CIVL Paragliding Committee

Fédération Aéronautique Internationale

CIVL Competition Class (CCC)

Paragliders permitted in FAI Category 1 Cross-Country events

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Editor's note: Hang-gliding and paragliding are sports in which both men and women participate. Throughout this document the words "he", "him" or "his" are intended to apply equally to either sex unless it is specifically stated otherwise.

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Contents

1 Introduction

This document contains the authoritative definition for paragliders permitted to be flown in FAI Category 1 paragliding cross-country events. Its purpose is to serve as a reference for manufacturers, testing laboratories, competition organizers and competition pilots.

Section 2 of the document shows the timeline which will result in the definition coming into effect. Section 3 lists the goals that served as the foundation for the definition of permitted paragliders. Those permitted paragliders fall into two categories:

1. The CIVL Competition Class, as summarized below, and defined in sections 4 and 5
2. EN certified gliders, if they meet the requirements listed in section 6

Section 7 describes the methods and procedures for testing the CIVL Competition Class requirements for certification, and for verification during competitions.

1.1 CIVL Competition Class summary

The CIVL Competition Class definition can be summarized as follows:

1. Use full EN certification (EN 926-1 and EN 926-2) as the basis
2. Additionally restrict top speed by limiting the maximum accelerator effect
3. Additionally restrict aspect ratio to the maximum flat aspect ratio exhibited by EN certified gliders by December 31st, 2013
4. Additionally require riser sets which prevent pilots from exceeding the certified top speed
5. Additionally require models to be available in multiple sizes, covering a wide range of pilot weight, in time before Category 1 events
6. Permit line breaking strength tests to be performed for each model size
7. Forego flight tests that are irrelevant to this class of gliders
8. Set the waiting time until pilot input for collapse tests to three seconds
9. Require flight tests to be conducted at the top of a wing's weight range, using a competition harness where relevant
10. Require the manual to contain additional information on the paraglider's operation and maintenance
11. Add clear, precise and simple-to-follow measurements and testing procedures to verify a wing's conformity with certification

2 Timing

January 7, 2014: Publication of the final 2015 edition proposal

February 21/22, 2014: CIVL Plenary, decision on acceptance of proposal

January 1, 2015: The definition becomes effective, and will be revised every two years from then on

Late 2015: Publication of the 2017 edition draft

Early 2016: CIVL Plenary, decision on acceptance of the 2017 edition proposal

January 1, 2017: If accepted by the 2016 Plenary, the revised definition becomes effective

3 Goals

The definition of Competition Class paragliders was created with the purpose of World and Continental Championships in mind: safe, fair and satisfying contest flying. This lead to the following goals for the class definition:

1. Safety –
    a. wings complying with this definition are be safe to fly by adequately trained competition pilots in competition conditions
    b. a wing's conformity with certification can be verified by each pilot with a few simple measurements
2. Fairness –
    a. ensure that wings are available for a wide range of pilot weights
    b. prevent pilots from gaining an undue advantage over others through temporary or permanent modification of their glider
3. Satisfaction – wings complying with this definition provide a satisfactory flying experience to the world's best competition pilots

4 Definitions

4.1 Paraglider

§4.1 A paraglider is a hang glider as defined by Section 7B of the FAI Sporting Code. Its main components are the canopy, the suspension lines (short “lines”), and two riser sets.

§4.2 The canopy is the aerodynamic portion of a paraglider, consisting of fabric and other non-rigid elements. Rigid elements may be used to guide brake lines between attachment point and top-most furcation point.

§4.3 The suspension and brake lines connect the canopy with two riser sets, one for the left half of the canopy, one for the right half of the canopy.

§4.4 A riser set consists of one or several individual risers, which each connect a subset of the suspension lines to the pilot harness’ main carabiners. A riser set can include an acceleration system.

§4.5 A riser is typically a piece of webbing fitted with a line attachment point and connected either directly or through additional webbing structure to the pilot harness’ main carabiners.

§4.6 The acceleration system is typically a pulley system that is operated by the pilot’s legs and modifies individual riser lengths to decrease the canopy’s angle of attack when activated. It is characterised by its maximum travel.

4.2 Paraglider design, model and size

§4.7 A paraglider design (short “design”) is characterised by:

- the canopy, including
  - planform, both when laid out flat and its vertical projection when in flight
  - aerodynamic profiles
  - internal structure
  - number and positions of line attachment points
  - materials used for manufacturing
- the line set, including
  - total number of lines
  - number of furcation points between riser and canopy line attachment points
  - line materials used for manufacturing, not considering line diameter
- the riser set, including
  - distance of each line attachment point to the main carabiner attachment point
  - lengths and positions of all elements connecting two or more risers, apart from the carabiner attachment point
  - materials used for manufacturing load-carrying parts
- any other characteristics that are commonly seen as a distinguishing factor between two paraglider designs

§4.8 A paraglider model (short “model”) is an instance of a paraglider design which exists in one or more sizes, and where those sizes have been obtained by scaling.

