2016 PLENARY – ANNEX 26

CIVL COMPETITION CLASS REQUIREMENTS REVISION

The proposals for the October 2016 CCC revision have been through the bureau, and have been subsequently reviewed here. Following comments from Gin, Ozone, Niviuk and others, these are the revised proposals which we would like to take forwards to the plenary. The deadline for proposals is 5th January so early comments would be appreciated.

The very brief summary of the changes is: 1, tidy up existing rules. 2, 23G theoretical load test. 3, Mandatory 14.5cm A-B speed system limiter. 4. High speed flight tests at trim speed + 15kmh (gps). 5. Test organization flight testing of XS (90kg max take-off-weight) mandatory, other sizes produced by linear scaling from the XS.

> The current rules are here:
> CCC requirements plus Annex B - Revision 3.5 approved September 8, 2014 available here:
> http://www.fai.org/civl-our-sport/competition-class-paragliders

The following revisions are proposed.

1. To tidy up the gliders permitted in Cat 1 competitions so that CCC or EN certified gliders are permitted, removing the complex 'legacy' rules left over from the transition from EN certification to CCC. There is no longer any need to impose additional restrictions on EN wings. The original rules were imposed because there was then concern that EN D wings might outperform CCC wings. That concern is no longer relevant, so this change amounts to a tidying up of the rule.
2. To permit the use of the 23G theoretical load test in cases where wings use tried-and-tested conventional structures. This resolves the problem with very thin and vulnerable dyneema upper level and brake lines that currently get through the current 14G post-bending test.
3. To tighten up the existing maximum speed limiter length from 18cm to 14.5cm (with 5mm tolerance) to limit speeds to no more than current values, to impose a consistent limiter length across wings.
4. To decouple high speed tests and limiter lengths by performing the high speed tests at a set speed 15kmh higher than trim speed (determined by gps ground speed, or an additional certification limiter or risers provided by the manufacturer and verified by the test organization).
5. To require certification by following the current rules for independent test-organisation flight-testing of the size XS (90kg maximum take-off weight) and permit other CCC sizes to be produced by linear scaling, leaving the manufacturers to determine that those other size wings are suitable for the pilots they sell them to. This change will mean that the rules no longer restrict the available sizes of CCC wings. It is hoped this change will encourage more manufacturers to produce CCC wings.

6. To tighten up the current flight tests by reducing the maximum permitted time before recovery 5 seconds to 3 seconds so that the wing fails if “Recovery through pilot action does not occur within the first 3 s of pilot action”
7. To require the flight test videos of the flight XS wing tested by the independent test organization to be submitted to CIVL and made available for inspection by other manufacturers, other test organisations and NAC team managers at least 1 month prior to any CAT1 event. This will allow an opportunity for issues with gliders to be identified and resolved prior to competitions (whereas currently they only appear at or after the event).

Detailed proposed rules:

1. Tidy up the references to permitted gliders in Cat 1 competitions. The current rule is:

6 Permitted paragliders in FAI Category 1 competitions

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

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

a. The flat aspect ratio of the paraglider’s canopy, as documented in the user’s manual, is 7.0 or less.
b. The paraglider’s model size is listed on CIVL’s Web site as fulfilling all of the following criteria:
   i. The model size was EN certified in time for the 2014 European Championship
   ii. The model’s canopy fulfils the CIVL Competition Class canopy shape requirements (§5.3 and §5.4)
   iii. The model has been replaced by a more recent one.

§6.3 Any CIVL Competition Class certified paraglider is permitted if the following applies:

a. The difference in top weights between the smallest and the largest CIVL Competition Class certified sizes of the paraglider’s model that are commercially available 90 days prior to the start of the competition, is 25 kg or more.
b. The smallest CIVL Competition Class certified size of the paraglider’s model that is commercially available 90 days prior to the start of the competition, has a top weight of 100 kg or less.

Note 1: The intent of the first two paragraphs in this section is to ensure that the introduction of Competition Class does not exclude existing but superseded wings, as has happened under previous rules. It also serves to ensure that pilots are able to participate in competitions flying low-end wings, without any further requirements from manufacturer or pilots.

Note 2: From January 1st, 2016, the smallest size must have a top weight of 90 kg or less, and the difference between the smallest and the largest size must be 35 kg or more. Additional measures will be defined as necessary to facilitate the creation of CIVL Competition Class paragliders by manufacturers newly entering competitions or returning to competitions after not having produced a high-end EN D competition wing.

