



# INSPECTION INSTRUCTION



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# Contents

- Rationale .....3**
- Personnel requirements .....3**
- Required documentation and equipment.....3**
- Service/inspection interval:.....3**
- Inspection.....4**
  - Identifying the equipment..... 4
  - Porosity test..... 4
  - Canopy strength test..... 5
  - Visual inspection of the canopy..... 6
  - Inspection of the lines ..... 7
  - Measuring the line strength..... 7
    - Minimum strength by model ..... 8
    - Older models which are not listed in the table: ..... 9
  - Riser inspection .....13
  - Measuring line lengths .....13
  - Documentation.....13
- Liability .....14**



## Rationale

The **NovaFullService NFS** (full inspection) or the **NovaTrimmTuning NTT** (trim check) should establish the airworthiness of the wing to be inspected.

## Personnel requirements

Inspections of NOVA paragliders must only be carried out by persons authorised by NOVA. A list of authorised individuals and inspection centres can be obtained online at <https://www.nova.eu/en/try-buy/?store=servicepartner>. Authorised check centres have staff trained by NOVA to undertake inspections.

Your national NOVA importer will also gladly assist you with advice and information.

## Required documentation and equipment

- the most recent version of the inspection instructions (<http://files.nova.eu/lineplans/>)
- Line plan (see relevant product details – Download section)
- Airworthiness specifications of the certification authorities (see [www.dhv.de](http://www.dhv.de), [www.para-academy.eu](http://www.para-academy.eu), [www.para-test.de](http://www.para-test.de))
- Parts list (<http://files.nova.eu/lineplans/>)
- Apparatus for measuring the total length of the suspension lines with 49N (~5kg) tension and a laser measuring unit with maximum +/-3mm measurement tolerance, specified by the manufacturer and data transfer capability. All authorised inspection centres use the above mentioned equipment and laser measuring device, so that consistent quality and comparability is guaranteed.
- Porosimeter by JDC, Hello or equivalent
- Fabric degradation tester (Bettsometer)
- Line strength gauge as stipulated by EN 926-1: 4.6.3

All apparatus must be regularly serviced and calibrated as specified by the manufacturer.

## Service/inspection interval:

**NOVA** expects all wings sold after 2007 to undergo a **NovaTrimmTuning (NTT)**. This NTT, initially free of charge in Germany and Austria, must be undertaken no

later than one year from the date of purchase. If the NTT has been performed, the **NovaFullService (NFS)** (complete inspection) only becomes due after 3 years from date of purchase (of the new wing). Further NFS should then be performed every two years.

If the paraglider was not submitted for an NTT, or if the deadline of one year after purchase has been exceeded, then the wing must be submitted for an NFS two years after purchase (of the new wing).

**The date of purchase of the new wing is critical for all deadlines and time limits concerning NTT and NFS, as well as for all warranties and guarantees.**

For exceptionally intensive use, e.g. regular acro flying or when used in areas where increased material stress is expected (e.g., sand, salty air near the coast), an annual NFS is recommended.

Regardless of the above specified time limits, each paraglider must be checked before one hundred flying hours - at the very latest.

For heavily stressed cloth, where the limits for porosity and/or the line strength are nearly reached, the inspector can shorten the next scheduled NFS to one year.

Equipment used for commercial purposes, (tandems or wings used for instruction) must be submitted for an annual NFS.

## **Inspection**

### **Identifying the equipment**

The model and serial number are listed on the certification sticker usually located on the wing tip or by the right-hand centre cell.

The certification sticker must be checked for completeness and legibility.

### **Porosity test**

Before the porosity test, all the areas to be tested must be checked for damage and if necessary, cleaned of dirt, dust or sand. Failure to do so will distort the test result. The cloth should be held against a light source to make small holes easier to see.

First, a measurement must be taken at the upper sail of the leading edge (center cell). If the measurement result here is above a value of 200s (JDC/ Hello), no further measurements need to be taken. If the first measured value is below 200s, 4 further measurements must be taken on the upper sail of the leading edge. The average of the 5 measurements is used for the evaluation. If a single value deviates significantly

from the other measurement results, the measurement must be repeated (possibly at a slightly different measuring point).

Measuring points:

The porosity has to be tested on the upper sail:

1. Center cell, approx. 20-30 cm behind the leading edge
2. 5th cell left/right, approx. 20-30 cm behind the leading edge
3. 10th cell left/right, approx. 20-30 cm behind the leading edge

The measured values must be noted in the check protocol.

