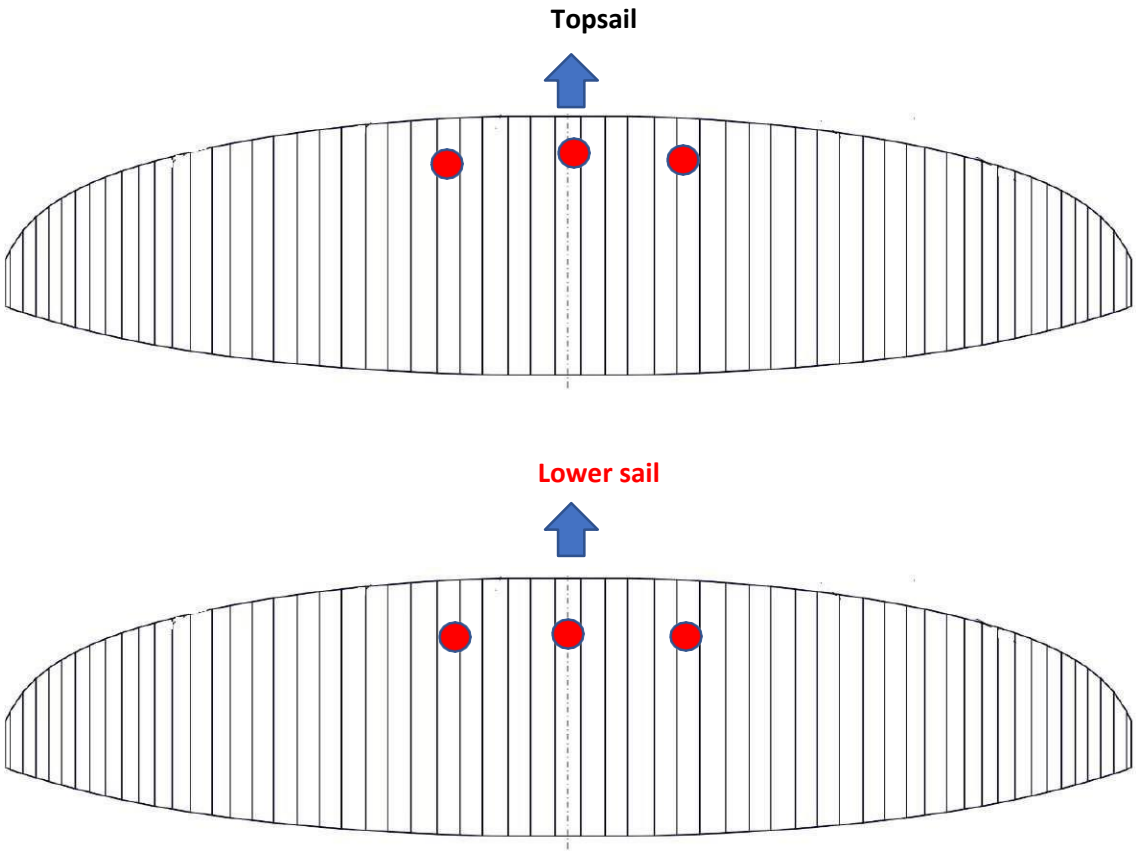
- Each individual line shall be inspected for damage to the sheath, cracks, kinks, chafing, core leaks and thickening. Visually and by "running through the fingers".
- All seams, splices and loops must be checked individually.
  → Damaged lines are to be replaced by original material (line and thread) in identical workmanship.

6.4 Visual and condition check of the connection parts

- The risers must be checked for damage. This concerns e.g. damage to the seams or tears, kinks, chafing caused by the control lines (ground handling), etc. The insides of the hangers (to the main carabiner and to the line locks) are to be inspected for damage caused by metal edges.
- The line locks/soft links are to be checked for damage and that they are firmly closed.
- At the accelerator, check the condition and length (must not shorten the A-riser) of the line, the pulleys (smooth running) and the connecting links (Brummel hooks).
- The attachment of the steering loop, the strap to the pulley/eyelet, the pulley/eyelet itself and the steering handle must be checked for perfect condition. The tape to the pulley/eyelet is checked for twisting and correct alignment of the pulley/eyelet, the swivels on the steering handle are checked for proper functioning, the steering line above is checked for untwisted course.
- The length of the risers (non-accelerated and fully accelerated) must be measured under 5daN load and compared with the specifications of the air sports equipment data sheet according to Appendix 4 (risers). The maximum deviation in the positions trim flight and accelerated may be 5 mm.
  → If damage to the risers is detected, the manufacturer must be consulted. Damaged line locks/soft links must be replaced.

