CIVL Paragliding Committee

Explained: Paragliders permitted in FAI Category 1 Cross-Country events

2015 Edition

Revision 1.9

Published January 7th, 2014

Fédération Aéronautique Internationale

Maison du Sport International
Av. de Rhodanie 54
CH-1007 Lausanne
(Switzerland)
Tél. +41 (0)21 345 10 70
Fax +41 (0)21 345 10 77
E-mail: sec@fai.org
Web: www.fai.org

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.

FEDERATION AERONAUTIQUE INTERNATIONALE

Maison du Sport International, Av de Rhodanie 54 – CH-1007 LAUSANNE Switzerland

Contents

1 Introduction

This document is a companion to the definition of the document "Paragliders permitted in FAI Category 1 Cross-Country events" (Version 1.9, published January 7th, 2014). Its purpose is to explain the thinking behind the many details in the definition document. We created a separate document in order to keep the actual definition as slim and concise as possible.

The structure of this document follows the definition document, with many Q(uestion), A(nswer) and E(xample) blocks interspersed: 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.

Q What is the relationship between this document, and the one titled "CIVL EN Competition Class Paragliders" that went out as a "request for comment" (RFC) in November 2013?

A This is the newest and most current version of the same document, with an updated title, amongst many other things.

Q What changed in the document since the version that went out for the RFC?

A A lot. As we had hoped, we received a tremendous amount of feedback from national associations, manufacturers, independent test laboratories, interest groups like the Paraglider Manufacturer's Association (PMA), the Paragliding World Cup Association (PWCA), as well as many individual pilots. We also received a very encouraging note from the European Hang-Gliding and Paragliding Union (EHPU), which invited us to present our work at their next meeting, in February, in preparation of the CIVL Plenary three weeks later.
Taking all this feedback into consideration resulted in a major overhaul of the original proposal, the result of which lies now before you. The details of these changes will be explained further down, but to summarize, the major changes from the RFC are:

- A name change, the class is now called „CIVL Competition Class"
- Reduced weight range requirements, which apply to all manufacturers
- Canopy shape is defined for the flat wing. Optical measurement of projected aspect ratio will be pursued for the future
- All sizes must be flight tested, for their respective top weights
- General alignment of all wording in the document with its baseline, the two EN 926 standard definitions for paragliding equipment.

See also the Competition Class summary in section 1.1.

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 at 65 km/h
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. Require shock and sustained loading tests to be performed once for each model
7. Permit line breaking strength tests to be performed for each model size
8. Forego flight tests that are irrelevant to this class of gliders
9. Set the waiting time until pilot input for collapse tests to two seconds
10. Require flight tests to be conducted at the top of a wing's weight range, using a competition harness where relevant
11. Require the manual to contain additional information on the paraglider's operation and maintenance

Q What is "CIVL EN Competition Class"?

A The concept of a "CIVL EN Competition Class" (CECC) was created during the 2013 CIVL Plenary, in response to growing dissatisfaction with the status quo (CIVL's FAI Category 1 competitions limited to gliders with EN certification) amongst officials from several countries. Along with the name, a rough draft of a definition for this CIVL EN Competition Class was created and voted on. 27 of the 28 countries present at the Plenary voted in favour of CECC.

Q Why now a name change from "CIVL EN Competition Class" (CECC) to "CIVL Competition Class" (CCC)?

A The term "EN" is protected, and may not be used for anything that is not in fact an EN standard. We are still pursuing the option of creating a formal EN standard based on the CIVL Competition Class definition presented here, but that will require some more time and work. For the time being, we had to drop the EN part from the name.

Q Why do we need a document to define the CCC? Isn't that already in the rules now?

A The 2013 Plenary changed Section 7B of the FAI Sporting Code – the rule book for paragliding cross country World and Continental championships – to say "From 1st of January 2015, paragliders permitted to fly in FAI 1st Category championships must follow the regulation defined in the CIVL-EN Competition Class Requirements document." And that's what this document is.

Q I heard there was a big "compromise" struck at the Plenary. Where did that lead to?

A Indeed, many of the delegates present and involved in creating the draft competition class definition are also officials in other important organizations, such as PWCA, EHPU and many national associations, of course. Up to that point, opinions regarding the future of competition class paragliders diverged significantly, and getting all those officials to agree on a rough class definition outline was a major first step.
The work was then handed to CIVL's Paragliding Committee. Since March, the Paragliding Committee has been working almost continuously on creating the final definition document, in time for approval by the 2014 Plenary.

Q Why all the work, didn't the compromise already say it all?

A The devil lies, as always, in the details. We wanted to ensure that the class we define will find support from officials, organizers, manufacturers, testing laboratories as well as competition pilots world-wide. We also wanted to make sure that fairness issues that had surfaced over the last two years in high level competitions were addressed. All this lead to many discussions, many proposals that had to be thought through, evaluated, sounded with external experts, before being accepted or tossed overboard. And finally, creating a watertight definition that leaves little or no room for loopholes and cheating is something that requires great attention to detail, and therefore time and work.

Q Who are the people in the Paragliding Committee, who contributed to this definition?

A The Paragliding Committee is chaired by Stéphane Malbos (FRA), a former hang-gliding pilot, self-acclaimed “true bureaucrat”, CIVL vice president.
Additional members, in alphabetical order, are:

- Adrian Thomas (UK), aerodynamics expert, competition pilot, member of the BHPA executive committee
- Brett Hazlett (CAN), competition pilot
- Didier Mathurin (FRA), French paragliding team coach
- Eduardo Sanchez-Granel (ARG), paragliding instructor, technical advisor to the PWCA
- Goran Dimiskovski (MAC), CIVL vice president, PWCA president, competition pilot
- Hamish Barker (AUS), CIVL treasurer, competition pilot
- Joerg Ewald (SUI), competition pilot, technical advisor to the Swiss Paragliding League
- Josh Cohn (USA), competition pilot
- Luc Armant (FRA), paraglider designer, competition pilot
- Martin Scheel (SUI), PWCA general secretary, Swiss paragliding team coach
- Raymond Caux (FRA), CIVL safety officer
- Torsten Siegel (GER), paraglider designer, competition pilot

Q And all those people agree with everything that is in here?

