



**COMMENT RESPONSE DOCUMENT (CRD)  
TO NOTICE OF PROPOSED AMENDMENT (NPA) 2007-10**

**for amending the Executive Director Decision No. 2003/10/RM of 24 October 2003  
on certification specifications, including airworthiness codes and acceptable means  
of compliance, for European Technical Standard Orders («CS-ETSO»)**

***"Validation of existing national equipment specifications"***

## Explanatory Note

### I. General

1. The purpose of the Notice of Proposed Amendment (NPA) 2007-10, dated 4 July 2007 was to propose an amendment to Decision N° 2003/10/RM of the Executive Director of the European Aviation Safety Agency of 24 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for European Technical Standard Orders (CS-ETSO). The NPA proposed to introduce new ETSO specifications related to various subjects and based on the transposition of existing national equipment specification.

### II. Consultation

2. The draft Executive Director Decision amending Decision N° 2003/10/RM was published on the web site (<http://www.easa.europa.eu>) on 5 July 2007.

By the closing date of 5 October 2007, the European Aviation Safety Agency (the Agency) had received 22 comments from 8 National Aviation 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. 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 highlights the changes as compared to the proposed rule as published in NPA 2007-10.

5. 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.
6. Such reactions should be received by the Agency not later than 4 October 2008 and should be submitted using the Comment-Response Tool at <http://hub.easa.europa.eu/crt>.

**IV. CRD table of comments, responses and resulting text**

<b>(General Comments)</b>		-
comment	2	comment by: <i>Aerodata AG</i>
	Aerodata AG has carefully reviewed the proposed NPA No. 2007-10. We are happy with the content of the document and appreciate EASA's move to transfer National Technical Standard (NTS) into European regulations.	
response	<i>Noted</i>	
comment	5	comment by: <i>Helicópteros del Sureste, S.A. / Helisureste CMA, S.A.</i>
	Attachment <a href="#">#1</a>	
	We think that criteria about the effects of failures on safety within the FAA Policy PS-ACE100-2005-10039 about " <i>Standardization and Clarification of Application of 14 CFR Part 23, §§ 23.1301 and 23.1309, Regarding Environmental Qualification</i> " should be taken into account for establishing the environmental qualification requirements for equipment on-board; particularly, for the airborne telecommunication systems in non aeronautical frequency bands (ETSO 2C514).	
response	<i>Noted</i>	
	Referenced FAA policy is applicable at aircraft level only and can not be applied at equipment level. This is also applicable to the CS 23.1309 requirements.	
comment	12	comment by: <i>UK CAA</i>
	Please be advised that the UK CAA has no comments.	
response	<i>Noted</i>	
comment	23	comment by: <i>FAA</i>
	The FAA has reviewed the subject NPA and has no comments.	
response	<i>Noted</i>	

**A. Explanatory Note - IV. Content of the draft decision - ETSO-C100b: Child Restraint System (CRS)**

p. 5-6

comment	9	comment by: <i>DGAC France</i>
	Attachment <a href="#">#2</a>	
	We would very much appreciate further explanations on the new ETSO-C100b on Child Restraint Device and the relation with the Invitation to Tender EASA.2007.OP.14 "study on child restraint systems".	
	In particular, we would like to know whether certification in accordance with this new ETSO will ensure compliance with Regulation 3922/91, Annex III, OPS 1.730(b) requiring that "all safety belts with shoulder harness have a single point release" (for example, see attached instructional safety card for CARES	

system developed by AMSAFE and approved by FAA we believe according to equivalent standards)

response *Noted*

This ETSO is an initial step in the harmonisation of equipment approval requirements. Dependant on the results from the study on child restraint systems further development of the ETSO standard may be necessary.

In general, an equipment approval does not ensure that aircraft or operational requirements are also met. It can therefore not be concluded that an equipment approval implies compliance with aircraft or operational requirements.