6.5 Checking the air permeability (porosity) of the cloth

- The air permeability measurements must be carried out at the specified points on the canopy and subsequently recorded in the inspection report.
- Make sure that the cloth is undamaged at the points to be measured.



The following measured values apply:

Table 1: Measured values air permeability			
Kretschmer	**JDC**	**HelloPorozit**	**State**
>250	>100	>200	As good as new
150-250	50-100	100-200	Good condition
100-150	30-50	25-100	Clearly used
50-100	15-30	18-25	Heavily used
< 50	< 15	< 18	Overused, no longer airworthy

→ If the condition is "Overstressed, no longer airworthy" this must be noted in the log as well as on the glider.

6.6 Checking the tear resistance of the cloth

- The test is carried out with the bed meter listed under 5. B).
  The test must be carried out on visibly aged cloth and generally from the 3rd retest onwards.
- In the topsail, middle lane, between the A-line linkage and the leading edge, the needle of the bettsometer is pierced at the edge of a ripstop caro.
- The test pull is in the direction of the next ripstop thread.
- If no further tearing occurs at a tensile force of 500 N (0.5 daN), the test is positive.
- If the fabric tears below this value, the paraglider is unairworthy.
- The determined measured value is entered in the verification protocol.
  → If this test shows that the glider is not airworthy, this must be noted in the log as well as on the glider.

6.7 Checking the line breaking strength

Table 2: Selection of lines to be tested (line plan Annex 2)				
Linen level	A	B	C	D
Topline	A1	B1 Alternative		
Centre line	AM1	BM1 Alternative		
Trunk line	AT1	BT1 Alternative		

Table 3: Minimum line strengths daN						
Umbrella size	XS	S	M	M/L	L	XL
Topleine	40	40	50	50	50	50
Centre line	55	65	80	90	100	100
Trunk line	90	105	130	150	150	150

- The middle A-lines, A1 of all floors are selected, alternatively B-1-lines (Annex 2, line plan) and tested for tensile strength with a tensile strength tester. The measured values are to be recorded in the verification protocol.
- The tested lines are replaced with lines of identical material and seam pattern. The length of the replacement lines must be

  ☐ the dimension in the line plan

  ☐ the dimension of the removed line before the test

  ☐ the dimension in the line plan with the addition of xx mm/ with the deduction of xx mm

  ☐ correspond to the dimension of the removed line before the test with the addition of xx mm/ with the subtraction of xx mm.

  The replacement lines shall be marked so that they are not retested at the next retest. It shall be noted in the inspection report which lines have been inspected. The tested lines shall be attached to the inspection report and handed over to the client.
- The minimum strength values listed in the table must not be fallen short of. If the strengths are below the lower limit, the line levels concerned must be completely replaced.
- At the first check (routine test not older than 30 months, less than 150 h), a check of the breaking strength of sheathed dyneema lines can be waived if the general condition of the canopy is good or better.

6.8 Checking the recovery properties of Dyneema lines

- For paragliders with full or partial Dyneema-lining, it must be checked whether the lines return to their original value after a stronger load - and corresponding stretching.
- The test is carried out with the precision spring balance listed under 5.B) with 20 daN tension. All lines are tested over the entire line length. The measurement of the line lengths according to 6.9. may only take place after a reset time (rest time) of XX minutes.

6.9 Measuring the line lengths

Measurement is carried out according to the specifications of EN 926/2-2014.

- The measurement must be carried out with one of the devices listed under 5. B). Measurements are taken under a constant load of 5 daN.
- Measuring range is from the inside of the line loop at the stem line (at the line lock) to the lower sail (Appendix 3).
- The measurement of the opposite wing side must be done in the same way, it cannot be done with a symmetry comparison.