§4.9 A paraglider model size (short “size”) is an instance of a paraglider model, sized for a specific total take-off weight range. It is characterised by

- its canopy dimensions
- its line dimensions, both length and diameter
- its acceleration system’s maximum travel

- its maximum allowed total take-off weight (short “top weight”)
- its recommended minimum total take-off weight

4.3 CIVL Competition Class paraglider

§4.10 A CIVL Competition Class paraglider model size is a paraglider model size that is certified to comply with all the certification requirements defined in section 5 of this document.

§4.11 A CIVL Competition Class paraglider is a paraglider that is identical in all characteristics listed in §4.7 and §4.9 with a Competition Class paraglider model size and which is flown at or below that Competition Class paraglider model size’s maximum allowed total take-off weight.

4.4 Paragliders permitted in competitions

§4.12 To be permitted in FAI Category 1 paragliding cross-country competitions, a paraglider must either be a CIVL Competition Class paraglider, or an EN certified paraglider in accordance with section 6 of this document.

4.5 Additional definitions

4.5.1 Main lines

§4.13 Main lines are lines that are directly connected to the riser set, and connected to the wing either directly or through one or several furcation points.

§4.14 Main lines are labelled A, B, C, etc. for each span-wise plane of main lines, with the front-most plane in direction of flight being A.

§4.15 Main lines are numbered 1, 2, 3, etc. for each chord-wise plane of main lines, with the plane closest to the wing’s centre being 1.

4.5.2 Main line count

§4.16 The main line count of a paraglider canopy’s chord-wise row of attachment points is the number of distinct main lines (not counting brake lines) that are connected, either directly or via furcation points, with any of that row’s attachment points.

§4.17 A paraglider model’s main line count is given by the maximum main line count across all its chord-wise rows of attachment points.

4.5.3 Line group

§4.18 A line group is defined as a set of lines connected to the canopy where all those lines are connected to main lines with the same number (§4.15), either directly or through furcation points.

4.5.4 CIVL accredited testing laboratory

§4.19 A CIVL accredited testing laboratory (short “testing laboratory”) is an independent testing laboratory qualified for testing paragliders which has performed a minimum of 3 full EN certifications according to EN 926-1 and 926-2 in the twelve months prior to any certification of Competition Class compliance.

5 Requirements for CIVL Competition Class

5.1 General

§5.1 In order to be certified as a CIVL Competition Class paraglider model size, test specimens of that exact model size must comply with the following set of requirements in its entirety:

a. Take-off weight requirements (§5.3 to §6.2b)
b. Physical requirements (§5.6 to §5.15)
c. In-flight requirements (§5.16 to §5.17)
d. Documentation requirements (§5.18 to §5.27)

§5.2 Compliance with the requirements must be verified and certified by a CIVL accredited testing laboratory (§4.19), using the measurement and testing procedures described in section 7.1 of this document.

5.2 Take-off weight requirements

§5.3 The difference in top weights between the smallest and the largest Competition Class certified size of the test specimen's model is 25 kg or more.

§5.4 The smallest Competition Class certified size of the test specimen's model has a top weight of 100 kg or less.

§5.5 From January 1st, 2016, the target take-off weight requirements will be such that the smallest size has a top weight of 90 kg or less, and the difference between the smallest and the largest size is 35 kg or more. Additional measures will be defined as necessary to facilitate the creation of Competition Class paragliders by manufacturers newly entering competitions or returning to competitions after not having produced a high-end EN D competition wing.

5.3 Physical requirements

5.3.1 Canopy shape

§5.6 The flat aspect ratio of the test specimen's canopy, according to the canopy dimension data provided by the manufacturer and verified during the certification process, does not exceed 7.90.

§5.7 On the centre half (the middle 50% of its span) of the test specimen's canopy, neither the leading edge nor the trailing edge have any concave sections.

5.3.2 Structural strength

§5.8 The test specimen's model size is covered by a passed shock loading and sustained loading tests as specified by EN 926-1.

§5.9 Any existing EN certification for the test specimen implicitly satisfies the structural strength requirement (§5.8) for the test specimen.

5.3.3 Line breaking strength

§5.10 The test specimen passed the theoretical line breaking strength test specified by EN 926-1 for its top weight, with the following modifications:

a. A separate test is permitted for each size.
b. The minimum line breaking strength for all individual line segments, including brake line segments, is 20 daN after bending conditioning according to EN 926-1, section 4.6.2. This value is superseded by any minimum line breaking strength defined by the revision of EN 926-1 effective at the time of testing.

c. The manufacturer defines the load distribution over the span-wise main line planes.

§5.11 The breaking strength of each line segment used in the test specimen's construction is equal to or higher than the breaking strength of the equivalent line segment subjected to the structural strength tests (§5.8) which cover the test specimen's size.

§5.12 For a test specimen with existing EN certification, to fulfil the line breaking strength requirements (§5.10 and §5.11), individual lines may be replaced with lines of higher breaking strength without repeating the structural strength tests according to §5.8 or the flight tests according to §5.16.

5.3.4 Riser set layout

§5.13 The test specimen's accelerator system, when fully engaged, shortens the front-most riser by 18 cm or less, in relation to the rear-most riser.

§5.14 The test specimen's riser sets are designed in a way that prevents a change of relative riser lengths beyond the one achieved by maximum acceleration system travel in the acceleration system configuration presented during certification. In particular, it prevents pilots from achieving speeds beyond the certified maximum speed through application of excessive force on the acceleration system, or through temporary modifications of the riser sets.

