

# **Comment Response Document: CAP 482 BCAR Section S Update**

CAP2548

A large, abstract graphic composed of overlapping blue and purple shapes, resembling a stylized wing or a modern architectural element, occupies the lower half of the page. It features a gradient from light blue to dark blue and purple, with curved edges and a layered effect.

Published by the Civil Aviation Authority, 2023

Civil Aviation Authority  
Aviation House  
Beehive Ring Road  
Crawley  
West Sussex  
RH6 0YR

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Published May 2023

Enquiries regarding the content of this publication should be addressed to: [ga@caa.co.uk](mailto:ga@caa.co.uk)

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## Chapter 1

## Summary

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- 1.1 A six-week public consultation on CAP 482, British Civil Airworthiness Requirements (BCAR) Section S (Small Light Aeroplanes), was published in July 2022 and sought comment on the proposed changes to CAP 482 as a result of the 2021 revised microlight aeroplane definition. The consultation did not ask any specific questions and instead allowed for free text responses. Comments could be submitted via the online consultation platform or by email.
- 1.2 The CAA received a total of 124 separate responses to the consultation. Each response was considered by the Working Group, which consisted of the Civil Aviation Authority (CAA), Light Aircraft Association (LAA), and British Microlight Aircraft Association (BMAA).
- 1.3 After consideration of the comments received, some of the original changes proposed in the consultation were amended and our rationale is explained within this Comment Response Document (CRD).

## Chapter 2

## Comments and Responses

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- 2.1 In responding to the consultation comments, the following standard classification system has been applied to reflect the Working Group’s agreed position:
- 2.2 **Accepted** — the Working Group agrees with the comment and any proposed amendment is reflected in the revised text.
- 2.3 **Partially Accepted** — the Working Group partially agrees with the comment and any proposed amendment is partially reflected in the revised text.
- 2.4 **Noted** — the Working Group acknowledges the comment, but no change to the text is considered necessary.
- 2.5 **Not Accepted** — The premise behind the comment or proposed amendment is not shared by the Working Group.

### Responses to Consultation Comments

- 2.6 The table below contains a representative subset of the substantive comments received from the consultation. Identifying information has been removed to preserve anonymity. Where identical or similar submissions were received, only one instance of the comment has been included. A small number of the consultation comments were not directly associated with the consultation topic and are therefore not represented in the table below.

**Comment ID 01** 600kg rule for microlight aircraft is excellent

**Classification** **Noted**

**Response** Thank you for your contribution.

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**Comment ID 02** Many microlight pilots do not hold an FRTOL licence, not a requirement for microlights.

There is no requirement for students to sit an RT exam paper, indeed there isn't an exam paper in the microlight world.

The lack of this requirement is apparent in the standard of phraseology used by those pilots who continue to operate without the relevant licence.

Now that the microlight class is up to to 600KG I think it's time to introduce a requirement to hold an FRTOL in the ANO

**Classification** **Noted**

**Response** Thank you for your contribution. This comment relates to flight crew licencing rather than the airworthiness requirements contained in BCAR Section S or the proposed changes thereto.

However this comment does fall within the scope of the CAA GA Pilot Licensing & Training Simplification project. An initial consultation ran in Autumn 2022 (CAP2335), which confirmed community support for embarking on the next phase of reforming the Sub-ICAO aeroplane licences/ratings (including the microlight rating) into a single Sub-ICAO licence. This comment has been forwarded to that project for consideration in that process.

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**Comment ID 03** For microlights, the current standards and oversight thereof by the BMAA & LAA have proven to be sufficient in maintaining an excellent safety record. Nearly all recorded microlight incidents are to do with issues not involving the structure or maintenance of the airframes. Instead, they are human factor, loss of control, or outside the aircraft issue related.

Therefore, there is no need to change the standards or, in particular,

ongoing maintenance/inspection regimes. Any such would merely increase cost and complexity, with no discernible safety benefit.

**Classification**      **Noted**

**Response**

Thank you for your contribution. BCAR Section S specifies the minimum design requirements for the issue of a Permit to Fly (initial airworthiness) and does not consider maintenance (continuing airworthiness). The purpose of this update is to ensure the initial airworthiness requirements are appropriate for the expanded microlight definition, incorporated into law in the 2021 amendment to the Air Navigation Order.

Additionally, the review seeks to harmonise Section S with other design codes (e.g. LTF-UL and UL-2) where appropriate to facilitate the import/export of aircraft. Furthermore, Section S was already insufficient for higher performance aircraft and required supplemental requirements from other design codes (e.g. CS-VLA) to be used. The update to Section S seeks to address this without impacting other aircraft.

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**Comment ID 04**

I think the BMAA do a fantastic job keeping the fleet of aircraft safe. With a proven track record. I do not think the BMAA maintenance regimen needs an overhaul have good safety and oversight using very experienced aircraft inspectors. It would be impossible to replicate the practical experience and knowledge the people have in a different manner and still be cost effective. Further legislation will stifle a blossoming and vibrant aviation community at a time when inflation is runaway

**Classification**      **Noted**

**Response**

Thank you for your contribution. BCAR Section S specifies the minimum design requirements for the issue of a Permit to Fly (initial airworthiness) and does not consider maintenance (continuing airworthiness). The purpose of this update is to ensure the initial airworthiness requirements are appropriate for the expanded microlight definition, incorporated into law in the 2021 amendment to the Air Navigation Order.

Additionally, the review seeks to harmonise Section S with other design codes (e.g. LTF-UL and UL-2) where appropriate to facilitate the import/export of aircraft. Furthermore, Section S was already insufficient for higher performance aircraft and required supplemental

requirements from other design codes (e.g. CS-VLA) to be used. The update to Section S seeks to address this without impacting other aircraft. Thank you for your contribution. BCAR Section S specifies the minimum design requirements for the issue of a Permit to Fly (initial airworthiness) and does not consider maintenance (continuing airworthiness). The purpose of this update is to ensure the initial airworthiness requirements are appropriate for the expanded microlight definition, incorporated into law in the 2021 amendment to the Air Navigation Order.

Additionally, the review seeks to harmonise Section S with other design codes (e.g. LTF-UL and UL-2) where appropriate to facilitate the import/export of aircraft. Furthermore, Section S was already insufficient for higher performance aircraft and required supplemental requirements from other design codes (e.g. CS-VLA) to be used. The update to Section S seeks to address this without impacting other aircraft.

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**Comment ID 05** Microlighting is a low cost form of flying that allows people to get airbourne for a lot less than flying C of A aircraft. The spirit of microlighting is learning all about your aircraft, how to fix it when it goes wrong and low cost flying.

The increase in weight limit, we were led to believe, was to allow for greater structural safety and the ability to carry a passenger and a reasonable amount of fuel/baggage. Bringing microlighting maintenance costs up will destroy the sport entirely as it defeats the object of flying an aircraft in such a category and will hugely damage the industry as well as residual prices for current owners.

**Classification:** **Noted**

**Response** Thank you for your contribution. BCAR Section S specifies the minimum design requirements for the issue of a Permit to Fly (initial airworthiness) and does not consider maintenance (continuing airworthiness). The purpose of this update is to ensure the initial airworthiness requirements are appropriate for the expanded microlight definition, incorporated into law in the 2021 amendment to the Air Navigation Order.

Additionally, the review seeks to harmonise Section S with other design codes (e.g. LTF-UL and UL-2) where appropriate to facilitate the import/export of aircraft. Furthermore, Section S was already insufficient for higher performance aircraft and required supplemental requirements from other design codes (e.g. CS-VLA) to be used. The update to Section S seeks to address this without impacting other aircraft.

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**Comment ID 06** Feel that these proposals would potentially increase costs for me. Regulation by CAA would be a retrograde step when BMAA manage regulation in such a way that enables me to continue flying. It isn't broken so don't fix it !

**Classification** **Noted**

**Response** Thank you for your contribution. None of the changes to BCAR Section S will affect how the fleet is overseen in terms of CAA involvement. Furthermore, BCAR Section S only covers the minimum design requirements for the issue of a Permit to Fly (initial airworthiness) and does not consider maintenance (continuing airworthiness) requirements, therefore the changes should not impact maintenance costs

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**Comment ID 07** Existing 450kg systems and regulations are absolutely fine for 600kg aircraft.

Perhaps if any new special things appear on these aircraft such as IFR certification, autopilot or twin engines then more regulation would be appropriate but otherwise there must be no hoop jumping or costs.

**Classification** **Not Accepted**

**Response** Thank you for your contribution. The WG disagrees with the comment and considers that a review of the airworthiness requirements in BCAR Section S is necessary following the introduction of heavier microlights.

Additionally, the review seeks to harmonise Section S with other design codes (e.g. LTF-UL and UL-2) where appropriate to facilitate the import/export of aircraft. Furthermore, Section S was already

insufficient for higher performance aircraft and required supplemental requirements from other design codes (e.g. CS-VLA) to be used.

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**Comment ID 08** 600kg rule for microlight aircraft is excellent Are there any plans to raise allowable MTOM in the SSDR category?, specifically for aircraft already meeting BCAR S airworthiness requirements for a microlight but who's owners wish to operate single seat at lower weights than they they are currently permitted at when 2 seat but slightly above the rather low MTOM of the current SSDR definition ?

**Classification** **Noted**

**Response** Thank you for your contribution. There are currently no plans to increase the allowable MTOM for the SSDR category beyond the current limits. For more information about the rationale for excluding SSDRs from the 600kg weight increase, see Chapter 3 of CAP2163: Reforming the microlight aeroplane category: implementation and key decisions, published 24 Aug 2021.

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**Comment ID 09** I feel the Section S regulations for the new 600kg light sport microlights should be as light and proportionate as possible, and guided by the BMAA, given the association's safety record.

As suggested by the BMAA, they should also align as closely as possible with the Czech and German regulations, and as many other countries as possible, to allow for seamless import and export.

**Classification** **Noted**

**Response** Thank you for your contribution. Both the BMAA and LAA were part of the working group that reviewed BCAR Section S. One of the purposes of the review was to harmonise Section S with other relevant design codes (e.g. LTF-UL and UL-2) where appropriate to facilitate the import/export of aircraft.

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**Comment ID 10** We are already seeing 600kg microlight which will only allow a cockpit load less than 160kgs as they have incorporated all available options

in the build design. Also differences training requires specific itemisation as some pilots have "differences training complete" in their logbook despite only having completed one item. Variable/Constant Speed props are a common training item in differences but then the pilots (incl some instructors) think that they are covered for all systems.

**Classification**      **Noted**

**Response**              Thank you for your contribution. The expanded microlight definition should help manufacturers to design aircraft with a useable total occupant weight. S 25 of BCAR Section S specifies the minimum value of the maximum occupant weight that manufacturers must adhere to.

The other comments relate to flight crew licencing aspects rather than the airworthiness requirements contained in BCAR Section S or the proposed changes thereto.

**Comment ID 11**      The 600kg and alignment to the Czech and German codes is excellent. I look forward to see new aircraft in the light sport microlight category in the UK

**Classification**      **Not Accepted**

**Response**              Thank you for your contribution.

**Comment ID 12**      I agree with the modifications as proposed but believe the higher MTOW of amphibians should be extended to aircraft with a ballistic recovery parachute system.

These systems impose a considerable weight penalty but are probably one of the best advances in GA safety in decades. Designers / builders / owners should not be discouraged from incorporating them due a decrease in useful load.