The result is noted in the inspection report in such a way that the actual line lengths are compared with the target line lengths and the deviations are shown separately.

Table 4: Allowed line length tolerances						
Linen level	A	B	C	D	Brake	
Shorter	-10 mm	-5 mm	0 mm	0 mm	-10 mm	
Longer	0 mm	0 mm	+5 mm	+5 mm	+ 20 mm	
Symmetrical deviation of the total line-lengths	+/-30 mm					

6.9.1 Steering lines

- The control lines are measured from the attachment to the paraglider canopy (if necessary with loops or gathering system) to the knot on the control handle.
- If the control lines have been changed by the owner, they must be adjusted relative to the line lengths in such a way that the line lead is achieved according to the factory setting, with the tolerances in table 4. This also applies if the owner does not wish this.

7. Trim corrections

For line length deviations greater than those listed in table 4, trim corrections must be made to the trunk lines. This is done by looping or unlooping additional loops into the line lock.

- Looping in an additional loop shortens the stem line by approx. 10 mm
- Unwinding an existing loop lengthens the stem line by approx. 10 mm
- Looping in an anchor stitch shortens the stem line by approx. 15 mm
- Extending an existing anchor stitch lengthens the stem line by approx. 15 mm

Einfacher Loop = 0 | Doppelter Loop = ca. 10 mm Verkürzung | Ankerstich = ca. 15 mm Verkürzung

After trim corrections have been made, all lines must be measured again. The tolerances in table 4 apply. In case of trim deviations that cannot be corrected with loops or anchor stitch in such a way that the tolerances in table 4 are met, the manufacturer must be contacted.

8. Documentation

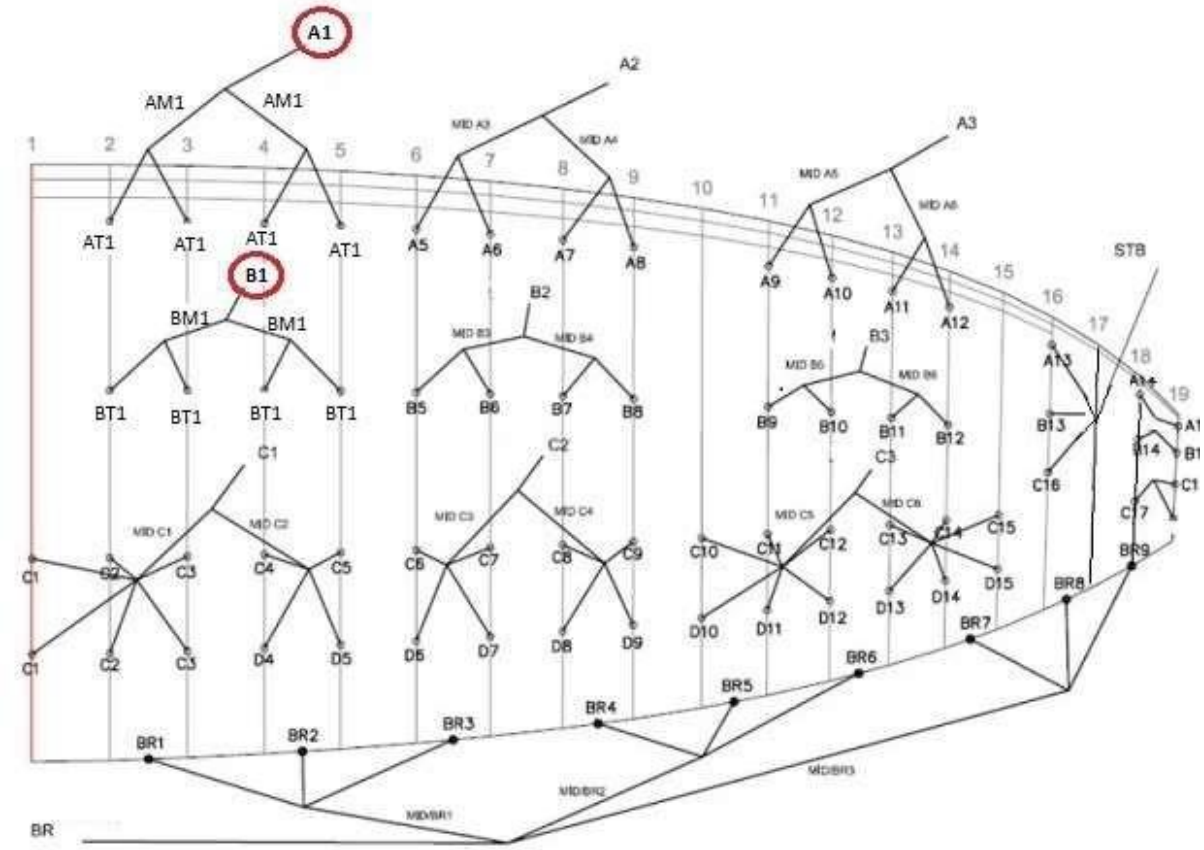
(The manufacturer may specify requirements for the documentation of the verification, e.g.)