§5.15 The only technical means to alter airspeed in flight are the test specimen's brake and acceleration systems. Specifically, there are no trim tabs or any other devices present which can be used to alter airspeed in flight without maintained pilot input.

5.4 In-flight requirements

§5.16 The test specimen passed the flight tests as specified by EN 926-2:2013, with the following modifications:

a. The test is conducted once, at the size's top weight
b. No test results are required for
    i. Roll stability and damping
    ii. Stability in gentle spirals
    iii. Low-speed spin tendency
    iv. Recovery from a developed spin
    v. B-line stall
    vi. Big ears at trim speed and in accelerated flight
c. In collapse tests, pilot reaction occurs after three seconds
d. Collapse, deep stall, full stall and high angle of attack recovery tests are performed with a competition harness

§5.17 Any existing EN certification for the test specimen implicitly satisfies the flight test requirement (§5.16) for the test specimen.

5.5 Documentation requirements

§5.18 Certification documentation is collected according to EN 926-1, section 6, and EN 926-2:2013, sections 6 and 8.

5.5.1 Measurements and documentation

§5.19 The test specimen's canopy dimensions correspond with the dimensions documented in the test specimen's user's manual, with a tolerance of +/- 2% for span measurements, and +/- 1% for chord and trailing edge measurements.

§5.20 If the test specimen has a rib that is marked for the Chord B measurement, that rib is the closest rib towards the canopy centre from the location halfway between the canopy centre and the canopy tip (75% of span).

§5.21 The line attachment point positions on the test specimen's canopy correspond with the positions documented in the test specimen's user's manual, with a tolerance of +/- 10 mm for chord-wise position, and no tolerance for span-wise position.

§5.22 The test specimen's line lengths correspond with the lengths documented in the test specimen's user's manual, with a tolerance of +/- 10 mm.

§5.23 The test specimen's riser lengths correspond with the lengths documented in the test specimen's user's manual, with a tolerance of +/- 5 mm.

§5.24 The maximum shortening of the front-most risers relative to the rear-most riser through the accelerator corresponds with the maximum shortening documented in the test specimen's user's manual, with a tolerance of +/- 5 mm.

§5.25 The line attachment points are documented photographically

§5.26 The riser set's layout, including accelerator travel, is documented photographically.

5.5.2 User's manual

§5.27 The user's manual fulfils the requirements defined in EN 926-2:2013, section 7, with the following additions:

a. Canopy dimensions: chord length at wing centre, chord length at 25% of span, span, and trailing edge length
b. Line attachment point positions
c. Line plan and line dimensions
d. Riser set schematic with dimensions
e. Maximum shortening of front-most risers relative to rear-most riser through accelerator
f. Flight characteristics, in comparison with a glider that is certified as EN D
g. In addition to point a)5): Information on maximum symmetric rear riser travel at maximum weight in flight
h. Recommendations and special considerations regarding SIV
i. Instructions for line measurements and re-trimming

5.6 Certification

§5.28 The testing laboratory, after verifying compliance with all requirements, issues a certification of compliance to the manufacturer, and submits a copy of this certification in electronic form to the CIVL competition coordinator at civl_comps@fai.org.

§5.29 The testing laboratory provides CIVL with access to the complete test documentation files in electronic form.

§5.30 The official certification date is the date when the full certification documentation is received by CIVL.

5.7 Marking

§5.31 The conformity of a paraglider to the requirements of this section shall be stated on a stamp or label permanently fixed to the canopy, which shall include the information defined in EN 926-2:2013, section 9, with the following modifications:

a. Replace d) with "CIVL Competition Class"

b. Replace f) with the edition of this document, i.e. “2015”, and its issue date

§5.32 EN-certified paragliders which are also certified CIVL Competition Class shall contain the following information on their EN conformity marking, as defined in EN 926-2:2013, section 9:

a. Under g), list “CIVL Competition Class 2015” and this document’s issue date

6 Permitted EN-certified paragliders

The intent of the paragraphs in this section is to ensure that the introduction of Competition Class does not exclude existing but superseded wings, as has happened under previous rules. It also serves to ensure that pilots are able to participate in competitions flying low-end wings, without any further requirements from manufacturer or pilots.

§6.1 Any EN-certified paraglider with classification A, B or C is permitted.

§6.2 Any EN-certified paraglider with classification D is permitted if at least one of the following applies:

a. The flat aspect ratio of the paraglider's canopy, as documented in the user's manual, is 7.0 or less.

b. The paraglider's model size is listed on CIVL's Web site as fulfilling all of the following criteria:

   i. The model size was EN certified before May 1st, 2014

   ii. The model's canopy fulfils the CIVL Competition Class canopy shape requirements (§5.6 and §5.7)

   iii. The model has been replaced by a more recent one.

c. The paraglider is also CIVL Competition Class certified according to section 5 of this document.

7 Measurement and testing procedures

7.1 Certification

These measurement and testing procedures must be applied during certification, to establish that a test specimen complies with the certification requirements. The reference for all these measurements is the data given in the test specimen's user's manual. All measurements must yield results that correspond with that reference, within the tolerance given for each measurement.

