CIVL Paragliding Committee

CIVL EN Competition Class Paragliders explained

2015 Edition

Revision 1.0

Published November 1st, 2013

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 sport 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 CIVL EN Competition Class definition (Version 1.0, published on October 29, 2013). 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) and A(nswer) blocks interspersed. Any questions that remain still open after reading this document should be directed at the chairman of the Paragliding Committee, Stéphane Malbos, at stefmalbos@orange.fr. Note that there is also a discussion thread on ParaglidingForum.com dedicated to the the CIVL EN Competition Class definition: http://www.paraglidingforum.com/viewtopic.php?p=384620

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 agreed on by the various stakeholders. 27 of the 28 countries present at the Plenary voted in favour of CECC.

Q Why do we need a document to define this class then?

A All the 2013 Plenary did was to change 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 be widely acceptable by officials, organizers, manufacturers 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

October 30, 2013: Publication of RFC

November 30, 2013: Deadline for feedback on RFC

January 2, 2014: Publication of the final proposal

February 19/20, 2014: CIVL Plenary, decision on acceptance of proposal

January 1, 2015: If accepted, the definition becomes effective, to be revised every two years from then on

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 glider that is capable of being carried, foot launched and landed solely by the use of the pilot's legs, has no rigid primary structure, and which is capable to demonstrate consistent ability to safely launch and land in nil-wind conditions. Its main components are the canopy, the suspension lines, and the 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 part 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.

§4.7 A paraglider model ("model") is a specific design, characterised by

- its 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
- its 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
- its 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 size ("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 allowed total take-off weight range, defined by the minimum and maximum allowed total take-off weight

§4.9 A paraglider model size range ("size range") consists of a set of sizes, covering a continuous take-off weight range from the smallest size's minimum allowed total take-off weight to the biggest size's maximum allowed 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. So we provide proper definitions for all the things referred to in our 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.

4.2 Competition Class Pro

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

§4.11 A Competition Class Pro paraglider model size is a model size that is identical in all characteristics listed in §4.7 and §4.8 with a model size that is part of a Competition Class Pro paraglider model size range.

§4.12 A Competition Class Pro paraglider is a paraglider that is identical in all characteristics listed in §4.7 and §4.8 with a Competition Class Pro paraglider model size and which is flown within that Competition Class Pro paraglider model size's allowed total take-off weight range.

§4.13 The core weight range is the allowed total take-off weight range that must be covered by all Competition Class Pro model size ranges.

§4.14 The core weight range is 95 to 115 kg.

§4.15 The extended weight range is the allowed total take-off weight range that must be covered by Competition Class Pro model size ranges from manufacturers that were represented at the previous FAI Paragliding Cross Country World Championships by 10 or more gliders.

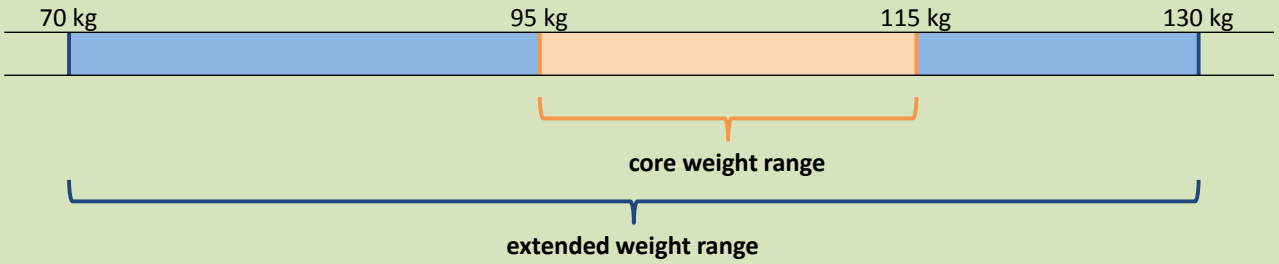
§4.16 The extended weight range is 70 to 130 kg.

Q What are those two weight ranges good for?

A To achieve **fairness**: To provide gliders for a wide range of pilot weights. Therefore we mandate that gliders must be available in several sizes, spanning the range from 70 to 130 kg. But small manufacturers might not be able to afford building wings in all those sizes, and risk that nobody will fly them in a competition anyway. This is why we only require the range of 95 to 115 kg to be covered by manufacturers with less than 10 wings at the previous World championships.

Q Can you draw a picture please?

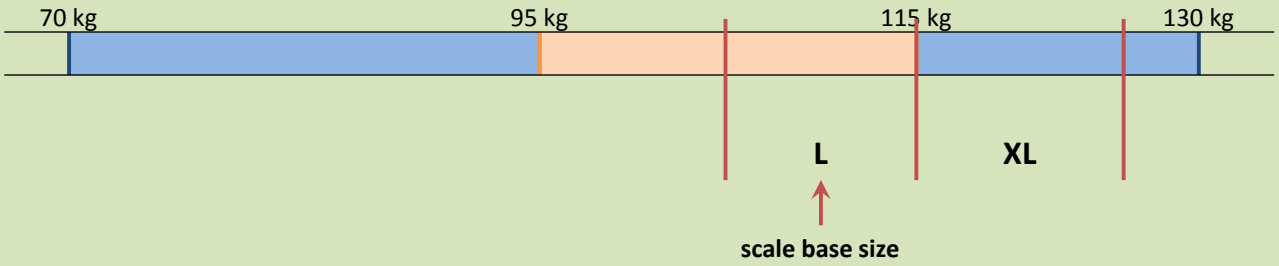
A Sure:



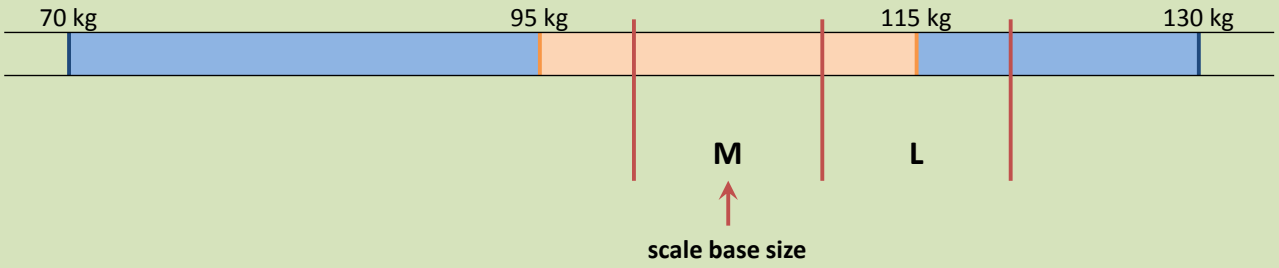
§4.17 The scale base size is the model size whose maximum allowed total take-off weight is closest to the top of the core weight range. If two sizes meet this criterion, the smaller of the two is the scale base size.

Q Can you give an example?

A **Example 1**: L: 105-115 kg, XL: 115-125 kg. The scale base size is the L size



Example 2: M: 100-110 kg, L: 110-120 kg: The scale base size is the M size



4.3 Competition Class Sport

Q Why are there now two competition classes?