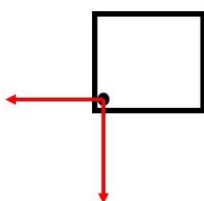
If the porosity value is "Intensively used" (see Assignment of the measured values below), it must be noted in the inspection report ("Check protocol") that the sail is close to its porosity limit. In this case, the next inspection must be performed within one year.

Assignment of the measured values:

<b>JDC/Hello</b>	<b>Kretschmer</b>	<b>Bewertung der Porosität</b>
>200	>800	As new
100-200	400-800	Good as new
30-100	100-400	Used
15-30	50-100	Intensively used
<15	<50	Not acceptable

If the porosity is deemed "not acceptable", the airworthiness of the wing cannot be guaranteed and this must be noted both in the inspection report as well as on the paraglider's certification sticker.

## Canopy strength test



The fabric strength of a paraglider is checked using a Bettrometer. This means that a needle fitted to the Bettrometer is pierced through the wing's cloth. This piercing must be performed in the corner of the ripstop panel. The tensile direction of the Bettrometer must correspond to the direction of flight and a second time 90° to flying direction.

The test must be completed on the upper surface, near the leading edge. For paragliders with a certified take off weight up to 130 kg, the limit value is 3 N (approx.

300 g); for paragliders with a certified take off weight above 130 kg the limit value is 6 N, (approx 600 g). When the limit value is reached, the measurement has to be stopped and the result has to be noted as "positive" in the inspection report. If the cloth tears before the limit value specified, then the wing is not airworthy.

When performing the measurement, we recommend clamping the cloth into a porosimeter.



The results of the Bettometer must be recorded in the inspection report.

### **Visual inspection of the canopy**

The canopy must be inspected for any damage which could affect its airworthiness. This includes damage to upper or lower surface, as well as the ribs, the diagonal ribs and all seams - especially in the area of the cell openings. Additionally, the attachment points and their stitching on the lower surface must be inspected.

Any tears on the upper or lower surface which are not close to the cell openings, that are not longer than 5 cm and are more than 5cm away from the panel edge (seam) can be repaired with specialist tape. Tears of more than 5 cm, damage to ribs, diagonal ribs, etc. must be repaired by NOVA or an authorised repair centre.

All safety-relevant damage, as well as any repairs, must be noted in the inspection report.

## Inspection of the lines

The paraglider should be laid out completely and the lines must be sorted. Check the lines are running freely. Run your fingers along the full length of every line. Also the area where the loop of the line is attached to the maillon has to be checked. If any damage or irregularities are found (either in the core or the sheath), then the line must be replaced. Additionally, all stitching and correct connections of the lines must be verified.

All repairs must be noted in the inspection report.

## Measuring the line strength

Line strength is tested during every NFS. This means the relevant lines are removed, measured and their breaking load is determined.

During the initial NFS after two (or three years, if a NTT has been performed) the Dyneema (PPSL) lined wings are not tested for breaking loads. With normal use, PPSL lines lose very little strength, as has been proven during various internal tests. For this reason, the breaking strength test is sometimes only performed at the NFS after four (or five years, if a NTT was undertaken). Glider models covered by this rule are marked with a tick in the table.

**Please note:** if unusually intensive stress is discovered or suspected, then the line strength must be tested during the first NFS. Reasons for unusual stress to the lines could be due to:

- salt: salt water, salty sea air
- sweat from the hands (during instruction, practise slope)
- sand
- frequent exposure to heat (>50°C, e.g. in a hot car)

Applicable to all breaking load tests: if a line has already been broken during a previous test or replaced for whatever reason, the opposite, equally named line must be checked. If this line has also been replaced, then the line listed in the table should be used as an alternative.

The determination of the breaking load is performed with specially manufactured equipment. The extending speed of the tensile test should be set to 1 m /min. (see EN 926-2:4.6.3)

If one of the tested lines fails the minimum breaking strength, then all lines (except the brake line) must be replaced. If the failure to meet the minimum breaking strength only applies to the main lines, then replacing these is sufficient. The table below lists the thresholds for line breaking loads.

All lines broken due to testing must be replaced. The model-specific paraglider materials stipulated by NOVA in the relevant parts list and the seam pattern guidelines must be adhered to.