7.1.1 Canopy dimension measurements

Results: Measurements of Span, Chord A, Chord B, Trailing Edge length (see Figure 1)

Unit: Millimeter

Tolerance: +/- 2% for span measurement; +/- 1% for chord and trailing edge measurement

Tension:

a. Span and Trailing Edge measurements are conducted under tension of 5 daN in the measurement direction
b. Chord measurements are conducted under tension of 1 daN in the measurement direction

Span is defined as the distance between the two outermost symmetrical attachment points that are closest to the rearmost span-wise internal band, provided that there are no stiffening elements, such as plastic, Mylar or tension tapes, outboard of those points. If there are stiffening elements then the span is measured to the outermost points on them that are closest to the rearmost span-wise internal band.

Trailing Edge length is defined as twice the distance between the outermost, rearmost attachment point and the trailing edge at the centre of the canopy (50% of span, same as rear measurement point for chord A).

Chord is defined by the distance between the trailing edge (held by a clip or sticky tape) and the farthest point on the leading edge (held by hand), without distorting the profile.

Chord A is defined as the chord length along the rib at the canopy centre (50% of span). If no rib is present at the canopy centre, then Chord A is defined as the chord length along the rib closest to the centre of the canopy centre (50% of span).

Chord B is defined as the chord length along the rib that is located halfway between the canopy centre and the canopy tip (75% of span). If no rib is present at the location halfway between canopy centre and the canopy tip, then Chord B is defined as the chord length along the closest rib towards the canopy centre from that location. Manufacturers are encouraged to clearly mark that rib to facilitate verification.

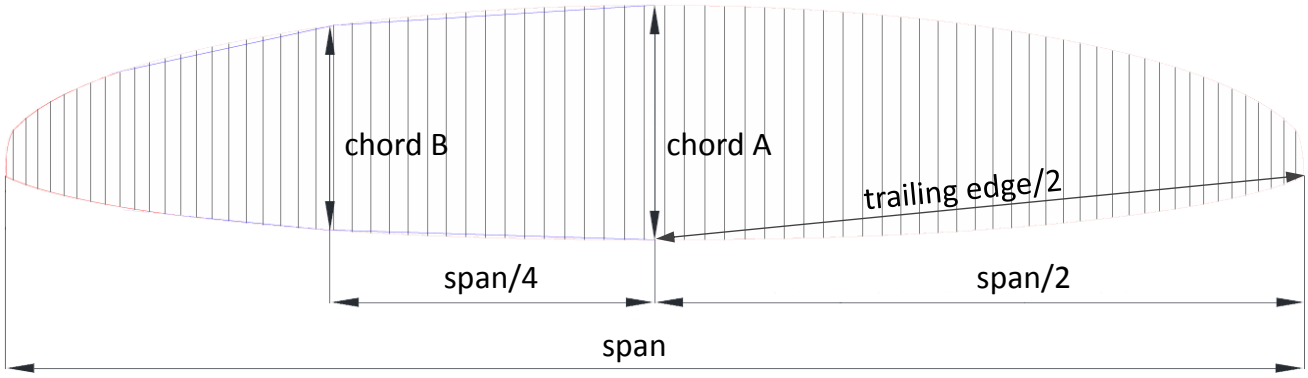

Figure 1: Canopy dimension measurements

7.1.2 Line attachment point measurements

Results:

a. Exact location of each line attachment points on the test specimen's canopy

b. Photographic documentation of each different type of line attachment points used on the test specimen's canopy

Location definition: An attachment point's location is defined by the rib it is attached to, and its distance from the trailing edge.

Unit: span-wise location: rib number (counting from wing centre); chord-wise location: Millimeter

Tolerance: none (span-wise); +/- 10 mm (chord-wise)

Tension: All measurements are conducted under tension of 1 daN in chord-wise direction

Procedure A: For each line attachment point:

1. Record the rib number the attachment point is attached to (counting from the wing's centre)
2. Apply the defined tension to the rib determined in step 1, in chord-wise direction
3. Measure and record the distance from trailing edge to the attachment point along the rib to which the attachment point is connected. If the dimension of the attachment point in measurement direction is greater than 2mm, use the attachment point's centre point in measurement direction as its location.

Procedure B: For each type of line attachment point (differing in design or construction or materials used) present on the test specimen's canopy: Record a photograph of one specimen, including a scale reference such as a ruler with clearly visible markings.

Procedure C: For each brake line attachment point, record the rib number the attachment point is attached to (counting from the wing's centre).

