COMMENT RESPONSE DOCUMENT (CRD) TO NOTICE OF PROPOSED AMENDMENT (NPA) 07-2006

for proposing introduction of certification specifications for Hot Air Balloons

"Hot Air Balloons (CS-31HB)"

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Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA), dated 21 June 2006 was to develop a certification specification for hot air balloons (CS-31 HB)[1]. The proposal for this new EASA CS-31HB is based on the draft CS-31HB (EASA Core Group 9 final CG9 draft 27 February 2003 / Draft C text.

II. Consultation

2. The draft Executive Director Decision proposing the introduction of certification specifications for Hot Air Balloons was published on the web site (http://www.easa.europa.eu) on 20 June 2006.

   By the closing date of 21 September 2006, the Agency had received 147 comments from 15 national authorities, professional organisations and private companies.

III. Publication of the CRD

3. All comments received have been acknowledged and incorporated into this Comment Response Document (CRD) with the responses of the Agency.

4. For a better understanding of some of the comments it should be noted that they refer to the proposed paragraph of CS-31 in NPA 07-2006 as stated in the header of the specific table.

5. In responding to comments, a standard terminology has been applied to attest the Agency's acceptance of the comment. This terminology is as follows:

   - **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
   - **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
   - **Noted** – The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
   - **Not Accepted** - The comment or proposed amendment is not shared by the Agency

   The resulting text is contained in the Appendix to this CRD.

6. The Agency's Decision will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.

7. Such reactions should be received by the Agency not later than **4 January 2009** and should be sent by email to CRD@easa.europa.eu.

IV. Review of the comments

8. In accordance with article 7(1) of the EASA Management Board Decision 08-2007 (13 June 2007) a comment review group was established to improve the quality of Agency measures and ensuring fair and appropriate treatment of all comments. The group composition is available on the Agency website[2].

9. The result of the review of comments is reflected in the appendix to this CRD. Although the structure and wording has been changed as a result of the review of comments, the Executive Director considers that the contents of the revised text does not differ significantly from that circulated at the start of the consultation process. Therefore, the Executive Director has decided that a further consultation round is not required.

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1 See NPA 07-2006 at http://www.easa.europa.eu/ws_prod/r/doc/NPA/NPA-07-2006.pdf

2 http://www.easa.europa.eu/ws_prod/r/doc/NPA/07-2006 NPA Review Group Composition.pdf

V. CRD table of comments, responses and resulting text

GENERAL

Cmt	Para	Comment provider	Comment/Justification	Response
16.	Explanatory Note V.13	Cameron Balloons Ltd.	Although harmonisation within EASA states may have a positive economic impact initially, this draft of the code will place all manufacturers in Member States at a competitive disadvantage due to the prescription of the 1.1m internal basket height for sporting purposes. JUSTIFICATION: The seven Non-EU manufacturers whose Type Certificates were adopted by EASA, presumably on the grounds of equivalent levels of safety, will always be able to supply lighter and cheaper baskets.	**Noted** Specific comments concerning the proposed requirement for an internal basket height requirement of 1.1. m in CS 31HB.59 are addressed in that paragraph in this CRD. The proposed new CS-31HB will enter into force at the date specified in the decision that introduces this new code. The new Airworthiness code can be part of the certification basis as required by 21A.17 (new TC) or 21A.101 (change to TC). The new Airworthiness code therefore does not have an effect on existing TC. Moreover the new code will be equally applicable to EU and non-EU applicants for an EASA TC.
59.	Explanatory Note V. 10., 11.,13., 14.	Cameron Balloons Ltd.	This code does not represent "best practice" and the "state of the art", as it ignores and prescribes against many existing well proven designs and practices. The majority of existing sporting "bottom end" equipment (basket, burner, cylinders) will not be compliant with this new code. A conservative estimate of the number baskets that do not comply with the new code is 4000 worldwide. It does not provide a "common denominator" or a "level playing field" as it diverges further from FAR31 (the code that has been used by many manufacturers within Member States as well as USA based balloon companies) than most of the existing design codes. Manufacturers in EU States will never be able to compete with FAR31 certified products on weight, cost and complexity of documentation terms. Envelopes certified to CS31 will never be able to be sold to replace time expired envelopes on FAR31 bottom ends which will be distinct economic disadvantage. From the above and the following paragraphs the statement that the code provides "a reasonable positive economic impact" cannot be justified. JUSTIFICATION: A hot air balloon usually consists of an envelope, a burner (or heater), a basket and a number of fuel cells (cylinders). The basket burner and cylinders are sometimes referred to as the "bottom end". The bottom end of most hot air balloons is generally interchangeable between different types for a given size. For example, the bottom end for a Cameron Z-90 is perfectly suitable	**Noted** The proposed Airworthiness code CS-31HB drafting is explained in paragraph IV(9) of the NPA. It is aiming for a common European Certification Specification based on the European draft C from the Core Group (CG) 9. This CG draft C was developed over several years with the participation of both industry and National Aviation Authorities, to meet more up to date requirements than the FAA FAR Part 31. The FAA FAR Part 31 had its last substantial amendment in 1980, and is therefore not considered as the leading document. The number of comments and contradicting opinions that the Agency received on NPA 07-2006 have lead to the establishment of a CS-31HB review group that ensures a fair and appropriate treatment of all comments. This CS-31HB review group has reviewed and responded to the comments and has reach an agreement on all issues brought forward. It is therefore concluded that the response to the comments and the resulting text are an acceptable common standard that will provide a level playing field within the member states. The comments addressing implementation of the new Airworthiness Code is explained in the response to comment 1.

Cmt	Para	Comment provider	Comment/Justification	Response
			for use with a Lindstrand 90 or Schroeder 90 (the burner load frames are generally of a similar size). Providing the pilot is aware of the burner emergency procedures, equipment weights and specific continued airworthiness requirements (usually in the form of a flight manual supplement) the operational characteristics are broadly similar. It is quite common for bottom ends to be flown with different envelopes as they have a much longer life cycle. Most manufacturers provide a flight and maintenance manual that is applicable to all their aircraft regardless of type and size. The Flight Manual is very rarely serial number specific. By introducing a Certification Specification which introduces new limitations (e.g. increased basket height, 0.3 m^2 per passenger, 2kg fire extinguisher, arbitrary specific number of burners for a given envelope size, specification of degree of difficulty of repairs) which have not generally been used in the past, airworthiness review and cross-compatibility becomes a very complex issue. A new envelope certified to CS31HB could presumably only be used with CS31 compliant equipment so each manufacturer will have to either; • specify the certification basis for each different item in the equipment listings of the flight manual, • re-certify all existing equipment to CS-31HB and hope it is never changed again, • produce at least two flight manuals, • produce a flight manual for each aircraft and re-issue it every time an item is replaced, or • ignore CS31HB completely and declare compliance with more widely used codes e.g. FAR31 and BCAR31 using Part 21.101 as a basis. If the owner of a pre-CS31HB sporting bottom end buys a CS31HB certified envelope he will have to throw away his basket and fire extinguisher and buy a compliant replacement for no good reason.	
60.	New rule proposal	M. Rouwendal	New rule: Maximum wind on the ground 8 knots. Maximum wind in the air 15 knots. Under pressure of bad weather in august, low or no income and many passengers waiting, balloonist seem to stretch-up safety on the most vital thing in hotair-ballooning: the wind. I even saw a balloon racing over with 40 knots and the pilot told this very proud afterwards! That is 72 km/h with no breaks! I think this will become the most important rule, it is writtten in some manuals but not in all of them, so balloonist can do what they want and most accidents with injury are wind related.	**Noted** Generic operational limitations, like mentioned for maximum wind conditions, are not part of the Certification Specifications. The Airworthiness requirements will however result in limitations like maximum wind speeds. Refer for example to CS 31HB.20 in the Appendix of this CRD

Cmt	Para	Comment provider	Comment/Justification	Response
61.	General Comment V Regulatory Impact Assessment Para 13 Impacts. Sub-Para Economic	Lindstrand Hot Air Balloons Ltd.	It is stated that "Since this newly proposed certification specifications are based on several existing Airworthiness Codes with a high degree of similarities, a negative economic impact is not expected". A negative economic impact can be expected. JUSTIFICATION: A negative economic impact can be expected both from the introduction of the design requirements to quantify, assess and control the tethering loads and from the requirement to consider the ground handling case. Both of these will cost money to consider document and may well cost money in terms of greater operational limitations.	**Noted** It is not considered acceptable to ignore loads encountered during normal operation of the hot air balloon. The means to show compliance have been discussed during the comment review and are included in AMC 31HB.27 and AMC 31HB.28
66.	General Comment V Regulatory Impact Assessment Para 11 Options	Lindstrand Hot Air Balloons Ltd.	It is stated that "A common denominator would improve transparency and provide a level playing field for future Type Certification of hot air balloons which would also provide a common standard of safety". According to this logic it would be best to copy the FAR 31 design requirements at their latest issue. JUSTIFICATION: Most of the major European manufacturers have a significant export presence in the USA. If we adopted identical design requirements it would provide for a "level playing field" across the whole world and provide for significant manufacturer and authority economic savings in cross-border Type Acceptance. Typically the FAR's are acceptable in Africa, Asia, South America and Australia, as well as the USA, without further demonstration of compliance.	**Noted** It is explained in chapter IV "Content of the draft decision" paragraph 9 that the basis of this proposal is coming from a European initiative. This has resulted in the core group 9 draft C text from February 2003. The FAA Part 31 last major revision was in 1980, it is therefore not considered to be more up to date than the i.e. the core group 9 draft.
67.	General Comment V Regulatory Impact Assessment, Para 13 Impacts Sub-Para "Equity and Fairness Issues Identified".	Lindstrand Hot Air Balloons Ltd.	Most balloons in Europe do not fully comply with the design requirements of CS 31 HB either at CG9 final draft dated 27 February 2003 or at NPA No. 07-2006. The substantial amount of serial hot air balloons operated in the USA and imported from Europe are imported on the basis of Import Type Acceptance by the FAA to the design requirements of the FAA in force at the time of application. The introduction of these certification specifications will add nothing to the acceptability within the USA and will add significant cost to local Type Approval. This is not "fair" or "equitable" or justifiable on the basis of improved safety. JUSTIFICATION: There is significant concern regarding the continuing acceptance by the FAA of Type Certificates for importation of European balloons into the USA and other countries who accept USA Type Acceptance. These Type Certificates are currently based upon USA acceptance of statements of compliance from the individual Nation Airworthiness Authorities who have an agreed Bilateral Treaty in place. There is a great deal of confusion regarding the continual acceptance of these statements and the establishment of an equivalent EASA bilateral	**Noted** Specific comments raised to the initial NPA proposal have been discussed in the review group. This has resulted in the amendment of several requirements and AMC that are now considered adequate for safety and acceptable for certification. Differences between the new CS-31HB and the FAA FAR Part 31 are considered justified because of safety concerns based on recent accidents and technical developments. Adoption of the FAR Part 31 content at its current amendment is considered not appropriate because this has not been reviewed and amended since a long time.

Cmt	Para	Comment provider	Comment/Justification	Response
			agreement with the FAA for balloons. In terms of "fairness" we do not seem to be in a fair position with regard to the USA and the countries that accept FAA Type Acceptance with no further showing of compliance. It would seem that adoption of the FAR's at their current amendment would advance our efforts of exportation of balloons considerably.	
68.	General Comment V Regulatory Impact Assessment Para 13 Impacts Sub-Para Foreign Comparable Regulatory Requirements	Lindstrand Hot Air Balloons Ltd.	It is stated that "Although the CS 31 HB is not harmonised with FAR 31, the similarity to FAR 31 will reduce certification efforts". This is not so. JUSTIFICATION: Each and every change that has been introduced both at CG9 final draft and under these proposed amendments move CS 31 HB further away from FAR 31 to the greater cost of European manufacturers. Balloons still manage to fly safely in the USA.	**Noted** The aim for the development of the new hot-air balloon certification standard is to provide a common technical standard for hot-air balloon certification in Europe. Although the aim is also to seek for harmonisation with the FAR 31 code (last major amended in 1980), developments over the years have been considered and introduced when found necessary. Similarity to the FAR 31 is also intended to indicate that some of the requirements are structured different from the FAR 31 i.e. put in AMC instead of in prescriptive requirements.
86.	Explanatory Note V. 10., 11.,13., 14.,	Ultramagic S.A.	The introduction of this code would mean that the majority of existing sports balloon "bottom end" (basket, burner, cylinders) would not be compliant. This would affect many thousands of pieces of equipment that are at present approved to be safe and in good use. Clearly the code does not represent "best practise" or "state of the art" if it ignores current well proven designs and practises. In a number of instances the code follows a very different direction to FAR31, the existing design code which has been used by many European manufacturers as well as US manufacturers. Consequently the code does not provide a "common denominator" or a "level playing field" within the worldwide industry and in fact penalises Manufacturers in EU states. The code as proposed will prevent UE manufacturers from competing economically with FAR31 certified equipment. Envelopes certified to CS31 will not be able to replace old existing envelopes equipped with FAR31 bottom end equipment or non CS31 certified equipment. Clearly this demonstrates that the code will have a negative economic impact and not positive one as stated in V13. JUSTIFICATION: In most cases a hot air balloon consists of an envelope and a bottom end (basket, burner and fuel cylinders.) Bottom ends tend to last longer than envelopes so it is normal to use a bottom end with more than one envelope. At present bottom ends are generally	**Noted** Also refer to comment 59. Retroactive implementation of the new CS-31HB is not considered. Therefore this new code has no direct impact on existing TC. This code will however provide one Certification Specification throughout the European member states what is considered as the playing field that is within the scope of EASA. It will also apply to non-EU applicants for an EASA TC. Comments addressing the certification process and treatment of changes to existing TC are not considered part of this NPA.

Cmt	Para	Comment provider	Comment/Justification	Response
			interchangeable between manufacturers. This has been the case for many years. Most manufacturers provide a flight and maintenance manual that is applicable to all their aircraft including all types and sizes. The manuals are very rarely specific to a particular serial number and they also cater for bottom end interchangeability. Certification Specification in CS31 introduces new limitations which are not in FAR31 and have not been used in the past. This makes airworthiness review and compatibility very difficult and complex. As a new envelope certified to CS31HB would require a CS31 compliant bottom end, then each manufacturer would have to specify the certification basis for each different item in the equipment listings in the flight manual. All existing bottom end equipment would have to be recertified to CS31HB. At least two flight manuals would have to be produced with flight manuals for each aircraft being produced that would have to be re-issued at each item replacement. Anyone purchasing a replacement envelope certified to CS31HB for a sports balloon that is pre CS31HB would no longer be able to use the existing basket even though it has been proved safe and is still airworthy. Since the code already states that the introduction of CS31HB "will have no direct effect on present safety levels ...." it is hard to justify a number of the proposed changes to the existing codes used on the basis of "a better understanding and implementation due to standardised specifications ....." Many of the proposed changes will affect ballooning as an aviation sport in the EU states and make significant negative economic impact both on balloon pilots and manufacturers.	

CS 31HB.1 APPLICABILITY

Cmt	Para	Comment provider	Comment/Justification	Response
11.	Draft Decision CS 31HB.1 Applicability	Cameron Balloons Ltd.	Adopt text from CG9 Draft Dated 27Feb 2003 JUSTIFICATION: There is an unnecessary difference from FAR31. The basket definition is incoherent.	**Not Accepted** The CG9 text contains certification process information that is included in Part 21. Also the definitions are included CS 31HB.2 instead of in the "applicability" paragraph.
62.	Draft Decision CS 31 HB 1(b) Applicability	Lindstrand Hot Air Balloons Ltd.	(b) A combination of heated air and lighter than air gas. JUSTIFICATION: The given temperature and pressure of a lighter than air gas should be the responsibility of the DOA.	**Partially Accepted** It is accepted that the "given temperature and given pressure" have no impact on the applicability of the airworthiness code. For clarity the wording is changed to "Mixed balloons, also called Rozière".

Cmt	Para	Comment provider	Comment/Justification	Response
131.	General Comment Book 1: Subpart A – General – CS 31HB.1 - Applicability	Transport Canada	Comment: The proposed CS applies to hot air balloons and "mixed balloons", which derive their lift from a combination of hot air and a captive gas. This applicability would appear to exclude "pure" captive gas balloons, i.e. those that rely on the gas alone for lift? For comparison purposes, it is offered that the Canadian AWM 531 applies to hot air balloons and balloons that derive their lift from a captive lighter-than-air gas.	**Noted** EASA is planning to issue separate airworthiness codes for Free Gas Balloons and Tethered Gas Balloons.