A Almost. There are topics where about as many opinions exist as people are involved, and competition paragliders seems to be one of those. What we have here now is the result of a long process, where everybody had to move from their position a few times, to achieve the big overall goal: A competition class definition that works and that satisfies the goals mentioned in section 3. We don’t see it as a compromise, but rather as the synthesis of all our ideas, into something that is better than each of our individual initial visions. This synthesis was achieved through very open and constructive discussions, guided by the overall objective rather than individuals defending their positions.

2 Timing

January 2, 2014: Publication of the final 2015 edition proposal

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

January 1, 2015: If accepted by the 2014 Plenary, 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 – wings complying with this definition should be safe to fly by adequately trained competition pilots in competition conditions
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 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 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 fulfil the following criteria:

a. the different sizes have been obtained by using a uniform scale factor
b. the architecture of the structure of the suspension line system is identical
c. identical materials are used for all sizes
d. the way materials are processed is identical for all sizes

§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

Q This is complicated, why do we need this here? It’s all stuff that is commonly known.

A To achieve **fairness**: A lot of it is to remove loop holes. In many cases, opinions on the exact nature of things that are “commonly known” differ considerably. We provide proper definitions for all the things referred to in the class definition and certification requirements. We decided to not go back any further than the definitions in Section 7B, though. This is why, for instance, there is no definition of “rigid” here.

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.

Q The RFC defined two classes: Competition Class Sports and Pro. What happened to that?

A The vast majority of comments we received was on this topic, and they made it obvious that these two classes caused a lot of confusion when in fact the intention had been to make things simpler. So we rethought our approach for integrating EN certified gliders in future FAI Category 1 Cross-Country events. As a result, we renamed the document (since it is now more than the definition of Competition Class), and use it to define exactly what paragliders are permitted in such events. See the following sub-section (4.4).

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.

Q What is meant by this? Can you give examples?

E A paraglider that is commonly referred to as a "two-liner" (such as the Dudek Coden or the Gin Boomerang 9), is one that, according to this definition, has a "main line count" of two. And a "three-liner" (such as the Advance Omega 8 or the AirDesign Pure) has a "main line count" of three.

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.

Q Which testing laboratories are currently CIVL accredited?

A As of January 1st, 2014, in alphabetical order:

- Air Turquoise (www.para-test.com)
- DHV Prüfstelle (www.dhv.de/web/dhv-pruefstelle)

Accreditation status of the European Academy of Parachute Rigging (EAPR, www.para-academy.eu) is currently under investigation.

5 Requirements for CIVL Competition Class

Q Is this the same as Serial Class? As the old Open Class? Or the "OCTWG" class of 2011?

A It's a new class, based on the rough outline created by delegates during the 2013 Plenary, as mentioned above. It is largely based on EN certification, uses additional elements that proved successful in the past, but also several new concepts that we are convinced will add to safety, fairness and satisfaction, compared to the wings that were flown in competitions over the last few years.

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 Q)
b. Physical requirements (§5.5 to §5.13)
c. In-flight requirements (§5.14 to §5.16)
d. Documentation requirements (§5.17 to §5.22)

§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 20 kg or more.

§5.4 The smallest Competition Class certified size of the test specimen's model has a top weight of 105 kg or less.

Q The RFC went much further than that by requiring big manufacturers to produce smaller gliders than the ones this rule will enforce. What happened with that?

A A central point in the RFC was the fact that only a subset of a model's weight range would need to pass flight tests, and that very small and very big sizes could be produced by scaling a tested design, without going through the tests themselves. This raised safety concerns, not the least from pilots who would be flying such wings. We adjusted, now all sizes will go through flight testing. This in turn makes the production of such gliders economically less feasible, since sales figures for such gliders lie in the low single digits, even for major manufacturers. Forcing manufacturers to build such gliders may result in them withdrawing from competition altogether, something we do not want to risk. That's why we reduced the required weight range to one that is already covered by today's competition gliders.

Q How does this achieve the overall goal of fairness? How does it ensure that wings will be available for a wide range of pilot weights?

A With these rules in place, a glider will only be permitted in a World or Continental Championship if it exists in a minimum of two sizes, but most likely manufacturers will choose to cover the required range with three sizes. And these sizes will all have to be designed and certified in time for the championships. This is a major step forward compared to today's situation, where usually the M size is certified in time for major competitions, but the other sizes only become available at a later time.
We had aimed for a much higher goal, but in the end had to cut back on our ambitions in order not to endanger the long-term success of this project. But manufacturers assure us that they will produce smaller gliders than demanded by the rules, if the requirements are easy enough to

meet. We certainly hope that this is the case, but will closely observe the situation and adjust the rules if needed to ensure that the available weight range will increase over time.

5.3 Physical requirements

5.3.1 Canopy shape

§5.5 The flat aspect ratio of the test specimen's canopy does not exceed 7.90.

Q Why limit flat aspect ratio, and not the projected one, as had been an option in the RFC?

A Measurement of projected aspect ratio, based on video or photographic evidence, would create a limit for canopy shapes that is more relevant to a glider's behaviour than the flat aspect ratio. While experiments show very promising results, the feeling is that the time is not quite ripe yet, and that in the first instance of this class definition, we should rely on proven and generally trusted measurement methods. But we will keep working on this.

Q Why 7.90, didn't the Plenary set this value to 7?