**Classification**      **Noted**

**Response**              Thank you for your contribution. The purpose of this revision to Section S is to update the initial airworthiness requirements for microlights to ensure they are appropriate for the revised ANO

microlight definition. Revising the ANO microlight definition to allow an increased MTOW for landplanes with recovery parachute systems is outside the scope of this update and would require a change to the ANO definition. Additionally, such a change would be out of step with other equivalent design codes (e.g. LTF-UL and UL-2) and may lead to harmonisation issues.

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**Comment ID 13** I have recently been involved in the initial feasibility study of a 600kg electric microlight aircraft designed to meet CAP 482 requirements. The weight increase from 450kg (2 seat) to 600kg (1 or 2 seat) allows reasonable range performance with a battery electric powertrain. However, I would like to see clear guidance on what testing would be required to satisfy the CAA on safe design and manufacture of li-ion battery cells & packs.

**Classification** **Noted**

**Response** Thank you for your contribution. This is outside the scope of the current update to Section S, but it is likely that the next major update to Section S will accommodate electric aircraft.

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**Comment ID 14** I believe the new minimum pilot weight of 70kg is far too high. Whilst there are a lot of heavier pilots as one who is only 49kg expecting me to carry ballast safely and securely of over 20kg is unrealistic. Not everyone is overweight. 55kg is acceptable and manageable.

I don't understand why the name of Section S is not Microlights rather than small light aeroplanes.

**Classification** **Accepted**

**Response** Thank you for your contribution. The 70 kg minimum pilot weight was introduced for harmonisation reasons. However, to avoid penalising lighter weight pilots, the 55 kg minimum pilot weight has been reinstated, and for pilot weights up to 70 kg it will be acceptable for the manufacturer to use secured ballast for balance and/or minimum weight purposes.

The title of BCAR Section S will be changed to "Microlight and Small Light Aeroplanes".

- Comment ID 15**
1. With the increase in weight and strength why is there still a limitation on aerobatics? Surely it should be up to the manufacture and normal wing loading strength tests to show if the aircraft is fit for aerobatics. Many new types of SLA's are very strong and to prohibit aerobatics may force them into a different class
  2. Spin tests are a must to understand the spin characteristics of the aircraft. This is more important as the microlight training syllabus doesn't include spin training. Spinning should be include in the syllabus for both microlight and light aircraft.
  3. Max and Min Seat weights shouldn't be specified but rather left to the manufacture to test and provide details to be added to the Permit. This allows for W&B calculations and potentially opening the class up to heavier pilots who would normally fly light aircraft.

**Classification**      **Noted**

**Response**

Thank you for your contribution. Section S does not currently include sufficient requirements for aerobatic aircraft e.g. the strength requirements in sub-section C would require updating. There are also licencing implications with such a change. Aerobatic microlights are not something currently being considered, but this may change in the future if there is sufficient interest from the GA community.

The WG agreed a revised set of spinning requirements for Section S. Regarding spin recovery training for pilots, this is outside the scope of BCAR Section S as it relates to flight crew licencing.

Manufacturers are free to specify the maximum and minimum seat weights within the limits of Section S. The limits specified in Section S are primarily to prevent manufacturers selecting artificially low maximum weights and artificially high minimum weights.

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- Comment ID 16**
- The proposed spin testing is totally pointless. I don't believe any pilot who accidentally enters a spin will be able to recover. The cost of testing will add to the cost of the aircraft, achieving nothing beneficial. Spin recovery is not part of the PPI or microlight licence training, so how is someone supposed to know what to do, never mind be current? A satisfactory solution would be for the aircraft to be deemed to be spin resistant, perhaps at a specified slip angle at the stall.

**Classification**      **Not Accepted**

**Response**      Thank you for your contribution. The WG did not agree with this approach and has retained a revised set of spinning requirements. Although spin recovery training is not part of the PPL/NPPL syllabus, there is a safety benefit to designing aircraft with benign stall and spin characteristics to aid recovery from unintentional spins.

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**Comment ID 17**      We appreciate the initiative and would like to see rules as close to the German LTF-UL as possible. The LTF-UL is very demanding already and statistics show that there are very little accidents caused by technical issues. Just take the LTF-UL and add spin testing as requirement.

**Classification**      **Noted**

**Response**      Thank you for your contribution.

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**Comment ID 18**      Any improvements which facilitate the easy importation of Light Sport Aircraft, without lowering the safety factors/standards for pilots, are essential, and should be allowed without the importer/agent having to become a so called manufacturer as per "Section S". As long as the manufacturer meets CAA UK standards and specifications.

**Classification**      **Noted**

**Response**      Thank you for your contribution.

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**Comment ID 19**      Page 7 Preamble. In describing issue 8 of Section S, rather than saying that this issue accommodates the revised microlight definition 'which raised the MTWA of these aeroplanes to 600 Kg', we suggest that to avoid possible misinterpretation this should read that this issue 8 'accommodates the revised microlight definition which now includes scope for certain aeroplane types of up to 600 Kg MTWA for a landplane and 650 Kg for an amphibian or floatplane'.  
Page 10 S2 Applicability. Although this wording does reflect the new microlight definition, it is suggested that the new wording 'not

exceeding 650 kg for an amphibian or floatplane' should in addition clarify that 'floatplane' in this context includes seaplanes which are not necessarily floatplanes, ie of the flying boat type. The word floatplane implies an aircraft with separate floats rather than one in which the fuselage is also the hull.

Page 12 S23(b) and S25 (b) Load Distribution and Weight Limits – and associated AMC material. Whilst it does seem appropriate to raise the standard maximum pilot weight to reflect increasing numbers of people weighing more than 90 Kg, the increase in the standard minimum pilot weight from 55 to 70 Kg seems likely to undesirably exclude a significant proportion of the lighter adult population and/or increase the risk of pilots of light weight inadvertently operating the aircraft outside of its permitted weight and cg envelope. It is recommended that the minimum pilot weight be retained at 55 Kg but that ballast may be used to remain within the weight and cg envelope if a pilot of less than 70 Kg is carried, providing that the aircraft includes specific provision for fitting this ballast (eg a water ballast container or ballast mounting pad) and the circumstances where ballast is needed are made clear in the POH and by placard(s).

AMC S25 Weight limits. It seems unduly proscriptive to require that the fuel payload requirement be based on the engine manufacturer's stated fuel consumption at max continuous engine power, when the installation into the aeroplane might well prevent this power level being achieved in level flight (for example due to the common choice of using a coarse pitch propeller). It is recommended that the AMC material instead of saying 'Maximum continuous power should be based on the engine manufacturer's data' should say 'Fuel consumption should be based on the consumption at the engine's maximum continuous power based on the engine manufacturer's data, or on the measured consumption when cruising at the maximum continuous power setting specified in the aircraft's POH'.

S155 (a) Pitch Control Force in manoeuvres. It is recommended that it be clarified that the minimum stick force of 7dN refers to reaching the positive limit manoeuvring load factor, ie it does not apply to reaching the negative limit manoeuvring factor. Suitable wording can be found in VLA 155.

S221 Spinning. The requirement to carry out spin testing has been a significant impediment to the approval of types of aircraft emanating from other countries where this is not required. In view of the lack of spin training for a microlight PPL meaning that pilots may not be able to carry out spin recovery actions in an emergency, it is recommended

that an alternative means of compliance be included negating the requirement for spin testing to be carried out for aircraft which either:

A. Are fitted with a ballistic parachute where the installation meets appropriate requirements over and above those in Sub-part K to ensure that it is fit for purpose (eg the German LTF-UL requirements) or

B. The aircraft has been shown to be spin resistant in accordance with appropriate requirements (eg F2245-212d 4.5.9.4)

AMC S221 (b) For clarity suggest that 'High power tests should be performed using at least 75% of take-off power at ISA sea level' be changed to 'High power tests should be performed using at least a power setting equivalent to 75% of the take-off power that would be obtained at ISA sea level'.

AMC S201 and AMC S221 (b) It is recommended that the power setting used for power-on wings-level stalls and power-on spin entries need not include power settings that result in an extreme nose up attitude involving a deck angle of more than 30 degrees. This reflects the approach stated in CS-23.201/221 and in the Flight Test Guide to CS-23 which states under 23.201 that 'an extreme nose up attitude is normally considered to be a pitch attitude of more than 30°'. This recommendation is included because the high power to weight ratio of some microlights can otherwise result in unrepresentative power-on stall and spin entries.

S301 (d) Gust Loads. Gust loads should be required to be applicable to any aircraft with a Vd over 140 knots, irrespective of the MTWA, as in previous issues of BCAR Section S.

S333(c) (1) and (2) Gust Loads. The use of the phrase 'must be able to withstand' in the wording 'the aeroplane must be able to withstand positive (up) and negative (down) gusts of .....

.....' seems woolly and it is recommended in both instances be replaced by 'the aeroplane must be designed such that encountering positive (up) and negative (down) gusts of .... does not cause limit loads to be exceeded'.

S331 (d) (3) Spanwise load distribution – reference to AMC material AMC 337 (1) (a). Assuming a spanwise lift distribution proportional to the wing local chord, as provided for here, may be significantly non-conservative for non-cantilever wings because it will tend to underload the portion of wing inboard of the strut or bracing wire attachments. It is recommended that this distribution be offered for cantilever wings only. For non-cantilever wings a Shrenk distribution or other distribution accounting for wingtip losses would be appropriate.

AMC material stated in AMC 337 would seem more applicable to S331.

AMC S411 The description of 'bending resistance tests' is inappropriate here, we recommend substituting 'control system flexibility tests'.

AMC S411 We suggest the statement 'No part of the control system should be shortened or prolonged by more than 25% when subject to loads stated in S395' is confusing as it appears to refer to an individual part (eg a pushrod or cable) rather than to the total system from end to end. Recommend replace with 'No control system should suffer a relative deformation of more than 25% when subject to the loads stated in S395, where relative deformation is as defined below'.

AMC S441 Offers the alternative of complying with CS-VLA Appendix A for fin manoeuvring loads S441 but in a similar manner we would strongly recommend offering the alternative of complying with CS-VLA Appendix A to complying with tailplane balance, manoeuvre and gust loads under S421, S423, S425, S427, and fin manoeuvre and gust loads under S441, S443, combined fin and tail loads under S447 and aileron loads under S455 which would provide a much simpler alternative approach consistent with higher codes including CS-VLA, CS-23, FAR 23 and ASTM F2245 and help greatly with the approval of types already designed to comply with one of these codes.

AMC S441 'Compliance with CS VLA Appendix A will be accepted in lieu of BCAR S 441 (c).' However there is no S441 (c) and clarity is required as to whether this in fact refers to S441 (a) or (b).

S473 'The ground load requirements of this subpart must be complied with at the design maximum weight'. The maximum weight condition may not create the maximum loads – for example the nosewheel loads may be higher at light weight and forward cg. It is recommended that this wording is changed to say that for the purposes of this subpart, the aircraft must be considered to be loaded to the loaded weight and centre of gravity position resulting in the largest loads on the components being considered.

S901 (b) (3) Engine installation. The new requirement for 'the engine to be installed to 'meet' (?) the engine manufacturer's requirements' is unduly proscriptive as there are often circumstances where an airframe manufacturer may choose for good reason to vary from the engine manufacturer's recommendations in some respects. Recommend changing to 'the engine must be installed in a manner to

comply with the intent of the engine manufacturer's installation instructions' or 'in accordance with proven aircraft design practice'.