A To achieve **fairness** and **safety**: In the past, there have always been a number of pilots in World or Continental championships who flew gliders classified below the high-end wings flown by the majority. This was often for safety reasons, these pilot felt they lacked the training or skills to fly high-end wings. We want to make sure that this option will remain in the future, so we create a very light-weight Sport class certification. This is to ensure that competitors can fly the wings they feel comfortable with, and won't be forced to fly wings above their comfort level. The certification is based on manufacturer self-declaration, and should not take more than 30 minutes for a manufacturer to complete, if requested by a pilot who wants to fly one of his wings in World or Continental championships.

§4.18 A Competition Class Sport paraglider model size is a model size that is certified to comply with all the certification requirements defined in section 6 of this document.

§4.19 A Competition Class Sport paraglider is a paraglider that is identical in all characteristics listed in §4.7 and §4.8 with a Competition Class Sport paraglider model size and which is flown within that Competition Class Sport paraglider model size's allowed total take-off weight range.

4.4 Competition harness

§4.20 A competition harness is any paraglider harness that

a. is certified according to the LTF test specifications (LTF 09)

b. is advertised by its manufacturer as either “competition”, “cross-country” or “pod” harness

c. includes and is flown with a leg fairing

4.5 CIVL accredited testing institution

§4.21 A CIVL accredited testing institution (“testing institution”) is any company, association or other legal entity which has performed a minimum of 3 full EN certifications according to EN 926-1 and 926-2 in the twelve months prior to the certification of Competition Class compliance.

5 Requirements for Competition Class Pro

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

A No, it's a new class, one we didn't have before. This class is based on the rough outline created by delegates during the 2013 Pleanry, as mentioned above. Additionally, it uses many of the 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 Competition Class Pro paraglider model size range, a paraglider model size range must comply with the following set of requirements in its entirety:

1. Size range requirements (5.2.1 to §5.7)
2. Physical requirements (§5.8 to §5.13)
3. In-flight requirements (§5.14 to §5.16)
4. Documentation requirements (§5.17 to §5.22)

§5.2 Compliance with the requirements must be verified and certified by a CIVL accredited testing institution (§4.21).

5.2 Size range requirements

5.2.1 Weight range coverage

Q Why a weight range requirement?

A See answer to question at §4.16

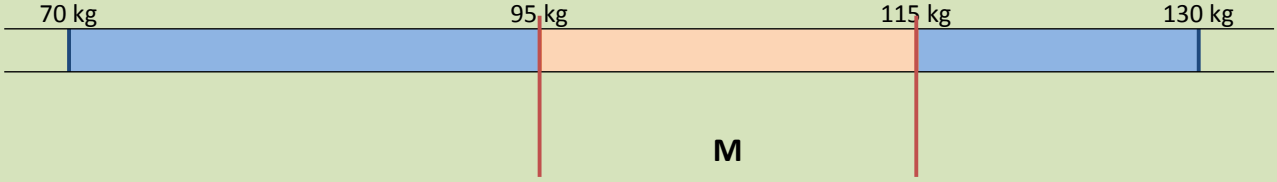
§5.3 The size range covers the core weight range (§4.14).

§5.4 If the size range's manufacturer was represented by 10 or more gliders at the previous FAI Paragliding Cross Country World Championships, the size range covers the extended weight range (§4.16).

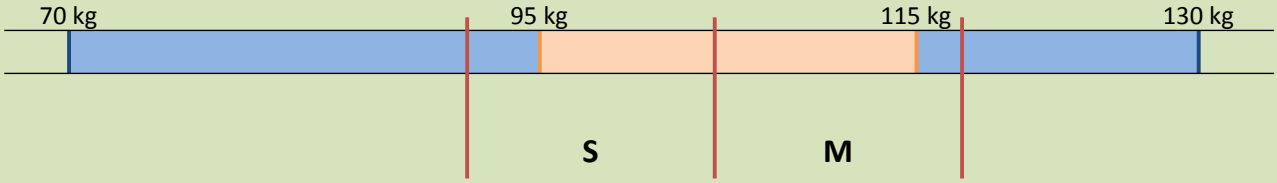
§5.5 The maximum allowed total take-off weight of the smallest size is 80 kg or less.

Q What does all that mean, exactly?

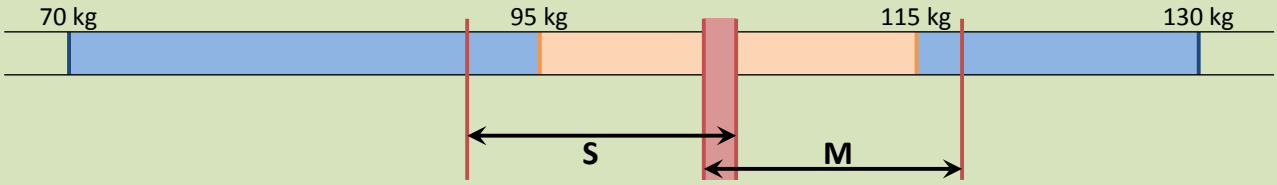
A Let's look at some examples. For these, a "small" manufacturer is one who only had a few, less than ten, gliders at the last World Championship. A "big" manufacturer is one who had ten or more gliders at the last World Championship.
Example 3: A small manufacturer creates a single glider, size M, which covers the core weight range. This is according to the rules, that one size can be certified as a "Competition Class Pro model size range"



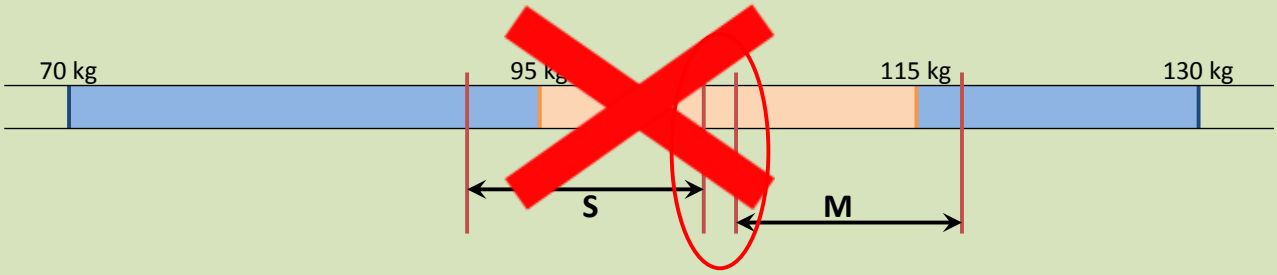
Example 4: Another small manufacturer builds two models, both overlapping the core weight range. This would also be permitted.