CS 31HB.2 DEFINITIONS

Cmt	Para	Comment provider	Comment/Justification	Response
13.	Draft Decision CS 31HB 2	Cameron Balloons Ltd.	(d) "Tethered flight" is the temporary restraint of a free balloon whilst in flight for the purposes of conducting an entire flight at a single location. (e) "Launch Restraint" is the temporary restraint of a free balloon for the purposes of initiating a free flight. JUSTIFICATION: Most balloon manufacturers give specific limitations for tethered flight (as defined above) which often include limitations on payload and windspeed. Free flight limitations apply during the "launch restraint" phase of a free flight and therefore there must be a clear differentiation between the two terms. The equipment used for tethered flight (as defined above) is different to the equipment used for launch restraint for safety reasons. For tethered flight, the balloon is normally restrained from 3 points but for launch restraint, the balloon is only restrained from a single point. These are two different load cases. The term tethered flight has been used for at least 25 years in this context. I do not think that the purpose of this rulemaking exercise is to create new confusing definitions for existing practices.	**Accepted** It is accepted that separate definitions are appropriate for tethered flight and launch restraint. The definition is amended to define this specific flight instead of the tethering means.
46.	Draft Decision CS 31HB.2	Ultramagic S.A.	(d) "Tethered flight" is the temporary restraint of a free balloon whilst in flight for the purpose of conducting an entire flight at a single location. (e) "Launch Restraint" is the temporary of a free balloon for the purpose of initiating a free flight. JUSTIFICATION: Ultramagic S.A. in agreement with Cameron Balloons confirm that	**Accepted** See response to comment No.13

Cmt	Para	Comment provider	Comment/Justification	Response
			most manufacturers give specific limitations for tethered flight (as defined above) which often include limitations on payload and wind speed. Free flight limitations apply during the "launch restraint" phase of a free flight and therefore there must be a clear definition between the two terms. The equipment used for tethered flight (as defined above) is generally different to that used for launch restraint.	
63.	Draft Decision CS 31 HB 2(b) Definitions - Basket	Lindstrand Hot Air Balloons Ltd.	A "basket" is the container suspended beneath the envelope for the carriage of the balloon occupants. JUSTIFICATION: Definitions of the construction of the basket are inappropriate within a section which is defining the meanings.	**Accepted**
64.	Draft Decision CS 31 HB 2(d) Definitions - Tethered Flight	Lindstrand Hot Air Balloons Ltd.	(d) "Tethered Flight" is the permanent restraint of a balloon during a flight. (e) "Launch Restraint" is the control of a balloon prior to launch of a free flight. JUSTIFICATION: Given that such a definition is required then the loads and safety factors that should be applied are different depending upon the eventual intentions of the pilot.	**Partially Accepted** see comments 13 and 46 It is accepted that separate definitions are appropriate for tethered flight and launch restraint. The definition is amended to define this specific flight instead of the tethering means.
132.	General Comment Book 1: Subpart A – General – CS 31HB.2 - Definitions	Transport Canada	Whereas the AWM makes a distinction between baskets and trapezes, in CS it is indicated that the term "basket" may also apply to any passenger carrying device, including gondolas, seats, etc. However, it is not clear that the term "basket" as used elsewhere in the CS is in line with that definition. In addition, the term "disposable ballast" is defined here but it is not used elsewhere in the main body of the CS and its use in AMC 31HB.51 does not appear to be entirely consistent with this definition.	**Partially accepted** The definition of "basket" is amended in accordance with comment 63. The term "Disposable Ballast" is kept, and where appropriate the term ballast in other paragraph is changed to "disposable ballast". see CS 31HB.51

CS 31HB.5 ABBREVIATIONS AND SYMBOLS (new)

Cmt	Para	Comment provider	Comment/Justification	Response
2.	CS 31HB Draft Decision new para CS 31HB.5 for Subpart A	Luftfahrt-Bundesamt	(newly inserted text underlined) **CS 31HB.5 Abbreviations and symbols** Abbreviations and symbols used in this CS 31HB are restricted to those in common usage.	**Partially accepted** The general policy for CS-Definitions is that it should only contain definitions and abbreviations and symbols that are used in more than one code. Definitions abbreviations and symbols only applicable to one code are included in that specific

Cmt	Para	Comment provider	Comment/Justification	Response
			JUSTIFICATION: This paragraph should be added because it is important to state that the abbreviations and symbols of CS 1 do not apply. CS 1 is aeroplane and rotorcraft related and does not reflect hot air balloon terminology.	code. A new paragraph is therefore added to CS-31HB

CS 31HB.12 PROOF OF COMPLIANCE

Cmt	Para	Comment provider	Comment/Justification	Response
133.	General Comment Book 1: Subpart B – Flight – CS 31HB.12 – Proof of compliance	Transport Canada	The allowable weight tolerances that may be used during flight-testing are not defined in the CS. CS.17 makes reference to the tolerance for climb performance, but in the absence of a definition for other requirements, it is not clear what tolerances, if any, would apply.	**Not accepted** Tolerances are not applicable and are also removed from CS 31HB.17. Also refer to comment 37 to CS 31HB.17

CS 31HB.14 MASS LIMITS

Cmt	Para	Comment provider	Comment/Justification	Response

3.	CS 31HB
	
	Draft Decision
	
	CS 31HB.14 Mass limits
		Luftfahrt-Bundesamt	(newly inserted text underlined ,deleted text ~~crossed-out~~)
			CS 31HB.14(b) Mass limits
			...
			(b)(2) The demonstrated mass, at which compliance with each applicable flight requirement is shown ~~(see AMC 31HB.14(b)(2))~~; or
			(b)(3) The operational minimum mass, which is the minimum mass limitation in the Flight Manual (See CS 31HB.81) and which must not be less than the demonstrated minimum mass in (2) above. (See AMC 31HB.14(b)(3))
			...
			JUSTIFICATION:
			For (b)(2): in Book 2 there is no AMC 31HB.14(b)(2) available.
			For (b)(3): correct reference to AMC should read ... (See AMC 31HB.14(b)(3).
				Noted
				CS 31HB.14 is reworded. AMC references are corrected.
				(Refer to the appendix to this CRD.)

14.	Draft Decision CS 31HB 14 Mass Limits	Cameron Balloons Ltd.	14(a)(1)(iii) delete the word "demonstrated". 14(a)(1)(iv) delete entirely 14(b) Add to AMC "An acceptable minimum mass will normally be (i) for balloons exceeding 3000 cu.m when carrying passengers – 50% of the maximum mass (ii) for balloons of 3000 cu.m. or less and for all balloons when carrying essential flight crew only, the empty mass together with	**Partially Accepted** The "demonstration" of both maximum and minimum mass is removed from the requirement. Mass limits need to be established, not demonstrated. The proposed addition to the AMC 31HB.14(b) is not

Cmt	Para	Comment provider	Comment/Justification	Response
			the minimum required occupants, fuel and equipment. JUSTIFICATION: 14(a)(1)(iii) It is difficult to demonstrate at the maximum mass, because this can only be done in Arctic weather. For that reason 31HB17 requires demonstration at the maximum mass "appropriate to the conditions of the test". It is perfectly satisfactory to use this mass and extrapolate by analysis or from experience. If this is not accepted, we will see ranges of balloons, each certified to a maximum mass which depends on the temperature on the day of the test, rather than to a fixed lift per cubic metre as at present. This will then be followed by repeated tests and applications to extend the mass range when cold weather is available - a useless expansion of testing and paperwork. Alternatively balloon certification will have to await cold winter conditions – a quite unnecessary cost and inconvenience which is not justified by any incident experience. 14(a)(1)(iv) simply duplicates 14(a)(1)(i) and duplicates the condition "least of" at 14(a)(1). 14(b)(2) Acceptable flight performance at minimum mass is very difficult to demonstrate. In good weather, a balloon is very pleasant to handle at low mass. A higher mass has some advantages in high-wind landings or turbulence, but how could these form the basis of a demonstration? Pilots making record or other special long-duration flights need to be able to use a very low mass and provision should be made for this. Justification for AMC. The "50% rule" was introduced as a result of flight test information obtained when testing large passenger balloons 400,000 cu. ft + ($1100m^3$) and has been verified by flight test for envelopes up to a volume of 600,000 cu.ft (16990 m^3). Smaller envelopes have been operating since 1971 with no stated minimum mass inferring that the safe minimum mass is less than the mass of the minimum equipment weights and minimum occupants.	accepted because the specific figures could be interpreted as a means of compliance where it is more considered guidance material. Paragraph CS 31HB.14(a)(1)(iv) is removed because, as mentioned in the justification, duplicates the requirements of CS 31HB.14(a)(1)(i).
45.	Draft Decision CS 31HB.14 Mass Limits	Ultramagic S.A.	14(a)(1)(iii) delete the word "demonstrated". 14(a)(1)(iv) delete entirely 14(b) Add to AMC "An acceptable minimum mass will normally be (i) for balloons exceeding 3000 cu.m when carrying passengers – 50% of the maximum mass (ii) for balloons of 3000 cu.m. or less and for all balloons when carrying essential flight crew only, the empty mass together with the minimum required occupants, fuel and equipment. JUSTIFICATION: Ultramagic S.A. agrees with and presents the justification as given	**Partially Accepted** see comment no 14

Cmt	Para	Comment provider	Comment/Justification	Response
			by Cameron Balloons as follows: "14(a)(1)(iii) It is difficult to demonstrate at the maximum mass, because this can only be done in Arctic weather. For that reason 31HB17 requires demonstration at the maximum mass "appropriate to the conditions of the test". It is perfectly satisfactory to use this mass and extrapolate by analysis or from experience. If this is not accepted, we will see ranges of balloons, each certified to a maximum mass which depends on the temperature on the day of the test, rather than to a fixed lift per cubic metre as at present. This will then be followed by repeated tests and applications to extend the mass range when cold weather is available - a useless expansion of testing and paperwork. Alternatively balloon certification will have to await cold winter conditions – a quite unnecessary cost and inconvenience which is not justified by any incident experience. 14(a)(1)(iv) simply duplicates 14(a)(1)(i) and duplicates the condition "least of" at 14(a)(1). 14(b)(2) Acceptable flight performance at minimum mass is very difficult to demonstrate. In good weather, a balloon is very pleasant to handle at low mass. A higher mass has some advantages in high-wind landings or turbulence, but how could these form the basis of a demonstration? Pilots making record or other special long-duration flights need to be able to use a very low mass and provision should be made for this. Justification for AMC. The "50% rule" was introduced as a result of flight test information obtained when testing large passenger balloons 400,000 cu. ft + ($1100m^3$) and has been verified by flight test for envelopes up to a volume of 600,000 cu.ft (16990 m^3). Smaller envelopes have been operating since 1971 with no stated minimum mass inferring that the safe minimum mass is less than the mass of the minimum equipment weights and minimum occupants."	
60.	CS 31HB.14(2)	M. Rouwendal	Assuming the load **CS 31HB.14(2)** Weighting the occupants and asking them instead of assuming 77 kg per occupant would be more precise than calculating +5%.	**Not Accepted** This maximum mass that needs to be established for certification the balloon should not be confused with operational loading of the balloon. The objective of the masses provided is explained in AMC 31HB.81(b)(2)
65.	Draft Decision CS 31 HB 14 (b)(1) and (3)	Lindstrand Hot Air Balloons Ltd.	Remove the above design requirements and rely on (2). Low mass operations are all about what the manufacturers can prove is acceptable - not what the authority thinks is best practice. JUSTIFICATION:	**Partially Accepted** CS 31HB.14(b) is reworded to require that the minimum mass is established for which compliance with the Flight requirements is shown to be met.

Cmt	Para	Comment provider	Comment/Justification	Response
			Proving that the balloon is adequately controllable at any particular loading regime is more important than a prescriptive formula. The formulas tend to change with changes in technology but the requirement to prove controllability should be more powerful.	This is consistent with the comment made.
73.	Draft Decision CS 31HB.14 Mass limits	Balony Kubicek	31HB.14(b)(2) AMC31HB14.(b)(3) JUSTIFICATION: In 31HB.14(b)(2) is a reference to absent AMC, it is a typing error probably. AMC31HB14.(b)(3) it pertains (2) evidently, it is not determined what is purposeful to treat it for a bigger balloon.	**Noted** CS 31HB.14 is reworded. AMC references are corrected. (Refer to the appendix to this CRD.)
87.	Draft Decision CS 31HB.14	DGAC France	**Rewrite the paragraph "CS 31HB.14 MASS LIMITS" as follows:** (a) The range of masses, from a defined minimum mass to a defined maximum mass, over which the balloon may be safely operated, must be established. (b) Occupant mass. A mass of 77 kg for each occupant must be assumed when defining the range of masses to be certified. (c) Maximum mass. The maximum mass is the highest mass at which compliance with each applicable specification of CS 31HB is shown. It must include the mass of the maximum number of occupants and 100% of fuel in the maximum required number of fuel cells. The lift-producing medium is excluded from the maximum mass. (d) Minimum mass. The minimum mass must include at least the sum of : (i) The empty mass determined under CS 31HB.16, (ii) The mass of the minimum number of occupants, (iii) The mass of the minimum equipment as specified in CS 31HB.85 (iv) The mass of a minimum of 30% of the usable amount of fuel of a fuel cell. (e) The operational maximum mass, which is the maximum mass limitation in the Flight Manual, must not exceed the maximum mass defined in CS 31HB.14 (c). (f) The operational minimum mass, which is the minimum mass limitation in the Flight Manual, must not be less than the minimum mass defined in CS 31HB.14 (d). JUSTIFICATION:	**Not Accepted** Re-structuring the content of 31.HB.14 is not considered necessary after the rewording of this requirement due to various comments.

Cmt	Para	Comment provider	Comment/Justification	Response
			- (b)(1) should be written to sum masses instead of mass in (i) and (ii), equipment in (iii), minimum in (iv). - In (a)(2) we have "the maximum mass … is not more than not less than". - In (a)(1)(iv) we have "the maximum mass … is not more than the least of …which must not exceed the demonstrated maximum mass". We find "demonstrated maximum mass" in (a)(1)(iii), "demonstrated mass" in (b)(2) and "demonstrated minimum mass" in (b)(3). We have "each mass" for compliance with all CS 31HB in CS 31HB.12 and "demonstrated mass" for compliance with flight requirement in CS 31HB.14. There are cross-references to AMC texts which do not exist : AMC 31HB.14 (b)(2) and AMC 31HB.14 (b). The second sentence of AMC 31HB.14 (a) should be part of the definition of maximum mass. The text is not understandable and we propose some improvements but it may be further adjusted to take into account the real intent of current text. (maximum mass defined with an amount of fuel which is not the maximum ?).	
88.	Draft Decision 31HB.14, 25, 30	DGAC France	Occupant mass should be increased from 77 kg to at least 86 kg. JUSTIFICATION: The mass of an occupant is artificially set to 77 kg. This seems to be quite a low figure considering the change in average human mass in modern societies. It is noted that, although 77 kg is the figure found in CS-23, the figure has been increased to 86 kg in CS-VLA. This has been justified by a need to have more safety margins to compensate for the less demanding certification criteria. It is suggested that the CS-VLA figure should be retained for the same reasons. The retained value must be consistent with the safety objective and with the level of confidence in the certification process. *Note: For information mass values in JAR-OPS 1*	**Partially Accepted** General consistency within airworthiness codes (CS-23 and CS-25 and FAR 31) requires that the mass for an occupant is kept at 77 kg for the requirements of paragraph CS 31HB.25. The occupant mass for CS 31HB.30 is changed to 86 kg, also consistent with other airworthiness codes. CS 31HB.14 is reworded and no longer contains the occupant mass.

Cmt	Para	Comment provider	Comment/Justification	Response
			And JAR-OPS 3	
89.	Draft Decision CS 31HB.16, impacting CS 31HB14 (b) (1)	DGAC France	**Rewrite CS 31HB.16 as follows:** The empty mass must be determined by weighing the balloon with minimum ~~installed~~ equipment as specified in CS31.HB.85, but without easily removable items. (See AMC 31HB.16) The lift producing medium is not part of the empty mass. **Then, Delete CS 31HB14 (b) (1) iii.** JUSTIFICATION: a) The logic of this definition, in relation to the currently proposed CS 31HB.14 (b)(1), is not consistent. In current CS 31HB.14 (b)(1), we find the empty mass in (i) referring to CS 31HB16 and the minimum equipment in (iii). Therefore, the logic would lead to believing that equipment is not part of the empty mass. But CS 31HB.16 considers that installed equipment (which are understood as comprising at least the minimum equipment) is part of the empty mass. b) How is defined "easily" in easily removable ? c) An important piece of information is only found in the associated AMC (The lift-producing medium is not part of the empty mass.). This should be moved to book 1.	**Not Accepted** Various comments and a variety of design examples have made it clear that the accurate definition of minimum installed equipment or equipment required for a basic flight are practically impossible. Both CS 31HB.14 and CS 31HB.16 are changed to remove the rule out the precise definition of minimum equipment.
124.	Draft Decision CS 31 HB 14(a)(2) - Mass Limits	Lindstrand Hot Air Balloons Ltd.	Delete CS 31 HB 14(a)(2). This is not essential in the spirit of Section IV Para 8 Sub-Paragraph 1. This is a further check on the maximum mass which is selected by the DOA to ensure that the chosen number of maximum occupants (at 77 kg) and the minimum fuel requirements do not exceed the maximum mass claimed. It is	**Accepted** CS 31HB.14 is reworded. (Refer to the appendix to this CRD.)

Cmt	Para	Comment provider	Comment/Justification	Response
			not essential. JUSTIFICATION: Design Organisations are approved by EASA to have procedures which prevent such miscalculations from occurring. It really is not necessary to include this within a design code.	
134.	General Comment Book 1: Subpart B – Flight – CS 31HB.14 – Mass Limits	Transport Canada	Comment: In CS 31.HB.14 (a), the words "not more than" appear to belong at the beginning of (a) (1), not the end of (a). In addition, subparts (a)(1)(iv) and (b) (3) are unclear. It seems that the maximum and minimum operational masses should be the maximum and minimum masses that are established on the basis of (a)(1)(i) through (iii) and (b) (1) and (2) respectively, not some other mass. It is not clear how the operational masses are established as no criteria for establishing them are identified. In 14(a)(2)(i) and 14(b)(1)(ii) refer to the maximum number of occupants and the required minimum number. It is unclear how either of these is established, in particular the required minimum number. In addition, aside from this reference, there does not appear to be anything else that indicates there is a "required" minimum number of occupants. In addition, the references to the AMCs in 14 (b)(2) and (3) are incorrect. Neither of the referenced AMCs, 31HB.14(b) and (b)(2), are included in the CS.	**Accepted** The wording "not more than" will be used in 14(a)(1). CS 31HB.14(a)(1)(iv) and (2) are deleted. CS 31HB.14 (b) is reworded and includes removal of (3). The references to the AMCs are changed consistent with the rewording of CS 31HB.14. (Refer to the appendix to this CRD.)

CS 31HB.16 EMPTY MASS

Cmt	Para	Comment provider	Comment/Justification	Response
89.	Draft Decision CS 31HB.16, impacting CS 31HB14 (b) (1)	DGAC France	**Rewrite CS 31HB.16 as follows:** The empty mass must be determined by weighing the balloon with minimum ~~installed~~ equipment as specified in CS31.HB.85, but without easily removable items. (See AMC 31HB.16) The lift producing medium is not part of the empty mass. **Then, Delete CS 31HB14 (b) (1) iii.** JUSTIFICATION: a) The logic of this definition, in relation to the currently proposed CS 31HB.14 (b)(1), is not consistent. In current CS 31HB.14 (b)(1), we find the empty mass in (i) referring to CS 31HB16 and the minimum equipment in (iii). Therefore, the logic would lead to believing that equipment is not part of the empty mass.	**Not Accepted** Various comments and a variety of design examples have made it clear that the accurate definition of minimum installed equipment or equipment required for a basic flight are practically impossible without creating a possible overlap between the two. CS 31HB.16 is therefore changed to require that a minimum mass needs to be established by weighing. The actual composition of the configuration for the minimum mass needs to be specified by the applicant. Also refer to AMC 31HB.81(b)(2).

Cmt	Para	Comment provider	Comment/Justification	Response
			But CS 31HB.16 considers that installed equipment (which are understood as comprising at least the minimum equipment) is part of the empty mass. b) How is defined "easily" in easily removable ? c) An important piece of information is only found in the associated AMC (The lift-producing medium is not part of the empty mass.). This should be moved to book 1.	
125.	Draft Decision CS 31 HB 16 - Empty Mass (AMC 31 HB.16)	Lindstrand Hot Air Balloons Ltd.	The AMC material specifically refers to fuel cells being "easily removable items". This should not be so. JUSTIFICATION: Whilst there is no argument that the fuel cells are "easily removable", they have traditionally been incorporated into the "Weight Sheet" for the overall balloon equipment. For most balloonists this allows for greater clarity in calculating the "empty mass" of the balloon. Ignoring these items will cause substantial confusion for pilots and the greater possibility of overweight operations.	**Not Accepted** Refer to the response to comment 89.

CS 31HB.17 PERFORMANCE: CLIMB

Cmt	Para	Comment provider	Comment/Justification	Response
4.	CS 31HB Draft Decision CS 31HB.17 Performance: climb	Luftfahrt-Bundesamt	(newly inserted text underlined ,deleted text ~~crossed-out~~) **CS 31HB.17 Performance: climb** (a) The balloon must be capable of climbing at least ~~91~~ 90 metres (300 feet) in the first minute from a start in equilibrium at ground level. Compliance must be shown at the maximum mass appropriate to the conditions of the test. (See AMC 31HB.17(a)) ... JUSTIFICATION: Make the metric value become an even number. During this (important) performance test the minimum altitude value is read from a fast changing display in the region of ±5 metres. Hence, 1 metre more or less does not count. The value could as well be "100 metres (330 feet)" as modern balloon burner and fabric systems leave no doubt in fulfilling this requirement.	**Accepted** In general the principle of equivalent tolerance is used for rounding off the converted figures. In this case the converted figure is from existing codes (300ft) which with equivalent tolerance results in 91m. For the practical reasons as presented in the justification it is accepted to use 90 m. The initial value of 300 ft in brackets was kept to show consistency with currently used ballooning codes. This is however removed. Refer to comment 90 below.