S977 Fuel Filter. While the intent of the new text regarding fuel filters, taken from CS-VLA, is laudable, it is difficult to see how it could be interpreted as to 'particle density' requirements for the contaminant. Engine manufacturers typically call for a mesh size on fuel filters but not the area of the filter element which is the other critical factor in determining the amount of contaminant that the filter can accumulate without creating reduced fuel flow. Suggest delete reference to particle density.

S2085 Ballistic parachute operating data and procedures. A bi-product of deleting this requirement altogether is to remove the need for the normal operating procedures for the ballistic chute to be described in the operating manual, which seems a mistake (insofar as triggering a ballistic chute opening can ever be considered 'normal'). However, it also seems a mistake to delete the warning to users of the fact that unlike other elements of the aircraft, the ballistic parachute installation has not been proven or even necessarily designed to ensure a safe emergency descent. An abbreviated version of the existing requirement S2085 would be preferable rather than deleting it.

## Classification

**Accepted**

## Response

Thank you for your contribution.

Preamble - The proposed change was agreed.

S 2 a) 2) - The proposed change was agreed.

S 23(b) and S 25(b) – To avoid penalising lighter weight pilots, the 55 kg minimum pilot weight has been reinstated, and for pilot weights up to 70 kg it will be acceptable for the manufacturer to use secured ballast for balance and/or minimum weight purposes.

AMC S 25 – The AMC text has been updated to state: "Fuel consumption should be the consumption at the maximum continuous power specified by the engine manufacturer. However, if the design of the engine installation prevents the engine developing the maximum continuous power specified by the engine manufacturer in level flight, then the maximum fuel consumption achievable in level flight may be used instead."

S 155 a) - The proposed change was agreed.

S 221 - A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with

very benign stall characteristics or fitment of a parachute recovery system.

AMC S 201 and AMC S 221 b)- The proposed changes were agreed.

S 301 d) - The proposed change was agreed.

S 333 c) 1) and 2) - The proposed change was agreed.

S 331 d) 3) and AMC S 337 - Agreed to change AMC S 337 such that it becomes the AMC for S 331 d) 3). The wording of paragraph 1) a) of the AMC for rigid-wing aircraft has also been updated to ensure it is conservative for non-cantilever wings.

AMC S 411 - The proposed changes were agreed.

AMC S 441 – Agreed that CS-VLA Appendix A may be used as an alternative to the requirements in S 321 to S 455. This change has been introduced via S 301 d). AMC S 441 has therefore been deleted.

S 473 - The proposed change was agreed.

S 901 b) 3) – Agreed to delete the requirement and add it as AMC instead.

S 977 a) - Agreed to reinstate the text.

S 2085 and AMC S 2085 - Agreed to reinstate the requirement and associated AMC.

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**Comment ID 20**

We have for 3.7 decades sold planes all over Europe. What we find frustrating and often an added cost is proving compliance to individual aircraft standards. The dream would to have everyone on the same page and be well aligned with our standards in the USA. Apart from a slim hope from that being a reality, we can hope for more unilateral standards between the USA and UK. I can understand it is partly a comfort factor based off being familiar with standards that have been in place for many decades. However for the UK CAA to accept the USA flight standards for our class of planes is not a great stretch, since compliance differences have been only a few issues. In the meantime planes that the UK stalls or rejects certification are accepted in many other countries. We wholeheartedly would like to support the UK on making certification of past and up and coming models and process we all can be happy with!

**Classification**      **Accepted****Response**

Thank you for your contribution. One of the reasons for this update is increased harmonisation with other design codes, primarily LTF-UL and UL-2, to facilitate the import/export of aircraft generally. Whilst closer alignment between the UK and US would have benefits, there are some fundamental differences between the US and UK that lead to a different general aviation regulatory landscape (e.g. geographical size and population density). It is hoped that the changes introduced at this revision will facilitate closer cooperation generally.

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**Comment ID 21**

Changes to the basic microlight definition - this seems a done deal anyhow, so I am not commenting on that specific aspect.  
S23(b) and S25 - I do not see any justification for increasing minimum pilot weight for CG range calculation from 55kg to 70kg. Whilst the population is certainly getting fatter, not all of them - and inclusion of CG calculation is not so far as I know projected for the PPL(M) syllabus, nor could it easily be introduced retrospectively. In my opinion the present 55kg value should remain. I do however fully concur with the proposal to increase maximum weights in the manner proposed.

S143, the terms "slight deviations" and "average pilot strength" are used without definition or explanation of how they should generally be determined. This creates a minefield, and such vagueness has no place in an airworthiness standard. This wording needs tightening up with some meaningful definitions provided somewhere. Is it not also long overdue that Section S, like some other codes, differentiated between pitch and roll inputs at a stick and yoke?

S155(a) should refer to \_pitch\_ control force.

S155(b)(1) introduces a new value of 5daN which is a very low value, if anything I'd expect a larger value here than the 7daN for conventional control systems. No justification for this has been provided. I cannot support this and would much prefer a return to the wording contained in issue 7.

S221, I was the author of the original Section S spinning requirements introduced at Issue 2 in 1999. This appears to me in line with the original intent of our work then and I support it. However, I am deeply concerned at the introduction of a GA opposite-rudder spin recovery in the AMC. Substantial research work was done in the late 1990s

showing that microlight aeroplanes designed for excellent low speed / high AoA handling favoured a rudder central spin recovery, and could be kicked into a spin in the opposite direction by opposite rudder. This was published, amongst other places, in BMAA TILs and a paper to the Society of Experimental Test Pilots. This radical change requires justification by reference to research that I do not believe has been published.

S301(d) I agree with this.

S333. I am interested to note that this has introduced gust envelope requirements that did not previously exist in Section S (except de-facto with a requirement to introduce them in aeroplanes with  $V_d > 140$ kts at which point VLA kicked in). Yet it retains the higher 4g limits that were used in Section S to avoid the nauseum of having to construct a gust envelope. Therefore we now have a standard here which is higher than either VLA or part 23. This seems indefensible for a lower cost and complexity standard aimed at simpler aeroplanes approved to national Permit to Fly standards. This needs re-work.

S474. This was useful best-practice advice, and I do not see the justification for its removal.

S1323 will create a huge amount of work for aircraft developers for no good value. The microlight community has managed for decades on the understanding that so long as ASI errors are known and accounted for, it doesn't matter how big they are. Blindly copying this requirement from CS.23 as appears to be the case adds considerable cost and nuisance to programmes, for no safety benefit.

S1365(c) was introduced originally around issue 3 to address a genuine safety concern. I see no justification for its removal.

S2001-3 / parachute system requirements. This is substantially more onerous than previous, and may prevent many systems being fitted altogether. It has changed, without to my knowledge published justification of the basic philosophy behind fitment of ballistic parachutes to microlights. I am very unhappy about this.

Overall, I find this set of amendments immature, unfit for use, and in need of significant review. I do not support their implementation without further and proper consultation.

**Classification****Partially Accepted****Response**

Thank you for your contribution.

S 23(b) and S 25 – The 70kg minimum pilot weight was introduced for harmonisation reasons. However, to avoid penalising lighter weight pilots, the 55 kg minimum pilot weight has been reinstated, and for pilot weights up to 70 kg it will be acceptable for the manufacturer to use secured ballast for balance and/or minimum weight purposes. The WG also pointed out that mass and balance calculations are included in the training syllabus for microlight pilots.

S 143 – The WG agreed to revert the last sentence of sub-paragraph b) to the previous wording. Additionally, sub-paragraph d) has been reworded to remove reference to “average pilot strength”.

S 155 a) and b) 1) – For sub-paragraph a) the proposed change was accepted. For sub-paragraph b) 1), it was agreed to revert the text back to that of issue 7.

S 221 – The AMC has been updated to recommend the ‘centralise controls’ technique if appropriate for a given type. The standard PARE technique is also included for reference.

S 333 – Introducing the gust envelope requirements in addition to the 4g limits brings Section S in alignment with UL-2 and LTF-UL as well as CS-LSA, except that Section S is more proportionate in only applying gust load requirements to aircraft with Vd exceeding 140 kts.

S 474 – Sub-paragraphs a), b), c), and d) of what was S 474 are retained in S473. Only sub-paragraphs e) and f) have been deleted. For sub-paragraph e), the WG agreed that it may not always be beneficial to have the tail wheel or skid be designed to come off. For sub-paragraph f), it was agreed that the bicycle undercarriage configuration is rare and approval of such configurations in the future will be handled on a case-by-case basis.

S 1323 – The WG disagreed with the comment. A calibrated ASI provides a valuable safety benefit for pilots in the form of accurate and reliable airspeed measurement. This is especially important to avoid over-reading true airspeed.

S 1365 c) – The content of 1365 c) has been retained as AMC to S1365 a).

S 2001 and S 2003 – For S 2001, the WG agreed to reinstate the second sub-paragraph. For the remaining requirements in Sub-Section K, the WG agreed to generally align with the approach in UL-2.

<b>Comment ID 22</b>	<p>I am concerned about the content of several parts of the BCAR S as there seems to be a change from previous understanding of the points below and I am worked there will be a Gold Plating of the Spec and prevent aligning with LTF UL and add extra costs to manufacturers trying to harmonise their production with no discernible increase in Flight or engineering safety.</p> <p>CAP 482 Section S draft Issue 8:</p> <p>S 155 Pitch control force in manoeuvres</p> <p>Make this the same as part b) unconventional control systems. This would also align with LTF-UL with a recommended minimum of 5daN.</p> <p>S 397 Loads resulting from limit pilot forces (See AMC S 397)</p> <p>Why the addition of the "Minimum limit pilot forces" these changes. It is unclear precisely what this requirement is trying to achieve.</p> <p>S 619 Special factors</p> <p>Align with UL-2; their wording and context are clearer</p> <p>S 221 Recovery from unintentional spins + AMC S 221</p> <p>The most significant problem for European harmonisation and a vast majority of manufacturers of current 600kg aircraft that are in use today across the world . Correct training and stall prevention is more required to overcome any tendency to inadvertently enter a spin and quick recovery at the incipient stage is more effective anyway. Therefore, additional mitigating recoveries like Ballistic recover Chutes and Stall warning systems are perfectly acceptable to the German and the Czech codes and this allows them to sell aircraft across the world .</p> <p>S 1191 Firewalls</p> <p>d) The firewall and shroud must be fireproof - What is the justification for such a dramatic change from fire resistance (5mins @ 1100oC) to fireproof (5mins @ 1100oC)? Suggest instead, MUST be fire resistance, but recommend fireproof.</p> <p>S 1193 Cowling and nacelle</p> <p>D This is not listed in UL-2 or LTF-UL, it is a light aircraft requirement from VLA, not a Microlight one. Should be removed.</p>
<b>Classification</b>	<b>Partially Accepted</b>
<b>Response</b>	Thank you for your contribution.

S 155 – The WG disagreed with the proposal to introduce a 5 daN control force for conventional control systems. Instead, the 7 daN control force has been retained with the option for it to be reduced if agreed by the CAA or an approved delegated organisation.

S 397 – The addition of the text “Minimum Pilot Forces” in the table was to make clear what loads are to be applied in S 395 a) 2) as this has caused confusion previously. To make this clearer, the column in the table has been renamed “60% of Maximum Pilot Force daN”.