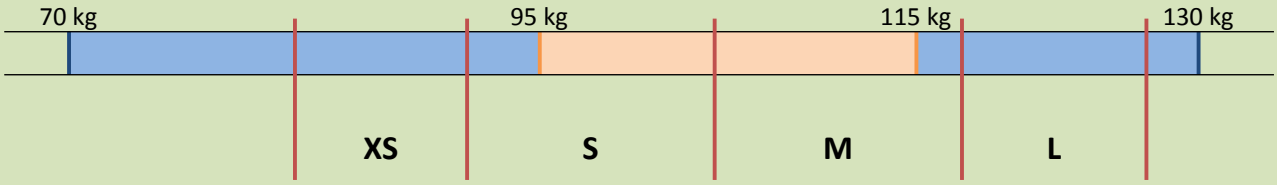
Example 5: The two sizes may even overlap



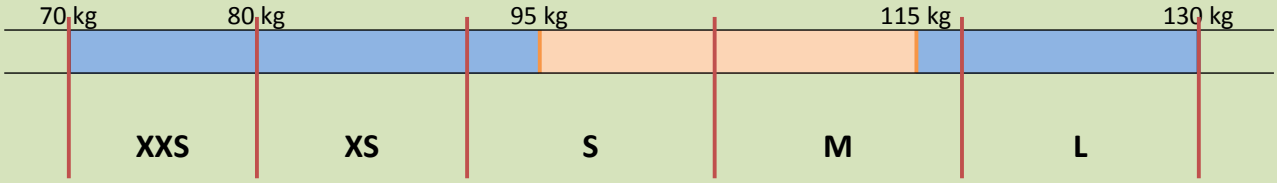
Example 6: But leaving a part of the core weight range uncovered is not allowed



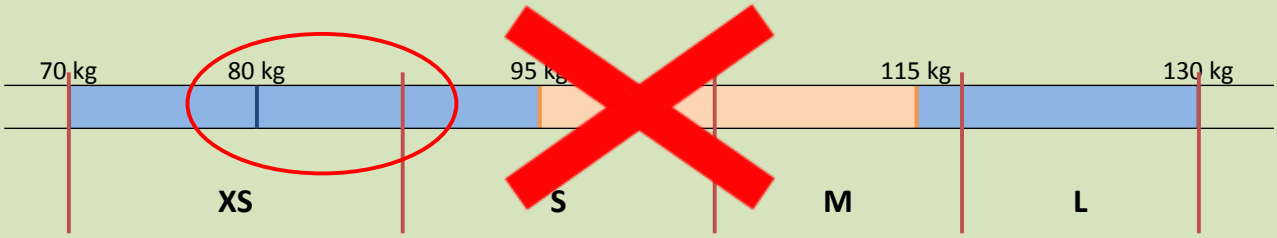
Example 7: A small manufacturer may choose to build additional sizes to cover a part or all of the extended weight range.



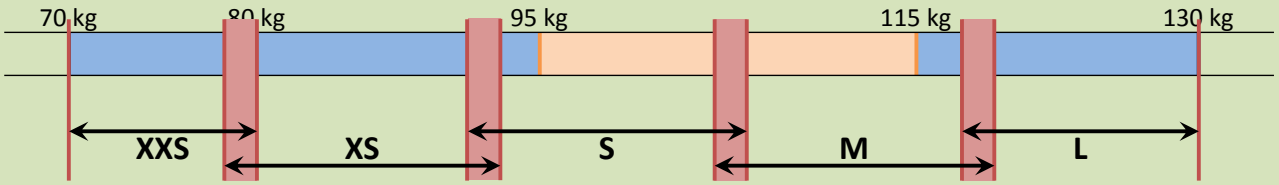
Example 8: A big manufacturer, on the other hand, must cover the whole extended weight range. He is free to pick the sizing to his liking, with one restriction: The top weight of the smallest size must be 80 kg or less.



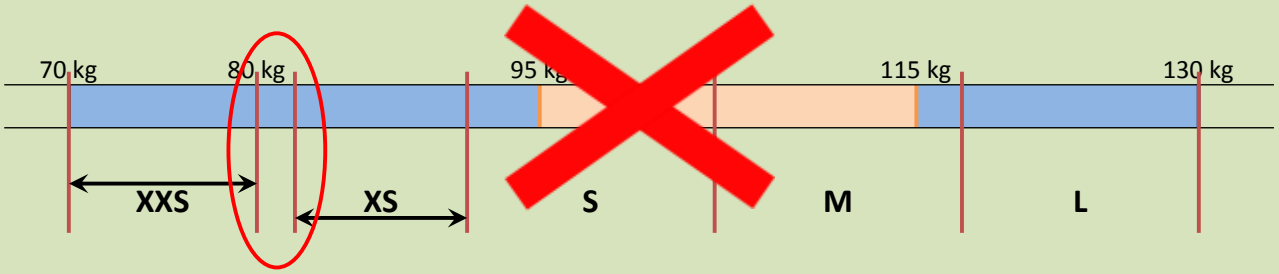
Example 9: Therefore, a model size range from a big manufacturer with a top weight above 80 kg for the smallest sizes will not be certified as “Competition Class Pro”.



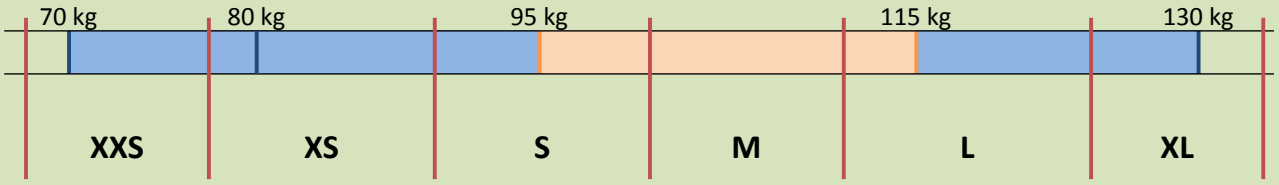
Example 10: Of course overlapping sizes is also an option for big manufacturers.



Example 11: But leaving any part of the extended weight range uncovered is not allowed



Example 12: Both big and small manufacturer may choose to exceed the extended weight range.



5.2.2 Size scaling

§5.6 Scaling of a size is achieved through linear reduction or expansion of all canopy dimensions, relative to the size range's scale base size (§4.17).

§5.7 For sizes with a scaling factor smaller than 100%, riser sets are scaled down through linear reduction of all load-bearing elements in the load-bearing direction, with a scaling factor that is no smaller than 80%, and no bigger than 100% for each individual size.

Q Why should riser sets be scaled down?

A To achieve **fairness** and **safety**: Pilots flying smaller wings often lack the reach required for rear riser steering. Shorter riser sets will enable those pilots to gain full control over their gliders.

Q Is riser scaling mandatory?

A No. The allowed scaling factor range includes "100%" – so it's OK to make them all the same size. But a manufacturer has the option to reduce the riser length of the smaller sizes from, for example, 50 cm to 40 cm.

5.3 Physical requirements

5.3.1 Canopy shape

§5.8 The canopy's vertically projected in-flight aspect ratio does not exceed 6.0.
or[1]

[1] Both options have been discussed at length, and no agreement could be reached within the PG SC. The SC is hoping for additional insights, especially from manufacturers, on the advantages and disadvantages of either method. A combination of the two options would also be possible. See also section 7.1.5 for information on how the two options would be measured.

The canopy's flat aspect ratio does not exceed 8.0. On the canopy's center portion (center 50% of span), neither the leading nor the trailing edge have any concave sections.

Q Why these values?

A To achieve **satisfaction** and **fairness**: In order to provide a satisfactory flying experience for top pilots, and to create a fair situation in Category 2 competitions, the Competition Class must be defined so that current high-end EN-D gliders will not outperform it by a huge margin, if at all. This is why canopy shape restrictions are defined so that current high-end EN-D designs are included.

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.

5.3.2 Line strength

§5.9 The calculated line strength for each size is sufficient to support 23 times the size's maximum allowed total take-off weight.