Proposal 1: Change 6.1 to read

6.1 Any EN certified glider is permitted.

Delete 6.2

It is hoped this is not contentious.

2. 23G theoretical load test.

The proposal is that if a glider uses new materials or construction techniques it has to pass the CCC physical structure and load tests. However if (and only if) the construction

techniques and materials used in the wing are identical to those used in a previous model that has passed CCC or EN physical strength and shock and sustained load tests then the new model can be certified CCC provided it complies with the 23G theoretical load test.

This proposal is intended to make it cheaper and easier for new manufacturers to introduce competition gliders. The move from 14G to 23G and to 40daN minimum strength has the benefit of eliminating the use of ultra-thin dyneema and (for example) Edelrid 9000-030 in upper cascades and brake lines which likes to tangle and cause some nasty deformations during flight which the pilot can't open.

The existing rule is:

5.2.2 Structural strength

§5.5 The test specimen's model size passed the structural strength tests specified in section 8.2.
or
The test specimen has a top weight of no more than 0.8 times the maximum tested weight that resulted from the successful sustained load test defined in section 8.2.4 on another size of the same model that passed the structural strength tests specified in section 8.2.

§5.6 Any existing EN certification for the test specimen implicitly satisfies the structural strength requirement (§5.5) for the test specimen's model size.

5.2.3 Line breaking strength

§5.7 The test specimen passed the theoretical line breaking strength test specified in section 8.3.

§5.8 The breaking strength of each line segment used in the test specimen's construction is equal to or higher than the breaking strength of the equivalent line segment subjected to the structural strength tests (§5.5) which cover the test specimen's size.

§5.9 For a test specimen with existing EN 926-1 certification, to fulfil the line breaking strength requirements (§5.7 and §5.8), individual lines may be replaced with lines of higher breaking strength without repeating the structural strength tests according to §5.5 or the flight tests according to §5.13.

Change 5.5 to

5.5 The test specimen's model size passed the structural strength tests specified in section 8.
Or
The test specimen has identical structure (materials, construction) to an existing or previous model of the same or larger maximum size that passed the structural strength tests as defined in section 8.2 AND the test specimen fulfills the theoretical line breaking strength requirements of section 8.3.

Delete 5.8 and 5.9

Section 8.3 currently reads:

8.3 Line breaking strength test

8.3.1 Principle

The test specimen's top weight is compared with the theoretical breaking strength of the test specimen's complete line system. The theoretical breaking strength is calculated based on the measured breaking strengths of pre-conditioned samples of the line materials actually used for the test specimen.

8.3.2 Procedure

Note: If identically constructed lines have already been tested, and their breaking strength after pre-conditioning is known, then these previously established values may be used, and steps 1, 2 and 3 of this procedure can be skipped.

1. Obtain three samples of each line type (i.e. three samples of each material and/or processing method) used in test specimen's line system. Each sample must have a length of 0.5 m, with loops on each end.
2. Pre-condition the line samples by bending them ± 180° around a cylinder of the same diameter as the line's (± 0.1 mm), while under constant tension of 2 N (see Figure 7). The centre point of the bend is to be aligned with the endpoint of the stitching of a line loop (the weakest point of the line). A complete cycle of 2 bending movements takes 2 s. Repeat for 5000 complete bending cycles.

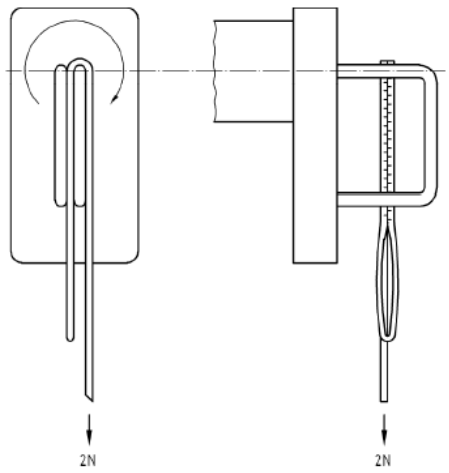

Figure 7: Line pre-conditioning device

3. Measure the pre-conditioned line samples' breaking force. The speed of applying the load must be faster than 0.01666 m/s. For the subsequent calculation, F_{break} is the lowest value out of the three measurements.
4. Calculate the test specimen's theoretical maximum weight as follows (see also 11.5Appendix A for an example):
   For the lowest line section (the one attached to the risers)
   $$W_{max} = \frac{\sum_i F_{break_i} \times n_i}{14g}$$
   where
   $g = 9.81 m/s^2$
   F_{break_i} is the breaking force of line type *i* used in the lowest line section
   n_i is the number of lines of line type *i* used in the lowest line section
5. For each of the additional line sections above, perform the same calculation.