### B. Draft Decision - CS-ETSO - ETSO-C100b: Appendix 1

p. 15-17

comment 10

comment by: *Boeing*

CHANGE REQUESTED: Boeing suggests revising the last sentence of paragraph 8 to read:

" ... ***Webbing should be made of Nylon or other suitable material shown effective by test.***"

JUSTIFICATION: As written in the NPA, the requirement is prescriptive. Applicants should not be limited to the type of material that can be used for lap belts.

response *Partially accepted*

resulting text

The webbing shall be made of nylon, or any suitable material that has been shown to be equivalent

### B. Draft Decision - CS-ETSO - ETSO-C132: Geosynchronous Orbit Aeronautical Mobile Satellite Services Aircraft Earth Station Equipment

p. 19-20

comment 7

comment by: *CAA CZ*

There are only standards for computer software approval stated in this ETSO. The CAA CZ is of an opinion that it is also necessary to specify standards for computer hardware approval and we therefore propose to include this task in the rulemaking programme of the Agency.

response *Noted*

The review of complex hardware standards and introduction into Section A of CS-ETSO is under consideration by the Agency.

### B. Draft Decision - CS-ETSO - ETSO-2C78: Crewmember Oxygen Mask

p. 21-22

comment 13

comment by: *European Cockpit Association*

In reviewing the proposed changes to ETSO 2C78, ECA was confused over

what style of constant flow masks the new ETSO is meant to apply. Wording in the NPA suggests that what is meant is the common "Dixie cup" style passenger constant flow oxygen mask. And in Section 3.2 Specific, there is a reference to parts of SAE AS 8025A, Passenger Oxygen Masks.

If this is indeed the style of mask, or one of the current styles of masks, that are meant to be regulated by ETSO C278, then ECA feels the mask should be made to meet not parts of SAE AS 8025A, but all of SAE AS 1224B, Continuous Flow Aviation Oxygen Mask. While AS 8025A.

ECA feels ETSO should require compliance not only with FAA TSO C78, but also with SAE AS 8026A, Crewmember Demand Oxygen Mask. Where there is a difference in the requirements between the two documents, the more comprehensive requirement should be that required.

Incorporating these requirements into the new ETSO 2C78 may make it more sensible to keep the ETSOs for demand, and constant flow, masks, separate.

In addition, ECA feels that a number of requirements specified in FAA TSO C78 do not insure adequate performance of crewmember demand oxygen masks. Where specific issues arise they are expanded upon with reference to the applicable TSO section. Regardless, we feel the ETSO should incorporate SAE AS 1224B.

response

*Noted*

Section 3.2.1 is a specific requirement for the breathing bag only and does not apply to the mask style itself.

The requirements for the mask have not been altered and remain in accordance with the Appendix to the ETSO. AS 8025 is only applicable for passenger oxygen masks and not suitable to replace the appendix requirements.

The Agency notes the recent published TSO-C78A by the FAA and the new issue of SAE standard AS 8026A, which indicate the need for further review of this standard. The intent of the amendment of this ETSO is to incorporate the selected national standard. The ongoing harmonisation with FAA TSO and revised standards (like AS 8026A) will be considered in future rulemaking.

comment

14

comment by: *European Cockpit Association*

1 - Applicability

While it may be possible to combine the ETSOs for crewmember demand and crewmember constant flow oxygen masks, we question the sensibility of attempting to govern two such different pieces of equipment within one set of requirements, especially when separate standards, as defined by SAE, exist.

response

*Noted*

Since there is no European standard for crewmember constant flow masks, the Agency will proceed to publish the crewmember oxygen mask standard. This is considered justified as comparison of a national standard for these types of masks showed little differences with the standard for crewmember demand oxygen masks at the time of evaluation. Current development of FAA TSO and SAE standards however indicate that further review is necessary. This will be considered for future rulemaking.

comment	15	comment by: <i>European Cockpit Association</i>
	3 – Specific Technical Conditions	
	Para. 3.2.1 - Breathing Bag Volume. ALPA believes that the correct SAE AS should be 1224B, Continuous Flow Aviation Oxygen Mask., not AS 8025, which is for passenger masks only.	
response	<i>Not accepted</i>	
	SAE AS1224 is the minimum requirement for the design, construction and performance of continuous flow oxygen masks for crew and passengers of <u>General Aviation Civil Aircraft</u> and not applicable for transport category aircraft.	