7.1.3 Line length measurements

Results: Overall suspension line length, as defined by EN 926-2, Annex A, for all attachment points on the canopy

Unit: Millimeter

Tolerance: +/- 10 mm

Tension: All measurements are conducted under tension of 5 daN in the measurement direction

7.1.4 Riser set measurements

Results:

a. For each maillon or other line attachment point, the distance between the inside of the maillon loop (the force transfer point between the attachment point and the line loops) and the outside of the main carabiner loop, both at trim speed and when the accelerator is fully activated. See also Figure 2 and Figure 3.

b. Maximum shortening of the front-most riser when accelerator is fully engaged, relative to the rear-most riser

Unit: Millimeter

Tolerance: +/- 5 mm

Tension: All measurements are conducted under tension of 5 daN in measurement direction

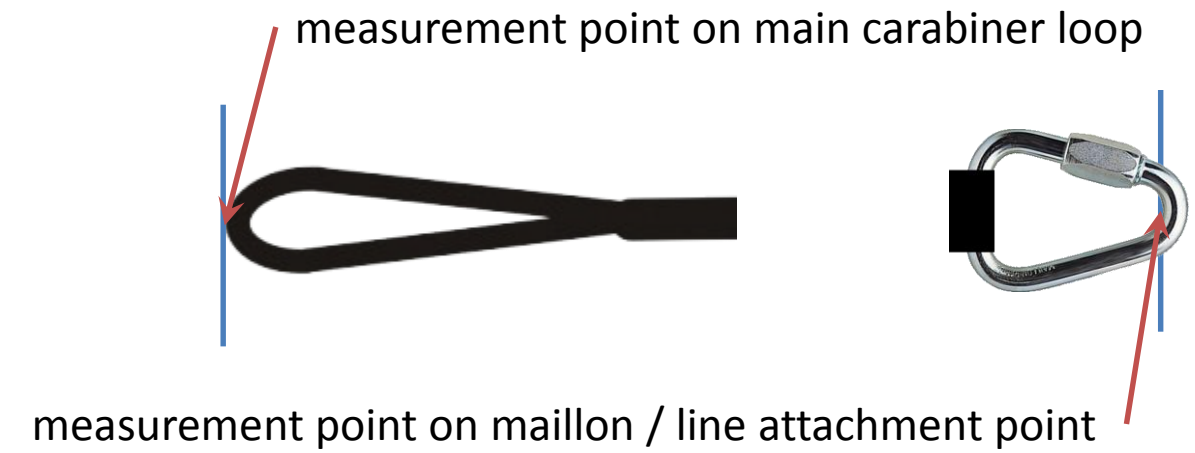

Figure 2: Riser measurement points

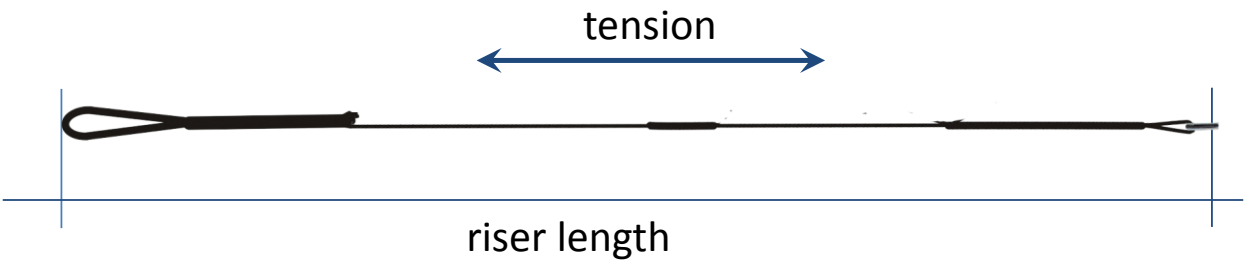

Figure 3: Riser length measurement

7.1.5 Canopy shape measurements

7.1.5.1 Flat aspect ratio

Result: Approximation of flat aspect ratio (AR_{flat})

$$AR_{flat} = \frac{4 * span}{chord(A) + 2.5 * chord(B)}$$

7.1.5.2 Leading and trailing edge shape test

Results: Establish that the centre 50% of the canopy's leading and trailing edge do not contain any concave sections.

Procedure:

1. Lay out the canopy flat on a flat surface
2. Use a tensioned string or any other straight device of sufficient length to optically mark the connecting line between points A_{front} and B_{front} (see Figure 4).
3. The test fails if there is any section where the connecting line between the two points does not run over or exactly alongside the wing (see Figure 5)
4. Repeat for the trailing edge, points A_{rear} and B_{rear}