Cmt	Para	Comment provider	Comment/Justification	Response
37.	Draft Decision CS 31HB.17 (b)	Austro Control	(b) Compliance with the requirements of paragraph (a) of this section must be shown at the maximum take off mass with a tolerance of +5%, -0%. A balloon may never be flown above MTOM! So a **+** 5% tolerance isn't possible. A minus tolerance would be useful in this case to be less restrictive**.** For equal trading it needs also more details (advisory material) concerning fuel pressure and number of burner coils to be used. From our conception we performed the performance climbs using one for double-, two for triple- and tree for quarto- burner with a medium fuel pressure (5 – 7 bars).	**Partially accepted** Paragraph CS 31HB.17 concerns climb performance, using the maximum mass as defined in CS HB31.14. This already includes standard tolerances. It is not considered necessary to change this tolerance in CS 31HB.17. Therefore tolerances are removed from CS 31HB.17. Minimum Burner fuel pressure required for the performance climb test is included in the AMC.
90.	Draft Decision CS 31HB.17	DGAC France	- Delete the (b) sub paragraph, and Rewrite the (a) sub paragraph as follows : The balloon at its maximum mass must be capable of climbing at least 91 metres in the first minute from a start in equilibrium at ground level in standard day conditions. - Remove the (a) numbering. JUSTIFICATION: There is a safety objective defined in the first sentence of (a).This is a climb performance with maximum mass. But it is immediately contradicted by the second sentence of (a) which authorises to limit this to a lower mass, totally arbitrary because dependent on the conditions of the tests which are left to applicant's choice. This is not consistent. The safety objective must be clear and the means of compliance must be left to discussion in accordance with CS 31HB.12. Also, within sub paragraph (b), there is no reason to give an upper limit to the mass for the test, because it is expected that compliance with this specification would be more difficult with a heavier balloon. It is proposed to delete (b). There is confusion from the fact that the requirement refers to a value of 91 metres and another of 300 feet as they do not represent the same distance (300 feet = 91.44 m). This code should only use metric units, giving unambiguous certification criteria.	**Partially Accepted** CS 31HB.17 is changed as proposed, except for the "standard day condition". It is not considered practical to require that this test should be performed in standard day conditions that may not exist for a long time. The value of 91 metres is changed to 90 metres for practical reasons. It is accepted to remove the 300 ft since this is a new Certification Specification.
135.	General Comment Book 1: Subpart B – Flight – CS 31HB.17 – Performance: Climb	Transport Canada	Subsections (a) and (b) are not fully consistent with respect to the mass. Subsection (a) requires the test to be conducted at the maximum mass, implying no tolerance, while (b) refers to maximum take-off mass and provides a tolerance.	**Noted** Refer to comment 37 above.

CS 31HB.20 CONTROLLABILITY

Cmt	Para	Comment provider	Comment/Justification	Response
91.	Draft Decision CS 31HB.20	DGAC France	Modify as follows: - CS 31HB20: It must be shown ~~– normally by demonstration with a balloon of the type for which certification is requested –~~ that the balloon is safely controllable and … JUSTIFICATION: The concept of replacing tests by validated analysis (if this is the meaning of "calculation") which provides enough confidence is used in other "CS" documents. This principle has been applied in wording proposed for CS 31HB.12 (1) as and is now suggested similarly for specifications found in CS 31HB.20.	**Partially Accepted** It is accepted to remove the "means of compliance" from this requirement and retain only the airworthiness requirement. It is also added that operational limitations related to the controllability, such as maximum wind speed, should be included in the Flight Manual.

CS 31HB.21 LOADS

Cmt	Para	Comment provider	Comment/Justification	Response
92.	Draft Decision CS 31HB.21	DGAC France	Reword CS 31HB.21 LOADS as follows: Strength requirements are specified in terms of : (a) limit loads that are the maximum loads to be expected in service, taking into account the load factors of CS 31HB.23 and (b) ultimate loads that are limit loads multiplied by the factors of safety of CS 31HB.25. JUSTIFICATION: There are some ambiguities in the currently proposed text. - What are "Applicable load factors"? If they are those of 31HB.23, then it would be better to cross-reference them. If not, the word "applicable" should be explained. - What are"Prescribed safety factors"? If they are those of 31HB.25, then it would be better to cross-reference them. If not, the word "prescribed" should be explained. The last sentence contradicts the first sentence that refers to ultimate loads which, obviously from their definition, are not simply limit loads. This sentence should be deleted. In any place in CS 31HB, loads should be described either as limit load or as ultimate load to avoid any ambiguity. Or, alternatively, the intent of this sentence should be clarified. (Was it intended to mean "*Unless called "ultimate loads", all loads are "limit loads""* ?)	**Accepted** It is accepted that it is more clear to separate both load definitions and to add the specific references to the load factors CS 31HB.23 and factors of safety CS 31HB.25. The last sentence is removed, and wherever necessary in Subpart C, specific limit load or ultimate load are used.

CS 31HB.23 LOAD FACTORS

Cmt	Para	Comment provider	Comment/Justification	Response
47.	Draft Decision CS 31HB.23 (b) Landing Load Factor	Ultramagic S.A.	" For all parts belonging to the balloon's suspension system, including the envelope to suspension pick up points, limit load must be determined using a limit load factor of at least 3.0" Change to " For all parts belonging to the balloon's suspension system, including the envelope to suspension pick up points, limit load must be determined using a limit load factor of at least 3.0 instead of 1.4" JUSTIFICATION: To avoid confusion when determining load factors.	**Partially Accepted** The intention of this comment is supported. However the applicability of the load factor in (a) is restricted to all except when (b) is applicable.
69.	Draft Decision CS 31HB.23 Coefficent of load pressure	Balony Kubicek	31HB.23(a) JUSTIFICATION: Leave in item (a) only, item (b) annual or change the coefficient of limit load pressure from 3 to 2.	**Not Accepted** The proposal is kept consistent with the earlier agreed CG9 draft (Feb 2003)

CS 31HB.25 FACTORS OF SAFETY

Cmt	Para	Comment provider	Comment/Justification	Response
70.	Draft Decision CS31HB.25 Coefficient of security	Balony Kubicek	Add into the text a possibility to decrease the coefficient of security 5 for design of envelopes cover to value 2, if it is approved, that the coefficient is sufficient.	**Accepted** It is recognised that the safety factor of 5 was related to the use of pre-synthetic fabrics in the past. A reduced factor of safety of at least 2 is accepted in FAR 31 if it is shown that the selected factor will preclude failure due to creep or instantaneous rupture from lack of rip stoppers. The technical content of the current FAR 31 requirement is adopted.
75.	Draft Decision: CS-31HB Book 1: Subpart C – Structure CS31HB.25 (d)	British Library	In applying factors of safety, the effects of temperature, ageing, fatigue and/or other operating characteristics that may affect the strength of the balloon must be accounted for. JUSTIFICATION: The effects of ageing and fatigue of the envelope due to exposure to UV-radiation are of particular interest with regards to the performance and strength of the envelope.	**Not Accepted** Adding the effects of ageing and fatigue is not accepted because these are material and design related properties that will not affect the factors of safety. The "suitability and durability" mentioned in CS 31HB.33(a) and CS 31HB.39 are considered to cover these aspects. From this comment it is concluded that CS 31HB.25(d) is not related to factors of safety, and it

Cmt	Para	Comment provider	Comment/Justification	Response
				is more appropriate to include this requirement in CS 31HB.27. Therefore, it is moved to CS 31HB.27(f).
88.	Draft Decision 31HB.14, 25, 30	DGAC France	Occupant mass should be increased from 77 kg to at least 86 kg. JUSTIFICATION: The mass of an occupant is artificially set to 77 kg. This seems to be quite a low figure considering the change in average human mass in modern societies. It is noted that, although 77 kg is the figure found in CS-23, the figure has been increased to 86 kg in CS-VLA. This has been justified by a need to have more safety margins to compensate for the less demanding certification criteria. It is suggested that the CS-VLA figure should be retained for the same reasons. The retained value must be consistent with the safety objective and with the level of confidence in the certification process. *Note: For information mass values in JAR-OPS 1* *And JAR-OPS 3*	**Not Accepted** General consistency within airworthiness codes (CS-23 and CS-25 and FAR 31) requires that the mass for an occupant is kept at 77 kg for the requirements of the paragraph CS 31HB.25. The occupant mass for CS 31HB.30 is changed to 86 kg, also consistent with other airworthiness codes.
93.	Draft Decision CS 31HB.25	DGAC France	**Rewrite CS 31HB.25 FACTORS OF SAFETY as follows:** (a) Except as specified in paragraphs (b) and (c) below, the factor of safety is 1.5. (b) A factor of safety of at least 2.25 must be used in the design of	**Partially Accepted** It is accepted to split the requirement CS 31HB.25(a) into separate paragraphs. **Note.** **The new order and numbering of the**

Cmt	Para	Comment provider	Comment/Justification	Response
			all fibrous or non-metallic suspension components. (c) A factor of safety of at least 5 must be used in the envelope design. The factor must be applied to the most critical loads resulting from the maximum operating pressure or envelope stress. (d) These factors must be applied to the loads resulting from the most critical effect of temperature and other operating characteristics that may affect the balloon strength. **Create a new "CS 31HB.26 ATTACHMENTS AND SUSPENSION" paragraph as follows** (a) The primary attachments of the envelope to the basket, trapeze, or other means provided for carrying occupants must be designed so that failure is extremely remote or so that any single failure will not jeopardise safety of flight. (b) The individual structural elements in the suspension system must be dimensioned and configured or duplicated so that failure of one structural element (single failure) does not cause any uncontrollable operating condition. JUSTIFICATION: Sub-paragraph (e) is not relevant to the purpose of 31HB.25. The specific subject of occupant mass has been addressed in another comment. It is suggested deleting this sub-paragraph taking into account proposed wording for 31HB.14. Sub-paragraph (c) is not relevant to the purpose of 31HB.25. It is suggested deleting this sub-paragraph and creating a dedicated new 31HB.26. It is noted that the currently proposed AMC 31HB.25 (a) contains specifications which should be in book 1 and the proposed new paragraph takes this into account. Sub-paragraph (b) is not understood. The factor must be applied to limit loads, according to 31HB.21. To apply it to "the more critical of the maximum operating pressure or envelope stress" is not consistent. What is meant here? Our interpretation is made in the proposal as an attempt to understand the intent. In sub-paragraph (d), the logic "text X and text Y or both" is not understood: it is suggested that "or both" should be deleted. How would the "effect of temperature and other operating characteristics that may affect strength of the balloon" be accounted for? How does this change the safety factor? This is not defined and then subject to arbitrary decisions. A rewording is proposed.	**paragraphs (a) through (c) is harmonised with the FAR part 31.25; and not in consistent with the proposal in this comment.** **New CS 31HB.25(b)** *(Applicable to the envelope)* This paragraph is amended to become similar to the current FAR Part 31 section 31.25(b). A reduced factor of at least 2 is introduced when specific material requirements are met. (see response to comment 70). **New CS 31HB.25(c)** *(Applicable to fibrous and non-metallic suspension components)* The factor of safety is changed to 2.25 (1,5 x 1,5); that when applied to landing loads (CS 31HB.23(b)) results in load factor of 6,75. The FAR Part 31 load factor (1.4) times the factor of safety (5) results in a factor of 7. The NPA proposed CS 31HB.25(c) "*The primary attachments of the envelope…*" was initially intended to be applicable to fibrous or non-metallic suspension components, and is therefore consolidated in this paragraph. Therefore the proposed new CS 31HB.26 is not accepted. CS 31HB.25 (d) is moved to CS 31HB.27(f). Also refer to comment 75. The text is reworded for clarity.

Cmt	Para	Comment provider	Comment/Justification	Response
137.	General Comment Book 1: Subpart C – Structure – CS 31HB.25 – Factors of Safety	Transport Canada	Subsection (a) calls for a factor of safety for fibrous or non-metallic suspension components of 3.0 (1.5 plus an additional 1.5). It is noted that AWM 531 calls for a factor of 5, therefore this would appear to represent a technical difference between the CS and the current AWM. Subsection (c) refers to the "basket, trapeze, or other means provided for carrying occupants". This implies that a distinction is made between a basket and other means. However, the definition of basket in CS 31HB.2 indicates that the term "may also apply to other appropriate means of occupant accommodation, including gondolas, seats, etc.", so the reason for the distinction in 25 (c) is not clear.	**Noted** The factor of safety is changed to 2.25 (1,5 x 1,5); that when applied to landing loads (CS 31HB.23(b)) results in load factor of 6,75. The FAR Part 31 load factor (1.4) times the factor of safety (5) results in a factor of 7.

CS 31HB.27 STRENGTH AND PROOF OF STRENGTH

Cmt	Para	Comment provider	Comment/Justification	Response
15.	Draft Decision AMC CS31.27(C)	Cameron Balloons Ltd.	Replace first two paragraphs with; "It has been shown by a number of decades of in-service experience that the traditional reinforced woven wicker and willow basket design offers a combination of resilience and impact resistance that can contribute considerably to the protection of occupants. The structure is also able to absorb considerable kinetic energy during impact on the ground or against obstacles." JUSTIFICATION: Existing text is wordy and repetitive.	**Partially Accepted** The proposed paragraph is classified as a Note, and moved to the end of the AMC.
94.	Draft Decision CS 31HB.27	DGAC France	modify "CS 31HB.27 STRENGTH AND PROOF OF STRENGTH" paragraph as follows (a) (unchanged) (b) The structure must be able to withstand ultimate loads for at least 3 seconds without failure. (c) For the balloon envelope, (1) the proof of strength must also make allowance for tear growth after damage of the envelope in order to prevent propagation of a tear to a hazardous size. (2) tests may be performed on representative portions of the envelope provided the dimensions of these portions are sufficiently large to include critical design features and details such as critical	**Partially Accepted** The proposed paragraph (a),(b) and (c) are accepted. Proposals and current text in the NPA proposal that are considered as an acceptable means of showing compliance are introduced as AMC, and removed from the requirements. Instead of "rough landing" the term "hard or fast landing" is used for consistency.

Cmt	Para	Comment provider	Comment/Justification	Response
			seams, joints, load-attachment points. (d)(1) The basket must afford the occupants sufficient protection during a hard or fast landing to avoid likely causing serious injury to the occupants, by absorbing some kinetic energy during impact on the ground or against obstacles and offering secure shelter for the occupants cowering behind the basket wall when crashing into trees or when being dragged by the wind over the ground. (2) A drop test must be performed if it is not possible to make use of an existing proven basket of the same or similar design (in terms of construction method, size, layout etc.) for a balloon of the size that is the subject of the application. In the absence of an alternative test proposal, this test must be performed at the maximum design mass of the basket in a manner that simulates the effects of gravity that occur as realistically as possible. The basket is dropped onto a horizontal concrete surface from a height of 1 m at 0°, 15° and 30°. The drop test must not result in deformation or fractures which, by their nature, could lead to the serious injury of occupants. JUSTIFICATION: Sub-paragraph (b) is internally inconsistent : "must be substantiated by test" in first sentence, with "proof by calculation" in third sentence. It also conflicts with 31HB.12. Simplification is then proposed in line with counter proposal already made for 31HB.12. In sub-paragraph (c), some important words are not defined: "Generally robust", "Adequate protection", "Reasonably envisaged", "Serious injury". It is understood that the associated AMC indicates an acceptable design complying with these specifications, but, unless it is agreed that this is the only acceptable design and the text is changed to state this, more precise criteria should be proposed. The proposed wording attempts in providing a possible means to deal with this issue. We find here reference to "rough landing" when in other places the vocabulary is "hard or fast landing". Is the intent the same? How and where are these terms defined? It is noted that the currently proposed AMC 31HB.27 (c) contains specifications which should be in book 1 (" a drop test must …").	
138.	General Comment Book 1: Subpart C – Structure – CS	Transport Canada	Section CS.27 (c) does not specify that a drop test is required. However, the alternative means of compliance (AMC 31HB.27 (c)) discusses the conditions under which a drop test must be	**Noted** The drop test is an acceptable means of showing compliance with requirement CS 31HB.27(d) (See

Cmt	Para	Comment provider	Comment/Justification	Response
	31HB.27 – Strength and proof of strength		performed, but it is unclear. The definition of baskets includes other means of carrying occupants, but the alternative means of compliance makes specific reference to woven wicker and willow baskets so it is unclear whether it applies to those other means of carrying passengers – e.g. gondolas, seats, etc. (Note: For comparison purposes, AWM 531.27(c) specifies that a drop test of the basket, trapeze or other place provided for occupants must be conducted. In addition, the drop test specified in the CS may not be as severe as that required by AWM 531. The CS specifies one drop height only, whereas the AWM may require a higher drop depending on the velocity attained in an uncontrolled descent (AWM 531.19), for which no equivalent requirement exists in the CS.)	resulting text) The specific reference is removed from the AMC and placed in a Note. The AMC is applicable to baskets as defined in CS 31HB.2. Uncontrolled descent and related requirements are not included in this code because a single burner failure should still produce a sufficient heat output to maintain level flight. (Refer to CS 31HB.47(e)) The exception to this requirement (see AMC 31HB.47(e)) will require application of a special condition.

CS 31HB.28 TETHERED FLIGHT LOADS

Cmt	Para	Comment provider	Comment/Justification	Response
12.	Draft Decision CS31HB 28 Tethered flight loads	Cameron Balloons Ltd.	Add the following text to the **AMC** "Tethered flight has been performed since 1971. During this time procedures and equipment have been developed to ensure that it is an activity that can be carried out safely in accordance with, and using equipment specified in the balloon flight manual. A reliable complex analysis of tethered flight loads is impossible. In most cases the tethered flight loads will be comparable to launch restraint loads with the exception of unforeseen gust conditions. Compliance with this requirement can normally be shown by limiting the windspeed and maximum take-off mass (below normal free flight operational limits) in which tethered flight is performed and showing compliance with strength requirements (see CS31.27) of all additional tethering equipment. The greatest danger during tethering is if the tethering equipment should fail and the balloon become unrestrained without enough positive buoyancy. For this reason single point / element tethering should not be considered." JUSTIFICATION: The requirement proposed here is impractical. A reliable analysis of tether loads is quite impossible. A simple test of a tethered balloon will provide no useful information as damage during tethering happens only exceptionally. From long experience, a number of precautions to avoid damage during tethering have been developed,	**Partially Accepted** The Proposed AMC does not provide an acceptable means of showing compliance with CS 31HB.27. Information in the proposal that provides guidance for an applicant is added as a note to the AMC.

Cmt	Para	Comment provider	Comment/Justification	Response
			and these are recommended in, for example, the Cameron Balloons Flight Manual Issue 10, Section 4, Paragraph 12.	
48.	Draft Decision CS31HB.28 Tethered flight loads	Ultramagic S.A.	Add the following text to the **AMC** Tethered flight has been performed for many years. Equipment and procedures have been developed to ensure that Tethered flight can be carried out safely in accordance with the various balloon manufacturers' flight manuals using specified equipment. Compliance with this requirement can be shown by limiting the wind speed and maximum take-off mass (below normal free flight operational limits) in which tethered flight is performed. JUSTIFICATION: It is impossible to carry out a practical analysis of tether loads. Damage during tethering is quite rare and testing of a tethered balloon will not provide sufficient useful information. Many years experience has resulted in the establishment of precautions that need to be taken when tethering. These precautions including wind speed limitations are included in the various manufacturers' Flight Manuals.	**Partially Accepted** Refer to comment 12.
95.	Draft Decision CS 31HB.28	DGAC France	Modify as follows: **CS 31HB.28 TETHERED FLIGHT LOADS** (a) The effects of the loads associated with tethered flight on the balloon's components, ~~(~~particularly the burner frame/load frame~~)~~ , must be assessed and accounted for in the design. ~~Assessment may be by test or analysis validated by tests, provided any analysis method is shown to be reliable~~. (b) Any associated operational limitations must be established and recorded in the Flight Manual. JUSTIFICATION: The concept of replacing tests by validated analysis (if this is the meaning of "calculation") which provides enough confidence is used in other "CS" documents. This principle has been applied in wording proposed for CS 31HB.12 (1) and is now suggested similarly for specifications found in CS 31HB.28.	**Partially Accepted** The proposed sub-paragraph (b) is added as CS 31HB.28(d). The information required for the flight manual is added in AMC to CS 31HB.81.