Parts lists: <http://files.nova.eu/lineplans/>

Seam images: [http://files.nova.eu/lineplans/line\\_sewing\\_new.pdf](http://files.nova.eu/lineplans/line_sewing_new.pdf)

The line strengths of the tested lines must be recorded in the inspection report.

### Minimum strength by model

The following table lists the lines to be checked and their minimum breaking strength.

The relevant factor should be multiplied by the maximum take-off weight of the wing.

Model	from 2. NFS required	1. Line / (N/kg) (Alternative to 1.)	2. Line / (N/kg) (Alternative to 2.)	3. Line / (N/kg) (Alternative to 3.)
Bion 2	from 1. NFS!	A1: x 9.6 (A2: x 9.6)	CM1: x 2.5 (DM1: x 2.5)	—
Ibex 3	✓	A1: x 12.9 (B1: x 12.9)	AM1: x 7.2 (BM1: x 7.2)	—
ION 4/5/6 (light) AONIC	✓	A1: x 9.1 (B1: x 9.1)	AG1: x 4.6 (BG1: x 4.6)	—
Mentor 4/5/6 (light)	✓	A1: x 8.8 (B1: x 8.8)	AG1: x 4.0 (BG1: x 4.0)	—
Mentor 7	✓	A1: x 10.4 (B1: x 10.4)	AM1: x 4.6 (BM1: x 4.6)	—
Mentor 4 light	✓	A1: x 8.8 (B1: x 8.8)	AM1: x 4.0 (BM1: x 4.0)	—
Phantom	✓	A1: x 10.4 (B1: x 10.4)	AM1: x 5.6 (BM1: x 5.6)	—
Prion 3	✓	A1: x 12.9 (B1: x 12.9)	AM1: x 7.2 (BM1: x 7.2)	—
Triton 2(light)/ Sector	from 1. NFS!	A3: x 5.8 (B3: x 5.8)	AM1: x 5.7 (BM1: x 5.7)	A1: x 11.0 (B1: x 11.0)
Prion 4	from 1. NFS!	A1: x 7.9 (B1: x 7.9)	AG1: x 4.3 (AG2: x 4.3)	—

Doubleskin/ Bantam/ Prion 5	✓	A1: x 8,8 (B1: x 8,8)	AM1: x 4,6 (BM1: x 4,6)	—
Ibex 4	✓	A1: x 7.9 (B1: x 7.9)	AG1: x 4.3 (AG2: x 4.3)	—
Xenon	✓	A1: x 9.6 (A2: x 9.6)	AM1: x 4.9 (AM2: x 4.9)	—
Codex	✓	S: x 2,9	AM1: x 8,5	—
Prion 6	from 1. NFS!	A1: x 10,3	AG1: x 3,7	—
Doubleskin 2	✓	S: x 4,1	BG5: x 2,5	—

For example:

Mentor 4 L max. take off weight = 130 kg

Lines are only load tested at the second NFS, i.e. after four years 4 (or five years, if a NTT has been performed).

1. Line A1 x 8.8 N/kg                      Calculation: 130 kg x 8.8 N/kg = 1144 N
2. Line AM1 x 4.0 N/kg                      Calculation: 130 kg x 4.0 N/kg = 520 N
3. Line fails

**Older models which are not listed in the table:**

The previous rule for minimum breaking strength applies to all paraglider models not listed above:

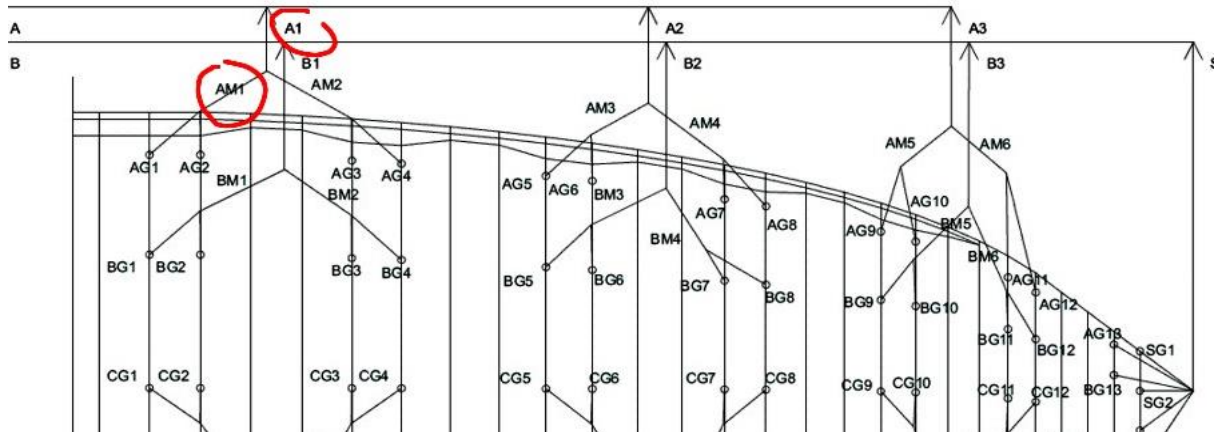
The A1 main line is removed, measured and its breaking strength is determined. Additionally, the innermost A-line in the middle gallery (AM1) is removed, measured and its breaking load is determined.