- All checks, measurement and repair work on the paraglider must be fully documented in the inspection report (Appendix 5). The inspection report must include the company name, name and signature of the inspector, place and date. The retention period at the check company is 5 years. A copy must be handed over to the owner.
- The inspection must be documented on the type plate of the paraglider in the space provided. The month and year of the inspection, the month and year of the maximum validity of the inspection, the company name of the inspection company, the date, the name and signature of the inspector must be written clearly in water-resistant pencil.

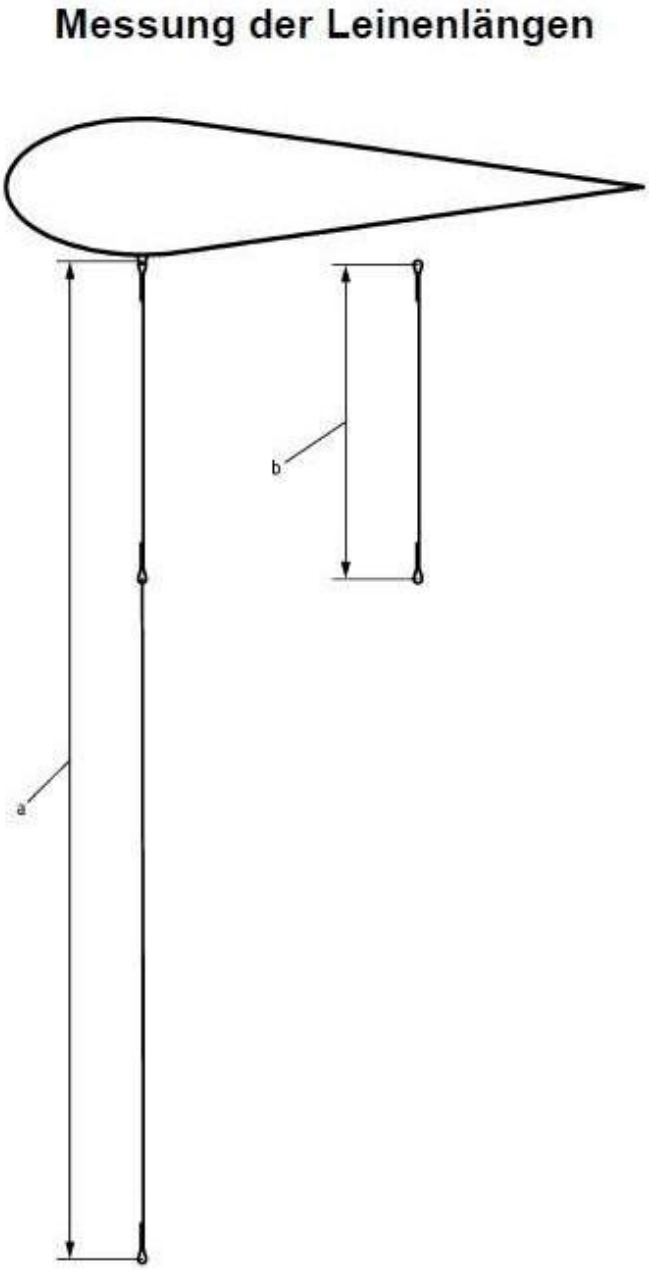
Annex 1: Specification of the tensile strength tester according to EN 926-1: 4.6.3

The breaking strength shall be measured by hooking the line to the two line loops on metallic connections of the tester with a diameter between 3 mm and 4,5 mm and applying the load .The speed rate of the tester to apply the load shall be between 0,7 m/min and 1 m/min.
A calibrated electronic sensor equipped with an electronic strain gauge (sampling rate at least 50 times per second) is required.