A This was done for several reasons, to achieve **satisfaction** and **fairness**:
1. We are convinced that all EN D wings currently on the market must be permitted in future Category 1 events. Banning those high-aspect-ratio high-end EN D wings from Category 1 events would create a complicated situation for Category 2 events, and especially for the PWCA, which is a strong supporter of the Competition Class, under the condition that existing EN D wings can be included with minimal changes (such as an updated line set and/or riser set).
2. Several high-end EN D wings are now on the market with aspect ratios close to 8.
3. Most top pilots will buy new high-end EN D gliders in 2014, and may not be able to afford a Competition Class glider right away in 2015. We don't want those pilots to be pushed out of competitions.
4. We don't want to create a class that would only be flown in one competition every year, while all the other top competitions, mainly the PWC, would be flown with other, more performing wings.
Therefore, we set the limit at the highest aspect ratio (according to the PMA approximation formula) on the market by December 31st, 2013. This is 7.90, as measured on the Axis Mercury Sport. This number will of course be reviewed with every new edition of the class definition.

Q Why have canopy shape restrictions in the first place?

A To achieve **safety** and **fairness**: Many experts, including manufacturers, report getting tired of the on-going arms race towards ever-increasing aspect ratio. The number of pilots skilled and capable to fully control such high-aspect gliders in all situations is becoming smaller and smaller. We want to encourage manufacturers to apply their ingenuity towards other aspects of paragliding design.

§5.6 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

§5.7 For the test specimen's model, the smallest size existing at the time of certification (the "baseline size") passed the shock loading and the sustained loading tests specified by EN 926-1.

Q Why are physical load tests needed in addition to the calculated line breaking strength tests below?

A For **safety** reasons: Experts in paraglider testing maintain that a test of the whole system, from riser sets to canopy, is required to ensure that no weak link crept into the design by accident. Also, this is part of the EN certification, and we wanted to stay as close to that as possible.

Q And why only load tests for one size?

A To achieve **fairness**: As the current situation shows, the costs for certification creates a barrier for manufacturers to produce and certify sizes for which there is only a small market. We are convinced that scaling a tested design up, allowing only thicker lines than the ones physically tested, will not introduce additional safety issues. This concept was already in place for the 2011 competition class (the "OCTWG" class) and proved to work very well.

Q Why is the smallest glider tested?

A To allow manufacturers to adjust line thickness for each size (see also the next section), ensuring that all lines will be equally strong, or stronger, than the ones that were physically tested.

§5.8 Any existing EN certification for the test specimen, or for a size that is smaller than the test specimen, implicitly satisfies the structural strength requirement (§5.7) for the test specimen.

5.3.3 Line breaking strength

§5.9 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.

Q The RFC had the "OCTWG 23 g rule" here, why did this change?

A By using the line breaking strength test as defined by EN 926-1, we can build on top of a lot of work that has already been done: The breaking strengths according to this standard (which is different from the one used in the "23 g rule", since lines are conditioned with 5000 bending cycles prior to breaking) for most line diameters are already known, and the test will mostly consist of a short calculation.
Also, by allowing separate tests for each size, manufacturers will be able to equip each size with adequately dimensioned lines. This was the most noticeable positive aspect of the "23 g rule" for pilots: The performance difference between sizes was much smaller than any time before and after. This will be possible again under this rule.

Q What about the safety advantage of testing unbent lines you talked about in the RFC?

A There is a concern that using the straight EN 926-1 standard for line strength tests will favour the use of Dyneema lines over Aramid lines. Dyneema lines lose less strength through bending, which means that thinner lines can be used to achieve the same overall strength. But unsheathed Dyneema lines are less stable in their length than their Aramid counterparts, and tend to shrink when not loaded. This can create potentially unsafe situations where gliders go out of trim in a short time.
The thinking is that given the known characteristics of the available materials, manufacturers will act responsibly and use materials that offer the best mix of safety, pilot convenience and performance. But we will observe the situation closely and react accordingly in a future edition if needed.

Q Why add a minimum line breaking strength for individual line segments?

A For **safety**: Requiring such a minimum reduces the risk of tearing top level lines after shock re-openings, or brake lines while launching. This was part of the "23 g rule", and is expected to be adopted by the next revision of the EN 926-1 standard as well.

§5.10 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 on the model's baseline size subjected to the structural strength tests (§5.7). This also applies to smaller sizes than the baseline size that are introduced at a later time, unless the new smallest size passes the structural strength tests according to §5.7 and becomes the new baseline size.

Q In other words?

A No thinner lines on any size than the ones that were physically load tested. But the above sounds more like a proper rule.

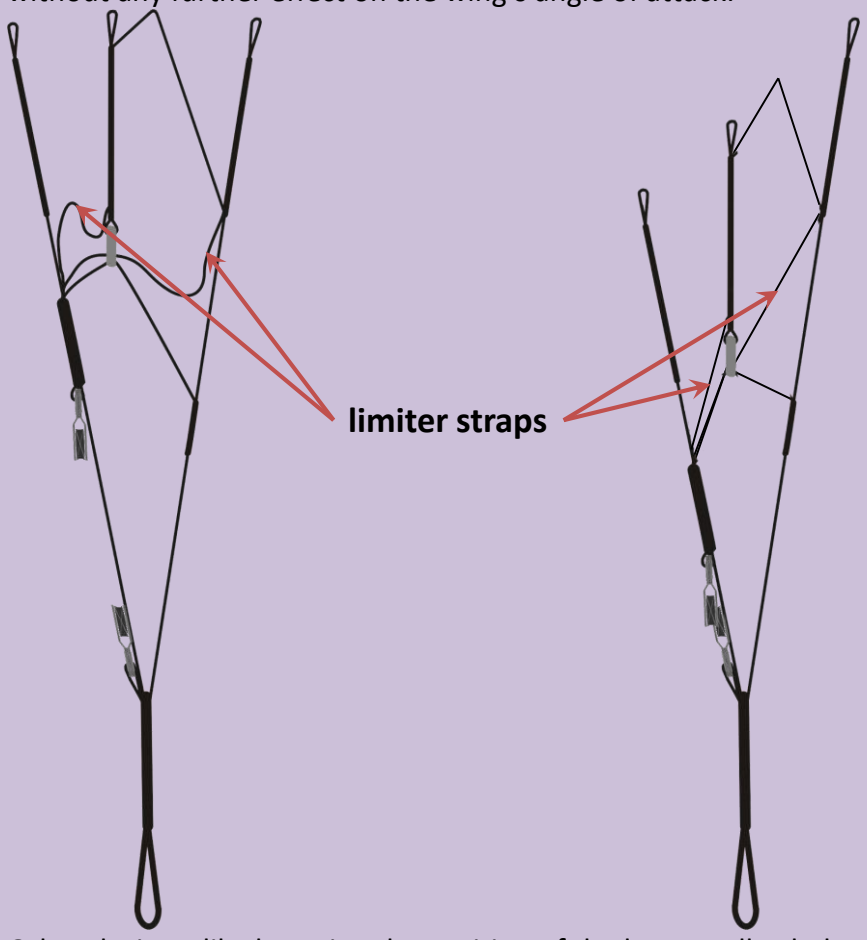
§5.11 For a test specimen with existing EN certification, to fulfil the line breaking strength requirements (§5.9 and §5.10), individual lines may be replaced with lines of higher breaking strength without repeating the structural strength tests according to §5.7 nor the flight tests according to §5.14.