In addition, sub-paragraph a) has been deleted as the content is adequately covered by S 395 and the other sub-paragraphs of S 397. The paragraph relating to unconventional control systems will be retained and has been moved below the table in S 397.

S 619 – The WG considered the existing text to be clear and therefore will not adopt the UL-2 wording. However, AMC S 619 b) has been updated to reflect the UL-2 wording regarding the factor of safety for composite structures.

S 221 – A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.

S 1191 d) – The change to fireproof aligns with other modern design codes including UL-2 and LTF-UL and has therefore been retained.

S 1193 d) – The WG consensus view was to retain this requirement as it reduces the spread of an engine fire. Furthermore, the changes make compliance more straightforward by allowing either fire-resistance or demonstrating that an additional fire hazard is not created.

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**Comment ID 23**

Dear Sir/Madam

With respect to the recently closed consultation on BCAR Section S, we would like to submit a late comment.

Comment

We suggest including the partial adoption of parts of CS22 appendix K (and its AMC) for powered sailplanes that are used for aerotowing (page 145 of CS22). This has minimum

performance/handling/strength/ergonomic and various other requirements/guidelines.

The parts that are appropriate would need to be agreed between the CAA, BMAA and BGA as subject matter experts.

Thanks for your consideration.

## Classification

**Noted**

## Response

Thank you for your contribution.

The WG noted that CS-22 Appendix K is already used as the basis when considering microlights for aerotowing sailplanes. However, it was agreed that Section S should be updated to formally include a supplement for this activity. A review of CS-22 Appendix K will be necessary to identify the relevant content to be incorporated into Section S. This activity is outside the scope of the current review but will be undertaken in a subsequent review of Section S.

## Comment ID 24

Dear Sir My comments re CAP 482 Section S, draft issue 8 are:

S25 Weight Limit: What would be the situation if a manufacturer opted for a lower pilot weight limit? What are the regulations for Certified Ballast?

S155 Pitch Control Force in Manoeuvres. The provisions of LTF-UL are well proven with an advised minimum of 5daN and the UK should try to harmonise. I believe this is what the original working group advised anyway.

S 397 Loads resulting from Minimum Limit Pilot Forces. I do not understand what the aim of this is?

S 619 Special Factors. I suggest you align the text with that proposed by the original Working Group to avoid further `inventing the wheel`.

S 201 Recovery from Unintentional Spins. The suggested text is ambiguous. My extensive experience confirms the classic RAF teaching that a wing drop at the stall can be arrested with judicious use of the rudder but insufficient to raise the wing. Excessive use of rudder can precipitate a flick in the direction of the rudder application. On no account should aileron be used as that can very quickly result in the aircraft flicking in the direction of the lower wing. This needs to

redrafted. The text used by the BMAA would be more than satisfactory and I suggest we align with it.

I trust that these comments will be helpful. (It is possible that you may get a further response from our team.)

**Classification**      **Partially Accepted**

**Response**            Thank you for your contribution.

S 25 - To avoid penalising lighter weight pilots, the 55 kg minimum pilot weight has been reinstated, and for pilot weights up to 70 kg it will be acceptable for the manufacturer to use secured ballast for balance and/or minimum weight purposes.

S 155 – The WG disagreed with the proposal to introduce a 5 daN control force for conventional control systems. Instead, the 7 daN control force has been retained with the option for it to be reduced if agreed by the CAA or an approved delegated organisation.

S 397 – The addition of the text “Minimum Pilot Forces” in the table was to make clear what loads are to be applied in S 395 a) 2) as this has caused confusion previously. To make this clearer, the column in the table has been renamed “60% of Maximum Pilot Force daN”.

In addition, sub-paragraph a) has been deleted as the content is adequately covered by S 395 and the other sub-paragraphs of S 397. The paragraph relating to unconventional control systems will be retained and has been moved below the table in S 397.

S 619 - The text in the consultation document reflects the WG consensus view. The WG has since agreed to also update AMC S 619 b) to reflect the UL-2 wording regarding the factor of safety for composite structures.

S 201 – It was noted that the comment refers to S 201, but quotes the title, “Recovery from Unintentional Spins”, from S 221. The WG considered the comment in the context of S 221. A revised set of spinning requirements has been introduced, which includes AMC material on recovery techniques based on the widely accepted centralise controls approach.

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**Comment ID 25**      Dear CAA,  
Title of the document is wrong, using the term Small Light Aeroplane does not align with anything, the term should be Microlight Aeroplane

as the term Microlight is defined in the Air Navigation Order. Also people are familiar with the term Microlight and also make Microlight aircraft. It also avoids confusion for people who are looking for the Microlight Airworthiness Requirements, so common sense should see the name changed.

S155 Pitch control force in manoeuvres

- a. The final figure has been unchanged at 7daN which is at odds with the German code and also the Czech code. Early discussions had indicated that 5daN would be proposed to help align but now gone this goes against the original ethos of aligning the codes where possible.
- b. This now has a defined limit of 5daN which is an addition to the previous section S, suggest that this change is removed and revert back to the previous as it also allows for any different control systems not yet imagined.

S221 Possibility of an acceptable means of compliance, although this could be a work in progress so appear as a future issue. Obvious acceptable means of compliance is a stall warner and ballistic recovery parachute. Flight testing should also include abused stall testing to see what characteristics the aircraft may have, details included in the Pilots Operating Manual.

S301 d) Gust loads should be applicable only to aircraft with a design maximum speed VD exceeding 140kt EAS.

AMC S411 We suggest the statement 'No part of the control system should be shortened or prolonged by more than 25% when subject to loads stated in S395' is confusing and what is meant is 'No control system should suffer a relative deformation of more than 25% when subject to the loads stated in S395, where relative deformation is as defined below'.

S441 b) first line appears to be incomplete should add "to withstand the following conditions:"

AMC S441 Offers the alternative of complying with CS-VLA Appendix A for fin manoeuvring loads S441 but in a similar manner we would strongly recommend offering the alternative of complying with CS-VLA Appendix A to complying with tailplane balance, manoeuvre and gust loads under S421, S423, S425, S427, and fin manoeuvre and gust loads under S441, S443, combined fin and tail loads under S447 and aileron loads under S455 which would provide a much simpler alternative approach consistent with higher codes including CS-VLA,

CS-23, FAR 23 and ASTM F2245 and help greatly with the approval of types already designed to comply with one of these codes.

AMC S441 'Compliance with CS VLA Appendix A will be accepted in lieu of BCAR S 441 c).' However there is no S441 (c) and clarity is required as to whether this in fact refers to S441 (a) or (b).

S619 Add into the AMC for Composite Factors a similar interpretation to the Czech code to cover the "Unless otherwise provided" factor. At the moment the interpretation is 2.25 for everything that is composite which has not been applied universally, most people miss the "Unless otherwise provided" part or at least its meaning. Other option is to specify when 2.25 should be used etc although this could be harder to achieve. See Czech requirements below:

Interpretation of additional safety factors for composite constructions:

The safety factor  $f$  for composite construction ranges from 1.5 to 2.25, i.e. the additional safety factor range from 1 to 1.5.

The use of additional safety factor depends on:

- 1) part or component to which it will be related,
- 2) accuracy of calculations and their reliability,
- 3) submitted tests of composite materials samples and the results of tests,
- 4) production check, control procedures and experience of the manufacturer.

The Technical Commission in cooperation with the senior technician and oponent expert of the project must decide whether appropriate additional safety factor will be used. In case of amateur constructions the senior technician together with the construction supervision technician must decide about the additional safety factor.

AMC S626 Last line needs to add "or an approved delegated organization."

S901 b)3) this should be a recommendation only as there may be valid reasons for not being able to meet all of the engine manufacturers installation requirements.

S1323 suggest the error limit in knots or mph.

S2001 The removal of this statement is problematic as it implies that any such system will work and if it doesn't then who is responsible,

liability problems. Either leave this statement in there or something else, at the very least the last sentence should be put back.

S2003 a) 1) Very firm requirement, again how would you prove this in every case?

S2081 Reinsert paragraph S2085

S2085 This needs to be reinserted or needs to have some kind of warning as the systems will not have been demonstrated to work. Add an example placard to AMC S2085.

Paragraph S2081 and S2085 Operating Data and Procedures

What is the justification for removal of this warning, as the statement is correct and owners/operators should be aware of this.

**Classification**      **Partially Accepted**

**Response**            Thank you for your contribution.

S 155 – For sub-paragraph a) the WG disagreed with the proposal to introduce a 5 daN control force for conventional control systems. Instead, the 7 daN control force has been retained with the option for it to be reduced if agreed by the CAA or an approved delegated organisation. For sub-paragraph b) 1), it was agreed to revert the text back to that of issue 7.

S 221 – A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.

S 301 d) – The proposed change was agreed.

AMC S 411 – The proposed change was agreed.

S 441 b) 1) – The proposed change was agreed.

AMC S 441 – The WG agreed to allow the use of CS-VLA Appendix A as an alternative to the requirements in S 321 to S 455. This will be introduced via S 301. Therefore AMC S 441 will be deleted.

AMC S 619 – The WG agreed to amend the AMC to align with UL-2.

AMC S 626 – The proposed change was agreed.

S 901 b) 3) – The WG agreed to delete the requirement and add an AMC instead.

S 1323 – The proposed change was agreed.

S 2001 – The second paragraph has been reinstated.

S 2003 – The text has been reverted back to that of issue 7.  
Additionally, S 2005 has been updated to generally align with the approach in UL-2 i.e. specify requirements for loads induced by parachute deployment.

S 2081 – The proposed change was agreed.

S 2085 – The requirement and the associated AMC have been reinstated.

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**Comment ID 26**

Dear UK CAA

We would like to thank UK CAA for the opportunity to comment the the proposed changes in BCAR Section S. The possibility to use MTOM 600kg created on-off opportunity to align and harmonise the mostly used Airworthiness codes – Czech (UL-2) , German (LTF-UL) and BCAR Section S. This would be a great benefit for the manufacturers but also for owners and pilots, because the cost of certification could be significantly reduced. The Czech and German codes already have such alignment so we hoped to achieve this also with Section S.

For past few years the LAA CR was communicating this possibility with UK CAA and BMAA and UK LAA. We think that this alignment is still possible.

Our comments are focussed only in the areas where we see the biggest problem for alignment. We found following three requirements which will make the harmonisation difficult:

1. Minimum stick forces and gradient reduced.

S 155 Pitch control force in manoeuvres

We do not see alignment with Czech UL-2 in the proposed text. We think that the requirement for 7DaN is not necessary, LAA CR is using following definition and final approval is up to LAA test pilot. We consider this solution is more flexible and proved to be sufficient.

UL 2 § 155 Elevator control forces exerted during manoeuvres

During turns or when recovering from steady speed manoeuvres the aeroplane must prove such an increase of elevator control forces which is proportional to the load factor at all speeds at which the

required standard acceleration can be achieved without stalling, and at the same time with retracted wing flaps and landing gear (where applicable).

In case of aircraft controlled by weight shifting or any other unconventional method, the pilot force necessary to reach the limit load must be agreed upon with the relevant authority.

S 397 Loads resulting from limit pilot forces

We do not see alignment with Czech UL-2 in the proposed text. LAA CR is using following definition:

UL 2 § 395 Control Systems

All parts of primary control system between the back stop and control surface have to be designed for loads corresponding to at least 125% of the control surface load stipulated in UL 2 § 423, UL 2 § 441 and UL 2 § 455.