CS 31HB.29 GROUND HANDLING

Cmt	Para	Comment provider	Comment/Justification	Response
17.	Draft Decision	Cameron Balloons Ltd.	Delete entire paragraph and add the following additional text to AMC31HB.27	**Accepted** Ground handling requirements are moved to CS

Cmt	Para	Comment provider	Comment/Justification	Response
	CS 31HB 29 Ground handling		"The design and strength of components (particularly the burner frame/load frame) must also consider the effects of recurrent and other loads experienced during ground handling and transportation." JUSTIFICATION: It is not clear from this drafting exactly how compliance with the ground handling requirement might be shown. By their nature, ground handling loads are impossible to quantify. Present designs of balloon are reasonably robust against ground-handling damage and have been improved as a result of modifications following experience. An addition to the AMC would highlight the design case to inexperienced Design Organisations.	31HB.27(e) The text is changed to reflect requirements only. New AMC is added to CS 31HB.27(e).
49.	Draft Decision CS 31HB.29 Ground handling	Ultramagic S.A.	Delete entire paragraph and add the following additional text to AMC31HB.27 "The design and strength of components (particularly the burner frame/load frame) must also consider the effects of recurrent and other loads experienced during ground handling and transportation." JUSTIFICATION: Ultramagic S.A. agrees with and presents the justification as given by Cameron Balloons as follows: "It is not clear from this drafting exactly how compliance with the ground handling requirement might be shown. By their nature, ground handling loads are impossible to quantify. Present designs of balloon are reasonably robust against ground-handling damage and have been improved as a result of modifications following experience. An addition to the AMC would highlight the design case to inexperienced Design Organisations".	**Accepted** See response to comment no 17.
96.	Draft Decision CS 31HB.29	DGAC France	**rewrite CS 31HB.29 GROUND HANDLING as follows:** The strength specifications of CS 31HB.27 must include consideration of the loads resulting from ground handling which are likely to occur in service. JUSTIFICATION: What are these "strength requirements" ? Are they the strength specifications of 31HB.27 ? Or something else ?	**Not Accepted** Contrary to the proposal, the ground handling strength requirements are considered a requirement that is included in CS 31HB.27(e).

Cmt	Para	Comment provider	Comment/Justification	Response
			What is meant by "consideration" ? Loads occurring in service cannot be determined before the balloon has been certified by the agency. Therefore, compliance with this text is not possible. What are "recurrent loads" ? The reference to "not to fail" would classify the ground handling loads as ultimate loads. Is this really a real case ? We therefore propose a simplified text.	
126.	Draft Decision CS 31 HB 29 - Ground Handling	Lindstrand Hot Air Balloons Ltd.	Delete the entire paragraph. JUSTIFICATION: This is a requirement that is frankly obvious to any competent, approved Design Organisation. It also has the potential for being very difficult for a Design Organisation to make a comprehensive statement of compliance against this requirement. In principle, commercial pressure from clients and operators ensure that the manufacturers pay close attention to designing sufficient robustness into the product through all aspects of operation and handling. Specific instances of balloons becoming unairworthy due to ground handling are relatively rare and will normally be observed during a pre-flight inspection and dealt with through product performance reviews and the service information system. There is no need to incorporate this requirement.	**Accepted** Refer to response to comment no 17

CS 31HB.30 RESTRAINT HARNESS

Cmt	Para	Comment provider	Comment/Justification	Response
1.	CS 31HB General comments CS 31HB.30	Luftfahrt-Bundesamt	**CS 31HB.30(a)** Following the logic of the text alignment the text block after (2)should be shifted to the right to be in line with (a) and (b). This text is a continuation of (a). JUSTIFICATION: errata	**Accepted**
5.	CS 31HB Draft Decision CS 31HB.30	Luftfahrt-Bundesamt	(newly inserted text underlined ,deleted text ~~crossed out~~) **CS 31HB.30 Restraint harness** (a) When a occupant restraint harness is installed, the occupant must be safely restrained within the basket when subjected to the following ultimate inertia load factors~~, subject to a maximum~~	**Partially accepted** It is apparent from the comments received that this paragraph can lead to confusion. A diagram, showing the inertia load factors is therefore added.

Cmt	Para	Comment provider	Comment/Justification	Response
	Restraint harness		~~resultant of 3g~~: (1) 2.0g Vertically upwards (2) 3.0g Horizontally in all directions An occupant mass of at least 77 kg (170 lb) must be assumed for the purposes of this paragraph. (b) ... JUSTIFICATION: The text of subparagraph (a) is unclear. As written (with the maximum resultant vector of 3g) the vertical (90°) vector is 2g whereas at 89° the value would be 3g. If part of the text is deleted as proposed above the original intention of the paragraph becomes more clear.	
76.	Draft Decision CS-31HB Book 1: Subpart C – Structure CS 31HB.30 (a) – first sentence	British Library	When an occupant restraint harness is installed, the occupant must be safely restrained within the basket when subjected to the following ultimate inertia load factors, subject to maximum resultant of 3g: JUSTIFICATION: The indefinite article changes from 'a' to 'an' when the first letter of the following noun is a vowel or mute.	**Accepted**
88.	Draft Decision 31HB.30	DGAC France	Occupant mass should be increased from 77 kg to at least 86 kg. JUSTIFICATION: The mass of an occupant is artificially set to 77 kg. This seems to be quite a low figure considering the change in average human mass in modern societies. It is noted that, although 77 kg is the figure found in CS-23, the figure has been increased to 86 kg in CS-VLA. This has been justified by a need to have more safety margins to compensate for the less demanding certification criteria. It is suggested that the CS-VLA figure should be retained for the same reasons. The retained value must be consistent with the safety objective and with the level of confidence in the certification process. *Note: For information mass values in JAR-OPS 1*	**Accepted** For showing compliance to this specific restraint harness requirement the mass for an occupant is changed to 86 kg consistent with several other airworthiness codes (CS-VLA, CS-22, CS-23 and CS-25).

Cmt	Para	Comment provider	Comment/Justification	Response
			And JAR-OPS 3	
97.	Draft Decision CS 31HB.30	DGAC France	**modify "CS 31HB.30 RESTRAINT HARNESS" as follows:** (a) When an occupant restraint harness is installed, the occupant must be safely restrained within the basket when subjected to the following acceleration ~~ultimate inertia load factors~~, subject to a maximum resultant of 3 g: (1) 2.0 g upwards (2) 3.0 g horizontally in all directions. ~~An occupant mass of at least 77 kg (170 lb) must be assumed for the purposes of this paragraph.~~ (b) (unchanged) JUSTIFICATION: - 31HB.30 (b) correctly refers to "acceleration specified in CS 31HB.30(a)". However, 31HB.30 (a) does not use that vocabulary : "ultimate inertia load factors" is not an appropriate wording. - The mass of occupants is already addressed in another paragraph: duplication is not appropriate. Furthermore, how should the wording "safely restrained" be understood? - What age or medical condition is to be considered when addressing the safety of the occupants? - Are injuries acceptable? - Is this a design specification for the restraint itself, meaning that it must not break under such forces? - Is this a specification addressing the resulting medical condition of the occupants? => It is suggested to replace (a) by a design specification applied to the harness stating it must not break under these forces: *"When an*	**Partially accepted** Inconsistent use of "ultimate inertia load factors" in (a) and "accelerations" in (b) is corrected. The paragraph CS 31HB.30(a) is rephrased to provide clear and unambiguous requirements for the restraint harness instead of "occupant requirements". Removal of "77 kg" is not accepted as explained in the response to comment no 88. Remark. The last part of the justification to comment 97 addresses the issue of human capability for restraining himself when subjected to 3g accelerations. A restraint harness is considered one of the means that can retain occupants onboard of the basket, but not the only one. Handholds, compartments and the basket itself are also considered as "retaining" features of a hot-air balloon. These are specified in the paragraph 31HB.59 and 31HB.63. See also comments made to those paragraphs in this CRD.

Cmt	Para	Comment provider	Comment/Justification	Response
			occupant restraint harness is installed, the harness must not fail when subjected to loads resulting from the occupant mass submitted to the following acceleration, ….". Eventually, the following point seems even more important. If an occupant may be subjected to 3 g acceleration, which is likely to be above average human capability for restraining himself, is it acceptable to certify a product without restraint harness?	

CS 31HB.33 MATERIALS

Cmt	Para	Comment provider	Comment/Justification	Response
98.	Draft Decision CS 31HB.33	DGAC France	**Rewrite CS 31HB.33 MATERIALS as follows:** (a) The suitability and durability of all materials must – (i) Be established on the basis of experience or tests; (ii) Meet approved specifications that ensure their having the strength and other properties assumed in the design data; and (iii) Take into account the effects of environmental conditions, such as temperature and humidity, expected in service. (b) Envelope materials must be shown not to support continued burning if ignited by the heater when the balloon is inflated or in flight. JUSTIFICATION: There is inconsistency between (a) and (b) sub-paragraphs: (a) states that conforming to specifications is sufficient when (b) states it is not. Paragraph (b) should be removed. This is consistent for example with similar CS25.603 or CS 29.603 wording. When reading CS25 or CS29, one can see that such a requirement is only applicable to materials "used for parts, the failure of which could adversely affect safety". Should we do the same here ? In addition, the use of the word "approved" is here defined in the AMC, but it shall be questionable of finding a better term, when the agency does not always formally approve those specifications. "Officially recognized" certification might be an alternative.	**Partially Accepted** It is accepted that this paragraph should be organised as proposed in this comment. However the text of CS 31HB.33(a) is changed to be consistent with other Airworthiness codes (CS 22-, CS 23-, CS VLA-, CS VLR.603). Instead of requiring that **all** materials need to comply with this requirement, only those used for parts failure of which could adversely affect safety are now specified. The proposed CS 31HB.33(a)(i) and (ii) are accepted as CS 31HB33.(a)(1) and (2) The proposed CS 31HB33(a)(iii) is considered AMC to CS 31HB.33(a)(2) and as such introduced in the AMC.

CS 31HB.35 MANUFACTURING PROCESSES

Cmt	Para	Comment provider	Comment/Justification	Response
99.	Draft Decision CS 31HB.35	DGAC France	Rewrite CS 31HB.35 MANUFACTURING PROCESSES as follows: Manufacturing methods and processes must be such as to produce	**Partially Accepted** CS 31HB.35, including the title, is rewritten consistent with the original FAR Part 31 and current

Cmt	Para	Comment provider	Comment/Justification	Response
			sound structure and mechanisms which retain the original mechanical properties under reasonable service conditions. JUSTIFICATION: Comment on the word "approved": see comment on 31HB.33. What is the intent of the second sentence? Is this related to the subject of critical parts which might need special manufacturing processes (see CS-E 515 (b)) ? If this is the case then, this important subject of critical parts should be dealt with in a dedicated paragraph such as CS-E 515, CS-P 160 or CS-APU 150. If this is not the intent, then the sentence is not relevant because the manufacturing processes are part of the type design which is type certificated? Based on other airworthiness codes on this subject (especially CS-E 70 (b)), a new text is proposed.	CS-VLA, CS-22 requirements. New AMC is added to clarify the approval status of process specifications. The requirement in CS 31HB.35 is similar to the paragraph 605 of CS 22, CS 23, CS VLA and CS VLR. It is not intended to be similar to CS-E515 or CS-P160.

CS 31HB.37 FASTENINGS

Cmt	Para	Comment provider	Comment/Justification	Response
26.	CS 31HB.37 Fastenings	CAA UK	Paragraph refers specifically to bolts, pins, screws and rivets used in the structure must confirm to an approved specification. In this paragraph for example no mention is made of Karabiners. It appears from the wording that only bolts, pins, screws and rivets need to be considered AMC 31HB.37 should be expanded to say that fastenings may not be limited to those specified in CS 31HB.37 JUSTIFICATION: Clearer text.	**Partially Accepted** CS 31HB.37(a): It is accepted that also other fasteners need to meet this requirement. However, instead of defining the scope in the AMC and mentioning specific types of fasteners in the requirement, the generic term "fasteners" is used in the requirement. (see resulting text)
100.	Draft Decision CS 31HB.37	DGAC France	**Rewrite CS 31HB.37 FASTENINGS as follows:** (a) Bolts, pins, screws, rivets and locking devices must conform to established specifications. (b) Locking methods must be established and documented. (c) Unless a joint is free from relative movement, secondary locking means must be used. (d) Self-locking nuts may not be used on bolts that are subject to rotation in service.	**Partially Accepted** The proposed change to CS 31HB.37(a) is not accepted. See comment 26. CS 31HB.37 is re-structured as proposed. The wording for CS 31HB.37(b) through (d) is accepted.

Cmt	Para	Comment provider	Comment/Justification	Response
			JUSTIFICATION: Comment on the word "approved" : see comment on 31HB.33. By reference to first sentence, the second sentence imposes to have "methods" complying with "specifications". This should be explained. A counter-proposal is made below. In third sentence, what is this joint ("the" joint) ? This cannot be understood. Not knowing the real intent, it is proposed to replace "the" by "a". If this is not the intent, then the sentence is not relevant because the manufacturing processes are part of the type design which is type certificated.	

CS 31HB.39 PROTECTION OF PARTS

Cmt	Para	Comment provider	Comment/Justification	Response
6.	CS 31HB Draft Decision CS 31HB.39 Protection of parts	Luftfahrt-Bundesamt	(newly inserted text underlined) **AMC 31HB.39 Protection of parts** Suspension system cables and components manufactured from stainless steels (corrosion resistant steels) are considered compliant with this requirement. To ensure the protection of parts, it is permissible to rely on recommended inspections (details in the Maintenance Manual). In cases where deterioration or loss of strength is unavoidable during the life of the product, details of appropriate mandatory replacement lives or in-service testing should be provided in the maintenance programme (see also CS 31HB.82) and - where reasonable - in the Flight Manual. JUSTIFICATION: In AMC 31HB.39, last sentence: a reference to the Flight Manual is needed (e.g. pre-flight check).	**Partially Accepted** This comment has shown that the proposed AMC is too prescriptive. The term "instructions for continued airworthiness" is used as a generic term instead of MM or FM. The AMC is amended to reflect that instructions for continued airworthiness can serve as a means of compliance to protect parts from deterioration beyond acceptable levels.
18.	Draft Decision CS 31HB 39 Protection	Cameron Balloons Ltd.	Restore version from the draft of 27 February 2003 JUSTIFICATION: This change has re-introduced a danger. The reason for stating that stainless steel must be used was the dangerous conditions that had occurred in the past with galvanised steel. If galvanised steel is used, the protection can be vaporised by burner heat; the large surface area of unprotected steel then loses	**Partially Accepted** It is accepted that the specific danger of using steel cables other than stainless steel must be clear, and is therefore more clearly mentioned in the AMC. The proposed draft text would however preclude use of other materials, and is therefore amended. Consistent with CS 31HB31.33 and the principles used in CS-22.609, CS-VLA.609, the scope of this

Cmt	Para	Comment provider	Comment/Justification	Response
			strength rapidly if stored wet. Of course Kevlar and other cables must not be ruled out inadvertently. The Feb 2003 version is better, but ideally, the AMC should explain why galvanised steel wire rope should not be used.	requirement is restricted from each part to those parts failure of which could adversely affect safety.
101.	Draft Decision CS 31HB.39	DGAC France	There are undefined terms in this paragraph which are not sufficiently explained in associated AMC. - "suitably" : what would be accepted as being suitable ? There should be a clear safety objective. - "protected against deterioration" : it seems that this is an impossible requirement. Deterioration is unavoidable when the product is used. - "loss of strength in service due to …. other causes" : this is too much vague. If we are not able to nominate them, "other causes" shall be removed or minimized by a word "likely". In addition to these ambiguities, the associated AMC introduces a concept of "mandatory replacement lives". It is not appropriate to impose "mandatory" actions by means of an AMC : as a minimum, this should be part of 31HB.39. Furthermore, this look like a concept of critical parts : see comment on 31HB.35 and 31HB.33. A complete re-writing of this paragraph would be necessary. JUSTIFICATION: Clarification of the intent and of the safety objective is obviously necessary. If there is a concept of "critical parts" in a balloon, this should be subject of a dedicated paragraph.	**Not Accepted** The "undefined terms" are commonly used in existing codes like FAR 31 without creating ambiguity, and are also consistent with terms used in other Certification Specifications. Compliance with design and construction requirements can be met by using appropriate combinations of design and instructions for continued airworthiness. It is therefore introduced as AMC to this requirement.

CS 31HB.43 FITTING FACTORS

Cmt	Para	Comment provider	Comment/Justification	Response
102.	Draft Decision CS 31HB.43 (c)	DGAC France	Replace the word "approved" by "officially recognized". JUSTIFICATION: See similar comment on use of the word "approved" inCS31.HB33.	**Not Accepted** Consistent with the response to comment 99 to CS 31HB.35, new AMC is added to clarify the approval status of practices.

CS 31HB.44 PROTECTION OF ENVELOPE AGAINS TEARING

Cmt	Para	Comment provider	Comment/Justification	Response
103.	Draft Decision CS 31HB.44 and	DGAC France	**rewrite CS 31HB.44 PROTECTION OF ENVELOPE AGAINST TEARING as follows:**	**Partially accepted** The change to (a) is accepted. However (b) is considered AMC since it shows

Cmt	Para	Comment provider	Comment/Justification	Response
	AMC 31HB.44		(a) The envelope must be designed such that ~~hazardous~~ propagation of tears or local damage will not ~~occur~~ result in a hazardous effect while the envelope is supporting limit loads. (b) Unless it can be demonstrated that basic envelope material can provide such a rip-stopping capability, horizontal and vertical load tapes and/or other rip-stoppers must be incorporated into the structure of the envelope so that likely tear lengths are limited to those for which level flight can be maintained. Failure of the envelope between rip-stoppers must be taken into account in the proof of the structure. JUSTIFICATION: The wording "hazardous propagation" is really ambiguous and not consistent with wording used in other airworthiness codes. It is assumed that the intent would be to refer to "propagation leading to a hazardous effect". It is also noted that the associated AMC contains specifications which should be in book 1 It is suggested deleting the AMC 31HB.44 and re-writing the text of 31HB.44 as shown below. However, the wording "hazardous effect" is not defined. In the absence of a requirement for a safety analysis in this CS 31HB, this should be definition in 31HB.2.	different means of complying to (a). Specific requirements for an AMC are kept in the AMC since these are not common requirements.