5.3.4 Riser set layout

§5.12 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 particular, it prevents pilots from achieving higher maximum speeds through application of excessive force on the acceleration system, or through temporary modifications of the riser sets.

Q How would this be achieved?

E There are several options. Currently, some riser set designs include a limiter strap between A and B riser, to limit the distance the A can be shortened in relation to B. Any further pull on the accelerator beyond the tested maximum accelerator travel pulls down A and B in parallel, without any further effect on the wing's angle of attack:



Other designs, like lowering the position of the lower pulley below the junction point of A and B risers, are possible and up to the manufacturer's discretion.

Q What's the purpose of this rule?

A To achieve **safety** and **fairness**: Some of the current riser set designs allow pilots to accelerate their gliders beyond the top speed used for certification, by applying large forces on the acceleration system. In our eyes, this creates a potentially unsafe situation (the pilot would not be able to release the acceleration system quickly in the case of a disturbance) as well as an unfair situation since many pilots are not physically able to do the same.

§5.13 The only technical means to increase airspeed beyond trim speed in flight is the test specimen's acceleration system.

Q No more trim tabs to speed up gliders?

A Exactly. This is a **safety** measure. Incorrect use of trim tabs has been identified as a contributing factor in the majority of incidents that occurred during the 2011 World Championships.

Q What about negative trims, to slow down the glider for thermalling?

A Those are allowed.

5.4 In-flight requirements

5.4.1 Flight test

§5.14 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. Low-speed spin tendency
    iii. Recovery from a developed spin
    iv. B-line stall
    v. Big ears at trim speed and in accelerated flight
c. In collapse tests, pilot reaction occurs after 2 seconds
d. Collapse, deep stall, full stall and high angle of attack recovery tests are performed with a competition harness

Q Why are in-flight tests needed?

A To achieve **safety**: To provide pilots with a reference regarding a Competition Class paraglider's flying behaviour.

Q Why must all sizes be tested now? In the RFC, only a part of the weight range had to be flight tested.

A Feedback we received on the RFC, not the least from pilots who would be flying very small or very big sizes, convinced us that flight tests need to be performed for every size.

Q Why use a modified version of EN 926-2, rather than the proven original?

A This was part of the compromise mentioned at the beginning, introduced for **safety** and **satisfaction** reasons:
1. Many experts, including test pilots from testing laboratories, maintain that the certification requirements as defined by EN 926-2 are not in all cases suitable nor relevant for competition paragliders. Especially, the reaction time, after a disturbance, of trained competition pilots at the level of CIVL category 1 competitions is expected to be much shorter than that of recreational pilots, for whom EN 926-2 was created.
2. As competition glider designs have been pushing the envelope of what is possible within the EN 926-2 framework, testing pilots feel they are endangering themselves when having to wait for up to five seconds until they can react to an induced disturbance.

3. Test pilots pointed out to us that the tests listed under point b. above either have a maximum result of “D” (so every Competition Class glider would pass the test anyway) or provide no additional information that would be relevant to this class of glider.

Q Can you give more information on why those 5 tests listed above (b.i-v) are not required?

A According to test pilots from testing laboratories:
i. Roll stability and damping: Will show nothing about safety of a wing of this class
ii. Low-speed spin tendency: Is not relevant because the maximum classification is D, no wing can fail this test
iii. Recovery from a developed spin: Spin behaviour is already evaluated in the trim speed spin tendency test. Performing a fully developed spin may be hazardous for a wing of this class. Pilots flying such wings are expected to have the skills to prevent a glider from entering a fully developed spin.
iv. B-line stall: Can already be excluded from EN tests, not relevant for two-liners
v. Big ears: Can already be excluded from EN tests. Is replaced by a required Quick descent option in straight flight

Q But the Plenary compromise spoke of a 1 second waiting period, now it is 2 seconds, why?

A Flight tests are performed to gather information on a glider’s reaction to specific, standardized disturbances. These tests do not try to re-create real-life situations, but rather provide a stable framework within which a comparison with existing gliders is possible. To do such a comparison, test pilots collect as much information as possible during each manoeuvre. Tests performed with 1 and 2 second waiting times showed that with 1 second, a pilot would not be able to collect sufficient data to gain a deep-enough understanding of a wing’s behaviour, to be able to classify the wing in any meaningful way. Therefore the waiting period was increased to 2s, which is a sufficient time, according to test pilots, to perform meaningful tests.

Q And why only test at the wing’s top weight?

A Competition wings are generally flown close to or at their top weight, and certainly never at their bottom weight, which would be the second option for flight tests. Test pilots confirmed that there may be a small amount of additional information gained from performing the tests at the bottom weight as well. But, so these test pilots, since this information is not really relevant to the glider’s real-life use, the potential results do not warrant the effort. We agree.

Q Why did you keep EN 926-2 at all? Why not create a suitable in-flight test for competition paragliders from scratch?