If all lines in the A and B areas are made from Dyneema, then the breaking strength test can be omitted until the NFS after four years (or five years, if a NTT has been performed).

**Please note:** if unusually intensive stress is discovered or suspected, then the line strength must be tested during the first NFS. Reasons for unusual stress to the lines could be due to:

- salt: salt water, salty sea air

- sweat from the hands (during instruction, practise slope)
- sand
- frequent exposure to heat (>50°C, e.g. in a hot car)



**Please note:** If a wing only has two line areas (i.e. main lines and one gallery), then the upper as well as the lower lines must be subjected to a load test. The upper gallery must be treated in the same way as the middle gallery on wings with three line areas. The limit values for the upper gallery must match the same values which are valid for the middle gallery on wings with three line galleries.

**Minimum strength of main and middle gallery lines on older models:**

	max. take off weight	Minimum strength			
		per main line		per middle gallery line	
		at 8 g	at 10 g	at 8 g	at 10 g
<b>2 main lines = (8A/B)</b> (Syntax; Primax; Rookie; Ra...)	60 kg	75 daN	90 daN	45 daN	54 daN
	65 kg	81 daN	98 daN	49 daN	59 daN
	70 kg	88 daN	105 daN	53 daN	63 daN
	75 kg	75 daN	94 daN	45 daN	56 daN
	80 kg	80 daN	100 daN	48 daN	60 daN
	85 kg	85 daN	106 daN	51 daN	64 daN
	90 kg	90 daN	113 daN	54 daN	68 daN
	95 kg	95 daN	119 daN	57 daN	71 daN
	100 kg	100 daN	125 daN	60 daN	75 daN
	105 kg	105 daN	131 daN	63 daN	79 daN
	110 kg	110 daN	138 daN	66 daN	83 daN
	115 kg	115 daN	144 daN	69 daN	86 daN
	120 kg	120 daN	150 daN	72 daN	90 daN
	125 kg	125 daN	156 daN	75 daN	94 daN
	130 kg	130 daN	163 daN	78 daN	98 daN
	190 kg	190 daN	238 daN	114 daN	143 daN
	220 kg	220 daN	275 daN	132 daN	165 daN
240 kg	240 daN	300 daN	144 daN	180 daN	

<b>3 main lines = (12A/B)</b> (X-act, Pheron, Mentor...)	60 kg	40 daN	50 daN	24 daN	30 daN
	65 kg	43 daN	54 daN	26 daN	33 daN
	70 kg	47 daN	58 daN	28 daN	35 daN
	75 kg	50 daN	63 daN	30 daN	38 daN
	80 kg	53 daN	67 daN	32 daN	40 daN
	85 kg	57 daN	71 daN	34 daN	43 daN
	90 kg	60 daN	75 daN	36 daN	45 daN
	95 kg	63 daN	79 daN	38 daN	48 daN
	100 kg	67 daN	83 daN	40 daN	50 daN
	105 kg	70 daN	88 daN	42 daN	53 daN
	110 kg	73 daN	92 daN	44 daN	55 daN
	115 kg	77 daN	96 daN	46 daN	58 daN
	120 kg	80 daN	100 daN	48 daN	60 daN
	125 kg	83 daN	104 daN	50 daN	63 daN
	130 kg	87 daN	108 daN	52 daN	65 daN
	140 kg	93 daN	117 daN	56 daN	70 daN
	150 kg	100 daN	125 daN	60 daN	75 daN
	160 kg	107 daN	133 daN	64 daN	80 daN
	170 kg	113 daN	142 daN	68 daN	85 daN
	180 kg	120 daN	150 daN	72 daN	90 daN
190 kg	127 daN	158 daN	76 daN	95 daN	
200 kg	133 daN	167 daN	80 daN	100 daN	