CS 31HB.45 FUEL CELLS

Cmt	Para	Comment provider	Comment/Justification	Response
1.	CS 31HB General comments CS 31HB.45	Luftfahrt-Bundesamt	newly inserted text underlined ,deleted text ~~crossed-out~~) **CS 31HB.45(f)** Typo: "fuel ~~s~~cell". JUSTIFICATION: errata	**Accepted**
7.	CS 31HB Draft Decision CS 31HB.45 Fuel cells	Luftfahrt-Bundesamt	(newly inserted text underlined, deleted text ~~crossed-out~~) **AMC 31HB.45(d) Fuel cells; Inertia loads** Consideration of applied loads should include handling and transport cases as well as the ~~(see CS 31HB.30)~~ flight cases (see CS 31HB.30 for ultimate load factors). JUSTIFICATION: In AMC 31HB.45(d) the sentence should say "....as well as the flight	**Not Accepted** See response to comment no. 38 below.

Cmt	Para	Comment provider	Comment/Justification	Response
			cases (see CS 31HB.30 for ultimate load factors)". This is because the 31HB.30 paragraph has quite another title.	
19.	Draft Decision CS31HB 45 Fuel Cells	Cameron Balloons Ltd.	Remove reference to Road Transport legislation (ADR) JUSTIFICATION: Airworthiness requirements should address what is required for airworthiness. If the Airworthiness regulations require prior Road Transport approval, this would cause delays by preventing both projects proceeding in parallel. The Road Transport approval of balloon cylinders is specific to cylinders for balloon use. If that should require prior airworthiness approval, then a complete Catch 22 would apply! Each approval should stand alone, although they may have some requirements in common.	**Accepted** The reference to Road Transport Legislation AMC 31 HB.45(a) is reclassified as a Note to the AMC in order provide information which is not a means of showing compliance to the airworthiness requirement.
20.	Draft Decision CS31.45	Cameron Balloons Ltd.	"Guards must be fitted to all fuel cells to protect the valves and other tank-mounted equipment from either inadvertent operation or damage, particularly in the case of a hard or fast landing when occupants may be thrown about the basket or obstacles outside the basket may be impacted". change to "Guards must be fitted to all fuel cells to protect the valves and other intrinsic equipment from either inadvertent operation or damage, particularly in the case of a hard or fast landing when occupants may be thrown about the basket or obstacles outside the basket may be impacted". JUSTIFICATION: A "Tank" in this context is usually a term applied to a static vessel (unless it is a portable tank) of a volume greater than 150 litres.	**Partially Accepted** For clarity, the wording "tank" is removed and instead of "intrinsic equipment" fittings is used. Consistent with CS 31HB.39, "protection from damage during carriage" is replaced by "protection from damage during ground handling or transport".
28.	AMC 31HB.45(f)(6) item 7	CAA UK	The term "expert" should be replaced with "authorised person" as this person performing the tests and inspections on a fuel cylinder will either be authorised as an unapproved subcontractor under the control of the Type Certificate Holder (or STC holder) or independently authorised. JUSTIFICATION: Improved text.	**Not Accepted** Item 7 is removed because the method used for login continued airworthiness data is not an airworthiness requirement.
38.	Draft Decision CS 31HB.45 (d) respectively AMC 31HB.45 (d)	Austro Control	Reference to CS 31HB.30 which only ask for 3g isn't adequate. ACG interpretations according, LFHB, BCAR31 and FAR 31 are to have to request a total design load factor of at least 7 (load factor of 1.4 and safety factor for non-metallic parts of 5). Studies and discussions with European manufacturers following a fatal accident in Austria showed very different interpretations e.g.,	**Accepted** It is accepted that the reference to CS 31HB.30 for acceleration values for flight cases would not provide an adequate safety level. Comparison to CS 22.787 Baggage compartment already shows a horizontal acceleration value of 9g, and CS 22.561(e) for an

Cmt	Para	Comment provider	Comment/Justification	Response
			there is no rule in the requirements, take 9g in referring back to Motor glider requirements, different calculations taking landing speed and deceleration in consideration. So a clear rule is very appreciable for fuel cylinder attachments (straps) but 3g is to less! For clear identification of approved cylinder straps markings should be requested.	engine installed above and beyond the pilot needs to comply with 15g. There is however currently no substantiation for acceleration values applicable to Hot-air balloons. The requirement is therefore kept without specific acceleration values. The requirement is re-numbered to CS 31HB.45(c). New AMC 31HB.45(c) is introduced to put emphasis on the consideration of high loads during a hard or fast landing.
39.	Draft Decision CS 31HB.45 (f)	Austro Control	Typo in the first paragraph, fuel sell should read fuel cell. (f)(3) A means of controlling the maximum fill in accordance with the applicable gas handling legislation. So far I know the general gas handling legislation ask for weight controlled filling. I would rather like to continue with volume controlled filling requesting a max fill valve for certification purposes.	**Accepted** **Noted** The method, volume or weight controlled filling, is not specified in the requirement.
50.	Draft Decision CS31HB.45 Fuel Cells	Ultramagic S.A.	Remove reference to Road Transport legislation (ADR) JUSTIFICATION: Ultramagic S.A. agrees with and presents the justification as given by Cameron Balloons as follows: "Airworthiness requirements should address what is required for airworthiness. If the Airworthiness regulations require prior Road Transport approval, this would cause delays by preventing both projects proceeding in parallel. The Road Transport approval of balloon cylinders is specific to cylinders for balloon use. If that should require prior airworthiness approval, then a complete Catch 22 would apply! Each approval should stand alone, although they may have some requirements in common."	**Accepted** The reference to Road Transport Legislation AMC 31 HB.45(a) is reclassified as a Note in the AMC in order to provide information which is not a means of showing compliance to the airworthiness requirement.
51.	Draft Decision AMC31HB.45 (F) (6) Fuel Cells	Ultramagic S.A.	Remove the following items listed under "The fuel cell data plate should include the following information" 6) The date of the next Periodic Inspection 10) The maximum filling mass and the tare of the receptacle with the fittings and accessories as fitted at the time of filing or the gross mass. Add (to replace 10) The tare of the receptacle with the fittings and accessories as fitted at the time of filing.	**Partially Accepted** AMC 31HB.45(f)(6) is renumbered to AMC 31hb.45(d)(5). The items 4), 5), 6), 7) and 8) are deleted from this AMC because the method used for login continued airworthiness data is not an airworthiness requirement. The data required for maximum filling of the fuel cell is dependent on the type of fuel cells used. Technical developments require a less specific AMC.

Cmt	Para	Comment provider	Comment/Justification	Response
			JUSTIFICATION: Item 6 is not necessary as the date required for this can easily be determined with reference to the Maintenance manual and balloon log book. The maximum filing mass can vary depending on fill conditions. Fuel cell is filled by volume. Listing of maximum filling mass could encourage overfilling.	
52.	Draft Decision CS31HB.45 (F) Fuel Cell fittings	Ultramagic S.A.	Remove the following items listed under "A pressurised fuel cell (fuel cylinder) must be equipped with:" (5) A Clearly visible label stating that the cylinders are only for use in hot air balloons. JUSTIFICATION: This label with the statement is not required. No label is required on the balloon burner stating similar.	**Partially Accepted** When a fuel cell is designed to the airworthiness requirements only, and would not meet an industry standard used outside of the application for hot-air balloons, such a statement should be considered. The requirement is moved to the AMC.
60.	AMC 31HB.45(a)	M. Rouwendal	Road transport **AMC 31HB.45(a)** The need for education the crew and pilots how to handle the propane, emergency first responce, and how to stop fire. The need of co2 firedistingishers should be written since a poudre-firedistingisher does not stop any fire on the ground with burning grass and blinding the passengers and pilot in the air. We have tested this with proffessional fireman.	**Noted** Education and training is not within the scope of the airworthiness requirements. The requirement to carry a fire extinguisher is covered in the renumbered CS 31HB.72. Substantiation for use of only CO_2 fire extinguishers is however not available. The current fire extinguisher requirements are therefore kept.
77.	Draft Decision CS-31HB Book 1: Subpart D – Design and Construction CS31HB.45 (b) – first sentence	British Library	Material characteristics to be considered in the design of pressurized fuel cells must include yield strength, tensile strength, ductility, impact strength, fracture resistance, time-dependent strength (ageing), fatigue strength, corrosion and fire resistance. JUSTIFICATION: The material properties at high temperatures and the resistance to fire should be taken into account in order to achieve as much protection as possible against an onboard fuel fire which in most cases leads to the loss of the aircraft.	**Accepted**
78.	Draft Decision CS-31HB Book 1: Subpart D – Design and Construction CS31HB.45 (e)	British Library	The fuel cell design and manufacture must be verified by a test programme agreed by the Agency. This test programme must consider burst testing, fatigue testing, impact testing, drop testing, macro examination of the material of the cell and welded joints (if applicable) and material variability. JUSTIFICATION: Omission of the word 'cylinder' as the fuel cell does not necessarily need to be of cylindrical shape as different types of fuel may require	**Accepted** Remark: The review group has decided to reclassify CS 31HB.45(e) as AMC since this is a means of compliance. Numbering of this requirement is changed to AMC 31HB.45(a)

Cmt	Para	Comment provider	Comment/Justification	Response
			different container designs and ways of manufacture.	
79.	Draft Decision CS-31HB Book 1: Subpart D – Design and Construction CS31HB.45 (e) – second sentence	British Library	This test programme must consider burst testing, fatigue testing, impact testing, drop testing, fire testing, macro examination of the material of the cell and welded joints (if applicable) and material variability. JUSTIFICATION: The material properties at high temperatures and the resistance to fire should be taken into account in order to achieve as much protection as possible against an onboard fuel fire which in most cases leads to the loss of the aircraft.	**Accepted** (See also remark 78 above)
104.	Draft Decision CS 31HB.45 and AMC 31HB.45 (a)	DGAC France	**Rewrite CS 31HB.45 FUEL CELLS as follows:** (a) It must be demonstrated by test or analysis or both that all pressurised fuel cells have sufficient strength margins to withstand all conditions of internal and external pressures, temperatures and loads likely to be encountered in normal or abnormal operation, including during carriage and storage. (b) The compatibility of the cells material with the fuel must be justified. Fatigue, ageing and corrosion capability of the cells must be assessed and any necessary limitation, protection or maintenance action must be determined. (c) Fuel cells, their attachments and related supporting structure must be shown by tests to be capable of withstanding, without detrimental distortion or failure, any inertia loads to which the installation may be subjected in normal or abnormal operation. (d) A pressurised fuel cell must be equipped with: (1) A shut-off valve on the main fuel supply or any other restriction of fuel flow. This valve must be equipped with a self-sealing coupling, or other means to avoid the release of hazardous quantities of fuel should the control be inadvertently operated without a fuel line connected. (2) A pressure relief valve, which must not be connected to the fuel supply, providing a sufficient margin against bursting of the fuel cell. (3) A means to control the maximum filling of the fuel cell. (4) A means to measure the remaining onboard fuel quantity. (5) A data plate containing information necessary for safe operation. (e) Guards must be fitted to all fuel cells to protect and prohibit fuel leakage from the valves and other tank-mounted equipment in case of	**Partially Accepted** The proposed text is partially accepted because also text changes from comment No 77, 78 and 79 are included. The specified minimum test programme in paragraph (e) in the NPA is moved to become AMC 31HB.45(a) AMC 31HB.45(d) is renumbered to become AMC 31HB.45(c). Additional editorial changes are reflected in the resulting text in the Appendix to this CRD

Cmt	Para	Comment provider	Comment/Justification	Response
			(1) Inadvertent operation and (2) Damage during carriage, normal operation and fast or hard landing. (f) Rigid extensions must not be fitted directly to fuel cell valves or fittings JUSTIFICATION: This paragraph is complex, with many errors or ambiguities, and is mixing certification specification with basic design practices. 1) Paragraph (a) which states that the design must take account of all relevant factors does not provide any useful certification specification. Furthermore, this aircraft code should not deal with compliance with "road" codes as currently done by means of associated AMC 31HB.45 (a). It is suggested deleting this AMC. 2) Paragraphs (b) and (c) as worded, define neither safety objectives nor certification specifications. They simply provide obvious statements on how to design a cell. 3) In (e) there are no pass/fail criteria. To test with no defined purpose is not appropriate. The reference to an agreement of the test programme by the Agency does not provide the necessary safety objective. 4) Within (f) "sell" is inappropriately used for "cell". 5) In (f)(1), should "full flow" be "fuel flow" ? Is "liquid supply" appropriate in relation to gas? A "liquid gas" is something which is not known in physics. How are defined these "hazardous quantities"? It is noted that some proposals exist for CS-25 or in paragraph (1)(e) of AMC to CS-E 130. The sentence "A shut-off valve on the main fuel supply without an excess flow valve, or any other restriction of fuel flow" cannot be understood. Should it read as follows : (1) when the main fuel supply has not an excess flow valve, a shut-off valve, or (2) for all cases, any other restriction of fuel flow. Or to be read as follows (1) A shut-off valve without an excess flow valve on the main fuel supply, or (2) any other restriction of fuel flow. This does not make much sense. In particular, what about the "excess flow valve": may it release a hazardous quantity of fuel? 6) In (f)(2), against what should the cylinder be protected ? This is not defined. The pressure relief valve shall protect the cylinder but must not be connected to it. How is defined the word "adequately"? 7) In (f)(3), where in European Union's or EASA's texts or in this CS 31HB is this "gas handling legislation" defined? 8) In (f)(4), the cross reference to 31HB.85 (a) is not pointing to a	

Cmt	Para	Comment provider	Comment/Justification	Response
			precise specification. Assuming it is to (a)(1), it is noted that the subject are not the same. 31HB.85 (a) refers to the quantity of fuel and 31HB.45 (f)(4) refers to the chemical constituents of the fuel. 9) In (f)(5), the Agency is acting outside of its competence. The rules for use of fuel cells in cars or boats or in buildings are not under its terms of reference. 10) In (g)(1), how is defined a "hard or fast landing" (see comment on 31HB.27)? The idea of occupants being thrown away during landing is not appalling in itself (see other comment on restraint harnesses). But, in order to comply with this (g)(1), how many occupants are supposed to hit the same guard? The level of "aggression" against the guards is not defined. This is then a totally arbitrary specification with no clear safety objective (to protect?). In the sentence "from either inadvertent operation or damage" the "or" is surprising : this should be an "and". 11) In (g)(2), the text is at same time a certification specification and an explanation of the need for such specification (due to ….). This paragraph refers to CS 31HB.46 which in turn refers to CS 31HB.45 (g)(2) : circular references should be avoided. A completely new version is proposed, but it does not solve all issues raised above.	
127.	Draft Decision CS 31 HB 45(f)(2)	Lindstrand Hot Air Balloons Ltd.	Remove the words "which must not be connected to the liquid supply". JUSTIFICATION: There is rarely a good design reason for introducing a prohibitive design requirement. In this particular situation the obvious conclusion is to make sure that the pressure protection is directed towards the vapour pressure of propane. However, cylinders normally become over-pressurised because of the presence of too much liquid. Consequently, the act of vacating liquid could reduce the danger exposure time by a factor of 27 (The expansion ratio of liquid to vapour at standard temperature and pressure.	**Partially Accepted** The requirement is amended to provide an objective requirement instead of a prescriptive requirement. Also refer to comment No.104.

CS 31HB.46 PRESSURE FUEL SYSTEMS

Cmt	Para	Comment provider	Comment/Justification	Response
21.	Draft Decision CS31HB AMC 46(b) Pressurised fuel systems	Cameron Balloons Ltd.	Revert to text of 27 February 2003 JUSTIFICATION: 46(b) AMC There is absolutely no evidence that a cylinder's guard ring extending a few centimetres above the basket top would be in danger. This should be more generally worded. Cylinders completely external to the basket have been prohibited in Germany but have	**Not Accepted** The text from 27 February 2003 is not considered adequate. The intent of this comment is however accepted. New AMC is introduced via the comments entered by the review group to this paragraph. These

Cmt	Para	Comment provider	Comment/Justification	Response
			been used with good results elsewhere including standard Cameron products. The standard Cameron "Lite" basket model uses external cylinders. There is no valid reason for this requirement.	comments are placed at the end of the comments to this paragraph.
53.	Draft Decision CS31HB.AMC 46 (b) Pressurised fuel systems	Ultramagic S.A.	Revert to text of 27 February 2003 JUSTIFICATION: 46(b) AMC – There is no evidence of any danger being caused by a cylinder's guard ring extending a few centimeters above the basket top. External cylinders have been used successfully and safely in many instances. Non basket balloon systems operate safely with no danger being caused. Consequently there is no reason for this requirement.	**Not Accepted** The text from 27 February 2003 is not considered adequate. The intent of this comment is however accepted. New AMC is introduced via the comments entered by the review group to this paragraph. These comments are placed at the end of the comments to this paragraph.
105.	Draft Decision CS 31HB.46 and AMC 31HB.46 (b**)**	DGAC France	**1)** Remove first part of AMC31.HB.46 (b). **2)** Modify CS.31HB46 (b) as follows: … likely to occur in service. **3)** Rewrite CS.31HB46 (c) as follows: (c) Any rigid extension that could be broken under any likely impact must be protected so that it can sustain the impact without failure. JUSTIFICATION: 1) The first sentence of AMC 31HB.46 (b) is not an interpretation of 31HB.46 (b). One is referring to avoidance of impacts; the second is related to resistance to impacts. It is suggested deleting the first part of this AMC (or to move it to AMC to 31HB.45). 2) In (b), the words "to occur" are missing : text should be "likely to occur in service". 3) In (c), it is recommended to use a direct grammatical style instead of double negative style : this is much clearer and more understandable.	**1) Not Accepted** New AMC is introduced via the comments entered by the review group to this paragraph. These comments are placed at the end of the comments to this paragraph. **2) Accepted** **3) Partially Accepted** The issue of this comment has been discussed by the review group. The conclusions are provided as comments in this table. The requirement of CS 31HB.46(c) is considered as a subset of CS 31HB.46(b) and therefore moved to become AMC to CS 31HB.46(b).
	CS 31HB.46(a) and AMC 31HB.46(a)	Review Group	It is considered clearer in the requirement to specify "each part" of the pressurised fuel system, instead of "elements" which are than listed. The listing of the parts is moved to AMC to this paragraph. Refer to the resulting text in the appendix to this CRD.	
	CS 31HB.46(b) and AMC 31HB.46(b)	Review Group	Service experience has shown that failure of hose connections in the pressurised fuel systems have contributed to accidents/incidents. Care must be taken that the design of hoses and connections of the pressurised fuel system must take deformations of i.e. the basket into account that occur during a hard landing. When this has been taken into account in the design, it is considered important that the configuration of the design should be maintained afterwards. Therefore identification of hoses and connections that are suitable for installation in a specific basket must be identified. Refer to the resulting text in the appendix to this CRD.	