A EN 926-2 is the result of many years of excellent expert work, and we want to build on top of that. We actually spent some time debating our own tests, but the discussion was inconclusive, and in the end, we decided to stick with what the 2013 Plenary voted on: EN 926-2 with shorter reaction times, only performed for the wing’s top weight, and flown with a competition harness.

Q Why the competition harness requirement?

A This was introduced to increase the relevance of these tests for competition paragliders. Since the vast majority of those gliders will be flown with a competition harness, the in-flight testing should be done on such a harness as well.
As explained above, the aim of the EN tests is not to recreate real-life situations, and the use of a competition harness for flight tests stands in disagreement to this. The debate whether a competition harness must be used or not went on for a long time, but produced no definite answer. So we decided to uphold the 2013 Plenary decision, but only to the extent to which test pilots feel that they can guarantee their own safety while executing the flight tests.

§5.15 Any existing EN certification for the test specimen implicitly satisfies the flight test requirement (§5.14) for the test specimen.

5.4.2 Maximum airspeed

§5.16 When flown at its top weight, the test specimen's maximum airspeed does not exceed 65 km/h.

Q Why restrict the top speed?

A For **safety** reasons: The dynamics of a paraglider during and right after a disturbance become much more violent and demanding, the higher the glider's speed at the time when the disturbance occurred. A speed of 65 km/h was deemed manageable by an adequately trained and skilled competition pilot: This is the top speed the originators of the CIVL EN Competition Class agreed on during the 2013 Plenary.

Q Won't this rule take the race aspect out of paragliding races?

A We expect not: In conjunction with the introduction of this Competition Class, changes in the scoring system will be introduced which diminish the need of high top speeds for winning tasks and competitions. These "final glide decelerators" will reward altitude at the end of the speed section to the point where flying at a glider's top speed (which also means losing altitude quickly) will become pointless.

5.5 Documentation requirements

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

5.5.1 Additional measurements and documentation

§5.18 The canopy dimensions are measured and recorded.

§5.19 The line dimensions are measured and recorded.

§5.20 The riser dimensions, including accelerator travel, are measured and recorded.

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

5.5.2 User's manual

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

a. Flight characteristics, in comparison with a glider that is certified as EN D
b. In addition to point a)5): Information on maximum symmetric rear riser travel at maximum weight in flight
c. Recommendations and special considerations regarding SIV
d. Instructions for line measurements and re-trimming

5.6 Certification

§5.23 The testing laboratory, after verifying compliance with all requirements, issues a certification of compliance (for a template, see Appendix A) to the manufacturer, and submits a copy of this certification in electronic form to the CIVL competition coordinator at civl_comps@fai.org.

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

§5.25 The certification becomes official with the publication on CIVL's Web site.

Q What is the address of this Web page?

A The page does not exist yet. It will be built during 2014, if the proposal outlined here is accepted by the 2014 Plenary.

5.7 Marking

§5.26 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

§5.27 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

§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 paraglider's main line count (§4.17) is two or less, and its canopy's flat aspect ratio, as documented in the user's manual, is 6.6 or less.

b. The paraglider's main line count (§4.17) is three or more, and its canopy's flat aspect ratio, as documented in the user's manual, is 7.0 or less.

Q What gliders are those?

A Groups a. and b. are what is commonly referred to as "low-end" or "classic" EN D wings: They are sufficiently distinct from the high-end EN D wings we aim to replace with CIVL Competition Class, so that they will not need to go through Competition Class certification to proof that they fall within the Competition Class limits.

Q Can you give some examples?

E An example for group a. (EN D two-liner with flat aspect ratio of 6.6 or less) would be the Niviuk Peak 3.
Examples for group b. (EN D three-liner with flat aspect ratio of 7.0 or less) would be the AirCross U Sport 2, and the Ozone Mantra M6.

c. 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 (§5.5 and§5.6)

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

Q Which wings fall into this group c.?

E At the time of writing: Swing Core 2 (sizes 22, 23, 24), Niviuk Icepeak 6 (sizes 21, 23, 24, 26), Ozone Enzo (sizes S, M, L). The list will grow as manufacturers replace their high-end EN D models with newer ones.

d. 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.

7.1.1 Canopy dimension measurements

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

Unit: Centimetre

Accuracy: One decimal digit

Tension:

a. Span and Trailing Edge measurements are conducted under tension of 50 N in the measurement direction
b. Chord measurements are conducted under tension of 10 N in the measurement direction

Span is defined as the distance between the two farthest symmetrical attachment points, 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 farthest points on them.

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. For a chord measurement at a position between ribs, the measurement can be made on both adjacent ribs, with a linear interpolation applied to arrive at the actual chord length.

Chord A is defined as the chord length at the centre of the canopy (50% of span).

Chord B is defined as the chord length halfway between the canopy centre and the canopy tip (75% of span)

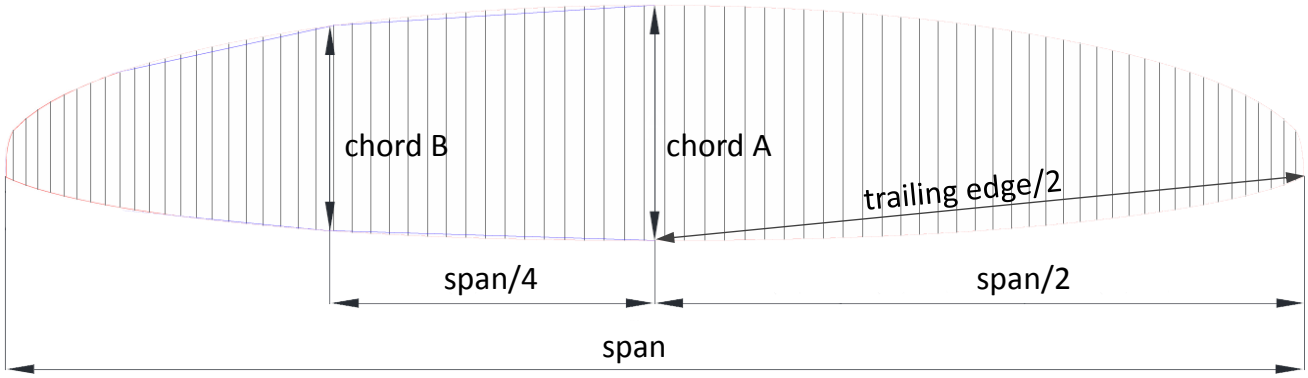


Figure 1: Canopy dimension measurements

7.1.2 Line length measurements

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

Unit: Centimetre

Accuracy: One decimal digit

Tension: All measurements are conducted under tension of 50 N in the measurement direction

Documentation: Measured overall line lengths must correspond with the lengths given in the user's manual, with a tolerance of ± 10 mm.