**B. Draft Decision - CS-ETSO - ETSO-2C78: Appendix 1**

p. 23-26

comment	6	comment by: <i>CAA CZ</i>
	All values are stated in Anglo-Saxon units only. The CAA-CZ is of an opinion, that values should be also stated in SI-system units, e.g. in round brackets.	
response	<i>Accepted</i>	
	The Appendix will be amended to include both SI and Imperial units.	
comment	16	comment by: <i>European Cockpit Association</i>
	Additional Specific Technical Conditions:	
	The equipment covered by ETSO 2C78 is provided specifically to ensure crewmembers continue to perform their flight duties at full capacity. ECA believes such safety equipment must be able to function during, and after, exposure to the full range of operating conditions to which an aircraft can reasonably expect to encounter. While these conditions are defined separately for each aircraft's certification, the crew oxygen masks may be used in a variety of aircraft designs. ECA feels the performance of the masks must therefore encompass the widest range of environmental conditions that may be encountered.	
	Some of the following comments address our concern that the referenced TSO C78 paragraph may not be adequate to insure mask performance from take-off to landing. The increased standard, which should be incorporated in Section 3 Specific.	
response	<i>Noted</i>	
	Since there is no European standard for crewmember masks, the Agency will proceed to publish this standard. This is considered justified as comparison of a national standard for these types of masks showed little differences with this standard at the time of evaluation. The technical content of the Appendix to this ETSO has not been changed, and will be kept consistent with the FAA Appendix to TSO-C78.	
	Current development of FAA TSO and SAE standards however indicate that further review is necessary. This will be considered for future rulemaking.	

comment	<p>17 <span style="float: right;">comment by: <i>European Cockpit Association</i></span></p>
	<p>TSO C78 Para. 2.3: ECA feels that an additional condition needs to be added: "The oxygen mask must be constructed of materials that do not react with common combustion products. These products should be common for the materials used in current aerospace manufacture to include fabrics, wiring insulation, etc., as well as airframe construction materials that may burn or outgas when heated during a fire."</p>
response	<p><i>Not accepted</i></p> <p>Since there is no European standard for crewmember constant flow masks, the Agency will proceed to publish the crewmember oxygen mask standard. This is considered justified as comparison of a national standard for these types of masks showed little differences with the standard for crewmember demand oxygen masks at the time of evaluation. The technical content of the Appendix to this ETSO has not been changed, and will be kept consistent with the FAA Appendix to TSO-C78.</p> <p>Current development of FAA TSO and SAE standards however indicate that further review is necessary. This will be considered for future rulemaking.</p>
comment	<p>18 <span style="float: right;">comment by: <i>European Cockpit Association</i></span></p>
	<p>TSO C78 Para. 2.5: The reason a mask is no longer delivering adequate flow is very likely to not be apparent to the wearer. The first thing a crewmember is likely to assume, if breathing is restricted, is that the oxygen line is kinked, or the oxygen supply is running out. Hence, if a mask is shown during certification testing to be subject to accumulation of frost to sufficient degree that the operation of the exhalation valve may be impaired, it is critical that crewmember manuals/training/training materials inform the crewmember of this possibility, and the action to be taken to restore the exhalation valve to adequate function.</p>
response	<p><i>Noted</i></p> <p>If a mask is shown during certification testing to be subject to accumulation of frost to sufficient degree that the operation of the exhalation valve may be impaired the action to be taken to restore the exhalation valve to adequate function should be covered in the DDP. (Refer to 21A.608(a)(2)).</p>
comment	<p>19 <span style="float: right;">comment by: <i>European Cockpit Association</i></span></p>
	<p>TSO C78 Para. 2.6: The requirement to provide a means to prevent or remove condensation from the inside surfaces of a full-face goggle lens must also apply to the goggle portion of a separate mask and goggle set up. While this ETSO does not cover separate smoke goggles, it is the appropriate place to include the requirement that crew masks that are to be mated with separate goggles include condensation removal capabilities, etc. For both full-face mask and separate mask and goggle setups, a means must be included to not only prevent or remove condensation, but to purge smoke or fumes from the goggle. This must be easily accomplished without breaking the face to mask seal of either the mask or goggle.</p>
response	<p><i>Not Accepted</i></p> <p>Since there is no European standard for crewmember masks, the Agency will proceed to publish this standard. This is considered justified as comparison of a</p>

national standard for these types of masks showed little differences with this standard at the time of evaluation. The technical content of the Appendix to this ETSO has not been changed, and will be kept consistent with the FAA Appendix to TSO-C78.