CS 31HB.47 HEATER SYSTEM

Cmt	Para	Comment provider	Comment/Justification	Response
8.	CS 31HB Draft Decision CS 31HB.47 Heater system	Luftfahrt-Bundesamt	(newly inserted text underlined) **CS 31HB.47 Heater system** (a) When a heater system is used to provide the lifting means, the system must be designed and installed so as not to create a fire hazard. (See AMC 31HB.47(a)) (b) Parts adjacent to a heater system (and if applicable, its flame) and the occupants must be protected from excessive heat. (c) There must be controls, instruments, or other equipment essential to safe control and operation of the heater system. They must be shown to be able to perform their intended functions during normal and emergency operation. (d) The heater system (including, for a burner, the burner unit, controls, fuel lines, fuel cells, regulators, control valves, and other related elements) must be substantiated by an endurance test designed to reflect the limiting conditions likely to be encountered in service, both in kind and duration. The endurance test proposed by the manufacturers must be approved by the Agency. (e) For a burner system, the test must also include at least three flameouts and restarts. (f) Each element of the heater system must be serviceable at the end of the test. (g) For a burner, the pilot light (or other means of ignition) must be shown to operate reliably in typical gusts and rain, must be readily accessible for relighting and must be easily relit. Continued operation of a burner must be possible in the event of a sustained pilot light failure. (h) Except in single-occupant balloons, the heater system (which for burners includes the burner unit, fuel lines, fuel cells, regulators and control valves) must be designed so that in the event of any single failure, it will retain sufficient heat output to maintain level flight. (See AMC 31HB.47(h)) **AMC 31HB.47(a)** **Heater system** In the sense of this requirement: - a "heater system" is a comprehensive term for the propulsion of a hot air balloon, which may also comprise designs other than the conventional propane burner. - a "burner" is understood to be a special design of a "heater system" which will usually be a conventional propane burner.	**Partially Accepted** The heater is not equivalent to the heater system, but is the part of the system that generates the heat (e.g. a conventional propane burner). The heater system also includes the fuel cells, lines etc. This is harmonised with FAR Part 31. For clarity a definition for the heater system is introduced in paragraph CS 31HB.2 instead of the proposed AMC. The proposed change to (c) and (f) are accepted. **Response to the question.** Both the requirement CS 31HB.47((h) (In the resulting text renumbered to CS 31HB.47(f)) and related AMC are based on the CG 9 proposal. Because single occupant hot-air balloons in general have a heater system with a single burner, a single failure in that system could result in a cold descend, and will not meet the requirement to maintain level flight. Detailed requirements were not drafted since this issue is too design specific. It will therefore be part of the process to establish the certification basis.

Cmt	Para	Comment provider	Comment/Justification	Response
			AMC 31HB.47(h) **Heater system** For those single occupant balloons which do not meet the single failure criteria in the requirement, measures to compensate for the increased likelihood of a cold descent landing (i.e. one without the assistance of a heater system) should be discussed with the Agency. JUSTIFICATION: In CS 31HB.47 as is the alternating use of "heater" and "burner" is confusing without further explanation. A "heater system" is the general term for the propulsion of a hot air balloon (e.g. solar heating) whereas a "burner" (e.g. propane burner) is a special design of a "heater system". In paragraphs (a)-(c) and (f) the words heater or system are completed to read "heater system". The paragraphs (d), (e), (g) and (h) remain unchanged because the term "burner" is explained in the new AMC 31HB.47(a). Questions: In CS 31HB.47(h) an exemption is made for single-occupant balloons. It is not understood why. In AMC 31HB.47(h) measures for compensation should be discussed with the Agency. From an AMC the reader would expect a hint what would be an acceptable means by the Agency. Unfortunately this is missing.	
106.	Draft Decision CS 31HB.47	DGAC France	Rewrite CS 31HB.47 (d) as follows: (d) The heater system must be substantiated by an endurance test designed to reflect the limiting conditions likely to be encountered in service, both in kind and duration. (1) For a burner system, which includes the burner unit, controls, fuel lines, fuel cells, regulators, control valves, and other related elements, the test must also include at least three flameouts and restarts. (2) Each element of the system must be serviceable at the end of the test. Then renumber current (g) and (h) as (e) and (f) respectively. JUSTIFICATION: Last sentence of (d) referring to an agency approval is not relevant to certification specifications because it is procedural: it is an obvious fact that the means of compliance with the certification basis must be agreed between the applicant and the agency. (e) and (f) requirements are added to the description of the test	**Partially Accepted** The proposal is accepted however, some minor text changes have been introduced.

Cmt	Para	Comment provider	Comment/Justification	Response
			within (d). For efficiency and clarity, it is proposed to merge (d), (e) and (f) into a new (d). Then renumber current (g) and (h) as (e) and (f) respectively.	
139.	General Comment Book 1: Subpart D – Design and Construction – CS 31HB.47 – Heater System	Transport Canada	No standard for the endurance tests mentioned in this section are identified. This leaves the CS open to inconsistent application and interpretation in this area.	**Noted** The requirement provides an objective instead of a detailed prescriptive test.
		Review group	Specific equipment that was required in the proposed CS 31HB.85 "minimum equipment" has been introduced in this paragraph because of its function that is part of the heater system. The former CS 31HB.85(a)(2) is reworded to better cover the issue that exists if multiple supplies and controls are part of a heater system Also AMC is added.	

CS 31HB.48 OPERATIONAL RELIABILITY OF THE HEATER SYSTEM

Cmt	Para	Comment provider	Comment/Justification	Response
22.	Draft Decision CS31.48	Cameron Balloons Ltd.	Delete paragraph "A permanently…… JUSTIFICATION: 1) There is no relationship in this case between sufficient heat output and reliability. 2) This AMC will not stand the test of time as it only deals with current technology. 3) The limits chosen seem quite arbitrary and do not reflect proven industry practice	**Partially Accepted** Refer to the review group comment at the end of this paragraph.
40.	Draft Decision AMC 31HB.48	Austro Control	Why +10% and on the other hand + 5%, why not 2750 m³ and 4745 m³. We would like to suggest let the figures without (+10%) and (+5%).	**Not Accepted** Refer to the review group comment at the end of this paragraph.
54.	Draft Decision CS31HB.AMC 48 Operational reliability of the heater system.	Ultramagic S.A.	Delete paragraph " A permanently sufficient heat output …….. JUSTIFICATION: Ultramagic S.A. agrees with and presents the justification as given by Cameron Balloons as follows: "1) There is no relationship in this case between sufficient heat output and reliability." "2) This AMC will not stand the test of time as it only deals with current technology."	**Partially Accepted** Refer to the review group comment at the end of this paragraph.

Cmt	Para	Comment provider	Comment/Justification	Response
			"3) The limits chosen seem quite arbitrary and do not reflect proven industry practice".	
60.	AMC 31HB.48	M. Rouwendal	I think we all need double systems for security so why not start with a double system? What if one fails in the air?	**Noted** Because single occupant hot-air balloons in general have a heater system with a single burner, a single failure in that system could result in a cold descend, and will not meet the requirement to maintain level flight. Since the design of this type of balloon is very specific, detailed requirements were not drafted in these airworthiness specifications. An equivalent level of safety will need to be established as part of the process to establish the certification basis. Also refer to the new CS 31HB.47(e) in the appendix to this CRD.
107.	Draf Decision CS 31HB.48	DGAC France	Modify title of this paragraph as follows: CS31.HB.48 **SAFETY ANALYSIS OF THE HEATER SYSTEM** Modify CS31.HB48 as follows: … so that a single failure due to technical fault, wear or ageing of the whole system or parts thereof could not ~~endanger the occupants~~ create a hazardous effect. JUSTIFICATION**:** The title of this paragraph (operational reliability) is not related to the content which is basically a request for performing a safety analysis. It is suggested changing the title into "**safety analysis of the heater system**". In the text the wording "endanger the occupants" is not defined and is not the wording found in other places in this CS 31HB in particular in AMC31HB.48 which refers to "a hazard". Therefore, this text is open to various interpretations and is not consistent with its own interpretation (AMC). It is suggested changing the wording into "… could not create a hazardous effect.". Of course, "hazardous effect" should be defined (see also comment on 31HB.44).	**Partially Accepted** Refer to the review group comment at the end of this paragraph.

Cmt	Para	Comment provider	Comment/Justification	Response
123.	Draft Decision CS 31 HB AMC 48	Lindstrand Hot Air Balloons Ltd.	The guidance material should be removed. It is not essential. JUSTIFICATION: The Lindstrand applicable range of burner size to envelope size already disagrees with the stated range incorporated within this AMC material. The requirement of CS 31 HB 17 is a better guide of the balance between economic power and system redundancy. It is not particularly fair or equitable that balloons have a greater malfunction tolerance than fixed wind aircraft.	**Partially Accepted** Refer to the review group comment at the end of this paragraph.
	CS 31HB.48	Review group	From the comments received it is concluded that this paragraph is interpreted inconsistently. The intended requirement that a heater system should provide enough heat output in case of a single failure in the system to be able to maintain level flight and sufficient control for descent, approach and landing is not clear. The requirement of CS 31HB.48 also seems to overlap the requirement of CS 31HB.47(h) in the NPA 07/2006. The proposed CS 31HB.48 is therefore removed and incorporated into the new CS 31HB.47(f). **Conclusion** The objective of CS 31HB.48 is covered by CS 31HB.47(f). AMC 31HB.48 is removed.	

CS 31HB.49 CONTROL SYSTEMS

Cmt	Para	Comment provider	Comment/Justification	Response
83.	Draft Decision CS-31HB Book 2: Subpart D – Design and Construction AMC 31HB.49 (e)	British Library	The use of a signal warning device, which actuates at a temperature below the limiting safe temperature is an acceptable means of compliance. If the actuation of the signal warning device is of a non-recurring type, the flight manual must contain appropriate instructions as to the safe operation of the balloon after the actuation of the signal warning device. JUSTIFICATION: If the signal warning device actuated in a non-recurrent operation, the balloon can no longer be deemed in an airworthy condition as the envelope material can not be protected against overheating. In such case the pilot must have appropriate instructions regarding the safe operation of the balloon. Also, appropriate instructions should be specified in the Maintenance Manual to reinstate the airworthy condition of the aircraft.	**Accepted** The second sentence is added to AMC 31HB.49(e).
108.	Draft Decision CS 31HB.49	DGAC France	Rewrite (c) as follows: To prevent bursting of the envelope, each mixed balloon using a captive gas as a lifting means ~~(mixed balloon)~~ must be equipped Rewrite (d) as follows:	**Accepted**

Cmt	Para	Comment provider	Comment/Justification	Response
			Each hot air balloon must have a means to allow the controlled release of hot air during flight unless ~~the Agency is satisfied that~~ the balloon complies with CS 31HB.20 without it. JUSTIFICATION: In (c), it is suggested that the wording of 31HB.51 should be used for consistency and clarity : "each mixed balloon" instead of "each balloon …. (mixed balloon)". In (d), the reference to satisfaction of the agency is not appropriate. It is suggested writing it as : "…. unless the balloon complies with …".	

CS 31HB.51 BALLAST

Cmt	Para	Comment provider	Comment/Justification	Response
80.	Draft Decision CS-31HB Book 1: Subpart D – Design and Construction CS31HB.51	British Library	Each mixed balloon using ballast must have a means for its safe storage and controlled release in such a way that is not hazardous to persons and objects on the ground. (see AMC 31HB.51) JUSTIFICATION: Ballast requirements should be changed in order to be consistent with CS31GB.51.	**Not Accepted** The required safety aspect for release of disposable ballast is included in the amended paragraph. Consistency with a draft proposal for a future CS 31GB airworthiness code is not considered justified.
109.	Draft Decision CS 31HB.51 and AMC 31HB.51	DGAC France	**CS 31HB.51 BALLAST** (a) Each mixed balloon using ballast must have a means for its safe storage and controlled release of the ballast material. (b) Means must be provided to prevent freezing or blocking of the mechanism necessary to the release of the ballast material. (c) The ballast material must be easily dissipated after release and must not pollute the environment. JUSTIFICATION: The associated AMC contains elements which should part of book 1 ("means must be provided to prevent …"). Pollution is not the only threat potentially posed by the ballast : if it is not dispersed it can act as an inert bomb. It so appears that there are implicit design "requirements" which are not specified in this CS 31HB.	**Partially Accepted** The text of CS 31HB.51(a) is changed. The proposals (b) and (c) remain included in AMC 31HB.51 because they are considered means to comply with the safety objective of CS 31HB.51. See also comment 140.
140.	General Comment Book 1: Subpart D – Design and Construction – CS 31HB.51 – Ballast	Transport Canada	In CS 31HB.2 – "Definitions", there is a definition of "disposable ballast". The terminology is not used here, so it is not clear if a distinction is being made between disposable ballast and other types of ballast.	**Accepted** The title and text of CS 31HB.51 and AMC 31HB.51 is amended for consistency with the definition in CS 31HB.2.

CS 31HB.55 RAPID DEFLATION MEANS

Cmt	Para	Comment provider	Comment/Justification	Response
41.	Draft Decision AMC 31HB.55(b)	Austro Control	**Rapid deflation means** The installation of turning vents or a drag rope is considered as a suitable device in the sense of subparagraph (a). (a) is a typo it should read (b)	**Partially Accepted** "(a)" is a typographical error. The text has however been changed as a result of comment 110.
60.	AMC 31HB.55(a)	M. Rouwendal	Smart vent **AMC 31HB.55(a)** 6 accident/incidents a year and still you advice the smart-vent / fast deflation system. There is no power needed to open the smart-vent as so is it's construction. It can be opened easely by wires (from the turning vents) touching each other and it it will not take its original place back again so is it's construction. It will not close by itself, you need another wire to close it. If a joking or suicidal passenger pulls the line it is to late for the pilot to correct it (specially with the new rule to strain himself). The effects of an open smart-vent is deadly, with the balloon inflating in seconds no correction in the air is possible. Raped deflation is only for balloonists who want to fly with too much wind anyway.	**Noted** Rapid deflation after landing is considered a vital safety related requirement. Minimising the risk for inadvertent operation in flight is already included in the requirement. This AMC describes the intended purpose of this rapid deflations means after landing.
81.	Draft Decision CS-31HB Book 1: Subpart D – Design and Construction CS31HB.55 (a) – second sentence	British Library	The system must be designed to minimize the possibility of inadvertent operation. JUSTIFICATION: The possibility of inadvertent operation can never be prevented. Sentence should be changed in order to be consistent with text in CS31HB.63 (a) (3).	**Accepted**
110.	Draft Decision CS 31HB.55	DGAC France	In (a), what is the criterion for judging that the "reliability" is adequate? Without such a safety objective, how can it be "substantiated"? The associated AMC does not provide help in understanding this text. A safety objective should be defined : reliability should not be, in itself, a certification specification. In (b), the text is not understandable alone. The referenced AMC 31HB.55 (b) does not provide help because it is not related to 55 (b) but to 55 (a). "To align the balloon" : aligned with what ? "Designated position" : what is this ? How is it designated ? This should be clarified. It is noted that AMC 31HB.59(e) might be giving a clue on the correct interpretation of 31HB.55 but this is not stated as such.	**Not Accepted** The proposal is consistent with the current airworthiness codes and there is no indication that a more objective substantiation criteria is needed. **Partially Accepted** AMC 31HB.55 is reworded for clarity

CS 31HB.57 CONTROL CORDS

Cmt	Para	Comment provider	Comment/Justification	Response
1.	CS 31HB General comments CS 31HB.57	Luftfahrt-Bundesamt	newly inserted text underlined ,deleted text ~~crossed out~~) **CS 31HB.57(e)(2)** Reference should read: 31HB.57(a)(2). JUSTIFICATION: errata	**Accepted**
111.	Draft Decision CS 31HB.57	DGAC France	In (b), there is some confusion in wording : the sub-title is "arming cords" when in the text we find either "arming device" or "cord". Should "arming device" be changed into "arming cords"? Again, in (a)(2) and (e)(2) we find some units which are not SI units. The limits so assigned are not the same when using the figure in N or when using the figure in lbf. Therefore, there is not a unique certification criterion (340 N = 76.44 lbf, not 75). Furthermore, the maths are incorrect : if 110 N were equal to 25 lbf, then 340 N would not be equal to 75 lbf. Non SI-units should be eliminated. JUSTIFICATION: Self explanatory;	**Not Accepted** The sub-title is consistent with the paragraph title "cord". However the arming device is not necessarily an arming cord. **Accepted** In general the principle of equivalent tolerance is used for rounding off the converted figures. In this case the converted figure of 75lbf (333,6 N) is rounded off to 340 N. The initial value of 75 lbf will be removed. Consistently the 25 lbf is also deleted in CS 31HB.57(e)(2)

CS31 HB.59 BASKET OR OTHER MEANS PROVIDED FOR THE OCCUPANTS

Cmt	Para	Comment provider	Comment/Justification	Response
9.	CS 31HB Draft Decision CS 31HB.59 Baskets or other means provided for the occupants	Luftfahrt-Bundesamt	(newly inserted text underlined) **CS 31HB.59(g)** ... (g) There must be at least one hand hold for each passenger. (See CS 31HB.63(b)) ... JUSTIFICATION: In both CS 31HB.59(g) and CS 31HB.63(b) there are requirements for passenger hand holds. If this is not overlapping, an explanation is needed. A cross reference CS 31HB.63(b) would be helpful as in this paragraph the strength requirements are addressed.	**Partially Accepted** CS 31HB.59(g) is renumbered to CS 31HB.59(h). The requirements in CS 31HB.59 is not overlapping CS 31HB.63. Hand holds are required, and can be considered occupants restraints. However an occupant restraint is not considered to be equivalent to a hand hold. A seat belt will for instance not provide means for an occupant to brace him/her self during landing.

Cmt	Para	Comment provider	Comment/Justification	Response
23.	Draft Decision CS31HB 59 Baskets or other means provided for the occupants	Cameron Balloons Ltd.	Restore wording of 27 February 2003 JUSTIFICATION: 59(c) The standard Cameron Balloons baskets, in the ranges covering six passengers and less, are constructed with a curved top exceeding 1.1 metres at most of the edges, but having a lower, curved entry point at the sides. This style of basket has been manufactured in thousands with completely satisfactory results. In the past it has been necessary to modify these baskets, destroying the elegance of their shape, when delivering to Germany. This is a discrimination against successful and long standing Cameron and other industry standard products. The draft of Feb. 2003 dealt with the question perfectly. This proposal will also create a divergence from FAR 31 and would unnecessarily prevent certification of American products. All the US manufacturers use a 46" (1.15mm) maximum external overall height (including runners padding and burner frame mounts) which is essential to sport and recreational use as this is the largest standard cargo opening of Sport utility vehicles in the US. The adoption of the German 1.1 metre minimum internal dimension for sport and recreational baskets will dictate the FAR31 and CS31 Design Codes will never be harmonised. Most of the Non-EU Type certificated products (e.g. Barnes, Raven, Balloon Works) already transferred to EASA (presumably on the grounds of an equivalent level of safety) will not meet this requirement. These manufacturers equipment will be lighter, cheaper and have the equivalent strength. Manufacturers from Member States will be penalised in export situations as it will not be practicable to provide two ranges of certified baskets. This will also mean the end of the use of the current designs of baskets for people with special needs with CS31 certified envelopes (unless EASA introduces increased minimum height requirements for wheelchairs). Manufacturers with products already certified to FAR31, BCAR31, CTG015 etc. could elect, under the framework of Part 21.101, to introduce and certify changed products under existing requirements. This will mean that CS31 will be little used, the important work (e.g. increased safety factors for landing loads) will be ignored and new manufacturers within member states will not be in a position to compete. This is not good rule making.	**Not Accepted** The wording of the CG 9 draft (27 February 2003) required an internal height of the basket of 1.10 m for baskets where more than six persons are carried. It was discussed in the review group that the height of the basket is actually a means of complying with a non specified objective requirement that a basket should provide protection to the passenger and pilot from falling out of the basket and from impact risks during landing. It was therefore decided to move the current internal basket height of 1.10 m to become AMC. As AMC, an internal basket height of 1.10 m is considered to be compliant with the new introduced requirement CS 31HB.59(c)(2). Other means to comply with this requirement, such as specific shapes and proven service experience can be used to show compliance with the requirement. Refer to the resulting text of both requirement and AMC in the appendix to this CRD.