7.1.3 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 travel of accelerator

Unit: Centimetre

Accuracy: One decimal digit

Tension: All measurements are conducted under tension of 50 N in the measurement direction

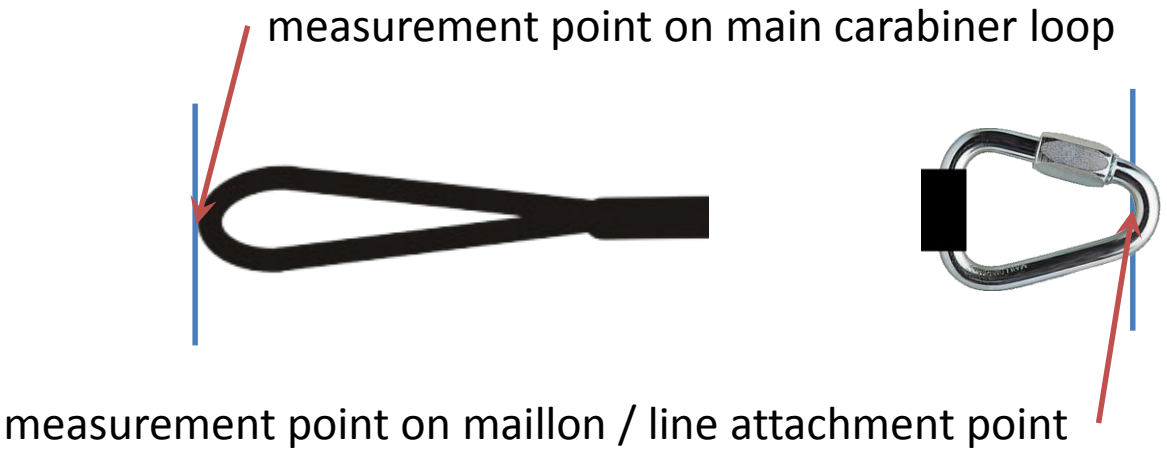


Figure 2: Riser measurement points

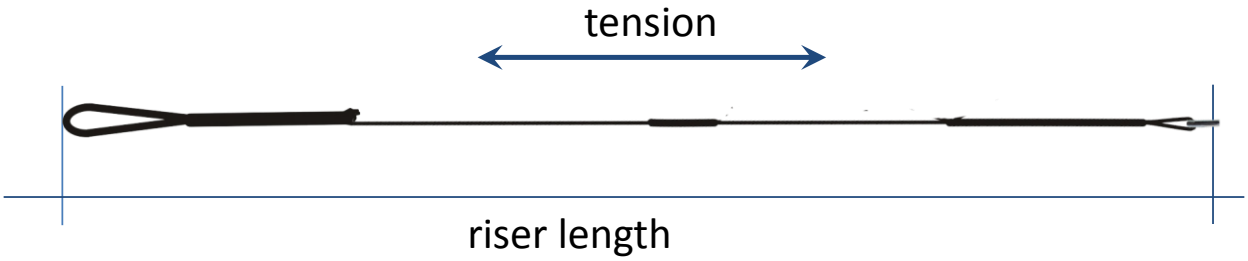


Figure 3: Riser length measurement

7.1.4 Canopy shape measurements

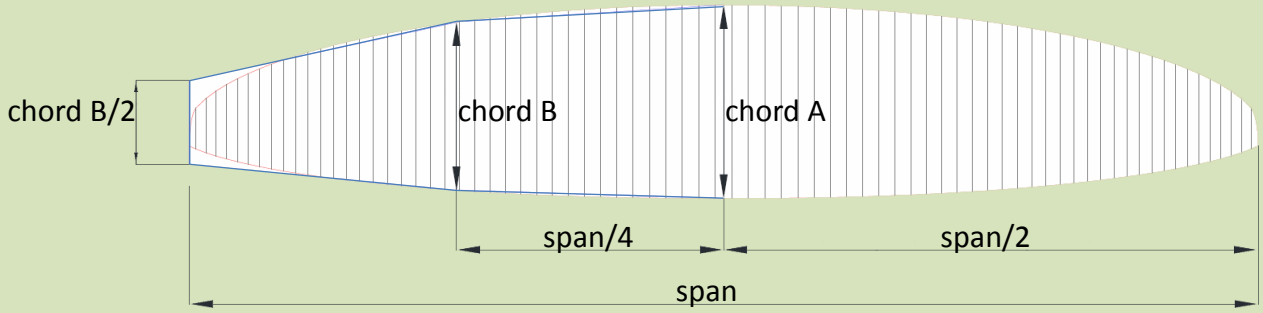
7.1.4.1 Flat aspect ratio

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

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

Q I thought AR=span2/surface_area. What's this formula?

A This was proposed by the Paraglider Manufacturer's Association (PMA) as an easy way to approximate a modern high-end paraglider's aspect ratio without having to determine the wing's surface area (which would be hard to do with a tape measure). The formula approximates the canopy's flat shape with two trapezoids:



For the five most common competition paraglider models flown in 2013, the error of the approximation, when compared with the flat aspect ratio given by the manufacturer, is 2.5% or less.