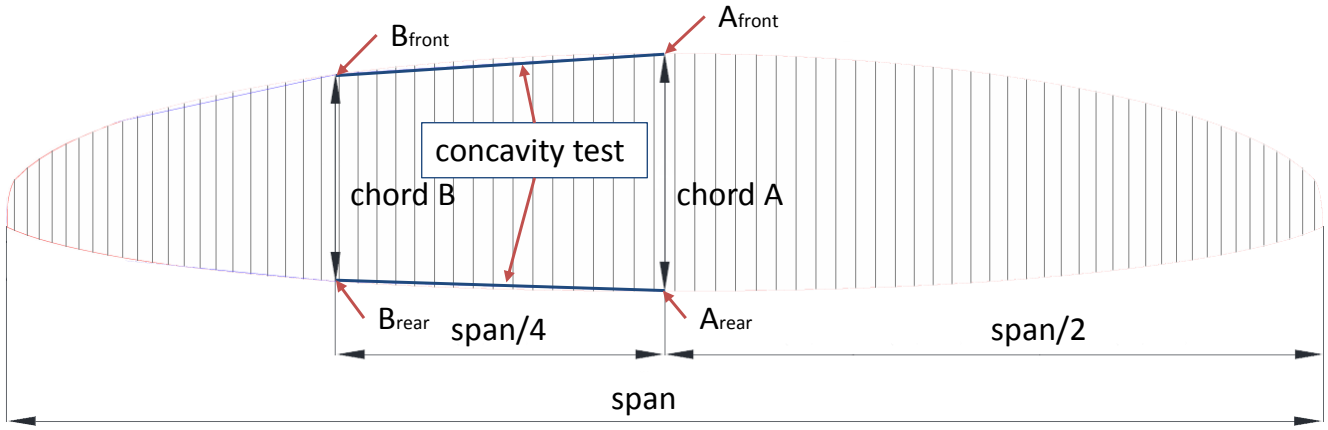

Figure 4: Position of concavity test

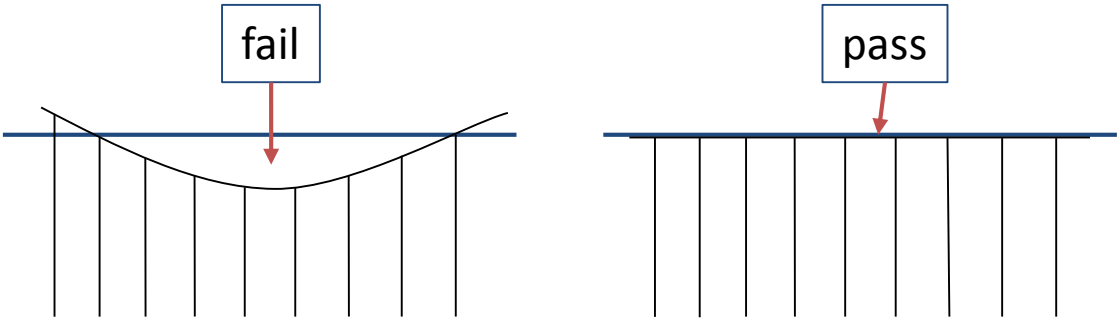

Figure 5: Detail view of concavity test

7.1.6 Riser set layout tests

Result: Establish that the riser sets are designed in a way that prevents a change of relative riser lengths beyond the one achieved by maximum acceleration system travel in the acceleration system configuration presented during certification.

Procedure A: Determine through observation and manipulation of a riser set whether change of relative riser lengths beyond the one achieved by maximum acceleration system travel is possible. The test fails if this is the case.

Procedure B: Determine through observation and manipulation of a riser set whether it is possible to increase accelerator travel through temporary or lasting manipulation of pulleys, risers or accelerator line in a way that alters the maximum possible change of relative riser lengths beyond the one achieved by maximum acceleration system travel in the acceleration system configuration presented during certification. The test fails if this is the case.

Procedure C, to be applied if results from procedures A and B are inconclusive:

1. Apply a tension of 5 daN or more to each individual line attachment point of the riser set, in load-bearing direction.
2. Activate the accelerator to the previously established maximum (section 7.1.4), allowing the tension distribution to shift towards the front risers, but maintaining a minimum tension of 5 daN for each individual riser.
3. Gradually apply force up to 65 daN on the accelerator line, in activation direction, and observe the relative lengths of the individual risers.
4. The test fails if the relative lengths of individual risers changes in step 3.

7.1.7 Line breaking strength tests

Calculated total line breaking strength tests are performed according to EN 926-1, with modifications regarding the test specimen (EN 926-1, section 4.2), minimum strength of individual line segments, and the distribution of loads between line planes (EN 926-1, section 3.3).

7.1.7.1 Test specimen

Every size of a model can be separately tested, at the maximum allowed total take-off weight of that size. The test does not have to be repeated for a size if that size uses the identically constructed lines (according to EN 926-1, section 2.3) as a bigger size that has already passed the test.

7.1.7.2 Minimum line breaking strength

Minimum line breaking strength of each individual line segment used in the construction of the tested paraglider, including brake line segments, must be according to EN 926-1. If the revision of EN 926-1 in effect at the time of testing does not define such a value, then the value defined in §5.10 applies.

7.1.7.3 Load distribution and total force

Load distribution between A, B, C, D and any further line planes is defined by the manufacturer. The sum of the individual calculated breaking forces for all line planes must exceed the total of the forces given by EN 926-1, section 3.3: 14 x g x [max weight in flight] with g=9.81 m/s2.

7.1.8 In-flight tests

The in-flight tests are performed according to EN 926-2:2013, with modifications regarding

- the set of tests performed
- test criteria, including pilot reaction time in collapse tests
- test procedures
- harness

The in-flight tests are considered passed if no individual test resulted in a classification higher than "D".

7.1.8.1 Flight test set

The flight tests to be performed, along with a reference to their description in EN 926-2:2013, a reference to their modified test criteria (where applicable) and the test pilot requirements are listed in Table 1.