In no case the load of any part of the control system can be lower than 60% of the pilot force as stipulated in UL 2 § 397.

UL 2 § 397 Loads introduced through pilot force

The control systems for the direct control of the aircraft along its longitudinal, lateral, or yaw-axis (main control system) and other control systems affecting flight behaviour as well as supporting points must be designed as far as to the back stops to withstand limit loads defined in the table of pilot forces.

In case of unconventional control systems (i.e. side sticks) the relevant authority may accept reduced pilot forces provided the actuating forces stated in the table cannot be applied.

Control Applied Load [daN] Load application method (single lever control is assumed)

Pitch 35 Push/pull of control stick

Roll 20 Control stick movements sideways

Yaw and other foot controls 90 Forward pressure on single pedal (of yaw control)

The yaw control system must be designed for 90 daN load per each pedal while applying the forward pressure on both pedals.

2. Special factors

S 619 Special factors b)3

You still have special factor 2,25 if not stated differently

We do not see alignment with Czech UL-2 in the proposed text. LAA CR is using following definition:

Problem is 2,25 – we use  $f = 1,5$  up to 2,25 see :

UL 2 § 303 Safety factor

Interpretation of additional safety factors for composite constructions:

The safety factor  $f$  for composite construction ranges from 1.5 to 2.25, i.e. the additional safety factor range from 1 to 1.5.

The use of additional safety factor depends on:

- 1) part or component to which it will be related,
- 2) accuracy of calculations and their reliability,
- 3) submitted tests of composite materials samples and the results of tests,
- 4) production check, control procedures and experience of the manufacturer.

The Technical Commission in cooperation with the senior technician and opponent expert of the project must decide whether appropriate additional safety factor will be used. In case of amateur constructions the senior technician together with the construction supervision technician must decide about the additional safety factor.

3. Spin requirements – THIS IS THE REAL SHOW STOPPER!

S 221 Recovery from unintentional spins + AMC S 221

This is major problem for harmonisation and big problem for majority of manufacturers of current 600kg aircraft. We think that this requirement is the show stopper of our harmonisation effort.

The practical experience of couple of thousand aircraft produced and operated in Czech and Germany does not support requirement for mandatory spin testing, The prevention of spin is enough.

Please reconsider your spin requirements. We propose to use EASA ELOS-BLSA.0221-01.

I hope that you would be able to consider our proposals. Pdf version is enclosed together with EASA ELOS.

If you need any information, please let us know.

**Classification**      **Partially Accepted****Response**

Thank you for your contribution.

S 155 – The WG has opted to retain the 7 daN control force but also introduced the option for it to be reduced if agreed by the CAA or an approved delegated organisation. This approach has the benefit of stating an acceptable value for the control force whilst also allowing for reduced values to be accepted, which is more closely aligned with UL-2.

S 397 – The WG noted that the applied loads for pitch and roll in UL-2 397 are lower than BCAR S. Furthermore, applying 60% of these values as the minimum limit load is too low in the view of the WG. The current values in BCAR S are harmonised with other codes e.g. CS-VLA and will therefore be retained.

AMC S 619 – The WG agreed to amend the AMC to align with UL-2 and allow for the factor of safety of 2.25 for composite materials to be reduced upon agreement by the CAA or an approved delegated organisation.

S 221 – The WG agreed a revised set of spinning requirements that provide an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.#

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**Comment ID 27**      Dear CAA, My thoughts on CAP 482 Section S draft Issue 8:

S 25 Weight limits

b) 2) A pilot weight of 70 kg.

Presumably, manufacturers can still go less than 70kg if they choose. We have numerous lighter even than the current weight of 55kg who have to use "certified" ballast (which is a non-defined term, nor any guidance given).

S 155 Pitch control force in manoeuvres

a) For conventional control systems, the minimum control force to apply a normal acceleration to the aeroplane, resulting in a limit load on the structure, must not be less than 7 daN.

Make this the same as part b) unconventional control systems. This would also align with LTF-UL with a recommended minimum of 5daN. This is what the original working group recommended.

### S 397 Loads resulting from limit pilot forces (See AMC S 397)

I do not fully understand the addition of the "Minimum limit pilot forces" these changes. It is unclear precisely what this requirement is trying to achieve.

### S 619 Special factors

Align with UL-2; their wording and context are clearer (see below). This is what the original working group recommended.

### "UL 2 § 303 Safety factor

Interpretation of additional safety factors for composite constructions:

The safety factor  $f$  for composite construction ranges from 1.5 to 2.25, i.e. the additional safety factor range from 1 to 1.5.

The use of additional safety factor depends on:

- 1) part or component to which it will be related,
- 2) accuracy of calculations and their reliability,
- 3) submitted tests of composite materials samples and the results of tests,
- 4) production check, control procedures and experience of the manufacturer."

### S 201 Recovery from unintentional spins + AMC S 221

b) This should be 30o wing drop to align with the latest version of CS22 (which is where I believe this requirement came from in the first place. "Normal use of the controls" must be defined as this is open to interpretation. For example, one test pilot takes this to mean that (during the stall), normal use of the controls means using Aileron to correct a wing drop. The NPPL Microlight syllabus, from which all Microlight pilots are taught, says NEVER use Aileron. Ailerons must remain neutral and use Rudder to prevent/limit wing drop. I'd suggest defining it as what is taught in the NPPL(M) syllabus. Ditto with recovery technique. Not defining this sentence has led to wildly different interpretations and, indeed, results of whether an aircraft is considered to be compliant or not.

### S 221 Recovery from unintentional spins + AMC S 221

The most significant problem for European harmonisation and a vast majority of manufacturers of current 600kg aircraft. The consensus of the German & Czech industry does not support spin testing in

preference to thorough stalling and behaviour investigations, plus other mitigation techniques such as BPRS, POH guidance and physical alternations to the airframe such as buffet/stall strips, stall fences & VG's (to prevent and/or reduce wing drop).

#### S 901 Installation

3) meet the engine manufacturer's installation requirements.

Disagree with this requirement. There may be good and sensible reasons for an aircraft manufacturer not to comply with an engine manufacturer's installation requirement. Instead, better wording would be that the aircraft manufacturer must fully consider the engine manufacturer's installation requirements.

#### S 977 Fuel strainer or filter

This could be improved (difficult to understand) and does not consider fuel injection systems where you have a high pressure and low pressure side to the fuel system, each requiring a different approach regarding fuel filtration.

#### S 1191 Firewalls

d) The firewall and shroud must be fireproof

What is the justification for such a dramatic change from fire resistance (5mins @ 1100oC) to fireproof (5mins @ 1100oC)? Suggest instead, MUST be fire resistance, but recommend fireproof.

#### S 1193 Cowling and nacelle

d) Each part behind an opening in the engine compartment cowling must either be at least fire-resistant for a distance of at least 600 mm aft of the opening or be shown not to create an additional fire hazard.

This is not listed in UL-2 or LTF-UL, it is a light aircraft requirement from VLA, not a Microlight one. Suggest removing.

#### S 1323 Airspeed Indicating System

Suggest revising the units from km/h to knots

#### OTHER THOUGHTS & SUGGESTIONS

\* Change to code name to Microlight (rather than Small Light Aeroplanes). The current name is misleading and causes a lot of confusion. The ANO does not define Small Light Aeroplanes, and neither does Section S itself. Both the ANO & Section S does define the term "Microlight".

\* A significant BMAA aim was to increase alignment with Czech (UL-2) and German (LTF-UL). A key remaining and critical area where the UK differs is spinning (neither of the mentioned European Microlight codes require spin testing).

\* Development of other and new Acceptable Means of Compliance.

\* Max empty weight and BPRS:

\* For future purposes, it would be sensible to have the ability to increase Max empty weight (not MTOW) if an owner wishes to fit or upgrade their BPRS.

\* BMAA also prefers the previous section text for BPRS testing compared to the new wording (see S2085).

\* Recommend a lower Max seat load of 90kg from 472.5-525kg MTOW, alleviating issues for designers/manufacturers in this sweet spot. Otherwise, we are just actively encouraging heavier and heavier aircraft.

\* LAACR & DULV have indicated very strongly that they wish to have a three-way meeting on the future of European Harmonisation of Microlight standards. This must happen before Section S Issue 8 is set in stone.

I am grateful to the CAA for all the hard work that has gone into the draft issue 8, some excellent progress has been made. With a little more refinement, I am very hopeful for the future of UK Microlighting.

Thank you for the consideration of my points.

**Classification** **Partially Accepted**

**Response** Thank you for your contribution.

S 25 – To avoid penalising lighter weight pilots, the 55 kg minimum pilot weight has been reinstated, and for pilot weights up to 70 kg it will be acceptable for the manufacturer to use secured ballast for balance and/or minimum weight purposes.

S 155 – For sub-paragraph a) the WG disagreed with the proposal to introduce a 5 daN control force for conventional control systems. Instead, the 7 daN control force has been retained with the option for it to be reduced if agreed by the CAA or an approved delegated organisation.

S 397 – The addition of the text “Minimum Pilot Forces” in the table was to make clear what loads are to be applied in S 395 a) 2) as this

has caused confusion previously. To make this clearer, the column in the table has been renamed “60% of Maximum Pilot Force daN”.

In addition, sub-paragraph a) has been deleted as the content is adequately covered by S 395 and the other sub-paragraphs of S 397. The paragraph relating to unconventional control systems will be retained and has been moved below the table in S 397.

S 619 – The WG disagreed with the proposal to align the requirement text with UL-2, but has amended the AMC to align with UL-2 and allows for the 2.25 factor of safety for composite materials to be reduced upon agreement.

S 201 – It was noted that the comment refers to S 201, but quotes the title, “Recovery from Unintentional Spins”, from S 221. The WG considered the comment in the context of S 201. The WG disagreed with the proposal to allow a wing drop up to 30 degrees as this is not in alignment with most other design codes, including UL-2 and LTF-UL. This is also less conservative than CS-VLA which requires no more than 15 degrees.

The proposed change to introduce AMC material to define “normal use of the controls” was agreed.

S 221 - A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.

S 901 b) 3) – The WG agreed to delete the requirement and add an AMC instead.

S 977 a) – The WG agreed to revert the text back to that of issue 7

S 1191 d) – The change to fireproof aligns with other modern design codes including CS-VLA, UL-2 and LTF-UL.

S 1193 d) – The WG consensus view was to retain this requirement as it reduces the spread of an engine fire. Furthermore, the changes make compliance more straightforward by allowing either fire-resistance or demonstrating that an additional fire hazard is not created.

S 1323 – The proposed change was agreed.

#### Other Thoughts & Suggestions

The title of BCAR Section S has been changed to “Microlight and Small Light Aeroplanes”.

As noted above in relation to S 221, a revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.

AMC material will be developed as and when needed.

The WG stated that where a BPRS is optional equipment, it is not part of the minimum equipment and therefore not part of the empty weight. Where a BPRS is required as part of the type approval in the absence of spin testing, it is included in the basic empty weight calculation.

S 2085 and the associated AMC have been reinstated.

A range of maximum seat loads based on MTOW has been introduced in S 25.

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**Comment ID 28**

Dear Sir, my comments on the CAP 482 consultation are attached. A few of the comments relate to items not changed in this issue, but which have arisen in the course of my work.

Title "Small Light Aeroplanes" is now effectively at odds with ANO restricted definition – change to "Microlights".