Cmt	Para	Comment provider	Comment/Justification	Response
29.	CS 31HB.59 (g)	CAA UK	This paragraph specifies that there must be one hand hold for each passenger, whereas CS 31HB.63 (b) requires that there must be a restraining means for passengers which can take the form of hand holds. The latter requirement infers permission that where a passenger is restrained by (say) a harness then a hand hold is not required. In that sense there is a conflict with CS 31HB.59 (g). The proposed solution is to delete CS 31HB.59 (g), which is in any case superseded and improved upon by CS 31 HB.63 (b). JUSTIFICATION: Deletion of inferior text.	**Not Accepted** It is required that hand holds are available for passengers in order to brace themselves for a landing, even if restraint harnesses are used. A restraint harness would not provide the same function. The requirement in CS 31HB.63(b) will therefore refer to CS 31HB.59(g) instead of the other way around.
55.	Draft Decision CS31HB. 59 Baskets or other means provided for the occupants	Ultramagic S.A.	Restore wording of 27 February 2003 JUSTIFICATION: The wording of 27 February 2003 reflects current practice of the major European manufacturers. Any changes to this are not seen as an improvement in safety. 1000s of balloons with baskets of an internal height of less 1.10m have operated safely over many years. Very often these are open baskets with swept sides where the long side can be slightly less than 1.10m in height to allow easier entry for passengers. This type of basket as well as smaller straight sided baskets are used where there are less than six occupants and the pilot thus has greater control of the passengers use of hand holds etc. A number of years ago the major European manufacturers introduced partitioned baskets where the internal basket height was increased to 1.1m. This was felt necessary because of the increase of numbers in the basket and their separation and remoteness from the pilot in command. Increasing the internal basket height to 1.10m for open baskets was not seen as a mandatory requirement but has sometimes been offered as an option. Making the internal height of 1.10m mandatory for open baskets will not increase safety and it would be particularly restrictive to European design capabilities. Also, many small baskets are designed to accommodate one or two persons. From experience it has shown that having an internal height 1.10m with these small baskets can make it very difficult for the pilot to transfer into the basket at the balloon inflation stage.	**Not Accepted** See response to comment No 23.
60.	CS 31HB.59	M. Rouwendal	Compartments 0,3 m2 per passenger **AMC 31HB.59(f)** is a good rule since the passengers have to be able to sit or bend their knees for a safe landing. The extra rule 6 passengers per compartment **CS 31HB.59(d)** is not a good idea since in a lot of circumstances it is vital for the pilot to correct the passengers and. the idea of passengers rolling over each other is not the matter since they always hold on to the ropes inside. The correction of passengers sitting on their knees instead of bowing their knees is vital since the	**Noted** In principle an average area of between 0.25 m^2 and 0.3 m^2 for occupants are considered an appropriate rule of thumb. It is however not an absolute figure acceptable as a requirement. This figure is therefore included in the AMC only. Consideration of space required to take a brace position for landing is added in the AMC. The

Cmt	Para	Comment provider	Comment/Justification	Response
			shock will come direct on their back causing long therm injuries. Passengers holding the basket in a wrong way having their hands and heads out of the basket, holding on the fuel-lines need direct correction from the pilot.	proposed requirement for dividing the basket into compartments when more than six passengers are carried is consistent with current requirements. There is no safety case to change this.
74.	Draft Decision CS31HB.59 Baskets or other agents	Balony Kubicek	Add into the item (d) a possibility of using seat belts instead of partitions. In the item (f) see AMC31HB.59(f) decrease the requirement of area for one passenger from 0,3 to 0,25m^2.	**Proposal CS 31HB.59(d)** **Not Accepted** The proposed requirement for dividing the basket into compartments when more than six passengers are carried is consistent with current requirements. There is no safety case to change this. **Proposal AMC 31HB.59(f)** **Partially Accepted** When the plan area is established, brace positions for landing should be considered. See also comment 60 above.
82.	Draft Decision CS-31HB Book 1: Subpart D – Design and Construction CS31HB.59 (c)	British Library	The internat height of the basket sides as well as the internal partition walls of the basket must not be less than 1.10 m. JUSTIFICATION: Internal partition walls are an important part of the basket structure in order to provide sufficient stiffness and robustness to the overall design of the basket. Furthermore, internal partition walls with a lower height may have a negative effect on occupant safety in particular during heavy and/or fast landings or during emergency procedures.	**Not Accepted** For the internal height of the basket sides, see response to comment No 23.
112.	Draft Decision CS 31HB.59	DGAC France	Rewrite CS 31HB59 (a) as follows: (a) To prevent entanglement of operating lines due to uncontrolled rotation, the basket may not rotate independently of the envelope unless this movement is under the control of the pilot. Clarify (e). JUSTIFICATION: In (a), there is no safety objective: it appears that this objective might be the associated AMC. It is suggested to move the objective into book 1. (e) is understood as that "more than one person" means that it is acceptable to have one person falling over another one but not two falling over one. Is this correct?	**Accepted** **Noted** CS 31HB.59(e) and the related AMC is rewritten for clarity.
141.	General Comment	Transport Canada	Using the definition found in CS 31HB.2 "Definitions", a basket may	**Accepted**

Cmt	Para	Comment provider	Comment/Justification	Response
	Book 1: Subpart D – Design and Construction – CS 31HB.59 – Baskets or other means provided for the occupants		also apply to "other appropriate means of occupant accommodation including gondolas, seats, etc.". Therefore it is unclear as to why "other means" is in the title. As well, the reference to "other means" in the title and subparagraph (b) make it unclear whether the references to "basket" in this section are meant to refer to baskets in the context of the definition (i.e. including other appropriate means), or whether they are limited or specified to conventional baskets only. If the requirements found in subsection (f), and the associated AMC are used as a means of determining the maximum number of occupants, as referred to in CS 31HB.14 "Mass Limits", the resulting status is still unclear. In addition to these requirements, there should be sufficient space provided for the pilot to have unrestricted access to all necessary controls. Subsection (k) refers to "limiting occupant configurations". The AMC refers only to the maximum number of occupants, however CS 31HB.14 "Mass Limits", subsection (b) (1) (ii) refers to the "required minimum occupants".	The wording has been amended to be consistent with the definition of basket in CS 31HB.2. **Accepted** A separate requirement is added to require the pilot's unobstructed access to the controls. **Not Accepted** CS 31HB.14(b)(1)(ii) has been removed. The minimum number of occupants (the pilot) is related to the minimum mass necessary to meet the flight requirements of the balloon. This is a balloon related limitation, not a basket limitation.

CS31 HB.63 OCCUPANT RESTRAINT

Cmt	Para	Comment provider	Comment/Justification	Response
1.	CS 31HB General comments AMC 31HB.63	Luftfahrt-Bundesamt	newly inserted text <u>underlined</u> ,deleted text ~~crossed-out~~) **AMC 31HB. 63(a)** In AMC 31HB.63(a) remove the comma. <u>JUSTIFICATION:</u> errata	**Accepted**
42.	Draft Decision CS 31HB.63(4**)**	Austro Control	May be a typo, acceleration instead of deceleration?	**Noted** The paragraph is removed since the requirement is considered overlapping with the requirements CS 31HB.59(b) and (c)(2). See resulting text in the Appendix to this CRD.
60.	AMC 31HB.63	M. Rouwendal	Occupant restraints **AMC 31HB.63(a)** The pilot restrained on the balloon. Perfectly the pilot can hold himself with one arm around the rightback standup frame of het trapeze under the burnerframe. No-one and no force can get him/her loose on that while still being able to use both hands. And where will the pilot end having his/her middle strained? Upside	**Noted** The requirement for a pilot restraint are for a basket that has a separate compartment for the pilot. The circumstances as described are a specific situation that is not generally applicable.

Cmt	Para	Comment provider	Comment/Justification	Response
			down most probable! When the pilot is restained he can not correct other passengers who for instance sit on their knees or holding hands and head out of the basket. Talking to them in a for them stressfull situation will not help. A maximum/minimum of length and weight for the pilot should be more relevent.	There has been a history of pilots of public-transport balloons falling out during rough landings. Although the passengers can use the handholds, the pilot is unable to do so because he must use the burner controls and control lines. It has become standard for the pilots to use a webbing restraint from the floor, attached to a belt which has a quick-release buckle.
113.	Draft Decision CS 31HB.63	DGAC France	1) In 31HB.63 (a), replace "of subpart C" by "of CS31.HB.30" 2) In CS31.HB63 (a)(1), replace "worn" by "attached". 3) Clarify CS31.HB63 (a)(4). 4) Define within CS31.HB63 (b), it which requirements of subpart C would be applicable. JUSTIFICATION: 1) In 31HB.63 (a), we suppose that the intent is not to refer to subpart C but to 31HB.30 (as done in 31HB.(a)(4)). If this assumption is correct, then subpart should be changed to the correct reference. 2) In (a)(1) the word "worn" has at least two different meanings which would affect significantly the interpretation of this paragraph, summarised as : to wear a hat or to deteriorate with use. To consider a worn (deteriorated) restraint would provide a margin. But it is assumed that the intent is to say "correctly fitted or correctly attached". The word "attached" is then suggested as being better than "worn". 3) In (a)(4), what is exactly required? As currently worded, this paragraph requires designing a shock absorbing system which protects the pilot, including against neck breaking. Was the real intent limited to consideration of injuries created by the restraint itself? This should be clarified. 4) it is not possible to identify anything related to "hand hold" in that subpart C.	**1) Accepted** **2) Not Accepted** The restraint is worn by the pilot and attached to the basket. **3) Noted** CS 31HB.63(a)(4) has been removed. Refer to comment 42 **4) Not Accepted** Requirements of Subpart C, except for CS 31HB.30, contain structural requirements applicable to hot-air balloons including the handholds of the basket. The reference to Subpart C will be removed since there is no need to make a reference to already applicable requirements.
142.	General Comment	Transport Canada	The reference to "other occupants" in subsection (b) is unclear. The phrase "all other occupants" would imply that the requirements	**Partially Accepted** The order of the requirements are reversed in order

Cmt	Para	Comment provider	Comment/Justification	Response
	Book 1: Subpart D – Design and Construction – CS 31HB.63 – Occupant Restraint		applicable to some occupants are addressed elsewhere, i.e. in subsection (a). Since subsection (a) addresses pilots in balloons where there is a separate pilot compartment, (b) could be interpreted as applying only to such balloons. It would be more clear if the general requirements in subsection (b) were addressed first and the specific requirements for partitioned baskets, in subsection (a), were addressed second. Subsection (b) and CS 31HB.59 ("Baskets or other means provided for the occupants") appear to be repetitive in that both address handholds yet CS 31HB.59(g) states that handholds are mandatory, whereas subsection (b) indicates they are only one means of compliance. Subsection (b) explains that hand holds are only one acceptable restraining means and specifies that the handholds must meet the Subpart C requirements, but it does not address the requirements that the other means of restraint must satisfy.	to remove possible misunderstandings. Handholds are required in a basket in order to provide a safe and obvious grasping point for occupants and preclude occupants from using other parts i.e. fuel lines, burner controls or the basket rim as handholds. New AMC is added to CS 31HB.59(h) for clarification. Restraint means, other than harnesses, need to comply with Subpart C. The Specific requirements CS 31HB.30 is specifically for the restraint harness and the attachment point(s).

CS 31HB.65 POSITIONAL LIGHTS (Proposal for a new paragraph)

Cmt	Para	Comment provider	Comment/Justification	Response
72.	Draft Decision CS31HB.65 Positional lights	Balony Kubicek	Add item with definition of the requirement for construction of positional lights for flight possibility in mode VRF NIGHT. Use from the valid FAR31.65 as whole.	**Not Accepted** Construction of positional lights is considered to be an operational requirement. General requirements for equipment are provided in CS 31HB.71

CS 31HB.67 TETHERED FLIGHT

Cmt	Para	Comment provider	Comment/Justification	Response
58.	Draft Decision CS31HB 67 Tethered Flight	Cameron Balloons Ltd.	Delete JUSTIFICATION: The pilot of a hot air balloon is taught to read weather for all operations, whether free or tethered, and uses various indicators (for instance small balloons filled with helium, speed of clouds and the behaviour of trees, flags etc.) to determine that the actual weather is similar to the forecast weather. For tethered operations, the suitability of the weather conditions should be determined by judgement. The pilot should not be encouraged to inflate a balloon to see if the weak link breaks. The "weak link" idea may provide an indication if the weather	**Not Accepted** The indication for tethered flight is intended to provide information for the pilot during the flight, not as a pre-flight instrument. It should also alert the pilot of changing circumstances during the flight. The "weak-link" is considered as one of the acceptable means of compliance. Other possible means are added to the AMC.

Cmt	Para	Comment provider	Comment/Justification	Response
			conditions change that the actual wind speed has increased outside of the flight manual limitations, but it will not necessarily alert the pilot to other potentially more dangerous changes in atmospheric conditions such as cumulonimbus activity. This could give the pilot a false sense of security. Tethered operations have been performed without this impediment for the past 25 years (a conservative estimate would be 1000+ annually in the UK alone) and it seems unreasonable to suggest that the pilot is capable of making a judgement to free fly without such a device but not capable of deciding whether it's safe to inflate a balloon and stay on the ground. There is no similar requirement in BCAR31, CTG015 or FAR31 so balloons certified to CS31 would be ignored for tethering purposes.	
85.	Draft Decision CS31HB.67 Tethered Flight	Ultramagic S.A.	Delete JUSTIFICATION: Applicable limitations for balloon flight whether free or tethered are weather related and as such determination of suitable conditions are best achieved by the pilot using the information gained from various weather indicators. These can be, for example the release of small helium balloons, observing speed of clouds and movement of trees or the use of a hand held wind speed indicator. The use of an indicator such as a weak link item as part of a balloon tether equipment could encourage pilots to operate the balloon until this limit is reached. This would be introducing an unsafe practice. The emphasis therefore should clearly be on the pilot continuing to monitor weather conditions and to cease the operation when weather conditions prove unsafe to continue. Thousands of balloon tethers have been freely carried out over many years. Practice has shown that a pilot who is capable of determining when it is safe to fly freely is more than capable of deciding whether it is safe to inflate and stay tethered and on the ground. BCAR31, CTG015 or FAR31 does not have this requirement so balloons certified to CS31 would be ignored for tethering purposes.	**Not Accepted** See response to comment 58.
114.	Draft Decision CS 31HB.67	DGAC France	1) Delete the part of the sentence starting from "such" to "minimized". 2) Add a requirement to deal with margin of annunciated limit reached. JUSTIFICATION: 1) The part of the sentence starting with "such" does not bring any	**1) Accepted** **2) Not Accepted** There is no margin specified because an unambiguous indication should be provided to the pilot.

Cmt	Para	Comment provider	Comment/Justification	Response
			useful certification specification and may be confusing with the use of the word "minimize". The real specification is the first part of the sentence ("the pilot …. have been reached"). The second part is only a "comment" or a rationale for having such a specification. 2) The request for pilot information on limitations "being" reached raises the question of the margin below the limit for such annunciation. This should be specified either in book 1 or in book 2.	

CS 31HB.71 FUNCTION AND INSTALLATION

Cmt	Para	Comment provider	Comment/Justification	Response
1.	CS 31HB General comments CS 31HB.71	Luftfahrt-Bundesamt	newly inserted text underlined ,deleted text ~~crossed out~~) **CS 31HB.71(a)(4)** Typo: "AMC 31~~G~~HB.71(a)(4)". JUSTIFICATION: errata	**Accepted**
24.	Draft Decision CS31HB 71 Equipment – Function and installation	Cameron Balloons Ltd.	Revert to text of 27 February 2003 JUSTIFICATION: 71(a)(2) It is unnecessary to label every piece of equipment. It would lower the quality and increase cost to do so. Labelling is an advantage only where it gives information that might not be obvious to a trained balloon pilot. Examples of this might be the volume of the balloon, fuel cylinder information and on any unusual controls.	**Not Accepted** The text of 27 February 2003 did not contain requirements for marking. However, the comment made shows that the objective of the proposed requirement in the NPA was unclear. Required equipment must be labelled to show its function or operating limitations if applicable. See resulting text in the appendix to this CRD.
56.	Draft Decision CS31HB. 71 Equipment – Function and installation	Ultramagic S.A.	Restore wording of 27 February 2003 JUSTIFICATION: Ultramagic S.A. agrees with and presents the justification as given by Cameron Balloons as follows: "71(a)(2) It is unnecessary to label every piece of equipment. It would lower the quality and increase cost to do so. Labelling is an advantage only where it gives information that might not be obvious to a trained balloon pilot. Examples of this might be the volume of the balloon, fuel cylinder information and on any unusual controls."	**Not Accepted** See response to comment No 24.
115.	Draft Decision CS 31HB.71 and AMC 31HB.71	DGAC France	**Rewrite CS 31HB.71 EQUIPMENT SPECIFICATION AND INSTALLATION as follows:** (a) The equipment which are part of the balloon type design must	**Not Accepted** CS 31HB.71(a) and related AMC is consistent with other CS's like CS-22. Consistency with CS-E is not considered appropriate because this specifically

Cmt	Para	Comment provider	Comment/Justification	Response
	(a)(4)		meet the relevant specifications of CS-31HB. Unless these specifications will subject this equipment to such cycles of operation as to adequately represent all the critical conditions affecting its airworthiness to which it may be expected to be exposed during service, the equipment specification must state those additional airworthiness specifications for which evidence of compliance will be needed. (b) Each item of equipment must be (1) labelled or marked as to its identification, function, or operating limitations, or any relevant combination of these factors; (2) installed according to limitations specified for that equipment. **CS 31HB.72 SYSTEMS AND COMPONENT VERIFICATION** For those systems or components which cannot be adequately substantiated by other tests of CS-31HB, additional tests or analyses must be conducted to demonstrate that the systems or components are able to perform the intended functions in all declared environmental and operating conditions, without creating a hazard to safe operation. JUSTIFICATION: In 31HB.71 (a), there is reference to "required item". What is this? This could be the items listed in 31HB.85 but the AMC 31HB.71 (a)(4) refers to items "required by operational rules". This should be clarified. Note that in (a)(4) the referenced AMC does not exist : we assume that it should be 31HB.71 (a)(4)). To interpret "when installed" of (a)(4) as meaning "not impaired by icing, heavy rain, high humidity or low and high temperature" as described in associated AMC is not obvious : this seems to be some sort of rulemaking by advisory material. By the way, how is defined "heavy rain"? How is defined "high humidity"? How are defined low and high temperatures? What are the limits to the certification exercise? It is suggested that using texts from other EASA's certification specifications would be an appropriate alternative (for example, CS-E 80 (b) and CS-E 170). It must be noted that in CS-E 170 (harmonised with FAR 33) refers to "***declared*** environmental and operating conditions", answering by this means the questions raised above. We propose a text that could possibly be completed with AMC material based on AMC to CS-E 80 and AMC to CS-E 170.	refers to engine related equipment. It is not considered necessary to define the operational circumstances like icing, heavy rain or low/high temperatures. The proposed split between, (a) equipment that is part of the balloon type design and (b) each equipment, is not supported. All equipment required by the CS-31HB needs to meet the requirements of CS 31HB.71.