Test name	Description in EN 926-2:2013	Modified test criteria	Test pilot
Inflation/take-off	5.5.18.1		Testing laboratory
Landing	5.5.18.2		Testing laboratory
Speeds in straight flight	5.5.18.3		Testing laboratory
Control movement	5.5.18.4		Testing laboratory
Pitch stability exiting accelerated flight	56.5.18.5		Testing laboratory
Pitch stability operating controls during accelerated flight	5.5.18.6		Testing laboratory
Behaviour exiting a fully developed spiral dive	5.5.18.9		Testing laboratory
Symmetric front collapse	5.5.18.10.1-3	7.1.8.2.1	Manufacturer or testing laboratory
Exiting deep stall (parachutal stall)	5.5.18.11		Manufacturer or testing laboratory
High angle of attack recovery	5.5.18.12		Manufacturer or testing laboratory

Test name	Description in EN 926-2:2013	Modified test criteria	Test pilot
Recovery from a developed full stall	5.5.18.13		Manufacturer or testing laboratory
Asymmetric collapse	5.5.18.14.1-3	7.1.8.2.2	Manufacturer or testing laboratory
Directional control with a maintained asymmetric collapse	5.5.18.15		Manufacturer or testing laboratory
Trim speed spin tendency	5.5.18.16		Testing laboratory
Quick descent option in straight flight according to user's manual	5.5.18.23	7.1.8.2.3	Testing laboratory
Alternative means of directional control	5.5.18.22		Testing laboratory
Any other flight procedure and/or configuration described in the user's manual	5.5.18.23		Testing laboratory

Table 1: Flight tests

7.1.8.2 Modified test criteria

7.1.8.2.1 Symmetric front collapse

Table 2 and Table 3 list additional ranges and classification criteria for this test.

Measurement	Range
Recovery	Recovery through pilot action after 3 s in less than a further 5 s
	Recovery through pilot action after 3 s in more than a further 5 s

Table 2: Addition to EN 926-2:2013, Section 4.4.10 Symmetric front collapse, Table 20

Measurement and Ranges (according to Table 20)	Classification
Recovery through pilot action after 3 s in less than a further 5 s	D
Recovery through pilot action after 3 s in more than a further 5 s	F

Table 3: Addition to EN 926-2:2013, Section 4.4.10 Symmetric front collapse, Table 21

In EN 926-2:2013, sections 5.5.18.10.1 Test 1: Unaccelerated collapse (approximately 30% of chord), 5.5.18.10.2 Test 2: Unaccelerated collapse (at least 50% of chord) and 5.5.18.10.3 Test 3: Accelerated collapse, replace each time the sentence

> *If the paraglider has not recovered spontaneously after 5 s or after 180° of turn (which ever happens first), the pilot acts on the controls to recover normal flight (without inducing a deliberate stall).*

with

> *If the paraglider has not recovered spontaneously after 3 s or after 180° of turn (which ever happens first), the pilot acts on the controls to recover normal flight (without inducing a deliberate stall).*

7.1.8.2.2 Asymmetric collapse

In EN 926-2:2013, sections 5.5.18.14.2 Small asymmetric collapse and 5.5.18.14.3 Large asymmetric collapse, replace each time the sentence

> *The pilot shall take no further action and remains passive until the glider either recovers, or changes course by more than 360°, or 5 s elapses.*

with

The pilot shall take no further action and remains passive until the glider either recovers, or changes course by more than 360°, or 3 s elapses.

7.1.8.2.3 Quick descent option in straight flight according to user's manual

The user's manual must list at least one quick descent option for straight flight. This option is tested according to EN 926-2:2013, section 5.5.18.23

7.1.8.3 Modified procedures

In EN 926-2:2013, section 5.5.1 General, disregard the first sentence ("*Two different test pilots of the testing laboratory each carry out one complete programme of the test manoeuvres laid down in 5.5.18, one at the minimum weight in flight declared by the manufacturer, the other one at the maximum weight in flight declared by the manufacturer.*"). Instead, the following applies:

1. The flight tests listed in Table 1 are carried out once, for the maximum weight in flight declared by the manufacturer.
2. The test specimen for the flight tests must be a production-grade paraglider, without loops or knots in the lines, and equipped with the final, non-prototype riser sets
3. The flight tests in Table 1 marked with "Testing laboratory" in the "Test pilot" column must be performed by a testing laboratory test pilot.
4. The flight tests in Table 1 marked with "Manufacturer or testing laboratory" in the "Test pilot" column must be performed by either a manufacturer test pilot or a testing laboratory test pilot. If the tests are performed by a manufacturer test pilot, then the following additional requirements apply:
    a. The tests are performed under direct observation of a test pilot from the testing laboratory.
    b. In addition to the usual video recording equipment defined by EN 926-2:2013 (section 5.5.4 Video documentation), the manufacturer test pilot is equipped with one or more on-board video cameras to record control movements and accelerator use.
    c. The correct execution of the tests is verified by the testing laboratory's test pilot through direct observation as well as inspection of all recorded video evidence.

7.1.8.4 Harness

The flight tests in Table 1 marked with "Manufacturer or testing laboratory" in the "Test pilot" column shall be flown with a competition harness with leg fairing which is compliant with the dimension requirements defined in EN 926-2:2013, section 5.5.6, if doing so does not compromise the test pilot's safety.