S 2 does Section S have to duplicate the ANO definition of microlight aeroplanes? Perhaps better to just list limitations of applicability of Section S by seats, weight and stall speed? No exclusive applicability would be implied (not all aircraft fitting these limitations have to be microlights).

S 23, S 25 the minimum occupant weights are likely to result in a "certification gap" between the heavier types and lighter types where 110kg or 200kg occupant loads are very high load fractions of the MTOW (e.g.  $200\text{kg} / 600\text{kg} = 0.33$ ,  $200\text{kg}/500\text{kg} = 0.4$ ,  $110\text{kg}/220\text{kg} = 0.5$ .) An intermediate value, such as 90kg up to 525kg (the French microlight limit), would be useful to allow reasonable load fraction figures. The requirement to use manufacturer full power fuel-burn figures and the additional 8kg over the current 2x86kg values should alleviate the current fuel capacity concerns.

S 155 if alignment with the Czech code is required the 7daN requirement must be removed. The Czech code simply requires an increase of control load proportional to load factor (presumably approximately proportional). Perhaps an AMC with control force at

max load factor appropriate to the aircraft handling would capture the intention, with a suggestion of 7daN?

S 321 Adding CS-VLA 301 d) to allow use of CS-VLA Appendix A would be useful. (See also AMC S 321 comment below.)

Effects of altitude and lightweight operation below MTOW both affect gust loads. An AMC allowing certification at sea level and MTOW only, but requiring comment in the POH on care or restricted speeds at high altitude or light weight, would be useful.

S 345 some explicit consideration of the aerodynamic loads on the flap surface may be useful, as per CS-VLA 345 or CS-VLA Appendix A. The loads in Appendix A are surprisingly large compared to basic calculations, which appears to be due to large loads experienced at the stall point.

S 397 c) if alignment is desired with the Czech code then the pitch minimum force should be 35daN. This is an arbitrary value used to provide some baseline strength for aircraft with aerodynamically very light control forces, which appears to be acceptable based on the Czech fleet but would otherwise require further, possibly destructive, load testing for UK operation.

S 421, to S 455 see comment on AMC S 441 below, for use of CS-VLA Appendix A requirements in place of these requirements.

S 477 CS-VLA Appendix C is more of a useful summary of the main requirements. See comment on AMC S 473 below.

S 629 a) simpler option for sub-140kt VD types would be useful. e.g. S 251 or flight test with attempts to induce flutter, with none apparent. (Item b) goes further, as it implies the need to monitor the structural vibrations plus knowledge to identify the frequencies of interest, which is usually done through ground vibration testing or computer simulation, i.e. full flutter survey.) Also a catch-all of "other agreed method" would be useful.

S901 b) 3) this requirement is overly onerous, as a number of engine ancillaries are often omitted or replaced with custom items, and the arrangement of ancillaries is often compromised by space constraints. For example, almost no microlights utilise the Rotax 912 airbox, instead fitting a separate air filter to each carburettor.

S977 b) the number of meshes per cm varies between different codes. The intention is already addressed in b)2). 1) could be removed entirely and be replaced by the FAA requirement 23.977 (b):

“The clear area of each fuel tank outlet strainer must be at least five times the area of the outlet line.”

S1013 b) add that cowling removal to check the oil level is acceptable if removing the cowling is a requirement of the daily inspection in any case, as typical microlight engines do not burn significant quantities of oil on a per-flight basis.

S 1323 Whilst a well-calibrated ASI is nice, the additional complexity of a static system with numerous failure modes versus the simplicity of a cockpit static, combined with the trend to the use of GPS flight planning and in-flight navigation systems makes the benefit of this requirement questionable.

S1545 “a)” is redundant.

S1545 “Radial yellow arc” should read “Radial yellow line”.

S 2001, S 2081, S 2085 the warning should be kept. Whilst some effort to assess the parachute attachments has been made there is no attempt to confirm through numerous flight tests the envelope of conditions in which the parachute actually works. The range of possible scenarios such as structural damage etc is very large.

AMC S 25 c) even tank capacity is ill-defined (filling to top of filler neck is not recommended on many aircraft, increased risk of loss of fuel through breathers is polluting and increasingly expensive!). Recommend removing this sentence.

AMC S 145 d) The statement “Note that the force required to contain the pitching of the wing should remain a pull force at all incidences.” should be replaced with “Note that the force required to contain the pitching of the wing should remain a pull force at all incidences below the apparent trim position.”.

AMC S 321 Adding CS-VLA 301 d) to allow use of CS-VLA Appendix A would be useful, as that is also considered a suitable replacement for CS-VLA 321-459. (See also AMC S 441 comment below.)

AMC S 321 b) Altitude increases gust loads and risk of flutter. However, most of these aircraft are typically flown at low altitude, so designing for the high altitude case seems wasteful. The AMC could suggest an approach of designing for sea-level, but requiring information in the POH re reduction in gust and VNE speeds for operation at high altitudes (e.g. above 10,000') if required.

AMC S 337 2) The primary flexwing manufacturers (Aeros and Air Creation) both assume a triangular spanwise distribution for positive

loads due to wing twist unsupported by “sprogs” or tip-rods. This may be a useful alternative to add to the AMC.

AMC S 441 A more general AMC against all tail surfaces, flaps, and ailerons to allow use of CS-VLA Appendix A would be useful, as these values are typically used to approximately check any values calculated by other means.

AMC S 473 c) The diagram isn't as useful as the table and diagram in CS-VLA Appendix C, which might be a useful replacement or addition.

Calculation of landing impact accelerations refers to “assumed” values of tyre and shock absorber deflections. This is suitable for design, but for certification changing this to “measured” or “observed” would be better. The reference to checking “fasteners” of large masses might be better expressed as “mountings” or “attachment means” as per S597.

Whilst the additional complexity of effectively adopting the CS-VLA requirements for landing gear is appropriate for most new types the option for a much simpler approach for simpler types might still be worthy of consideration: a static load test to 3g ground reaction (or 3.33g, or even 4g). Otherwise most of the simple cable braced trike landing gear designs would probably not meet the new requirements, despite 30 years or more successful operational experience of such designs. This would generate a “certification gap” between the simple designs and increasingly sophisticated designs which these changes to BCAR S are aimed at.

AMC S 785 a) minimum pilot weight no longer 86kg. Suggest removing this AMC.

AMC S 2085 this warning should be kept. Whilst some effort to assess the parachute attachments has been made there is no attempt to confirm through numerous flight tests the envelope of conditions in which the parachute actually works. The range of possible scenarios such as structural damage etc is very large.

**Classification** **Partially Accepted**

**Response** Thank you for your contribution.

Title – The title of BCAR Section S has been changed to “Microlight and Small Light Aeroplanes”.

S 2 – The text of this requirement does not duplicate the ANO microlight definition and already defines the applicability of the requirements by number of seats, weight, and stall speed.

S 23 and S 25 – A range of maximum seat loads based on MTOW has been introduced.

S 155 – The WG has opted to retain the 7 daN control force but also introduced the option for it to be reduced if agreed by the CAA or an approved delegated organisation. This approach has the benefit of stating an acceptable value for the control force whilst also allowing for reduced values to be accepted, which is more closely aligned with UL-2.

S 321 – The proposal to use CS-VLA Appendix A as an alternative to the requirements in S 321 to S 455 is agreed. This has been introduced in S 301.

The WG disagreed with the proposal to only certify gust loads at sea level and MTOW as this is not sufficiently conservative. The WG also commented that the effects of altitude on gust loads or flutter may be addressed by specifying operating speeds that reduce with altitude.

S 345 – The WG agreed to add a new AMC for S 345 a) to state: “If the aeroplane meets the criteria for using CS-VLA Appendix A, then Appendix A may be used to determine flap surface loadings”.

S 397 c) – The WG disagreed with the proposal to adopt the pitch and roll limit pilot forces in UL-2 and will retain the current values in BCAR S, which are harmonised with other codes e.g. CS-VLA. However, the wording has been updated to allow scope for the limit pilot forces to be reduced if agreed by the CAA or an approved delegated organisation.

S 421 to S 455 – Agreed that CS-VLA Appendix A may be used as an alternative to the requirements in S 321 to S 455. This change has been introduced via S 301 d). AMC S 441 has therefore been deleted.

S 477 – The WG agreed to remove the diagram from AMC S 473 c) and instead refer out to VLA Appendix C.

S 629 – The WG considered that performing flight flutter tests in accordance with sub-paragraph b) is appropriate for sub-140 kt VD types. The requirement text was amended to include “either by quantitative or qualitative means” to make clear that compliance may be demonstrated by instrumenting the aircraft or by ‘feel’.

S 901 b) 3) – The WG agreed to delete the requirement and add an AMC instead.

S 977 b) – The WG considered that paragraphs b) 1) and b) 2) deal with different aspects of the fuel strainer and will therefore be retained.

The updated wording also harmonises Section S with other relevant design codes.

S 1013 b) – Agreed, AMC added to allow cowl removal on aircraft with low oil burn.

S 1323 – The WG disagreed with the comment. A calibrated ASI provides a valuable safety benefit for pilots in the form of accurate and reliable airspeed measurement. This is especially important to avoid over-reading true airspeed.

S 1545 – The proposed changes were agreed.

Additionally, the WG noted that AMC S 1545 will be changed to allow delegated organisations to agree alternative ASI marking.

S 2001, S 2081, S 2085 – The WG agreed to change the certification approach for aircraft with parachute recovery systems to more closely align with UL-2.

AMC S 25 – The proposed change was agreed.

AMC S 145d) – The proposed change was agreed.

AMC S 321 – Section S now incorporates gust loads, making the wording of this AMC at issue 7 redundant. It has therefore been removed.

AMC S 321 b) – The WG opted to retain the AMC wording to ensure that aircraft are designed for flight loads over the full operating envelope. Specifying reduced gust and VNE speeds at altitude may be an acceptable means of complying with this requirement.

AMC S 337 2) – The WG noted that AMC S 337 has been moved and is now the AMC for S 331 d) 3). The proposed changes to the wording were agreed.

AMC S 441 – The WG agreed to allow the use of CS-VLA Appendix A as an alternative to the requirements in S 321 to S 455. This will be introduced in S 301. Therefore AMC S 441 has been deleted.

AMC S 473 c) – The WG agreed to remove the diagram and instead refer out to VLA Appendix C.

The proposed wording changes were agreed.

The WG agreed to introduce an AMC to S 471 stating that the CAA or approved organisation may be contacted for agreeing a more appropriate certification route for light weight aircraft.

AMC S 785 a) – The proposed change was agreed.

S 2085 – The requirement and the associated AMC have been reinstated.

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**Comment ID 29** Dear CAA,

This email responds to the current consultation regarding the proposed changes to CAP 482, British Civil Airworthiness Requirements (BCAR) – Section S – Small Light Aeroplanes.

Here are my thoughts and ideas for consultation feedback:

\* We agree with changing the name of Section S from Small Light Aeroplanes to Microlights as it is done in the most of other countries.

\* We disagree with need of spinning tests. Spins are extremely dangerous with fatal consequences. In addition it would be an expensive item for small producers of UL aircraft. Spins are not allowed to perform with UL aircraft and this prohibition must be highlighted on the warning label inside the cockpit (obligatory at least in Czech republic). The test pilot can only prove (and we do it) if the aircraft can get into spin easily or not. But, during the test flight, the pilot is able to note the moment of risk of spin in time and is able to react and get it under control. But, it is absolutely impossible to test spinning itself. In case the BRS would be obligatory, we do not see any reason to test the aircraft for spinning.