§5.10 All individual lines are tested to break at a force no smaller than 40 daN.

Q These two paragraphs look familiar, wasn't this part of the OCTWG definition for 2011?

A Exactly. One of the very positive aspects of the 2011 generation of competition gliders was that the performance gap between sizes was much smaller than any time before and after. By allowing manufacturers to adjust line diameters to individual sizes without any additional cost produced small gliders which performed almost equally well as large ones. We want to maintain this, for obvious fairness reasons.

Q Is there also a safety advantage?

A Yes, there is, the main drivers behind the "23 g rule" are **safety** and **fairness**. This rule matches much more the reality of how our lines are affected by use than the classic line stability tests where lines were bent a few thousand times before breaking them. The classic tests favour Dyneema/Spectra over Aramid lines, which seems unjustified given Dyneema's propensity for shrinking. Also, the safety margin is bigger with this rule. And requiring a minimum of 40 daN reduces the risk of tearing brake lines at launch.

5.3.3 Structural strength

§5.11 All sizes overlapping the core weight range passed shock load and sustained load tests as specified by EN 926-1. Any existing EN certification for a size implicitly satisfies this requirement for that particular size.

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

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.

Q And why only load tests for a part of the range?

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. The thinking is that scaling a tested design up or down will not introduce additional safety issues, so we forego the tests for scaled sizes.

Q Why do you want to test exactly the range from 95 to 115 kg?

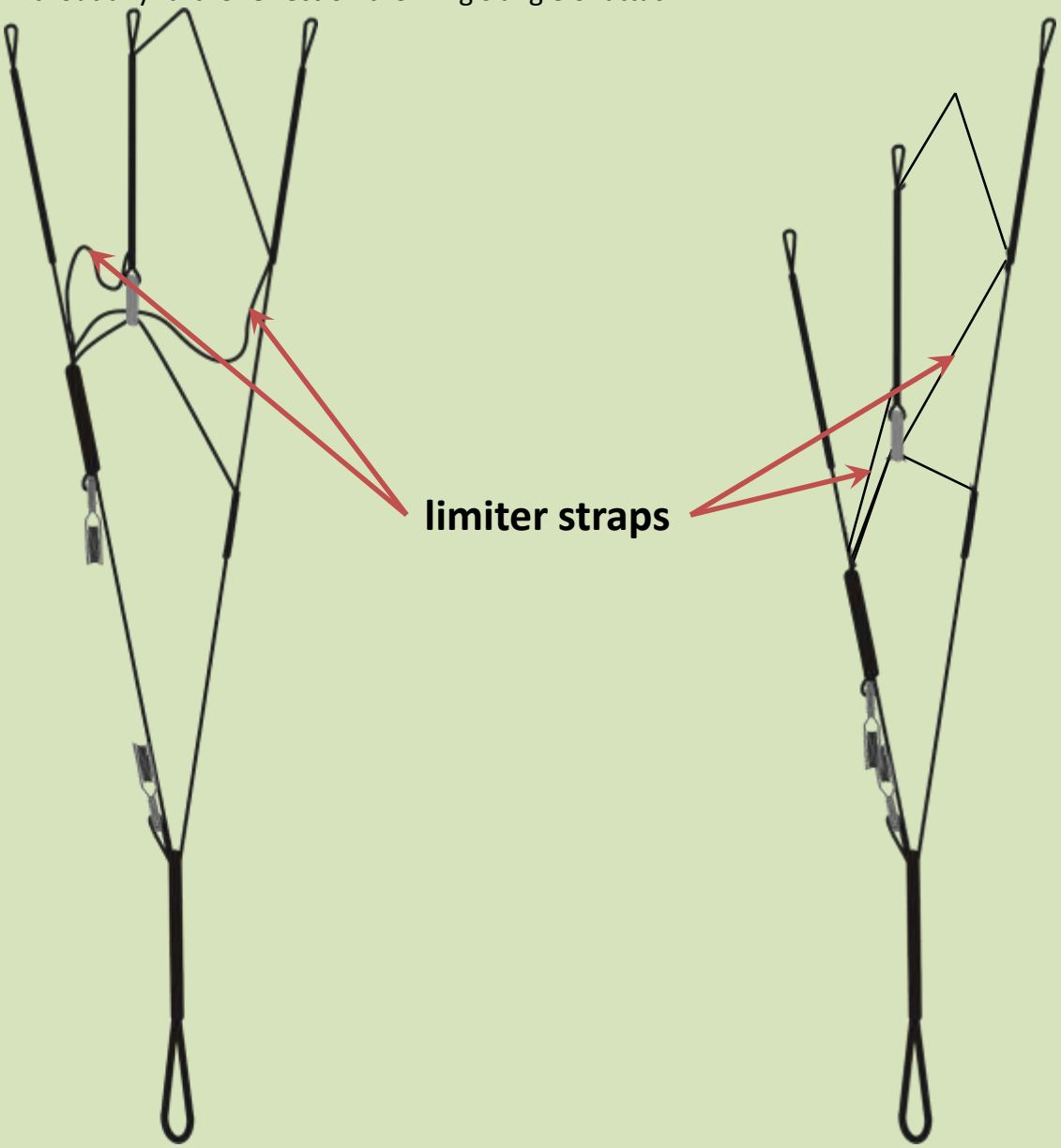
A For **fairness** reasons: This range is covered by the majority of existing high-end EN-D designs. By requiring for this range to be tested according to EN-926-1 (and slightly modified EN-926-2, see §5.14), we maintain the status quo in terms of available gliders for nations where paragliding is restricted to certified gliders, without any negative impact on any others.

5.3.4 Riser set layout

§5.12 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 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?

A 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 acceleration system.

Q So, 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 All sizes overlapping the core weight range passed all flight tests as specified by EN 926-2, with no individual rating higher than "D", with the following modifications:

a. Pilot reaction is permitted after 1 second

b. All tests are flown with a competition harness (§4.20)

Any existing EN certification for a size implicitly satisfies this requirement for that particular size.

Q Why are in-flight tests needed?

A To achieve **safety**: To provide pilots with a reference regarding a competition class pro paraglider's flying behaviour.

Q Why only for the core weight range? Why is this range 95 to 115 kg?

A See our answers to the same questions at §5.11

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. Many experts, including test pilots from testing institutions, maintain that the certification requirements as defined by EN 926-2 are neither 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. Additionally, 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 could react to an induced disturbance.

Q Why then 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 wanted to build on top of that, rather than simply throw it away. We actually spent some time debating our own set of 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 and flown with a competition harness.

Q Why the competition harness requirement?

A This was also 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, it makes sense to do the in-flight testing on such a harness as well.

5.4.2 Maximum airspeed

§5.15 When flown at its maximum allowed total take-off weight, the scale base size'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 high speed (which also means losing altitude quickly) will become pointless.

§5.16 The maximum airspeed of any scaled size, when flown at its maximum allowed total take-off weight, does not exceed the maximum airspeed of the scale base size when flown at its maximum total take-off weight.

5.5 Documentation

5.5.1 Measurements

§5.17 The canopy dimensions of all sizes are measured and recorded

§5.18 The line dimensions of all sizes are measured and recorded

§5.19 The riser dimensions of all sizes are measured and recorded

5.5.2 Owner's manual

§5.20 An owner's manual for each size of the model size range exists

§5.21 The owner's manual is available in English. Additional languages are optional but recommended.