7.2 Verification during competitions

These measurement and testing procedures shall be applied during competitions to verify that a particular paraglider corresponds with its Competition Class model size sufficiently to not give its pilot an unfair advantage over other pilots. Additionally, these measurements and testing procedures provide pilots with a simple way to verify their wing's conformity with certification themselves.

7.2.1 Canopy dimension verification

A paraglider passes verification if span, trailing edge and both chord measurements according to section 7.1.1 yield results that correspond with those documented in the paraglider's manual, within a tolerance of +/- 2% for span measurement and +/- 1% for chord and trailing edge measurement.

7.2.2 Line attachment point verification

A paraglider passes verification if

1. visual comparison of all line attachment points on the paraglider's canopy with the photographic documentation of the line attachment points on the paraglider's CIVL Competition Class model size shows no difference in design, construction nor materials used
2. all chord-wise line attachment point position measurements according to 7.1.2 yield results that differ by a maximum of the greater of +/- 10 mm from those documented for the paraglider's CIVL Competition Class model size
3. all span-wise line attachment point positions, including brake line attachment points, correspond exactly with those documented for the paraglider's CIVL Competition Class model size

7.2.3 Line length verification

As the starting point for all line length verifications, the actual overall line lengths are measured and recorded according to section 7.1.2. To speed up the measurement process, the complete length from main carabiner loop to attachment points may be measured, and the riser lengths deducted afterwards, as is standard practice for line measurements today.

7.2.3.1 Relative line length verification 1: Angle of attack test

The purpose of this verification is to detect deliberate changes to the canopy's angle of attack with the intention of increasing the paraglider's performance. Additionally, this verification also allows pilots to verify whether their wing's line set complies with certification. Verification is done by executing the following test procedure:

1. For each line group (§4.18) of the tested paraglider:
    a. Based on line lengths given in the paraglider's user's manual, calculate the average of the overall line lengths of all lines attached to the wing that are attached to:
        i. the front-most main line of that line group (labelled A, see §4.14). This is value $A_{nominal}$ for that line group.
        ii. the rear-most main line of that line group (labelled B on a glider with main line count 2, C on a glider with main line count 3, etc., see §4.14 and §4.17). This is value $Z_{nominal}$ for that line group.
    b. Calculate the difference between $A_{nominal}$ and $Z_{nominal}$ for that line group: $Diff_{nominal}=A_{nominal}-Z_{nominal}$
    c. Based on the actual measured line lengths, calculate the average of the overall line lengths of all lines attached to the wing that are attached to:
        i. the front-most main line of that line group (labelled A, see §4.14). This is value A_{actual} for that line group.
        ii. the rear-most main line of that line group (labelled B on a glider with main line count 2, C on a glider with main line count 3, etc., see §4.14 and §4.17). This is value Z_{actual} for that line group.
    d. Calculate the difference between A_{actual} and Z_{actual} for that line group: $Diff_{actual}=A_{actual}-Z_{actual}$
    e. Calculate the difference between nominal and actual difference for that line group: $Diff_{result}=Diff_{nominal} – Diff_{actual}$
2. The paraglider fails verification if $Diff_{result}$ is more than +20 mm (trimmed fast) for at least one pair of symmetric line groups.
3. If $Diff_{result}$ for any line group is less than -10 mm (trimmed slow), then the pilot should be warned that his paraglider may need to be re-trimmed to be flown safely.

7.2.3.2 Relative line length verification 2: Camber test

This verification only applies to gliders with a main line count of 3 or more (see §4.17). The purpose of this verification is to detect deliberate changes to the canopy's camber (the arching of the profile

in chord-wise direction) with the intention of increasing the paraglider's performance. Verification is done by executing the procedure described in section 7.2.3.1, but in steps 1.a.ii and 1.c.ii, instead of the rear-most main line, the second main line from the front (labelled B, see §4.14) must be used for the calculation of $Z_{nominal}$ and Z_{actual}.

7.2.3.3 Absolute line length verification: Arc test

The purpose of this verification is to detect deliberate changes to the canopy's span-wise arc with the intention of increasing the paraglider's performance. Verification is done by executing the following test procedure:

1. For each line attached to the tested paraglider's canopy, calculate the difference between the nominal overall length given in the paraglider's user's manual, and the actual measured overall length: $Diff_{line}=Length_{nominal}-Length_{actual}$
2. The paraglider fails verification if three or more symmetric line pairs exist where $Diff_{line}$ is more than +50 mm for both lines in a pair, or less than -50 mm for both lines in a pair.

7.2.4 Riser length verification

A paraglider passes verification if riser set measurements according to section 7.1.4 yield results that correspond with those documented in the paraglider's manual, with a tolerance of +/- 5 mm for individual risers as well as maximum shortening of front-most riser.

7.2.5 Line diameters, profiles and internal structure verification

A paraglider passes verification if:

1. a comparison with the model size's stored schematics as well as the model size's stored reference glider shows identical internal and external construction elements
2. all dimensional measurements of profile shape dimensions and internal structure element lengths yield results that differ by a maximum of the greater of +/- 1% or 5 mm from the corresponding lengths given in the model size's stored schematics as well as those measured on the model size's stored reference glider
3. all its line diameters are identical to the ones listed in the model size's stored schematics, as well as the ones present on the stored reference glider