Current development of FAA TSO and SAE standards however indicate that further review is necessary. This will be considered for future

comment 20

comment by: *European Cockpit Association*

TSO C78 Para. 3.2 (b): The 3 second duration for the mask to withstand a 30 pound pull along the axis of symmetry of the oxygen supply tube is not sufficient. A recent experience involving an inflight smoke/fumes event indicated that current oxygen mask hose lengths may not be adequate to reach cockpit equipment from a seated position. In the recent event, a co-pilot attempted to reach an item in the rear of the cockpit while seated and wearing a seat belt. The mask hose restricted the length of his reach. It is easy to imagine that a crewmember having this difficulty would exert a sustained pull on the masks oxygen hose of longer than 3 seconds, while they continued to attempt to stretch rearward to reach emergency equipment. ECA feels that the requirement should be for a pull not exceeding 20 seconds..

ECA feels this is one of the areas that may have different requirements for a pilot's demand mask, verses a "Dixie cup" style mask, and supports our concern that combining the demand and constant flow crew mask ETSOs into one document is not practical.

response *Not accepted*

Since there is no European standard for crewmember constant flow masks, the Agency will proceed to publish the crewmember oxygen mask standard. This is considered justified as comparison of a national standard for these types of masks showed little differences with the standard for crewmember demand oxygen masks at the time of evaluation. The technical content of the Appendix to this ETSO has not been changed, and will be kept consistent with the FAA Appendix to TSO-C78.

Current development of FAA TSO and SAE standards however indicate that further review is necessary. This will be considered for future rulemaking.

comment 21

comment by: *European Cockpit Association*

TSO C78 Para. 3.7: The requirement that the exhalation valve not inadvertently operate under a 3g load applied in any direction is insufficient. There have been fairly recent events where, after a loss of cabin pressure, crewmembers have performed aircraft recovery maneuvers that exceeded 3 g's. The most recent of these involved a B99, where the g-loading was sufficient to cause aircraft structural damage. ECA feels the exhalation valve should not operate under g-loadings within the range of loads the aircraft is certified to.

This is another area where combining demand and constant flow masks into one set of requirements may not be the best approach.

response *Not accepted*

Since there is no European standard for crewmember constant flow masks, the Agency will proceed to publish the crewmember oxygen mask standard. This is



considered justified as comparison of a national standard for these types of masks showed little differences with the standard for crewmember demand oxygen masks at the time of evaluation. The technical content of the Appendix to this ETSO has not been changed, and will be kept consistent with the FAA Appendix to TSO-C78.

Current development of FAA TSO and SAE standards however indicate that further review is necessary. This will be considered for future rulemaking.

comment

22

comment by: *European Cockpit Association*

TSO C78 Para. 3.8: In dealing with "Extreme Temperature" it is ECA opinion that a crew mask must be tested to the extremes that can be reasonably anticipated. While TSO C78 requires heat soaking to 160° F for 12 hours, it only requires cold soaking to 0° F, and that only for 2 hours. Recent experience with some constant flow (Dixie cup) mask materials indicates that when the mask is cold soaked to -20° F or below, and held there for more than 2 hours, the material undergoes changes that did not occur in the first 2 hours and which could negatively affect the masks ability to perform adequately.

The guidance in SAE AS 8025, Para. 5.1.2 is that "The assembly shall be capable of being stowed at temperatures of 71 °C (160 °F) for 120 hours at relative humidities varying from 5 - 95% and at -57 °C (-70 °F) for two hours, without adversely affecting subsequent performance after return to room temperature." ECA feels that while this is a better requirement, that the length of cold soaking be at least 4 hours. This modified AS8025 requirement is a much more realistic representation of what an aircraft might encounter, and in particular, business type aircraft.

In addition to the above, the mask should not only exhibit no "gummy or sticky" characteristics after being heat soaked, but should exhibit no tendency toward being so stiff or brittle as to prevent it from adequately molding to the wearer's face after being cold soaked. This provision must also apply to any smoke goggle/integrated smoke goggle, to ensure the ability to prevent smoke and fume intrusion to both the mask and goggle.

response

*Not accepted*

Since there is no European standard for crewmember constant flow masks, the Agency will proceed to publish the crewmember oxygen mask standard. This is considered justified as comparison of a national standard for these types of masks showed little differences with the standard for crewmember demand oxygen masks at the time of evaluation. The technical content of the Appendix to this ETSO has not been changed, and will be kept consistent with the FAA Appendix to TSO-C78.

Current development of FAA TSO and SAE standards however indicate that further review is necessary. This will be considered for future rulemaking.

resulting text

**APPENDIX 1. ~~FEDERAL AVIATION ADMINISTRATION~~ STANDARD FOR CREWMEMBER DEMAND OXYGEN MASKS**

**1.0 Purpose.**

This Standard contains minimum performance standards for the manufacture of demand type oxygen masks for use with non-pressure demand (straight-demand and diluter-demand) and pressure-demand oxygen systems. **It is based**

on the equivalent FAA standard for crewmember demand oxygen masks and the Agency has added values that are in imperial units also in SI units.