§5.22 The owner's manual covers the following topics:

a. Pilot level recommendation
b. Flight characteristics, in comparison with a Competition Class Sport glider
c. Recommendations regarding rapid descent techniques
d. Information on brake and rear riser travel before stall, both for instantaneous and sustained application
e. Recommendations and special considerations regarding SIV
f. Line plan, including instructions for line measurements and re-trimming
g. Recommendations for maintenance and care

5.6 Certification

§5.23 The testing institution, after verifying compliance with all requirements, issues a certification of compliance (for a template, see section 7.1.7) 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 certification becomes official with the publication on CIVL's Web site.

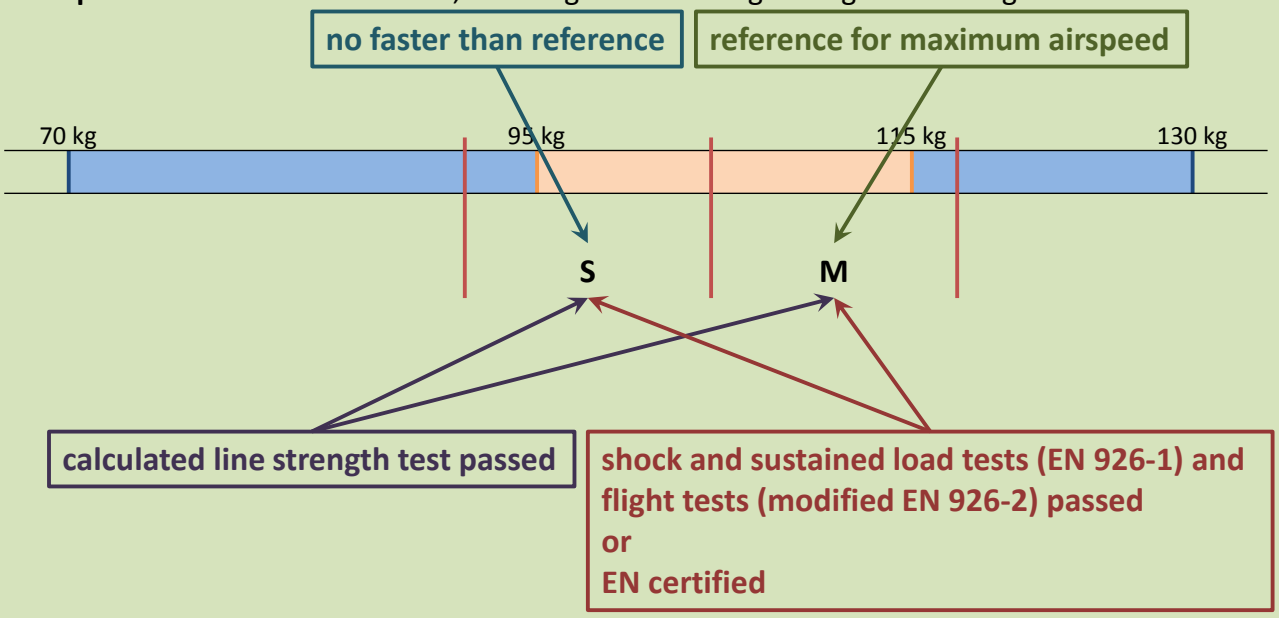
Q What is the address of this Web page?

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

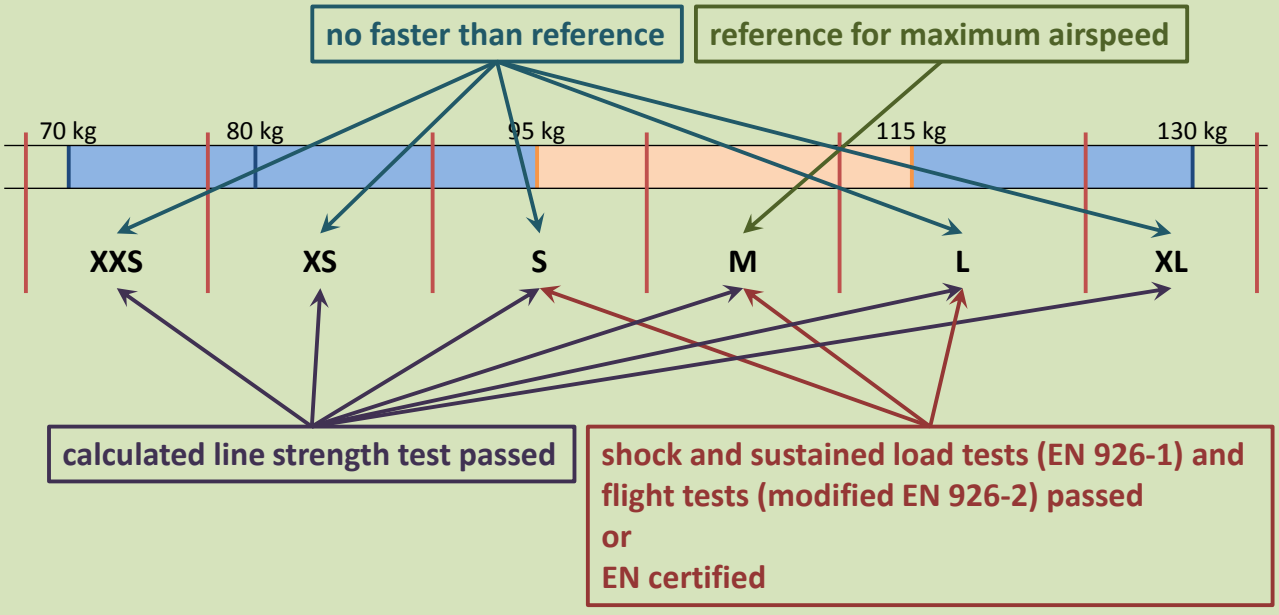
Q How do all these rules play together?

A Let's look at the minimum requirements, in terms of sizes, for both a "small" and a "big" manufacturer.

Example 13: A small manufacturer, covering the core weight range with two gliders



Example 14: A big manufacturer, covering the extended weight range with six gliders



6 Requirements for Competition Class Sport

Q Is this the same as the old (pre 2012) "Serial Class"?

A Almost, yes. We tried to model this class after the gliders which, unofficially, were known as "Serial Class" gliders, before the introduction of the current high-end EN-D gliders.

6.1 General

§6.1 In order to be certified as a Competition Class Sport paraglider model size, a paraglider model size must comply with the following set of requirements in its entirety:

1. Physical requirements (§6.3 to §6.7)
2. In-flight requirements (§6.8 to §6.9)
3. Documentation requirements (§6.10 to §6.12)

§6.2 Compliance with the requirements must be declared by the manufacturer.

6.2 Physical requirements

6.2.1 Canopy shape

§6.3 The canopy's vertically projected in-flight aspect ratio does not exceed 5.1.
or[2]
The canopy's flat aspect ratio does not exceed 7.0. On the canopy's center portion (center 50% of span), neither the leading nor the trailing edge any concave sections.

Q Why these values?

A We looked at the values manufacturers of high-end EN-D gliders give for their second-highest rated model, and set the limits so that those gliders would be included.