8.3.3 Result

The test fails if any of the following applies:

a. The breaking strength measured during the line breaking strength tests of any sample of line material used in the construction of the test specimen, including brake lines, is less than 20 daN
b. W_{max} of any line section is less than the test specimen model size's top weight

Change 8.3 to read:

8.3.1 Principle

The test specimen's top weight is compared with the theoretical breaking strength of the test specimen's complete line system (excluding brakes). The theoretical breaking strength is calculated based on the measured breaking strengths of samples of the line materials actually used for the test specimen, and built using identical materials and splicing techniques.

The load calculation for testing the breaking strength of the line sets shall be applied to each size of the glider, at the maximum flying weight of that glider size.

8.3.2 Procedure

Note: if identically constructed lines have already been tested and their breaking strength is known, then these previously established values may be used.

8.3.2.1

The line breaking strengths for the load calculation will be based on the tests of an independent testing laboratory. The paraglider manufacturer will provide samples of the lines to the testing laboratory with the sewn and/or spliced terminations.

The testing laboratory shall test at least 10 samples of each type of line and will take the average load achieved from those 10 samples.

1. Measure the pre-conditioned line samples' breaking force. The speed of applying the load must be faster than 0.01666 m/s. For the subsequent calculation, F_{break} is the average value out of the ten measurements.
2. Calculate the test specimen's theoretical maximum weight as follows
   For the lowest line section (the one attached to the risers)
   $W_{max} = \frac{\sum_i F_{break_i} \times n_i}{23g}$

   Where

   $g = 9.81 m/s^2$

   F_{break_i} is the breaking force of line type *i* used in the lowest line section

   n_i is the number of lines of line type *i* used in the lowest line section

3. At each level above, in every cascade of lines and across each line junction the calculated total strength has to be the same or stronger than the level below it (tolerance 5%). For example across a line junction where one lower line (e.g. 100daN) splits to two upper lines the total strength of the two upper lines added together must be greater than the strength of the single lower line (i.e. >95daN total, given the 5% tolerance).
   The manufacturer will decide the load distribution between the different lines according to their own calculation. The line load calculation will be applied to all load bearing lines of the glider, including the stabilo, but not the brake lines.
   The absolute minimum strength of any individual line, including the brake lines, must be equal to or greater than 40daN.
   A pilot may repair damaged lines by replacing them with identical lines or lines of greater strength.

Argumentation:
Pros:

- We do not have problems with structural failure in CCC wings.
- We do have a problem with the very tiny dyneema lines permitted under the existing 14G post-bending rule causing tangles and cravats and manufacturers would prefer these ultra-thin lines were excluded.
- We do not need to physically test the same structure again and again. This is a waste of time, effort and money, since physical testing is very error prone.
- The rule change is subtle but saves manufacturers considerable time and money.
- The rule change does not give an advantage to old or new gliders
- The rule change reduces the competitive disadvantage of small pilots and allows manufacturers to more economically produce gliders with a wide variety of sizes closely matched to their pilot take-off-weights.

Cons:

- We will need to be sure that manufacturers do continue to match the construction techniques used in physically load-tested gliders. This may require inspection of line attachment points at glider checks.
- The independent testing organisations will lose a source of funds.

It is hoped that this will not be contentious

3. **High speed flight tests and limiters:**

the proposal is to do the flight tests at trim speed and at 15kmh faster than trim speed, with the speed delta determined by GPS ground speed. The aim is to standardize the speed at which high speed tests are performed, and to decouple that speed from the riser limiter lengths. We also propose to reduce the maximum permitted riser length from 18cm to 14.5cm (tolerance, 5mm).

The current rules are:

9.5.1 Speeds in straight flight test

Performed by: Testing laboratory test pilot

Procedure:

1. Assess the trim speed in 10 s stabilized straight flight.
2. Assess the minimum speed in 10 s stabilized straight flight.
3. Assess the riser configuration during stabilized straight and fully accelerated flight.