\* We agree with ability to increase Max empty weight (not MTOW) if I wish to fit or upgrade my BPRS. We prefer the tests for BPRS should be unified with UL-2 and LTF-UL.

\* We consider as useless complication to set the max. seat load for each MTOW separately. All producers will use 600 kg anyway, so the limit of 100 kg/seat might be kept.

We suggest to follow the rules UL-2 and LTF-UL and so to make effort to unify requirements for this category in all countries. The airworthiness certificate, once issued, might be mutually recognized between different countries.

If the aircraft is once appropriately tested and recognized as airworthy (or certified) by the authority of one country, it should be automatically accepted by another country too. Simply said, flight conditions are the

same worldwide and the aircraft is flying the same disregarding the borders.

Mainly, please take into account that we are talking about small sport ultralight airplane. The requirements on its construction and equipment should be reasonable and adequate to its purpose of use. We consider the new rules (600 kg) as enough demanding for ultralight aircraft to assure that it is appropriately proven for structural rigidity, safety and airworthiness.

Thank you for the consideration of my points.

**Classification**      **Partially Accepted**

**Response**              Thank you for your contribution.

Title – The title of BCAR Section S has been changed to “Microlight and Small Light Aeroplanes”.

Spinning – A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.

BPRS – The WG stated that where a BPRS is optional equipment, it is not part of the minimum equipment and therefore not part of the empty weight. Where a BPRS is required as part of the type approval in the absence of spin testing, it is included in the basic empty weight calculation.

The WG agreed to change the certification approach for aircraft with parachute recovery systems to more closely align with UL-2.

Maximum seat load – The WG disagreed with the comment as not all microlights will necessarily be designed to the new MTOW. Introducing a range of maximum occupant weights based on MTOW is proportionate and will help those who design and build aircraft with an intermediate MTOW.

The other comments are noted. One of the purposes of this update is to harmonise Section S with other design codes (e.g. LTF-UL and UL-2) where appropriate to facilitate the import/export of aircraft.

**Comment ID 30** Dear Sir/Madam,

Our principal feedback is that we strongly support that CAP 482 is updated to allow for sport aircraft with an MTOW up to 600 / 650 kg. We would like to suggest that the rules, as far as possible, are compatible with equivalent construction standards and requirements from the UK's trade partners, including the US (ASTM F2245), Germany (LTF-UL 2019), Czech Republic (UL 2 část I. – ULL znění 2019), Finland (AIR M5-10), Sweden (TSFS 2020:85 Section 'NLF') and Norway (document no. pending – draft document is based on unilateral acceptance of aforementioned standards).

Since the above construction standards and requirements aren't entirely identical, it makes sense to seek solutions for CAP 482 that are as compatible as possible with such foreign standards, while at the same time seeking compatibility with former aircraft designed according to the current CAP 482.

We would respectfully like to suggest the following:

\* The name of Section S should reflect that the specification covers a weight range up to 600 / 650 kg, which is internationally considered as 'light sport aircraft'. Therefore, the name of Section S could be 'Light Sport Aeroplanes'. Alternatively, the term 'Microlights' could be used.

\* The maximum empty weight allowed should be formulated as a requirement for 'minimum useful load'. Instead of specifying a fixed minimum useful load requirement, regardless of MTOW, we suggest a variable approach depending on MTOW. A percentage of 35,8 for two-seat aircraft (land) fits very well with internationally applied requirements for aircraft between 472,5 and 600 kg. Please see Annex below, including graph, for further details. Finland has similarly devised a percentage rule, unfortunately with a percentage incompatible with the US', German and Czech construction standards. The ideal solution is 35,8 percent, while figures up to 37 percent might be acceptable.

\* The useful load requirements should be designed to facilitate electrification.

\* CAP 482 should be aligned with Czech (UL 2 část I. – ULL znění 2019) and German (LTF-UL 2019) standards regarding spinning requirements.

Thank you for the consideration of our points.

Kind regards,

### Annex – Minimum requirements for useful load

Useful load is defined as the difference between the maximum take-off mass specified by the manufacturer for the relevant aircraft (serial number) and the empty mass of the aircraft configured with all applicable equipment installed, including unusable fuel (if any).

1. Aeroplanes (land planes) with two seats, combustion engine and an MTOM of more than 475 kg: The maximum take-off mass should not exceed 600 kg. The minimum useful load shall be 35.8 per cent of the maximum take-off mass:

2. Aeroplanes (sea planes or amphibious aircraft) with two seats, combustion engine and an MTOM of more than 495 kg: The maximum take-off mass (with floats) should not exceed 650 kg. The minimum useful load shall be 35.8 per cent of the maximum take-off mass after a deduction of 50 kg has been made.

3. Aeroplanes (land planes) with one seat, combustion engine and an MTOM of more than 315 kg: The maximum take-off mass should not exceed 600 kg. The minimum useful load shall be 18 per cent of the maximum take-off mass, or 110 kg, whichever is greater.

4. Aeroplanes (sea planes or amphibious aircraft) with one seat, combustion engine and an MTOM of more than 330 kg: The maximum take-off mass should not exceed 650 kg. The minimum useful load shall be 18 per cent of the maximum take-off mass, or 110 kg, whichever is greater.

5. Aeroplanes (land planes) with one or two seats, electric engine and an MTOM of more than 475 kg: The maximum take-off mass should not exceed 600 kg. The minimum useful load shall be 90 kg per seat.

6. Aeroplanes (sea planes or amphibious aircraft) with one or two seats, electric engine and an MTOM of more than 495 kg: The maximum take-off mass should not exceed 650 kg. The minimum useful load shall be 90 kg pr seat.

7. Aeroplanes with an MTOM lower than the masses specified in paragraph 1-6:

The useful load requirements (if any) currently in use in the UK should continue to apply such aircraft.

**Classification****Partially Accepted****Response**

Thank you for your contribution.

Title – The title of BCAR Section S has been changed to “Microlight and Small Light Aeroplanes”.

Useful load – The proposed change has not been adopted in this issue as it is not harmonised with the other major design codes e.g. LTF-UL and UL-2. For now the WG has introduced a range of maximum seat loads based on MTOW.

Spinning – A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.

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**Comment ID 31** Dear CAA,

This email responds to the current consultation regarding the proposed changes to CAP 482, British Civil Airworthiness Requirements (BCAR) – Section S – Small Light Aeroplanes.

I'm concerned that there will be unintended consequences (or perhaps intended but hidden consequences) in this proposed revision of BCAR section S. Keeping it short, I feel most of the changes\* placed to ensure suitable strength in the heavier "Light Sports" microlights have been written across the board for all microlights whether sub-472.5kg or above. Just as the proposed changes are intended to facilitate introduction to the the UK market of 'Light Sport Microlights' (LSMs) with MTOW of up to 600kg, in my view they equally obstruct any future introduction of new types of lightweight microlight in the existing 450(+) kg microlights (or “Small Light Aeroplanes”) or even the earlier sub-390kg two-seat microlights which are now only available on the second-hand market or as kit-built types that have already been approved.

For instance:

- Has anyone considered the normal weight range of women\*\*, a very high proportion of whom weigh less than 70kg and would need to carry ballast if flying solo. Designers are unlikely to voluntarily choose a minimum crew weight lower than that required by the certification code. I would suggest that any aircraft which cannot be designed for a minimum crew weight of lower than 70kg should be required to provide suitable location for removable ballast and not have to rely on ad hoc solutions.

- The lowest maximum crew weight as written will apply to all future microlight designs, not just those in the 472.5-600kg range - this means that many existing designs (with maximum seat loads of 86 or 90kg) would not have achieved approval had they been submitted under the new rules. This will inhibit introduction of new lightweight designs, such as may be desired for training pilots to fly SSDR single-seaters.

- I find it strange that flexwing (in the context of microlights) is classed as an "unconventional control system"\*\*\*\*. Surely, after all this time, flexwings can be considered conventional within the context of microlights. My comment is about the thought processes of the authors of this amendment to BCAR-S and their apparent lack of understanding of microlights.

- Engine installation rules have been tightened by S901b)3) - all quite reasonable for yet more powerful engines, but what is the safety case for changing years of regulation for lighter, lower-powered craft? Similarly, more complicated wording has been added in S 977 "Fuel strainer or filter" seems to impose extra requirements regardless of aircraft weight and engine size; and what's the point of the change to S 1145 "Ignition switches" sub-section b)? There's more like that, eg what definition difference between "fire resistant" (old definition) and "fire proof" (new definition) in S1191 "Firewalls", again in the context of microlights conforming to the old sub-450 rules.

... and so on. My core point is that we were sold the 600kg definition change as adding to the microlight fleet, but in reality I fear those who wish to fly simpler sub-450kg (or even sub-390kg) 2-seat microlight aircraft will most likely be limited to existing approved designs with costs to approval inhibiting any new entrants to the market. Those rule changes required for the introduction of the 600kg weight limit should have been written as alternatives for aircraft between 451kg and 600kg MTOW whilst leaving the existing requirements unchanged for aircraft with an MTOW of 450kg or lower.

There is a clear safety case for increasing the rigour of the design requirements for aircraft in the new higher sub-600kg class, but there is none for introducing this rigour into new aircraft types which could have gained approval under the previous rules.

Notes:

\* the only exception appears to be that 'gust response' requirements are excluded for lighter/slower aircraft.

\*\* Source: <https://www.onaverage.co.uk/body-averages/average-female-weight> ;note, I weighed less than 55kg when I flew my first solo in a glider, aged 22, and needed to wear a parachute as ballast.

\*\*\* S 155 Pitch control force in manoeuvres, sub section b)

Thank you for the consideration of my points.

Classification: Partially Accepted

Thank you for your contribution.

To avoid penalising lighter weight pilots, the 55 kg minimum pilot weight has been reinstated, and for pilot weights up to 70 kg it will be acceptable for the manufacturer to use secured ballast for balance and/or minimum weight purposes.

A range of maximum seat loads that increases with MTOW has been introduced. This will help to ensure that lower weight designs are not unduly affected.

The WG noted the comment on the use of the term “unconventional” to describe control systems that are widespread on certain types of microlight. It was noted that sidestick controls are also described as unconventional in BCAR S even though these are increasingly common.

This terminology may be changed in subsequent revisions to BCAR S but will be retained here as it is known and understood.

S 901 b) 3) – The WG agreed to delete the requirement and add it as an AMC instead.

S 977 a) – The WG agreed to reinstate the text.

S 1145 – The WG noted that the changes to this requirement were to harmonise with UL 2 and LTF-UL.

S 1191 d) – The change to fireproof aligns with other modern design codes including CS-VLA, UL-2 and LTF-UL.

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**Comment ID 32** Dear CAA,

This email responds to the current consultation regarding the proposed changes to CAP 482, British Civil Airworthiness Requirements (BCAR) – Section S – Small Light Aeroplanes.