6.2.2 Structural strength

§6.4 The model size is EN or LTF certified and therefore passed shock load and sustained load tests as specified by EN 926-1.

6.2.3 Riser set layout

§6.5 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 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.

§6.6 The only technical means to increase airspeed beyond trim speed in flight is the acceleration system.

§6.7 Any trim mechanism intended to counteract line movement for maintenance purposes offers an option to block and seal the mechanism for the duration of a competition.

Q What is the reason for this paragraph?

A **Fairness**: We don't want to exclude innovations like Icaro's trim speed optimizer (TSO) as long as they can be prevented from providing an unfair advantage to a pilot during a competition.

[2] See §5.8: If the decision is to use projected aspect ratio for Competition Class Pro, then it could also be used for Competition Class Sport. Otherwise using manufacturer-provided figures for either flat or projected aspect ratio would be the alternative.

6.3 In-flight requirements

6.3.1 Flight test

§6.8 The model size is EN or LTF certified and therefore passed all flight tests as specified by EN 926-2, with no individual rating higher than "D".

6.3.2 Maximum airspeed

§6.9 The maximum airspeed of the model size, when flown at its maximum total take-off weight, is no higher than 60 km/h.

Q Why these values?

A Again, we looked at the values manufacturers of high-end EN-D gliders give for their second-highest rated model, and set the limits so that those gliders would be included.

6.4 Documentation

6.4.1 Owner's manual

§6.10 An owner's manual for the model size exists

§6.11 The owner's manual is available in English. Additional languages are optional but recommended.

§6.12 The owner's manual covers the following topics:

a. Pilot level recommendation
b. Recommendations regarding rapid descent techniques
c. Information on brake and rear riser travel before stall, both for instantaneous and sustained application
d. Recommendations and special considerations regarding SIV
e. Line plan, including instructions for line measurements and re-trimming
f. Recommendations for maintenance and care

6.5 Certification

§6.13 The manufacturer completes a declaration of compliance (template see section 9) and submits a copy of this declaration in electronic form to the CIVL competition coordinator at civl_comps@fai.org.

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

Q What is the address to this Web page?

A See answer to §5.24

7 Measurement and testing procedures

7.1 Certification

These measurement and testing procedures must be applied during certification, to establish that a paraglider model size or a paraglider model size range complies with the certification requirements.

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

Unit: Centimetre

Accuracy: One decimal digit

Tension:

a. Measurement of Span is conducted under tension of 5 kg in the measurement direction
b. Measurement of Chord is conducted under tension of 1 kg 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.

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 center of the canopy (50% of span).

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

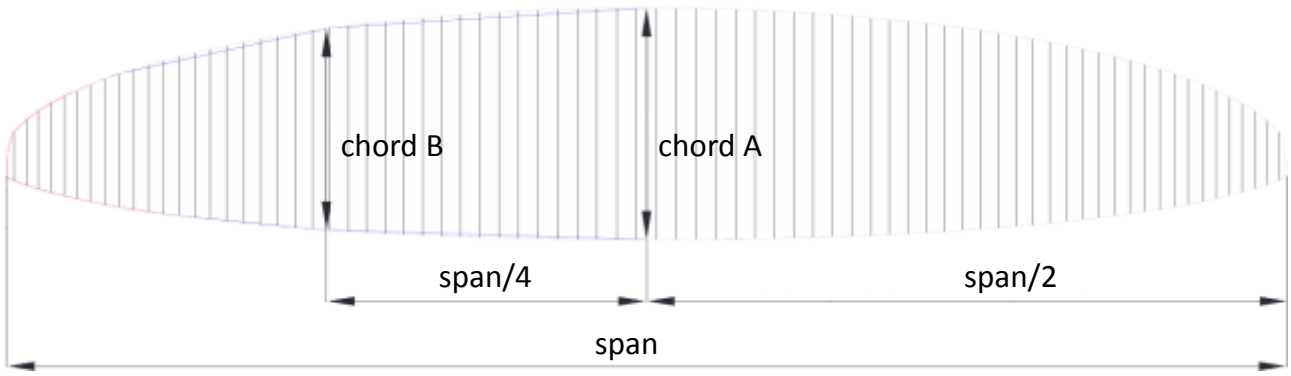


Figure 1: Canopy dimension measurements

7.1.1 Line length measurements

Results: Total line length between line attachment points on canopy and riser sets for all attachment points on the canopy

Unit: Centimetre

Accuracy: One decimal digit

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

7.1.2 Riser set measurements

Results:

a. For each maillon or other line attachment point, the distance between the inside of the maillon loop and the inside 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 5 kg in the measurement direction

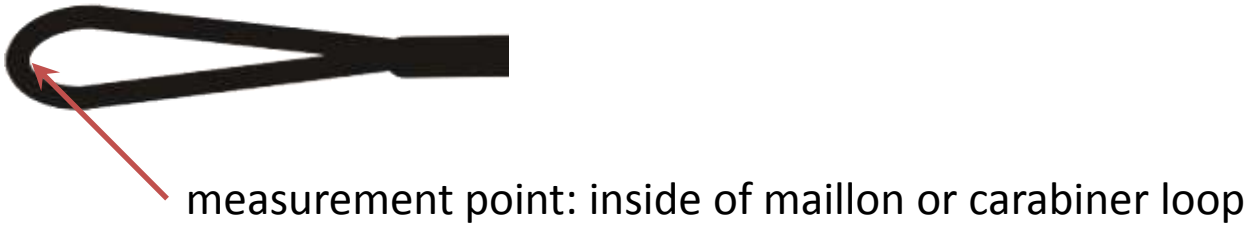


Figure 2: Measurement point for riser length measurements

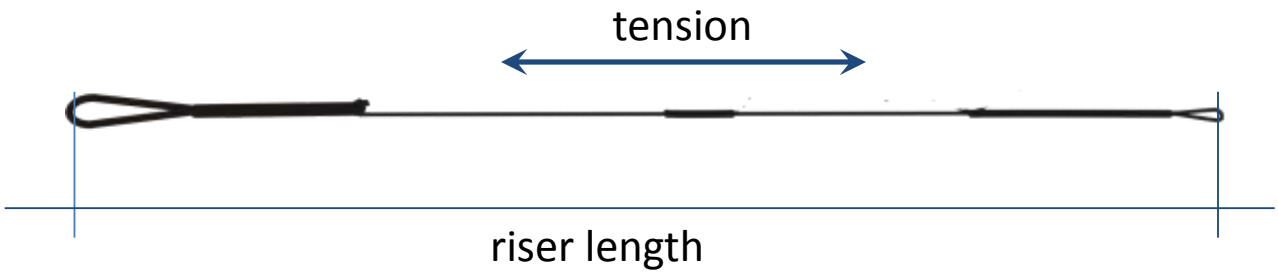


Figure 3: Riser length measurement

7.1.3 Canopy scaling measurements

Result: Scaling factor S between a model size range's base scale size (bss) and the measured size (ms)

Unit: Percentage (0% to 100%)

Accuracy: +/- 2%

$$S = \frac{span_{ms}}{span_{bss}} = \frac{chord(A)_{ms}}{chord(A)_{bss}} = \frac{chord(B)_{ms}}{chord(B)_{bss}}$$