Appendix 2: Line plan with marking of the lines to be tested according to 6.7.

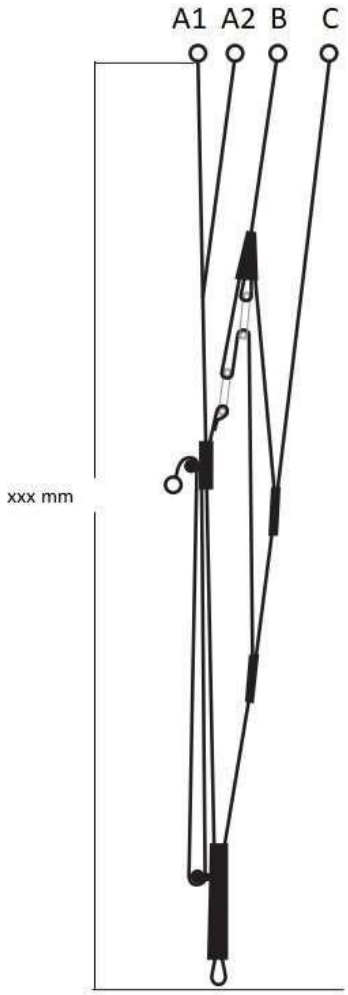


Appendix 3: Measuring the line lengths, Measuring range

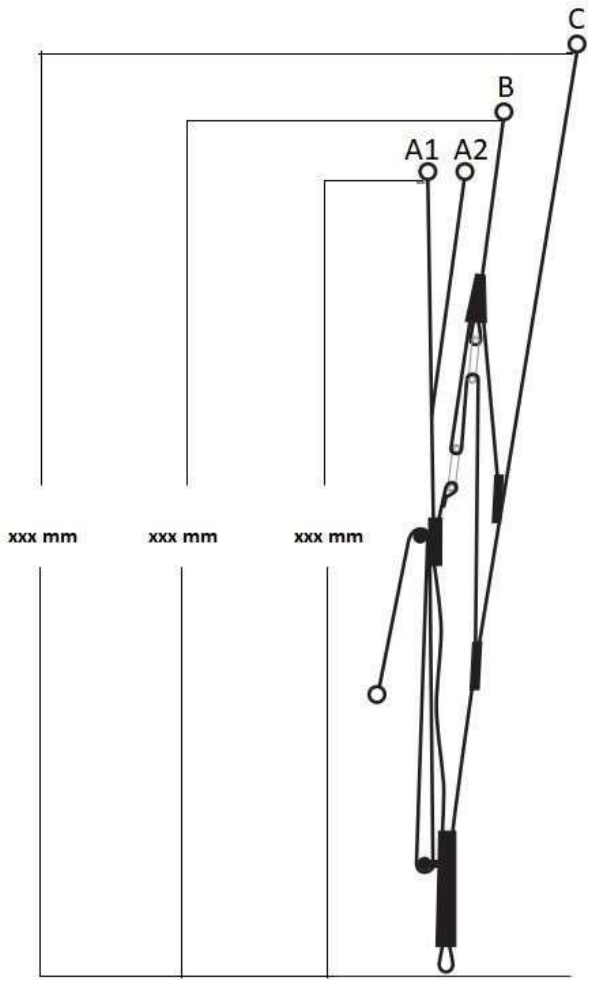


a Gesamtleinenlänge
b Länge eines Leinenabschnittes

Appendix 4: Risers and Measurement Specifications Trim Flight and Accelerated Flight



Trimmflug



Beschleunigt

Appendix 5: Verification protocol