Camera axis: Camera not required

Results: The test fails if either of the following applies:

a. The measured trim speed is less than 30km/h
b. The speed range using the controls is less than10 km/h
c. The elements on the riser set designed to limit the top speed are not fully loaded and tight when the test specimen is fully accelerated

The proposals for speed in the high speed test are for testing at gps trim speed +15kmh. (i.e. if trim speed is 45kmh gps ground speed when flying straight into wind, the high speed tests are to be performed while flying in the same direction and having accelerated to at least 60kmh gps ground speed). Manufacturers may add a limiter for certification that sets the maximum speed to some value more than 15kmh faster than trim speed if they wish to make it easier for the test pilots to test at a consistent trim setting.

Required rule change to 9.5.1:

3. stabilize the glider in straight flight at trim speed (controls released) and record the gps ground speed. Continue in the same flight direction and accelerate to

achieve a gps ground speed 15kmh faster. Record the riser settings at that higher speed. These riser settings are to be used for high speed flight tests.
The manufacturer may provide elements in the riser used during testing to ensure that the maximum accelerated speed is a minimum of gps trim speed + 15kmh for certification in order to increase repeatability of the high speed tests.

The trim and accelerated gps ground speeds must be recorded in the gps tracklog and assessed to check that the high speed tests are performed at trim speed + 15kmh. These gps tracklogs showing the trim speed and speed for accelerated tests must be included in the documentation for the glider.

c. If the manufacturer provides a limiter to set the speed for high speed tests, the glider fails if the limiter is tight at a gps ground speed that is less than 15kmh faster than the gps ground speed at trim. Note: no tolerance is permitted on the 15kmh speed delta, this is a minimum.

Change the existing rules on high speed flight tests to replace the words “maximum speed” with “certified speed as defined in 9.5.1”.

For each of the high speed flight tests 9.53, 9.54, 9.5.6, 9.5.11, 9.5.13 replace

Procedure:

1. Stabilise the test specimen in straight flight at maximum speed.

with

1. If the manufacturer has provided a limiter to set the speed for high speed tests (9.5.1) stabilize at the speed where the limiter is fully tensioned. If the manufacturer has not provided a certification limiter (9.5.1) stabilise the test specimen in straight flight at trim speed (controls released) then accelerate to the high speed defined in 9.5.1 (trim+15kmh), prior to executing the test maneuver.

Add to results:

“the glider fails if the gps tracklog shows that the increase in ground speed between the stabilized flight with controls released and the stabilized flight at high speed when the test was performed was less than 15kmh.”

4. **limiters:**

The aim is to standardize the speed at which high speed tests are performed, and to decouple that speed from the riser limiter lengths. We therefore propose to reduce the maximum permitted riser length from 18cm to 14.5cm (tolerance, 5mm).

The existing rules on riser set layout are:

5.2.4 Riser set layout

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

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

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

Change rule 5.10 to read

5.10 The test specimen's accelerator system, when fully engaged, shortens the front-most riser by 14.5cm in relation to the rear-most riser (tolerance 5mm).

The existing rule 5.21 reads:

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

Change 5.21 to read:

5.21 The maximum shortening of the front-most risers relative to the rear-most riser through the accelerator does not exceed 14.5cm (tolerance 5mm).

Argumentation:
These changes will simplify glider-checking (as all wings have the same maximum limiter length). All current CCC wings already conform to this rule. Some older CCC wings do not (e.g. Icepeak 6), but these are not competitive anyway, so no special retrospective rule need be imposed to exclude them.

5. Permit scaling

The relevant current rules are:

6 Permitted paragliders in FAI Category 1 competitions

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

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

a. The flat aspect ratio of the paraglider's canopy, as documented in the user's manual, is 7.0 or less.
b. The paraglider's model size is listed on CIVL's Web site as fulfilling all of the following criteria:
   i. The model size was EN certified in time for the 2014 European Championship
   ii. The model's canopy fulfils the CIVL Competition Class canopy shape requirements (§5.3 and §5.4)
   iii. The model has been replaced by a more recent one.