7.1.4 Riser set scaling measurements

Result: Scaling factor S between risers of the model size range's base scale size (bss) and those of the measured size (ms)

Unit: Percentage (0% to 100%)

Accuracy: +/- 1%

$$S = \forall\ lineAttachmentPoints\ l: \frac{distance(l, mainCarabiner)_{ms}}{distance(l, mainCarabiner)_{bss}}$$

7.1.5 Canopy shape measurements

7.1.5.1 Projected aspect ratio

Result: Projected aspect ratio (AR_{proj})

Procedure:

1. Pick a day with maximum contrast between paraglider and sky colour.
2. Set a camera of type GoPro Hero 3 to continuous photo or photo burst mode, with the maximum possible number of photos per second
3. Place the camera on a levelled surface, pointing skywards
4. Have the measured paraglider fly straight over the camera, while taking pictures with the camera. The pilot should aim to fly in a straight line, without any brake input, as straight over the camera as possible
5. Make a visual pre-evaluation of the taken pictures, choosing the ones with no visible brake input, with the canopy straight over the camera (pilot and canopy aligned)
6. Upload these pictures to the online aspect ratio evaluation tool[3] provided by CIVL (available from June, 2014)
7. Use the resulting maximum aspect ratio, along with the given measurement ID, for certification

Q Does this actually work?

A Adrian Thomas has been using this method to determine projected aspect ratios of bird and insect wings in his research work at Oxford University. Our thinking is that a method used for published research work is accurate enough for our purposes.

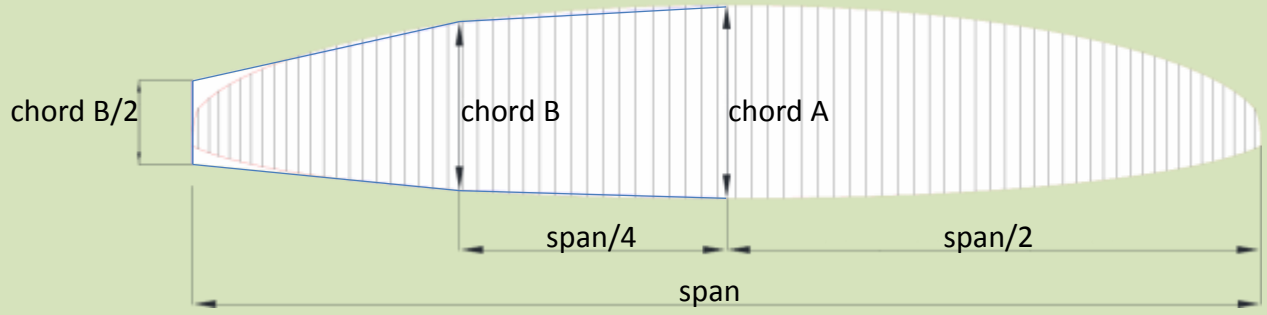
7.1.5.2 Flat aspect ratio for Competition Class Pro

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

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

Q I thought AR=span^2/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

[3] This tool will be based on software that is used by Adrian Thomas to determine projected aspect ratio of bird and insect wings in his research work at Oxford University.

approximation, when compared with the flat aspect ratio given by the manufacturer, is 2.5% or less.

7.1.5.3 Flat aspect ratio for Competition Class Sport

Result: Aspect ratio (AR)

Procedure: The manufacturer reports the flat aspect ratio as calculated by the software program used to design the wing.

7.1.6 Line strength calculations

Result: Verified line scheme

Procedure:

1. The manufacturer provides samples of all used individual lines, with the sewn and/or spliced terminations, to the testing institution
2. The testing institution determines the maximum applicable load for each line type by measuring the breaking force for each line type in three different instances and calculating the average of these three individual measurements.
3. Based on the determined maximum applicable load for each line type, the manufacturer creates a line scheme that fulfils the following criteria:
    a. The sum of the maximum applicable loads of all lines directly attached to the riser sets is equal to 23 times the maximum allowed total take-off weight of the paraglider model size in question, or higher
    b. At each level, above each line furcation point, the sum of the maximum applicable loads of all lines branching off the furcation point is 95% or more of the maximum load of the line below the furcation point.
    c. If one line cascade at level n has a total maximum load of less than 100% of the lower line's maximum load (level m), the next higher level's total maximum load (level o) must be again no smaller than 95% of the level n line's maximum load.
    d. The load distribution across the different lines is at the manufacturer's discretion
    e. The line scheme includes all load-bearing lines, including the stabilo line, but not the brake lines.
4. The testing institution verifies that the provided line scheme meets the criteria give above.

Q Is this a new invention?

A No, as mentioned above in section 5.3.2, this is the line strength rule that was created by the OCTWG in 2010 and then enforced for competition gliders in 2011.

7.1.7 Riser set layout tests

Result: Establish whether 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 5 kg to the riser set in load-bearing direction, evenly distributed over the line attachment points
2. Activate the accelerator to the previously established maximum (section 7.1.2)
3. Apply force up to 150 kg and observe the relative lengths of the individual risers
4. Test fails if the relative lengths of individual risers changes in step 3.

7.1.8 In-flight tests

The in-flight tests are performed according to EN-926-2[4], with modifications regarding harness and pilot reaction times.

7.1.8.1 Harness

All tests shall be flown with a competition harness as defined in §4.20.

7.1.8.2 Pilot reaction time

The following changes to pilot reaction times apply

7.1.8.2.1 Symmetric front collapse

Adjust ranges and classification according to Table 1 and Table 2.

Measurement	Range
Recovery	Recovery through pilot action after 1 s in less than a further 5 s
	Recovery through pilot action after 1 s in more than a further 5 s

Table 1: Addition to EN-926-2, Section 4.4.10 Symmetric front collapse, Table 20

Measurement and Ranges (according to Table 20)	Classification
Recovery through pilot action after 1 s in less than a further 5 s	D
Recovery through pilot action after 1 s in more than a further 5 s	F

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

In Section 5.5.19.10 Symmetric front collapse test, replace 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 (without inducing a deliberate stall).*

with

> *If the paraglider has not recovered spontaneously after 1 s or after 180° of turn (which ever happens first), the pilot acts on the controls to recover (without inducing a deliberate stall).*

7.1.8.2.2 Exiting deep stall (parachutal stall)

Adjust ranges and classification according to Table 3 and Table 4.

Measurement	Range
Recovery	Recovery through pilot action after 1 s in less than a further 5 s
	Recovery through pilot action after 1 s in more than a further 5 s

Table 3: Addition to EN-926-2, Section 4.4.11 Exiting deep stall (parachutal stall), Table 22

[4] For the purpose of this RFC, we base our modifications on EN-926-2:2005, which is the edition currently in place. This section will be updated once EN-926-2:2013 becomes available (expected November 2013)

Measurement and Ranges (according to Table 22)	Classification
Recovery through pilot action after 1 s in less than a further 5 s	D
Recovery through pilot action after 1 s in more than a further 5 s	F

Table 4: Addition to EN-926-2, Section 4.4.10 Exiting deep stall (parachutal stall), Table 23

In Section 5.5.19.11 Exiting deep stall (parachutal stall) test, replace the sentence

If the glider does not recover in 5 s then intervene in accordance with the user's manual.

with

If the glider does not recover in 1 s then intervene in accordance with the user's manual.