## 2.0 Design and Construction of Mask.

To be eligible for approval under a **European** Technical Standard Order Authorisation, the oxygen mask must possess the following design and construction characteristics.

2.1 Masks designed for use with a remotely located oxygen flow regulator must include a flexible oxygen supply tube fixed or detachable at the mask or at the regulator or at both. Oxygen supply tubes used in conjunction with mask-mounted oxygen flow regulators are not subject to this paragraph.

2.2 The mask must be designed for respiration through the nose and mouth (oronasal). The mask may also include integral goggles designed to protect the eyes from smoke and harmful gases (fullface).

2.3 The mask must be constructed of materials that –

- (a) do not contaminate air or oxygen;
- (b) are not adversely affected by continuous contact with oxygen; and
- (c) are at least flame resistant.

2.4 The mask must be designed to prevent the accumulation of hazardous quantities of expiratory gases within the facepiece chamber.

2.5 The mask must be designed to prevent the formation of accumulation of frost which would interfere with the function of the exhalation valve, unless it can be shown that the frost can be removed by external manipulation without removing the mask from the face of the user.

2.6 The full-face mask must be designed to include means for the prevention or the removal of condensation from the inside surfaces of the goggle lenses.

2.7 Masks equipped with oxygen supply tubes designed for quick disconnection at the mask or at the regulator must incorporate means to alert the user when his oxygen supply tube has become disconnected. Such means must not restrict the flow of ambient air through the oxygen supply tube by an amount exceeding 25 percent. This section does not apply if the quick disconnect device incorporates means to prevent inadvertent separation.

## 3.0 Performance.

Five masks of each kind for which approval is sought must be shown to comply with the minimum performance standards set forth in paragraphs 3.1 through 3.12, except that only one mask of each kind is required to comply with the provisions of paragraphs 3.6, 3.8, 3.9, and 3.11. Tests must be conducted at ambient atmospheric conditions of approximately **102 kPa (30" hg.)** and **21 °C (70°F.)**, except as otherwise specified. Gas flow rates and pressures must be corrected to STPD.

3.1 *Quick-disconnect Coupling.* The force required to separate quick disconnect couplings not designed to prevent inadvertent separation must not be less than **45 N (10 pounds)** exerted along the axis of symmetry of the oxygen supply tube.

### 3.2 Strength.

(a) The mask must be capable of sustaining a pull force on the suspension device attachment fittings of not less than **156 N (35 pounds)** in any direction for a period of not less than 3 seconds.

(b) The oxygen supply tube assembly must be capable of sustaining a pull force of not less than **134 N (30 pounds)** exerted along the axis of symmetry of the tube for a period of not less than 3 seconds.

(c) The oxygen supply tube assembly must be capable of sustaining an internal pressure of **10 kPa (1.5 p.s.i.g)**

### 3.3 Leakage.

(a) The total inward leakage rate, with the complete mask positioned on the face or on a suitable test stand in a manner which simulates normal use, must not exceed 0.10 LPM STPD at any negative differential pressure within the range of from zero to 1.5 KPa (6.0 inches of water).

(b) Inhalation valves installed in pressure-demand masks must not backleak more than 0.015 LPM, STPD, when subjected to a suction pressure differential of 0.03 KPa (0.1" H<sub>2</sub>O) and not more than 0.15 LPM, STPD, when subjected to a suction pressure differential of 3 KPa (12.0" H<sub>2</sub>O).

(c) The oxygen supply tube assembly must not leak when subjected to an internal pressure of 10 KPa (1.5 p.s.i.g).

### 3.4 Flow Resistance.

(a) The inspiratory resistance of the mask and oxygen supply tube including the oxygen supply connector when inserted in an appropriate mating fitting must not exceed the following negative differential pressures at the corresponding oxygen flow rates:

Differential Pressure KPa (inches H <sub>2</sub> O)	Flow Rate (LPM)
0.15 (0.6)	20
0.37 (1.5)	70
0.62 (2.5)	100

(b) The expiratory resistance of the mask must not exceed the following positive differential pressures at the corresponding oxygen flow rates:

Differential Pressure KPa (inches H <sub>2</sub> O)	Flow Rate (LPM)
0.25 (1.0)	20
0.50 (2.0)	70
0.75 (3.0)	100

3.5 *Pressure-Demand. Exhalation Valve Performance.* The exhalation valve installed in a pressure demand mask must open when the pressure within the facepiece is 2.7 KPa (20 mm Hg) and the pressure in the supply tube is 2.0 KPa (15 mm Hg) to 2.7 KPa (19.9 mm Hg).