§6.3 Any CIVL Competition Class certified paraglider is permitted if the following applies:

a. The difference in top weights between the smallest and the largest CIVL Competition Class certified sizes of the paraglider's model that are commercially available 90 days prior to the start of the competition, is 25 kg or more.
b. The smallest CIVL Competition Class certified size of the paraglider's model that is commercially available 90 days prior to the start of the competition, has a top weight of 100 kg or less.

Note 1: The intent of the first two paragraphs in this section is to ensure that the introduction of Competition Class does not exclude existing but superseded wings, as has happened under previous rules. It also serves to ensure that pilots are able to participate in competitions flying low-end wings, without any further requirements from manufacturer or pilots.

Note 2: From January 1st, 2016, the smallest size must have a top weight of 90 kg or less, and the difference between the smallest and the largest size must be 35 kg or more. Additional measures will be defined as necessary to facilitate the creation of CIVL Competition Class paragliders by manufacturers newly entering competitions or returning to competitions after not having produced a high-end EN D competition wing.

Change rule 6.3 to read:

6.3 Any CIVL Competition Class Certified paraglider is permitted.

The existing rule 5.5 is:

5.5 Certification

§5.22 The testing laboratory, after verifying compliance with all requirements, issues a certification of compliance to the manufacturer, and submits a copy of this certification in electronic form to the CIVL President email: civl-president@fai.org .

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

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

Change Rule 5.5 section 5.22 to read:

5.22 The testing laboratory after verifying compliance with all requirements of the size XS (maximum take-off weight 90kg or less) model specimen, issues a certification of compliance to the manufacturer, and submits a copy of this certification in electronic form to the CIVL president email: civl-president@fai.org

Add

5.25 Other sizes of the model specimen are permitted as CCC wings provided they are derived from the glider specified in 5.22 by direct linear scaling.

The existing rule 5 is:

5 Requirements for CIVL Competition Class

5.1 General

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

a. Physical requirements (§5.3 to §5.12)
b. In-flight requirements (§5.13 to §5.14)
c. Documentation requirements (§5.15 to §5.21)

§5.2 Compliance with the requirements must be verified and certified by a CIVL accredited testing laboratory (§4.19), using the measurement and testing procedures described in sections 7, 8, 9 and 10 of this document.

Change 5.1 a to read:

In order to be certified as a CIVL Competition Class paraglider model size XS (maximum take-off weight 90kg or less), test specimens of that exact model size must comply with the following set of requirements in its entirety:

Add:

5.3 Other sizes of that paraglider model are CIVL Competition Class Certified if they are derived by linear scaling from the CCC certified model size XS (maximum 90kg take off weight or less). For these scaled gliders the linear scaling factor must be defined by the manufacturer, and all linear measurements of the gliders must match the scaled dimension within the tolerances specified in section 5.4: Span +2%, -2%. Chord +1%, -1%. Tab positions +1cm, -1cm. Line lengths +2cm, -2cm.

6. Reduce the time for recovery on pilot action from 5 to 3 seconds.

In each of the flight tests defined in section 9 where recovery following pilot action is permitted the rules currently read:

Results: The test fails if either of the following applies:

a. Recovery through pilot action does not occur within the first 5 s of pilot action

Change: in every place where it occurs in section 9 replace “5 s” with “3 s”.

7. Require the flight test videos of the flight XS wing tested by the independent test organization to be submitted to CIVL and made available for inspection by other manufacturers, other test organisations and NAC team managers at least 1 month prior to any CAT1 event.

The current rule is:

9.4.5 Video documentation

1. All the tests must be filmed on video. If required explicitly by the procedures 9.5, the test pilot maintains a defined course relative to the camera axis when starting the test manoeuvre.
2. In 9.5 the following terms are used:
   a. Camera axis: Profile: The pilot maintains a course at a right angle to the horizontal projection of the camera axis.
   b. Camera axis: Face-on: The pilot is approaching the camera along the horizontal projection of the camera axis.
3. If manoeuvres are executed by a manufacturer pilot, the manufacturer test pilot is equipped with one or more on-board video cameras to record control movements and accelerator use.

Together with detailed specifications on camera positions within the flight test rules.

Add:
9.4.5.4 flight test videos of the XS wing tested by the independent test organization are to be submitted to CIVL where they will be reviewed by the CIVL paragliding competitions panel and made available for inspection by other manufacturers, other test organisations and NAC team managers at least 1 month prior to any CAT1 event.