7.1.8.2.3 High angle of attack recovery

Adjust ranges and classification according to Table 5 and Table 6.

Measurement	Range
Recovery	Recovery through pilot action after 1 s in less than a further 3 s
	Recovery through pilot action after 1 s in more than a further 3 s

Table 5: Addition to EN-926-2, Section 4.4.12 High angle of attack recovery, Table 24

Measurement and Ranges (according to Table 24)	Classification
Recovery through pilot action after 1 s in less than a further 3 s	D
Recovery through pilot action after 1 s in more than a further 3 s	F

Table 6: Addition to EN-926-2, Section 4.4.12 High angle of attack recovery, Table 25

7.1.8.2.4 Asymmetric collapse test

In Section 5.5.19.14 Asymmetric collapse test, replace 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 1 s elapses.

7.1.8.2.5 B-line stall

Adjust ranges and classification according to Table 7 and Table 8.

Measurement	Range
Recovery	Recovery through pilot action after 1 s in less than a further 5 s
	Recovery through pilot action after 1 s in more than a further 5 s

Table 7: Addition to EN-926-2, Section 4.4.19 B-line stall, Table 38

Measurement and Ranges (according to Table 38)	Classification
Recovery through pilot action after 1 s in less than a further 5 s	D
Recovery through pilot action after 1 s in more than a further 5 s	F

Table 8: Addition to EN-926-2, Section 4.4.19 B-line stall, Table 39

7.1.8.2.6 Big ears

Adjust ranges and classification according to Table 9 and Table 10.

Measurement	Range
Recovery	Recovery through pilot action after 1 s in less than a further 5 s
	Recovery through pilot action after 1 s in more than a further 5 s

Table 9: Addition to EN-926-2, Section 4.4.20 Big ears, Table 40

Measurement and Ranges (according to Table 40)	Classification
Recovery through pilot action after 1 s in less than a further 5 s	D
Recovery through pilot action after 1 s in more than a further 5 s	F

Table 10: Addition to EN-926-2, Section 4.4.20 Big ears, Table 41

In Section 5.5.19.20 Big ears test, replace the sentence

> *The pilot shall take no further action and remains passive until the glider either recovers, or 5 s elapses.*

with

> *The pilot shall take no further action and remains passive until the glider either recovers, or 1 s elapses.*

7.1.8.2.7 Big ears in accelerated flight

Adjust ranges and classification according to Table 11 and Table 12.

Measurement	Range
Recovery	Recovery through pilot action after 1 s in less than a further 5 s
	Recovery through pilot action after 1 s in more than a further 5 s

Table 11: Addition to EN-926-2, Section 4.4.21 Big ears in accelerated flight, Table 42

Measurement and Ranges (according to Table 42)	Classification
Recovery through pilot action after 1 s in less than a further 5 s	D
Recovery through pilot action after 1 s in more than a further 5 s	F

Table 12: Addition to EN-926-2, Section 4.4.21 Big ears in accelerated flight, Table 42

In Section 5.5.19.21 Big ears in accelerated flight test, replace the sentence

> *The pilot shall take no further action and remains passive until the glider either recovers, or 5 s elapses.*

with

> *The pilot shall take no further action and remains passive until the glider either recovers, or 1 s elapses.*

7.1.9 Airspeed measurements and tests

7.1.9.1 Absolute airspeed measurements

Result: Airspeed

Unit: km/h

Accuracy: One decimal digit

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, with minimal control input
5. For each leg, the maximum GPS ground speed achieved during the measurement phase is recorded
6. The local airspeed is the average of the four measured GPS ground speeds
7. The airspeed is determined by transforming the local airspeed to 1000 m MSL with ICAO standard atmosphere, according to the formula defined in EN-12491:2001

7.1.9.2 Relative airspeed tests

Result: Relative maximum airspeed of tested glider A in relation to maximum airspeed of glider B. Possible values are “slower”, “equal” or “faster”

Procedure:

1. Both measured paragliders must be flown at their respective maximum allowed total take-off weight
2. The wind speed at launch during the test must not exceed 15 km/h. Differences in wind speeds at launch level during the test must not exceed 10 km/h.
3. The two paragliders fly the following pattern three times:
    a. Establish formation: same level, same direction, close proximity (wingtip to wingtip)
    b. Full acceleration
    c. 10 seconds stabilization phase, to dampen pitch and correct course
    d. 60 seconds observation phase, with minimal control input
4. Observation of relative speeds through the two pilots, and optionally through a ground-based observer positioned straight below the flight path.
5. If during the observation phase glider A falls behind glider B, the result is “slower”. If A pulls away from B, the result is “faster”. If no difference can be observed, the result is “equal”.
6. The final result is determined according to Table 13.

Test a	Test b	Test c	Result
Slower	Slower	Slower	Slower
Slower	Slower	Equal	Slower
Slower	Slower	Faster	Slower

Test a	Test b	Test c	Result
Slower	Equal	Equal	Slower
Slower	Equal	Faster	Equal
Slower	Faster	Faster	Faster
Equal	Equal	Equal	Equal
Equal	Equal	Faster	Faster
Equal	Faster	Faster	Faster
Faster	Faster	Faster	Faster

Table 13: Result of relative speed tests

7.2 Verification during or after competitions

These measurement and testing procedures can be applied during competitions, or afterwards in case of a protest, to verify that a particular paraglider is a Competition Class paraglider.

7.2.1 Canopy dimension verification

A paraglider passes verification if span and both chord measurements according to section **Error! Reference source not found.** yield results that correspond with those documented for that paraglider's Competition Class model size, within a tolerance of +/- 0.5%.

7.2.2 Line length verification

A paraglider passes verification if line measurements according to section 0 yield results that correspond with those documented for that paraglider's Competition Class model size, within the following tolerances:

1. The tolerance for relative measurements between front-most and rear-most line attachment points, averaged over the group of lines extending from each main line, is +/-2cm
2. The absolute tolerance is +/-4cm from each attachment point to the bottom of the riser, with an overall offset of +/-5cm to compensate for average line stretch or shrinkage and systematic differences between testing prototypes and production gliders.

7.2.3 Riser length verification

A paraglider passes verification if riser set measurements according to section 7.1.2 yield results that correspond with those documented for that paraglider's Competition Class model size, with a tolerance of +/- 0.7 cm for both individual risers and maximum accelerator travel.

7.2.4 Maximum airspeed verification

A paraglider passes verification if relative airspeed tests with the paraglider's Competition Class model size range's stored reference glider according to section 7.1.9.2 yield a result of "slower" or "equal".

7.2.5 Profiles and internal structure verification

A paraglider passes verification if a direct comparison with other gliders of the same model size (during the competition) or with the model size range's stored reference glider (after the competition) produces no significant differences in profile shapes and internal structure.

8 Competition Class Pro: Certification of Compliance

To be completed after RFC.

Q When can we expect this template to be available?

A The template will be included in the final version of the Competition Class definition document, to be published on January 2nd, 2014

9 Competition Class Sport: Declaration of Compliance

To be completed after RFC.

Q When can we expect this template to be available?

A The template will be included in the final version of the Competition Class definition document, to be published on January 2nd, 2014