3.6 *Vibration.* The flow of gases during the respiratory process must not cause vibration, flutter, or chatter which would interfere with the satisfactory operation of the mask.

3.7 *Acceleration Load.* The exhalation valve must not inadvertently operate under a 3g load applied in any direction.

3.8 *Extreme Temperature.* The mask must comply with paragraphs 3.3 through 3.5 in an ambient temperature of 21°C (70°F.) within 15 minutes after being stored at a temperature of 71°C (160°F.) for 12 hours, and within 15 minutes after being stored at -18°C (0°F.) for 2 hours. The relative humidity during storage must vary from 5 to 95 percent. The mask facepiece must not be gummy or sticky and must provide a normal seal after the high temperature exposure.

### 3.9 Low Temperature Test Delay.

(a) The mask must function properly, without apparent delay, at a temperature of 21°C (70°F.) after being stored at a temperature of -7°C (20°F.) for not less than 2 hours.

(b) The mask must function properly, without apparent delay, and continue for a

period of not less than 15 minutes when tested at a temperature of  $-7^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ) after being stored at a temperature of  $21^{\circ}\text{C}$  ( $70^{\circ}\text{F}$ ) for not less than 12 hours.

### 3.10 Decompression.

(a) A mask not equipped with a pressure relief valve must not suffer damage and must comply with paragraphs 3.3 through 3.5 after being subjected to a decrease in ambient pressure from  $83\text{ kPa}$  ( $12\text{ p.s.i.a.}$ ) to not less than  $19\text{ kPa}$  ( $2.7\text{ p.s.i.a.}$ ) for a straight or diluter-demand kind, or to not less than  $14\text{ kPa}$  ( $2.1\text{ p.s.i.a.}$ ) for a pressure demand kind, within a period of not more than 1 second. This decompression test must simulate the condition that could be imposed on a mask being worn by a crewmember during the specified decompression.

(b) A mask equipped with a pressure relief valve must be subjected to the decompression specified in subparagraph (a) of this section during which the pressure relief valve must open at a differential pressure of  $4.2\text{ kPa}$  ( $17''\text{ H}_2\text{O}$ ) and must relieve the differential pressure to a value not exceeding  $4\text{ kPa}$  ( $16''\text{ H}_2\text{O}$ ) within 5 seconds. During the 5-second interval, the pressure differential must not exceed a value of  $5\text{ kPa}$  ( $20''\text{ H}_2\text{O}$ ). The pressure relief valve must close at a differential pressure of  $3.5\text{ kPa}$  ( $14''\text{ H}_2\text{O}$ ).

3.11 *Cycling*. The mask must comply with paragraphs 3.3 through 3.5 after being subjected to the following simulated breathing schedule for a total of 50,000 cycles:

Respiratory Cycles	Minute Flow Rate LPM, STPD	Volume, Tidal Liters
20,000	20	1.0
25,000	30	1.5
5,000	70	2.0

A constant time interval must be maintained between respiratory cycles.

3.12 *Microphone*. If the mask is designed to include a microphone, the installation of the microphone must not interfere with the operation of the mask.

## 4.0 Quality Control.

4.1 *Production Tests*. Each mask must be shown to comply with the provisions of paragraph 3.3(a), total leakage.

4.2 *Random Tests*. One mask must be selected at random from each lot and must be shown to comply with paragraph 3.1 through 3.12. The lot size must be selected by the applicant subject to the approval of the ~~Agency~~ Federal Aviation Administration (see FAR § 37.5), on the basis of evaluation of the applicant's quality control systems (see ~~21A.139b~~ § 37.5 (a) (3)).