	210 kg	140 daN	175 daN	84 daN	105 daN
	220 kg	147 daN	183 daN	88 daN	110 daN
	235 kg	157 daN	196 daN	94 daN	118 daN
	250 kg	167 daN	208 daN	100 daN	125 daN

<b>4 main lines = (16A/B)</b> (Philou..)	60 kg	30 daN	38 daN	18 daN	23 daN
	65 kg	33 daN	41 daN	20 daN	24 daN
	70 kg	35 daN	44 daN	21 daN	26 daN
	75 kg	38 daN	47 daN	23 daN	28 daN
	80 kg	40 daN	50 daN	24 daN	30 daN
	85 kg	43 daN	53 daN	26 daN	32 daN
	90 kg	45 daN	56 daN	27 daN	34 daN
	95 kg	48 daN	59 daN	29 daN	36 daN
	100 kg	50 daN	63 daN	30 daN	38 daN
	105 kg	53 daN	66 daN	32 daN	39 daN
	110 kg	55 daN	69 daN	33 daN	41 daN
	115 kg	58 daN	72 daN	35 daN	43 daN
	120 kg	60 daN	75 daN	36 daN	45 daN
	125 kg	63 daN	78 daN	38 daN	47 daN
	130 kg	65 daN	81 daN	39 daN	49 daN

8 g

The breaking load of the broken line is at the LTF limit of 8 g. Since further use will result in the line strength falling below the limit value, the lines should be replaced.

If the breaking load is between >8 g and 10 g, it is the responsibility of the inspector to determine the deadline for the next NFS, however, this should be no later than one year or 100 flying hours.

> 10 g

The breaking load of the broken line is clearly above the LTF limit of 8 g.

For normal usage (<200 hours or 400 flights in two years, no acro manoeuvres), we recommend the next NFS is performed in two years.

**Please note:**

The minimum strength for the middle lines in the table is applicable to all models, where two lines (middle gallery) are connected to the main lines. For models where three lines are connected to the main lines (e.g. the Carbon), the minimum strength is determined as follows:

The minimum strength of the main line is taken from the table and divided by three. The result must be multiplied by 1.2 and this provides the minimum strength of the lines connected to the main lines.

If the minimum strength of a main line is, for example, 120 daN, then the minimum strength of the gallery above is 48 daN (for three lines connected to the main line).  
 $(120/3) * 1.2 = 48 \text{ daN}$

We don't prescribe a strength test for the gallery lines. If such a test is performed, the minimum strength should be calculated as follows:

Minimum strength =  $1.2 * (\text{max. take off weight} * \text{load factor}) / (\text{number of A\&B gallery lines})$

For example:

Max. take off weight = 110kg

Number of A&B gallery lines (excluding stabilo lines) = 40

Required load factor = 10 g.

Minimum strength =  $[(110 * 10) / 40] * 1.2 = 33 \text{ daN}$

## Riser inspection

The risers must be checked for wear and tear. Particular attention should be paid to the main hang loops (possible damage from the carabiners), the stitching and maillons (locked, no damage or sharp edges). The maillons should be locked so tight that they cannot be opened only by hand. Broken o-rings should be replaced. If there is damage or abrasions on the main hang loops, maillons or components, the riser needs to be replaced. Other checks are covered during the speed-system inspection. When the riser is stretched (6daN pull from the main hang loop to the A-line maillon), the speed-system cord must never shorten the A-line area.

Any repairs must be recorded in the inspection report.

## Measuring line lengths

Line measurement is performed by means of a special measuring device (see Required documentation and equipment) and in-house developed software (<http://my.nova.eu/>). The NOVA designed software environment COS (Computer Online System) captures all relevant data and stores them on a central server.

However, to gain access to this online system requires thorough training at NOVA International. A list of authorised personnel or inspection centres can be found online at: <https://www.nova.eu/de/try-buy/?store=servicepartner>.

## Documentation

The results of all tests must be added to the inspection report ("Check protocol") which is generated by the online system.

A copy of the inspection report must be added to the paraglider.

The date for the next NFS must be marked on the wing.

## **Liability**

NOVA cannot be held liable for any errors made by inspectors or service centres. Any work completed is at the pilot's own risk.

If there is any doubt about the performance of the inspection or the airworthiness of the wing, please contact NOVA.



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