Cmt	Para	Comment provider	Comment/Justification	Response
143.	General Comment Book 1: Subpart F – Equipment – CS 31HB.71 Function and Installation	Transport Canada	In addition to not creating a hazard during operation, subsection (b), it is suggested that there should be a requirement that the equipment be designed to prevent a hazard in the event of a malfunction (Note: For comparison purposes, AWM 531.71(c) specifies, "(c) The equipment, systems, and installations must be designed to prevent hazards to the balloon in the event of a probable malfunction or failure."	**Partially accepted** The consideration of the effects of malfunction of these systems or equipment is introduced as AMC.
		Review group	Comments and discussions concerning the "minimum equipment", "equipment necessary for a basic flight" and overlaps between system requirements and CS 31HB.85 have resulted in the following position from the review group. Requirements for equipment that are considered to be intrinsic items of a system are moved to the appropriate paragraph. For example, CS 31HB.85(a)(1)-(3) are moved to CS 31HB.47(c). Equipment requirements not covered by these system requirements (miscellaneous equipment) are moved to Subpart F, consistent with other airworthiness codes. A new paragraph CS 31HB.72 is introduced for that purpose.	

CS 31HB.81 FLIGHT MANUAL

Cmt	Para	Comment provider	Comment/Justification	Response
10.	CS 31HB Draft Decision CS 31HB.81 Flight manual	Luftfahrt-Bundesamt	(newly inserted text <u>underlined</u>) **CS 31HB.81 Flight manual** ... (b) Information in the Flight Manual and Approval: The Flight Manual must contain all the information necessary for safe operation of the balloon as well as the operating limitations. This section of the manual requires approval. The necessary content of the Flight Manual includes: (1) A description of the balloon and its technical equipment with explanatory sketches; (2) Specification of the permissible lifting gas (For mixed balloons only); (3) The operating limits including CS 31HB.14; (4) Emergency procedures<u>;</u> <u>(5) Normal operating procedures;</u> <u>(6) Ground handling procedures including inflation, deflation and storage</u>. <u>JUSTIFICATION</u>: In CS 31HB.81 it should be required that normal operating procedures and ground handling and inflation (take-off) instructions must be in the Flight Manual.	**Partially Accepted** CS 31HB.81 is restructured (see comment 25). The proposed addition for ground handling is included. Normal operating procedures are considered to be covered within the term "normal and emergency procedures".

Cmt	Para	Comment provider	Comment/Justification	Response
25.	Draft Decision 81(a) Flight Manual	Cameron Balloons Ltd.	Revert to version of 27 February 2003 JUSTIFICATION: The storage of the manual on board the basket is unnecessary as it has no content that could be practically accessed in flight. Most manufacturers' manuals are large documents which embody also the maintenance manual, and which was never intended to be carried in flight. One is reminded of the joke in the film "Those Magnificent Men and their Flying Machines". We understand that this is an ICAO requirement, perfectly suited to large aeroplanes. This does not make it practical or sensible for hot air balloons. The carriage of a large and cumbersome document on a single occupancy chair would result in a reduction in safety.	**Partially Accepted** ICAO requirements specify that operating limitations and any other information necessary to the safe operation shall be made available by means of a flight manual, markings and placards, and any other means as may be effectively accomplishing this purpose. It is therefore not mandatory to carry a flight manual on board. CS 31HB.81 is restructured to require: (a) That a flight manual should be provided. (b) The content of the flight manual and which parts need approval. (c) What information should be on board of the balloon. Note: The requirement is changed so that a flight manual should be provided with each balloon, not just for each type.
30.	CS 31HB.81 (b)	CAA UK	This paragraph contains a sentence "This section of the manual requires approval". However, it is not clear which particular section "this section" is referring to. Neither does CS 31 HB specify that the Flight Manual must contain sections. Other EASA certification specifications are much clearer on this subject and it is proposed that similar text to that proven to be effective in CS-VLA, CS-VLR, CS-22, CS-23, CS-25, CS-27 and CS-29 is used here. For example "Each part of the Flight Manual that is necessary for safe operation of the balloon, as well as the operating limitations, must be furnished, verified and approved and must be segregated, identified and clearly distinguished from each unapproved part of that manual. The necessary content of the Flight Manual includes: * * * * * * * *" JUSTIFICATION: Improved text based upon satisfactory experience of texts used in other EASA Certification Specifications.	**Partially Accepted** CS 31HB.81 is restructured (see comment 25). The approval requirement is specifically added to CS 31HB.85(b)(2). More detailed AMC is provided for a better understanding of the acceptable standard of the flight manual.
57.	Draft Decision CS31HB. 81 (A) Flight Manual	Ultramagic S.A.	Restore wording of 27 February 2003 JUSTIFICATION**:** The storage of the manual in the balloon basket is unnecessary as it is impractical to access and use during flight. A balloon does not glide or fly as an aircraft does and any time spent reading a manual during a balloon flight could prove dangerous due to lack of concentration on flying the balloon. Balloon flight consists of a great	**Partially Accepted** Refer to the response to comment 25.

Cmt	Para	Comment provider	Comment/Justification	Response
			deal of preparation before flight and it is at this stage that the pilot requires access to the manual. The majority of balloon pilots carry the manual in the retrieve vehicle for access prior to and after flight. This is a much safer and practical option with a hot air balloon.	
116.	Draft Decision CS 31HB.81	DGAC France	Delete "where suitable" in second sentence of (a). Clarify title for paragraph(b). Clarify contents of (b) Clarify (b)(3). JUSTIFICATION: In (a), the wording "where practical" is not clear enough : anyone may declare that storage is impractical. It is suggested deleting these words : storage for the flight manual must be provided in all cases. We assume that (b) title should be "information ***to be provided*** in the flight manual and approval". In this sub-paragraph (b), what is meant by "this section" which appears in second sentence? The CS31HB81 is supposed to define what is expected in a flight manual and what is formally approved by the agency. It is recommended to clarify the content of the manual. IN (b)(3), something is missing because CS 31HB.14 cannot be qualified as being an operating limit.	**Partially Accepted** The requirement to carry the flight manual on board is amended, and captured in a new paragraph CS 31HB.81(c) and related AMC. (see also the response to comment 25) Paragraph CS 31HB.81(b) is reworded. The operational limitations are specifically added in the appropriate paragraph. CS 31HB.14 CS 31HB.20 CS 31HB.28 CS 31HB.49(e) CS 31HB.59(e) and (l) Since both maximum and minimum mass are limitations, a generic statement is added to the end of CS 31HB.14.
120.	Draft Decision CS 31 HB 81(a) - Flight Manual	Lindstrand Hot Air Balloons Ltd.	Delete the second sentence. JUSTIFICATION: It is reasonable to expect a pilot to have read the Flight Manual before (s)he embarks on a flight. There is no content of the Flight Manual that is of practical use to the pilot during flight.	**Partially Accepted** Refer to the response to comment 25.
128.	Draft Decision CS 31 HB 81(a) - Flight Manual	Lindstrand Hot Air Balloons Ltd.	Remove this recommendation. JUSTIFICATION: The specimen Flight Manual quoted in CS 22 is a very poor example for a balloon Flight Manual. I think that better guidance should be provided.	**Noted** The reference to the example in CS-22 is considered useful for new applicants for a TC.
129.	Draft Decision CS 31 HB 81(b) - Flight Manual	Lindstrand Hot Air Balloons Ltd.	Delete the words "in the applicable balloon Flight Manual". JUSTIFICATION: This information is more appropriate to the Maintenance Manual or IPC. It is best to limit the information included in the Flight Manual to the bare essentials so that there is greater clarity of presentation	**Partially Accepted** Deletion of the wording in AMC 31HB.81 as proposed is accepted because the paragraph is already intended for the Flight Manual. The comment however makes clear that wording

Cmt	Para	Comment provider	Comment/Justification	Response
			of information and a reduced requirement for updating of the information.	needs to be clarified. The Flight Manual needs to contain a comprehensive list of approved burner, basket and envelope configurations. This is required for flight, not for maintenance. This should not be mistaken with the information of an IPC.
130.	Draft Decision CS31HB. 81 Flight	Schröder Fire Ballons GmbH	after b 4 should be added: b 5) normal operating procedures b6) ground handling procedures incl. handling, inflation, deflation and storage JUSTIFICATION: this for us is a necessary completion of this paragraph	**Partially Accepted** CS 31HB.81 is restructured (see comment 25) The proposed addition for ground handling is included. Normal operating procedures are considered to be covered within the term "normal and emergency procedures".
144.	General Comment Book 1: Subpart G – Operating Limits and Details – CS 31HB.81 Flight Manual	Transport Canada	Subpart (b)(3) refers to the operating limitations "including CS 41HB.14". This reference is not clear since it does not indicate what elements of CS.14 are being referred to. For example, 14(a)(2)(i) refers to a maximum number of occupants; is this one of the limitations being referred to, or is the reference only to the limitations specifically identified in 14(a)(iv) and (b)(2)? There are other references to the limitations in the FM, e.g. CS.59(k) and these are not mentioned. It would be clearer if CS.81 explicitly listed the minimum operating limitations that need to be addressed.	**Partially Accepted** The reference to CS 31HB.14 is removed. Instead of adding all references to the specific requirements, references to CS 31HB.81 are added in: CS 31HB.14 CS 31HB.20 CS 31HB.28 CS 31HB.49(e) CS 31HB.59(e) and (l)

CS 31HB.82 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Cmt	Para	Comment provider	Comment/Justification	Response
31.	CS 31HB.82 Instructions For Continued Airworthiness	CAA UK	While this paragraph requires a maintenance manual to be produced, it does not indicate the need for it to be reviewed and amended, in light of design changes or in-service experience. JUSTIFICATION: Text change to ensure maintenance manual development in light of experience.	**Noted** The requirements to collect and analyse data and consequently change the instructions for continued airworthiness are laid down in the implementing rule 1702/2003 Part 21. (i.e. Subpart A 21A.3, 21A.4 and Subpart B 21A.57 and 21A.61.) CS 31HB.82 is amended to specify the content of the instructions for continued airworthiness in more detail.
32.	CS 31HB.82 Instructions For Continued Airworthiness	CAA UK	There is no provision in this paragraph for the issue and dissemination of airworthiness information, normally seen as Service Bulletins or Service Letters, or for the Type Certificate Holder (or STC Holder) to publish data as a result of design reviews	**Noted** Refer to comment 31 above.

Cmt	Para	Comment provider	Comment/Justification	Response
			or in-service information. JUSTIFICATION: Clarification.	
33.	CS 31HB.82 Instructions For Continued Airworthiness	CAA UK	This paragraph does not have provision to provide a basic weighing report for the balloon. This information would be required to support continued airworthiness. JUSTIFICATION: Missing requirement needed for continued airworthiness.	**Not Accepted** A weighing report is in effect required because of CS 31HB.16 and the related AMC. A reference to the Flight Manual is included in that AMC.
34.	AMC 31HB.82 Instructions For Continued Airworthiness	CAA UK	Although the inclusion of "mandatory replacement lives and in-service testing should be provided in the maintenance programme" is referred to in AMC 31HB.39, the need to list replacement lives and in-service testing should also be contained in AMC 31HB.82 JUSTIFICATION: AMC material relevant to two requirements.	**Accepted** This is included in CS 31HB.82(d)(9).
35.	AMC 31HB.82 Instructions For Continued Airworthiness	CAA UK	(a) Maintenance Manual (4) "Details of repairs with reference to the degree of difficulty and resulting associated demands placed on the agency that performs the repair (e.g. manufacturer only, licensed repair station holding appropriate permit, skilled person)" This should be replaced by just "Details of repairs with reference to the degree of difficulty" Where and by whom a repair/inspection is performed is the responsibly of the competent authority. If any repairs are classified as complex i.a.w with Part M then an appropriately approved organisation or person would need to be employed. The wording currently in AMC 31HB.82 has assumed that a manufacturer will hold an approval to release maintenance. JUSTIFICATION: Simplification of text.	**Not Accepted** The AMC to CS 31HB.82 is restructured for consistency with existing AMC. The proposed information addressing the skills required for the execution of repair tasks is considered not standardised with other continued airworthiness information and therefore removed from the AMC.
43.	Draft Decision AMC 31HB.82 (a)	Austro Control	(a) Maintenance Manual For each type of balloon, a Maintenance Manual must be established… The current praxis tells us there are MM's for dedicated type ranges (as covered by a specific TCDS). We think it is an unnecessary burden for the industry to establish a MM for each individual type. Further comment:	**Partially Accepted** It is considered acceptable that a maintenance manual may contain information for a dedicated type range. The current wording can therefore be ambiguous, and is amended. CS 31HB.82 is reworded and contains the requirement to list life limited parts.

Cmt	Para	Comment provider	Comment/Justification	Response
			We suggest to add a § (7) A list with the values of all life limits parts.	
84.	Draft Decision CS-31HB Book 1: Subpart G – Operating Limits and Details AMC 31HB.82 (a)	British Library	(7) Maintenance and test procedures for life-limited parts and components. JUSTIFICATION: The condition of life-limited parts and components should be monitored appropriately and instructions shall be provided with regards to the decommissioning and replacement of life-limited parts and components.	**Partially Accepted** CS 31HB.82 is reworded and contains the requirement to list life limited parts.
117.	Draft Decision CS 31HB.82 and AMC 31HB.82	DGAC France	**Rewrite CS 31HB.82 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS** (a) In accordance with 21A.61 (a), manual(s) must be established containing instructions for continued airworthiness of the balloon. They must be updated as necessary according to changes to existing instructions or changes in balloon's definition. (b) The instructions for continued airworthiness must contain a section titled airworthiness limitations that is segregated and clearly distinguishable from the rest of the document(s). The airworthiness limitations section must set forth each mandatory replacement time, inspection interval and related procedure required for type certification. (c) The following information must be considered, as appropriate, for inclusion into the manual(s) required by CS 31HB.82 (a). (1) A detailed description of the Balloon and its components, systems and installations. (2) Handling instructions, including proper procedures for uncrating, de inhibiting, acceptance checking, lifting and attaching accessories, with any necessary checks. (3) Basic control and operating information describing how the Balloon's components, systems and installations operate. Information describing the methods of starting, running, testing and stopping the Balloon or its components and systems including any special procedures and limitations those apply. (4) Servicing information that covers details regarding servicing points, capacities of tanks, reservoirs, types of fluids to be used, pressures applicable to the various systems, locations of lubrication points, lubricants to be used and equipment required for	**Not Accepted** (a) and (b) are not included because these are already required by Part-21 and the Basic Regulation (Regulation (EC) No 216/2008) Annex I 1.d. CS 31HB.82 is reworded, and slightly less detailed requirements are introduced. The more detailed information is introduced in the AMC 31HB.82.

Cmt	Para	Comment provider	Comment/Justification	Response
			servicing. (5) Scheduling information for each part of the Balloon that provides the recommended periods at which it should be cleaned, inspected, adjusted, tested and lubricated, and the degree of inspection, the applicable serviceability limits, and work recommended at these periods. Necessary cross-references to the airworthiness limitations section must also be included. In addition, the applicant must include, if appropriate, an inspection programme that includes the frequency of the inspections necessary to provide for the continued airworthiness of the Balloon. (6) Troubleshooting information describing probable malfunctions, how to recognise those malfunctions and the remedial action for those malfunctions. (7) Information describing the order and method of removing the Balloon and its parts and replacing parts, the order and method of disassembly and assembly, with any necessary precautions to be taken. Instructions for proper ground handling, crating and shipping must also be included. (8) Cleaning and inspection instructions that cover the material and apparatus to be used and methods and precautions to be taken. Methods of inspection must also be included. (9) Details of repair methods for worn or otherwise non-serviceable parts and components along with the information necessary to determine when replacement is necessary. Details of all relevant fits and clearances. (10) Instructions for testing including test equipment and instrumentation. (11) Instructions for storage preparation, including any storage limits. (12) A list of the tools and equipment necessary for maintenance and directions as to their method of use. <u>JUSTIFICATION</u>: The wording of this paragraph is not 100% consistent with 21A.61. The associated AMC contains specifications which should be in book 1 (see use of the word "must"). Therefore, the current AMC 31HB.82 should be embodied into 21HB.82. This could be as follows (based on various other EASA airworthiness codes).	

CS 31HB.83 CONSPICUITY

Cmt	Para	Comment provider	Comment/Justification	Response
121.	Draft Decision CS 31 HB 83 - Conspicuity	Lindstrand Hot Air Balloons Ltd.	Delete the whole paragraph. JUSTIFICATION: Whilst this requirement has been within the design codes stretching back to the original FAR's, it still makes little sense to require balloons to be conspicuous. I am not sure if a "stealth" balloon is possible to design.	**Not Accepted** It is considered possible to design a balloon that would not be conspicuous by choosing a "non-contrasting colour" or maybe even a transparent fabric. This would not be safe and therefore not acceptable.

CS 31HB.85 MINIMUM EQUIPMENT

Cmt	Para	Comment provider	Comment/Justification	Response
36.	AMC 31HB.85(a)(6)	CAA UK	This paragraph makes a statement that the balloon may be operated safely without an accurate altimeter although this is classed as minimum equipment, stating pilot judgement. Would this be the case when operating around controlled airspace? While this of course is an operational aspect and is outside that of the certification specification. Some balloon manufacturers specify a minimum of a QFE check at an annual inspection. There is a possibility that with the current AMC 31HB.85(a)(6) statement that the manufacturers inspection schedule will require an addition to make it an acceptable maintenance programme in the future i.a.w. Part M. JUSTIFICATION: Clarification.	**Noted** The comment shows that an altimeter could be required by operational rules and is in fact not minimum equipment required for airworthiness. The altimeter is therefore removed from the list of minimum equipment.
118.	Draft Decision CS 31HB.85	DGAC France	Paragraph (a) (9) is not understandable and should be modified. JUSTIFICATION: In (a)(9) what is meant by "EASA-approved" (should this be read as "EASA-Approved type"?)? Is there an ETSO for such components? What is a size-specific "kit"? If the intent is to number it (a)(9), then the grammar is wrong because it reads as : "each balloon must be equipped with …. must be provided".	**Accepted** The "kit" required for tethered operation should be provided if the balloon is certified for tethered operation. Refer to resulting text.
119.	General Comment	DGAC France	As CS-31HB is a **certification <u>specification</u>**, the word "requirement" should be replaced by "specification" throughout the document. JUSTIFICATION:	**Not Accepted** The use of the word "requirement" is consistent with other certification specifications,

Cmt	Para	Comment provider	Comment/Justification	Response
			Consitency.	
122.	Draft Decision CS 31 HB 85(4) - Minimum Equipment	Lindstrand Hot Air Balloons Ltd.	Delete this requirement. JUSTIFICATION: This is more appropriate to operations rather than balloon design.	**Not Accepted** The specified equipment is considered essential for the airworthiness of the balloon. The requirement is however moved to the new CS 31HB.72, and called "miscellaneous equipment", consistent with other airworthiness requirements.
145.	General Comment Book 1: Subpart G – Operating Limits and Details – CS 31HB.85 Minimum Equipment	Transport Canada	The minimum equipment para (.85) allows a warning signal in lieu of a 'thermometer' as a temperature indicator. These devices only indicate that a particular temperature has been reached or exceeded and, we believe, these warning devices are a "one-time-use" device that, once "utilized", are no longer available. It is not understood how such a one-time-use device can satisfy para .49c. A continuous envelope temperature indicator should be required. These are readily available and are in common use.	**Not Accepted** The "one-time-only" temperature indicator is considered to meet the minimum requirement. However both Operational and Maintenance procedures should be included to cover the follow-up actions in case the indicator is triggered.