## 5.0 Maximum Environmental (cabin) Altitude.

The minimum pressure to which the mask has been shown to decompress satisfactorily in accordance with paragraphs 3.10(a) or (b) of this standard determines the maximum environmental altitude of the mask, except that it shall not exceed the value shown in the following table:

Maximum Environmental (Cabin) Altitude	Kind of Mask
40,000 feet	Straight or Diluted-Demand
45,000 feet	Pressure-Demand

**6.0 Abbreviations and Definitions.**

LPM	Liters per minute.
STPD	Standard temperature and pressure, dry (0°C. 760 mm.Hg.)
p.s.i.g.	Pounds per square inch, gage.
p.s.i.a.	Pounds per square inch, absolute.
g	Acceleration or gravity, 9.81 m/ second <sup>2</sup> (32.2 feet/second <sup>2</sup> ).
Tidal volume	Volume of air inspired per breath.

**B. Draft Decision - CS-ETSO - ETSO-2C512: Portable Gaseous Oxygen Supply p. 27-28**

comment 11

comment by: Boeing

CHANGE REQUESTED: EASA uses Aerospace Standard AS 1046 as the basic Minimum Performance Standard. Aerospace Standard AS 1046 describes a complete system that includes the oxygen dispensing unit or mask. Also, the standard is applicable to cylinders with different types of regulators and flow rates. Boeing recommends adding an allowance to the ETSO to permit the cylinder to be labeled as compliant with the ETSO when a mask is added, and then identify masks that would make it compliant with the ETSO when one or more of the masks are added to the unit when it is placed in service on the aircraft. The selected mask(s) has to be compatible with the appropriate flow rate and usage.

JUSTIFICATION: A large number of portable oxygen cylinders currently do not have a mask when sold. The mask is specified separately and may be added by the customer after airplane delivery, but before entry into service. Our suggestion would allow flexibility for airlines to optimize mask installation.

response *Noted*

Since there is no European standard for Portable Gaseous Oxygen Supply, the Agency will proceed to publish the Portable Gaseous Oxygen Supply standard.

If separate standards are required for oxygen cylinders, a rulemaking proposal should be submitted to the Agency.

**B. Draft Decision - CS-ETSO - ETSO-2C514: Airborne Systems for Non Required Telecommunication Services (in Non Aeronautical Frequency Bands) p. 42-43**

comment 8

comment by: CAA CZ

There are only standards for computer software approval stated in this ETSO. The CAA CZ is of an opinion that it is also necessary to specify standards for computer hardware approval and we therefore propose to include this task in the rulemaking programme of the Agency.

response *Noted*

The review of complex hardware standards and introduction into Section A of CS-ETSO is under consideration by the Agency.

**B. Draft Decision - CS-ETSO - ETSO-2C514: Appendix 1 - 2. General design requirements**

p. 45

comment 3 comment by: *Helicópteros del Sureste, S.A. / Helisureste CMA, S.A.*  
We estimate that it should say "aircraft" instead of "equipment".

response *Accepted*  
Refer to the resulting text for the change details.  
Justification:  
The equipment shall not impair the airworthiness of the aircraft, as stated in the first line.

comment 4 comment by: *Helicópteros del Sureste, S.A. / Helisureste CMA, S.A.*  
We estimate that it should say "aircraft" instead of "equipment".

response *Accepted*  
Refer to the resulting text for the change details.  
Justification:  
The equipment shall not impair the airworthiness of the aircraft, as stated in the first line.

resulting  
text

**2. GENERAL DESIGN REQUIREMENTS****AIRWORTHINESS**

The equipment shall not, under either normal or failure conditions; impair the airworthiness of the aircraft in which it is installed.

**OPERATION OF CONTROLS**

The operation of controls intended for use during flight, in all possible positions, combinations and sequences, shall not result in a condition whose presence or continuation would be detrimental to the continued safe operation of the ~~equipment~~ aircraft.

Operating the system shall not significantly affect the workload of the air crew.


**DESIGN OF CONTROLS**

Controls and indicators intended for use by flight crew shall be of suitable design for the intended cockpit environment / philosophy (e.g. size, readability, illumination).

**EFFECTS OF TESTS**

Unless otherwise provided, the design of the equipment shall be such that, subsequent to the application of the specific tests, no condition exists which would be detrimental to the continued safe operation of the ~~equipment~~ aircraft.

## Appendix A - Attachments

 [FAA Policy PS-ACE100-2005-10039 Standardization and Clarification of Application of 14 CFR Part 23, §§ 23.1301 and 23.1309, Regarding Environmental Qualification.pdf](#)

Attachment #1 to comment [#5](#)

 [caresInstructionalCard.pdf](#)

Attachment #2 to comment [#9](#)