7.1.4.2 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 even ground
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}

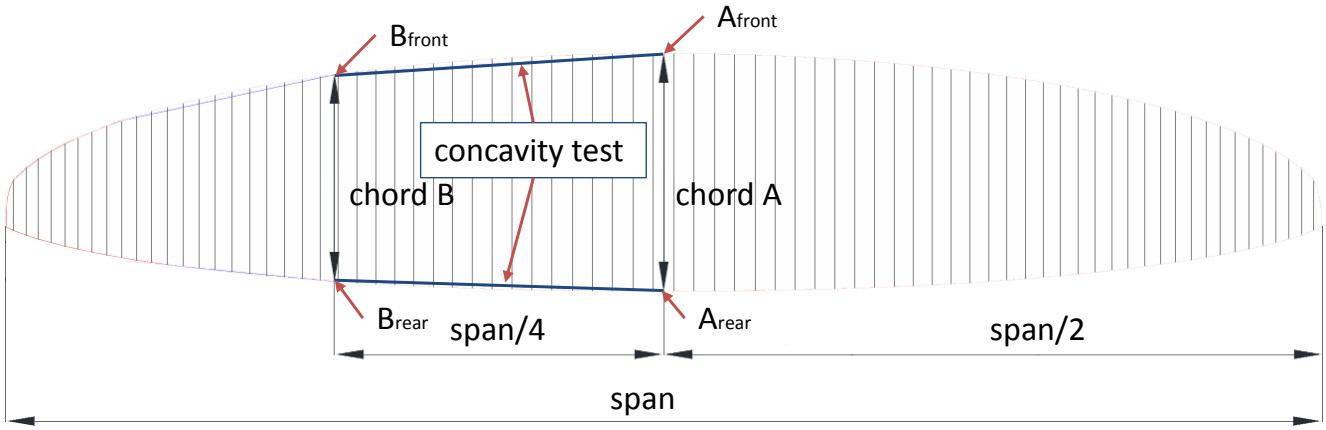


Figure 4: Position of concavity test

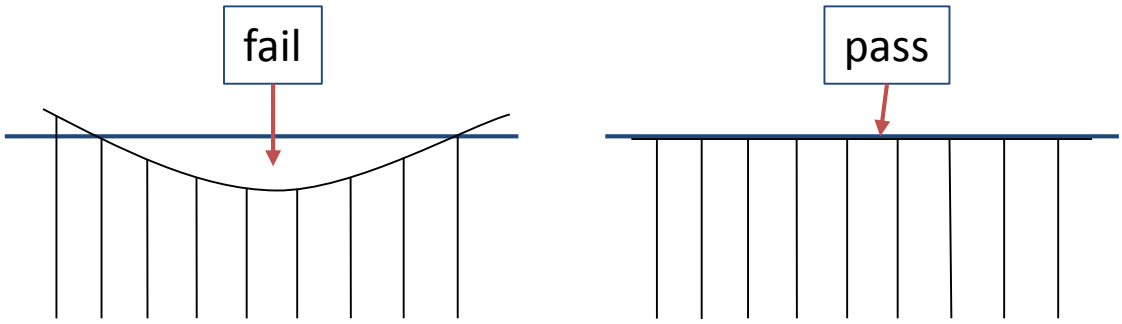


Figure 5: Detail view of concavity test

7.1.5 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.

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, to be applied if results from procedure A are inconclusive:

1. Apply a tension of 50 N 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 7.1.3), allowing the tension distribution to shift towards the front risers, but maintaining a minimum tension of 50 N 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.

7.1.6 Structural strength tests

Shock loading and sustained loading tests are performed according to EN 926-1[1], with modifications regarding the test specimen (EN 926-1, section 4.2): For each model, only one size, as defined in §5.7, is tested.

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

[1] While this document refers to the edition which is currently in effect (EN 926-1:2006), the tests must be performed according to the edition in effect at the time of certification. The CIVL Bureau may publish a revised version of this section upon publication of a newer standard document.

926-1 in effect at the time of testing does not define such a value, then the value defined in §5.9 applies.

7.1.7.3 Load distribution

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.

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	7.1.8.2.1	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	7.1.8.2.2	Testing laboratory
Symmetric front collapse	5.5.18.10.1-3	7.1.8.2.3	Manufacturer
Exiting deep stall (parachutal stall)	5.5.18.11		Manufacturer
High angle of attack recovery	5.5.18.12		Manufacturer
Recovery from a developed full stall	5.5.18.13		Manufacturer
Asymmetric collapse	5.5.18.14.1-3	7.1.8.2.4	Manufacturer
Directional control with a maintained asymmetric collapse	5.5.18.15		Manufacturer
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	7.1.8.2.5	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 Control movement

Table 2 lists additional classification criteria for this test.

Measurement and Ranges (according to Table 8)	Classification
Approximately constant (any control travel)	F

Table 2: Addition to EN 926-2:2013, Section 4.4.4 Control movement, Table 9

7.1.8.2.2 Behaviour exiting a fully developed spiral dive

Table 3 lists additional classification criteria for this test.

Measurement and Ranges (according to Table 18)	Classification
More than 4.5 g measured, and “turn remains constant”, and “with pilot action”	F

Table 3: Addition to EN 926-2:2013, Section 4.4.9 Behaviour exiting a fully developed spiral dive, Table 19

7.1.8.2.3 Symmetric front collapse

Table 4 and Table 5 list additional ranges and classification criteria for this test.

Measurement	Range
Recovery	Recovery through pilot action after 2 s in less than a further 5 s
	Recovery through pilot action after 2 s in more than a further 5 s

Table 4: 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 2 s in less than a further 5 s	D
Recovery through pilot action after 2 s in more than a further 5 s	F

Table 5: 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 2 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).*

7.1.8.2.4 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 2 s elapses.*

7.1.8.2.5 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" in the "Test pilot" column must be performed by a manufacturer test pilot, with the following additional requirements:
    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.

Q What is the advantage of having manufacturer test pilots perform some of the test manoeuvres?