We support the BMAA comments as below:

- Suggest changing the name of Section S from Small Light Aeroplanes to Microlights. – ‘Small Light Aircraft’ was an interim legislative category introduced as a bridge when the microlight definition was last changed in the early 90’s and as such is now a remnant term.
- Suggest alignment with Czech (UL-2) and German (LTF-UL) regarding spinning requirements. – we appreciate that this is a hurdle for a lot of foreign manufactured aircraft that are prohibited by law from spinning even for testing. It is also considered high jeopardy for flight test crew – which may outweigh the advantages. Most stall spin accidents are inadvertently entered and have insufficient height for recovery. Therefore the requirement may be replaced with thorough investigation of stall characteristics and recovery with out of balance entries.
- Max empty weight and BPRS; suggest the ability to increase Max empty weight (not MTOW) if I wish to fit or upgrade my BPRS.
- The previous section text for BPRS testing is preferred to the new wording (see S2085).
- An intermediate Max seat load of 90kg from 472.5-525kg MTOW would alleviate issues for designers and manufacturers at this optimum weight point.

Additionally:

S1323 – the requirement for maximum +/- 5% / 8kmh airspeed indication error. To get accurate static pressure to meet this requirement can be challenging for microlight aircraft, and if possible it can involve some complexity of plumbing and vent placement.

Many if not most microlights currently use simple cockpit static pressure. The advantage of such is simplicity and reduction of failure modes / possibility. The failure modes of ‘plumbed static systems’ include vents being blocked when cleaning, suffering water ingress, and becoming inadvertently disconnected, holed, or leaking from fractures in aging tubing. In such a case the air speed reading is likely to increase which could lead to flying more slowly than intended or safe. We have experience of exactly this happening. For a sport aircraft such as a microlight we believe this is greater jeopardy than flight planning errors from mistakenly using indicated speeds. An alternative of calibration chart in the flight manual should be sufficient and could be considered at least as safe if not safer.

**Classification**

**Partially Accepted**

**Response**

Thank you for your contribution.

Title – The title of BCAR Section S has been changed to “Microlight and Small Light Aeroplanes”.

Spinning – A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system. The WG noted that Czech and German codes (UL-2 and LTF-UL) do not include spinning.

Maximum empty weight – The WG stated that where a BPRS is optional equipment, it is not part of the minimum equipment and therefore not part of the empty weight. Where a BPRS is required as part of the type approval in the absence of spin testing, it is included in the basic empty weight calculation.

S 2085 – The WG agreed to reinstate S 2085 and AMC S 2085.

Maximum seat load – A range of maximum seat loads based on MTOW has been introduced.

S 1323 – A calibrated ASI provides a valuable safety benefit for pilots in the form of accurate and reliable airspeed measurement. This is especially important to avoid over-reading true airspeed. The potential for an ASI to fail due to the reasons given in the comment can be mitigated by routine maintenance and pre-flight checks. The updated wording also harmonises Section S with UL-2 and LTF-UL.

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**Comment ID 33**

Dear CAA,

This email responds to the current consultation regarding the proposed changes to CAP 482, British Civil Airworthiness Requirements (BCAR) – Section S – Small Light Aeroplanes.

Here are my thoughts and ideas for consultation feedback:

- Suggest changing the name of Section S from Small Light Aeroplanes to Microlights. - Disagree with changing the name to microlights. Most people associate microlights with flexwings & SSDRs not aircraft above 450kg +. The change would cause confusion to the public. If it means that the BMAA needs to change its name then so be it. .
- Suggest alignment with Czech (UL-2) and German (LTF-UL) regarding spinning requirements. No I think spin testing is an important

safety consideration - SLA should not be easy to spin and if they do they should be easily recoverable - even if it is not part of the training for pilots.

- Max empty weight and BPRS; suggest the ability to increase Max empty weight (not MTOW) if I wish to fit or upgrade my BPRS. - Agree with the suggestion to allow greater flexibility for BPRS fitting.
- The previous section text for BPRS testing is preferred to the new wording (see S2085). - no comment
- An intermediate Max seat load of 90kg from 472.5-525kg MTOW would alleviate issues for designers and manufacturers at this optimum weight point. - Agree it provides greater flexibility for designers.

Thank you for the consideration of my points.

**Classification**      **Partially Accepted**

**Response**            Thank you for your contribution.

Title – The WG considered that including “Microlight” in the title of Section S is justified as the design requirements are primarily for this class of aircraft. However, the WG acknowledged that there are other aircraft types that will make use of Section S as well. Therefore, BCAR Section S has been changed to “Microlight and Small Light Aeroplanes”.

Spinning – A revised set of spinning requirements has been introduced that provides an option for spin testing to be omitted for aircraft with very benign stall characteristics or fitment of a parachute recovery system.

Maximum empty weight – The WG stated that where a BPRS is optional equipment, it is not part of the minimum equipment and therefore not part of the empty weight. Where a BPRS is required as part of the type approval in the absence of spin testing, it is included in the basic empty weight calculation.

S 2085 – The WG agreed to reinstate S 2085 and AMC S 2085.

Maximum seat load – A range of maximum seat loads based on MTOW has been introduced.

**Comment ID 34** I have not read the full CAP 482 consultation but an article in Flyer magazine stated that you are considering reducing the minimum stick forces and stick force gradient to harmonise with UL-2 and LTF-UL. Have you done a safety study to look at the accident record of aircraft that have stick forces and stick force gradients as low as required by UL-2 and LTF-UL, compared to ones that meet Section S? I think this should be done before making a change.

I suggest also considering the findings in this AAIB accident report where very light stick forces and a low stick force gradient contributed to this near fatal accident:

AAIB investigation to Silent 2 Electro, G-CIRK - GOV.UK  
([www.gov.uk](http://www.gov.uk))

Thank you.

**Classification** **Noted**

**Response** Thank you for your contribution.

The longitudinal static stability stick force and stick force gradient requirements (S 173 & S 175) have not changed in the revised Section S. The requirement specifying the pitch control force to achieve the positive limit manoeuvring load factor (S155) has been amended, but this is not directly relevant to the accident involving G-CIRK.

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**Comment ID 35** Dear GA Unit at the CAA,

I have placed my comments on the consultation below, between the horizontal lines. .

With regard to powered parachutes, these are flying in large numbers in Europe; certification methods are affordable and this is why it's one of the faster growing sectors in the leisure aviation area.

The requirements for the UK are along way from the mainstream elsewhere, this explains why there are very few certified models in the UK and this will continue all the time the requirements are not in step with the practical offerings that people are flying elsewhere in the world. Powered parachutes are truly affordable aviation, hangarage is not mandatory and the requirements for take off and landing lend many farmers' fields to the purpose.

All my comments are in a purely personal capacity without the knowledge or endorsement of either association.

Section S consultation

S 2 Applicability (See AMC S 2)

Premise:

Section S should not apply to Powered Parachutes.

Evidence and thoughts for consideration:

Current legislation has led to only 4 certified two seater powered parachutes in approximately 40 years. In Europe a medium sized manufacturer has three or four dual seater trikes for powered parachutes in their range. The development of this type of aircraft has been totally stifled by Section S. Any visitor to a light sport aviation festival or exhibition like the Couple Icare at St Hilaire in the South of France would see the huge number of these aircraft flying, mostly from the Low Countries in Northern Europe, all of which are excluded from the UK.

S2 d) is part of the problem.

Solution:

Create a new document for the certification of powered parachutes. Transfer the trike and powerplant requirements across, but look to changing the wing requirements to existing ones in widespread use. Use existing wisdom and certification structures from the countries where they are popular, some of these standards are on the BSI book as British Standards. Provide a focused document rather than the current one where about 60% of the content does not apply to powered parachutes.

Take into consideration that the vast majority of powered parachutes flown outside the UK are purchased as a separate wing and trike - then combined. It would be very simple (as EN926-1/2 and EN1651 do) to treat the wing and trike as two separate entities.

S 303 Factor of safety

Powered parachute wings could be tested by EN926-1 (also a British Standard) which would give a simple pass/fail for structural strength, including steady state and shock loading with a huge margin. EN or DGAC load testing can be performed by Air Turquoise in Switzerland, Aero Tests in France, or the DHV in Germany.

### S 321 General (see AMC S 321)

Can served by the BS/EN 926-1 load test, simple

### S 605 Fabrication methods

The methods of fabrication used must produce consistently sound structures which must be reliable with respect to maintaining the original strength under reasonable service conditions. If a fabrication process (such as gluing, spot welding, heat-treating, or processing of plastic materials) requires close control to reach this objective, the process must be performed under a defined process specification. Unconventional methods of fabrication must be substantiated by adequate tests.

This is a very poorly written part of the standard, as S603 which is now being deleted also is. There are no objective pass/fail conditions. There is no way of simply and conclusively showing that the manufacturer has passed or failed this requirement. It is part of a wish list, or a design code, not a standard. BSI could advise where this could be improved.

What defines adequate, close, or reasonable? BSI editorial input could help here.

### S 626 Cables and non-rigid members

For powered parachutes, again covered by EN926-1 and the line bending test.

### S 1303 Flight and navigation instruments

The following are required flight and navigation instruments: 1) An airspeed indicator,

Debatable whether this is needed for a powered parachute, given the very low speed, problems with finding an accurate ASI for the same and the method by which speed is controlled.

### Sub-Section K Microlight Parachute Recovery Systems

Omission - no mention of descent rate rate after parachute deployment or of any testing with any sort of load. How do we know the parachute is fit for purpose? Will the aircraft occupants survive a 3.5 m/s descent rate? 5.5m/s? 7m/s? 8.5 m/s? Only the first two from EN 12491 experience

There is no possibility of cushioning the impact with a parachute landing fall... so the descent needs to be survivable sitting.

### S 2003 General

No pass fail/criteria. Are we advising on design or producing an objective standard to pass/fail hurdles?

### AMC section

#### Sub-Section B Flight

Replace all of this section for powered parachutes with a cut down version of BS/EN926-2.

Thousands of ram air canopies for powered and unpowered have been certified to this standard. Revisions to the standard will be done for free by BSI/CEN and you can decide whether to copy the relevant bits or not.

#### Sub-Section C Structure

Replace with BS/EN926-1.

Examples of powered parachutes with load tested wings include the

ITV Bulldog (<https://www.itv-wings.com/en/wings-and-accessories/powered-paragliding-wings-itv/bulldog-itv-powered-paragliding.html>)

and the Ozone

Triox(<https://www.flyozone.com/paramotor/products/gliders/triox-2>).

To conclude, the current certification scheme has not been a success in terms of the numbers of aircraft certified in the UK.

There are better options elsewhere, tried and tested, that just need adapting to the UK.

### Classification

### Noted

### Response

Thank you for your contribution.

These comments are not directly related to the Section S changes that were consulted on following the expanded microlight definition. The WG consensus view was that the current requirements in Section S are generally appropriate for large powered parachutes e.g. dual seat trikes. However, when it comes to certifying powered parachutes a flexible approach is taken and alternative standards, not explicitly listed in Section S, may be recognised.

## Chapter 3

## Next Steps

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- 3.1 The consultation provided the CAA with valuable insight into the views of the general aviation sector on the proposed changes to CAP 482, BCAR Section S (Small Light Aeroplanes). The CAA is grateful to all those who took the time to review the consultation document and submit comments, which have helped shape the final version.
- 3.2 The Working Group reviewed in detail all the comments received and made further changes to CAP 482 based on the views expressed. In addition to accommodating the 2021 revised microlight aeroplane definition, the changes enhance harmonisation with other equivalent design codes, and should facilitate the import/export of microlight aeroplanes.
- 3.3 There are no legislative changes required to ratify the introduction of CAP 482, BCAR Section S Issue 8. The final version of [CAP 482, BCAR Section S Issue 8](#) was published on 15 May 2023.