CIVL Paragliding Committee

RFC: Definition of CIVL EN Competition Class Paragliders

2015 Edition

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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

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Contents

1 Introduction 4
2 Timing 5
3 Goals 6
4 Definitions 7
4.1 Paraglider 7
4.2 Competition Class Pro 8
4.3 Competition Class Sport 8
4.4 Competition harness 8
4.5 CIVL accredited testing institution 9
5 Requirements for Competition Class Pro 10
5.1 General 10
5.2 Size range requirements 10
5.3 Physical requirements 10
5.4 In-flight requirements 11
5.5 Documentation 11
5.6 Certification 12
6 Requirements for Competition Class Sport 13
6.1 General 13
6.2 Physical requirements 13
6.3 In-flight requirements 13
6.4 Documentation 14
6.5 Certification 14
7 Measurement and testing procedures 15
7.1 Certification 15
7.2 Verification during or after competitions 22
8 Competition Class Pro: Certification of Compliance 24
9 Competition Class Sport: Declaration of Compliance 25

1 Introduction

This document is an official request for comments (RFC) from the Paragliding Committee of the "Commission International de Vol Libre" (CIVL), the hang-gliding and paragliding commission within the "Federation Aeronautique International" (FAI). It contains a draft of the authoritative definition and certification requirements of CIVL EN Competition Class paragliders for cross-country competitions.

The intention of this RFC is to gather feedback from stakeholder organizations outside CIVL, in order to formulate the definite class definition for 2015. Topics where input is explicitly sought are marked yellow. If you represent an organization or a paraglider manufacturer, please send your feedback to the chairman of the Paragliding Committee, Stéphane Malbos, at stefmalbos@orange.fr.

For individuals wishing to provide feedback and discussing the contents of the RFC, we opened a discussion thread on ParaglidingForum.com at http://www.paraglidingforum.com/viewtopic.php?p=384620.

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.

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.

§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.

4.3 Competition Class Sport

§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

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

§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.

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.

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]
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.

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.

[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 7.1.6 for information on how the two options would be measured.

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.

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.

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

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.

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.

§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 8) 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.

6 Requirements for Competition Class Sport

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 have any concave sections.

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.

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.

[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.

6.4 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.

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.

7.1.1 Canopy dimension measurements

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)

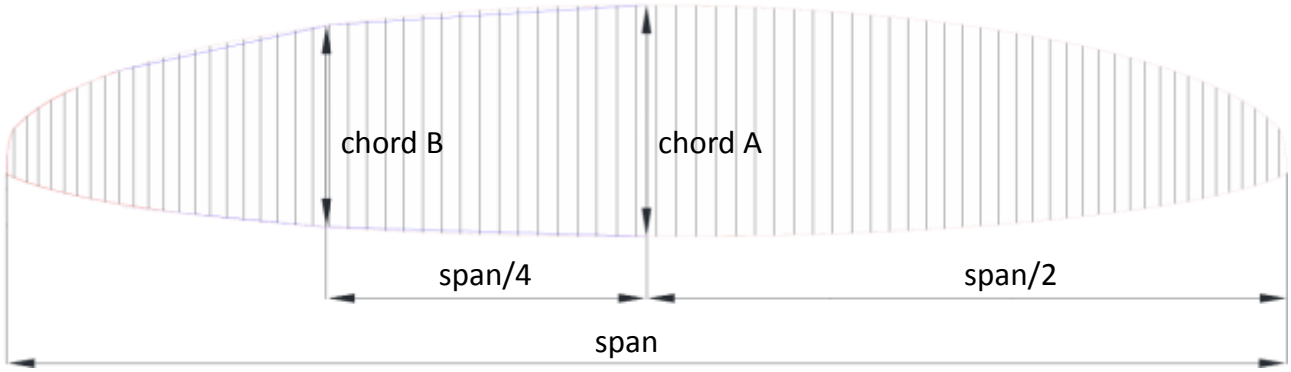

Figure 1: Canopy dimension measurements

7.1.2 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

7.1.3 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

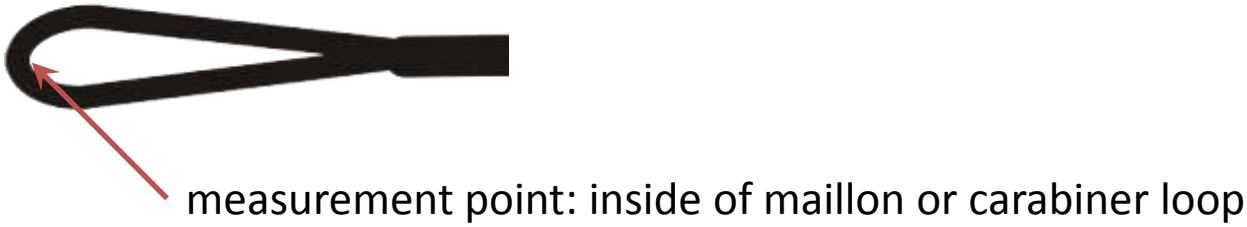

Figure 2: Measurement point for riser length measurements

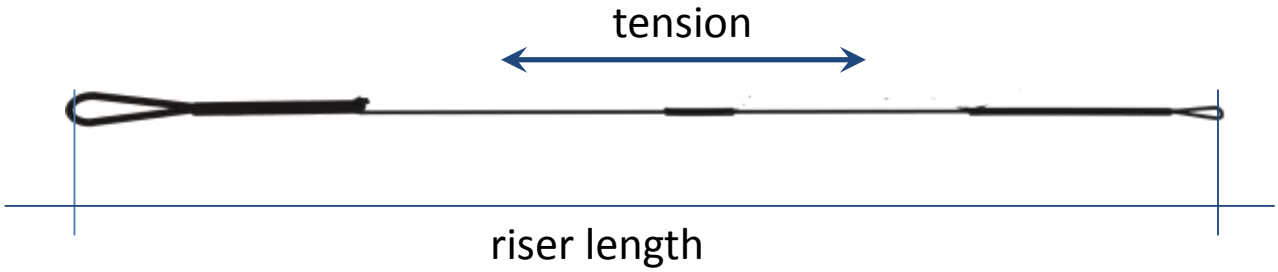

Figure 3: Riser length measurement

7.1.4 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%

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

7.1.5 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%

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

7.1.6 Canopy shape measurements

7.1.6.1 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

7.1.6.2 Flat aspect ratio for Competition Class Pro

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

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

7.1.6.3 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.

7.1.7 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:

[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.

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.

7.1.8 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 7.1.3)
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.

7.1.9 In-flight tests

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

7.1.9.1 Harness

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

7.1.9.2 Pilot reaction time

The following changes to pilot reaction times apply

7.1.9.2.1 Symmetric front collapse

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

Measurement	Range

[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)

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).

7.1.9.2.2 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

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.

7.1.9.2.3 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

7.1.9.2.4 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.*

7.1.9.2.5 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

7.1.9.2.6 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.*

7.1.9.2.7 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.*

7.1.10 Airspeed measurements and tests

7.1.10.1 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

7.1.10.2 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
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 7.1.1 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 7.1.3 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 7.1.10.2 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.

9 Competition Class Sport: Declaration of Compliance

To be completed after RFC.