A This is done for **safety** and **fairness**: A manufacturer test pilot typically performs those manoeuvres many times during the development of a paraglider. By the time the glider is ready for certification, he will be fully acquainted with the glider, have the necessary confidence that the manoeuvres work, will know exactly how to induce the disturbances according to the standard, and be able to perform the tests in a safe manner.
Testing laboratory test pilots, on the other hand, typically have only a short time available to acquaintance themselves with a test glider, to learn how to best perform the manoeuvres. This does not always lead to satisfactory results, and can create dangerous situations for the test pilot.
Letting the manufacturer test pilot perform the tests under the supervision of the testing laboratory's test pilot combines the best of both worlds: Safe, efficient testing by pilots familiar with a wing (as will be the pilots flying those wings in competitions), correctly executed and evaluated by an expert.

7.1.8.4 Harness

The flight tests in Table 1 marked with "Manufacturer" 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.

7.1.9 Airspeed measurements

Result: Establish that the test specimen's maximum airspeed, when flown at its maximum allowed total take-off weight, does not exceed the allowed maximum airspeed defined in §5.16.

Procedure:

1. The measured paraglider must be flown at its maximum allowed total take-off weight.
2. The wind speed at launch level during the measurement must not exceed 15 km/h. Differences in wind speeds at launch level during the measurement must not exceed 10 km/h.
3. The paraglider flies four legs in close succession: North to South, South to North, East to West, West to East.

4. For each leg, the following pattern is flown:
    a. Establish course line
    b. Full acceleration
    c. 10 seconds stabilization phase, to dampen pitch and correct course
    d. 30 seconds measurement phase, without control input
5. For each leg, the maximum GPS ground speed achieved during the measurement phase is recorded
6. The measured airspeed $AS_{measured}$ is the average of the four measured GPS ground speeds
7. The calculated airspeed $AS_{calculated}$ is determined by transforming $AS_{measured}$ to 1000 m MSL in ICAO standard atmosphere, through multiplication with the correction factor *CF*. The correction factor *CF* depends on the altitude *h* at which the measurement was performed (in m), on air pressure *p* (given for MSL, in hPa) and air temperature *t* (given in degree Celsius), both as observed at the time of the measurement[2].

$$CF(h,p,t) = \sqrt{\frac{(100 * p - 11 * h)/((t + 273) * 287)}{1.11}}$$

$$AS_{calculated} = AS_{measured} * CF(h,p,t)$$

Q What is this formula?

A The correction factor we need here is

$$\sqrt{\frac{actual\ air\ density}{air\ density\ at\ 1000\ m\ MSL\ in\ ICAO\ standard\ atmosphere}}$$

For the actual density, we use

$$density = \frac{pressure}{absolute\ Temperature * specific\ gas\ constant\ for\ air}$$

For pressure, we assume a linear drop of 11 Pa for each meter altitude, which is a good-enough approximation for dry air at altitudes below 4000m MSL.
The absolute temperature is approximated by adding 273 to the temperature in degree Celsius.
The specific gas constant for air is rounded to 287.
The air density at 1000 m MSL in ICAO standard atmosphere is rounded to 1.11 kg/m^3

8. The test fails if $AS_{calculated}$ is bigger than the allowed maximum airspeed defined in §5.16.

Q Are you aware that GPS ground speed is not the same as air speed?

A Yes we are. But by flying the four legs N-S/S-N/E-W/W-E, we eliminate wind effects from the measurement sufficiently for the purpose of this test.

Q Why not use a regular airspeed sensor, as they are available for most free-flight instruments?

A Experience shows that while those instruments are very accurate themselves, it is nearly impossible to create accurate and reliable paraglider airspeed measurements with them in real-life conditions. The low airspeed and the many different forces affecting canopy, harness and sensor typically influence the results to the point where they become meaningless. This testing procedure is easy to perform and creates sufficiently accurate results for our purpose. But if a testing laboratory can demonstrate that their airspeed measurement equipment produces appropriate accuracy, they may use such equipment instead (see below).

Q You use a lot of approximations here, is that appropriate?

A Yes, for two reasons:
1. We believe that the flight tests required for Competition Class certification will be the limiting

[2] CIVL will provide an Excel spreadsheet to perform this calculation.

factor for top speeds for the foreseeable future.
2. With the introduction of final glide decelerators in scoring, a glider's top speed will be far less relevant than it is today, other factors will be more decisive for winning tasks and competitions. Therefore there will be less push by manufacturers towards reaching the permitted top speed, and an approximation to establish whether a glider's top speed is lower than the limit is sufficient.

Alternative procedures, which rely on airspeed measurement equipment, may be used for this test if appropriate accuracy can be achieved. In that case the measurement can be performed in a single leg along a course line of the pilot's choice, following the pattern given in step 4 above.

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.

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 for that paraglider's CIVL Competition Class model size, within a tolerance of +/- 0.5%.

7.2.2 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 including riser sets may be measured, and the riser lengths deducted afterwards.

7.2.2.1 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. 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 +10 mm (trimmed fast) for at least one pair of symmetric line groups.
3. The paraglider fails verification if $Diff_{result}$ is more than +20 mm (trimmed fast) for any of its line groups.
4. 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.

7.2.2.2 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 7.2.2.1, 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}.

7.2.2.3 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.

7.2.3 Riser length verification

A paraglider passes verification if riser set measurements according to section 7.1.3 yield results that correspond with those documented for that paraglider's Competition Class model size, with a tolerance of +/- 5 mm for individual risers as well as maximum accelerator travel.

7.2.4 Maximum airspeed verification

A paraglider passes verification if it passes the airspeed measurement test according to section 7.1.9.

7.2.5 Line diameters, profiles and internal structure verification

A paraglider passes verification if a direct comparison with other gliders of the same model size or with the model size's stored reference glider produces no significant differences in line diameters, profile shapes, internal structure or any parameter recorded during certification.

Appendix A Competition Class: Certification of Compliance

To be completed after acceptance of this proposal by the CIVL Plenary.

Q When can we expect this template to be available?

A If the proposal is accepted by the 2014 Plenary, the template will be included in the officially approved version of this document, expected to be published May 1st, 2014.