NOTICE OF PROPOSED AMENDMENT (NPA) No 2007-10

DRAFT DECISION OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY

AMENDING

DECISION No 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»)

Validation of existing national equipment specifications

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A. EXPLANATORY NOTE.

I. General

1. The purpose of this Notice of Proposed Amendment (NPA) is to envisage amending Decision No 2003/10/RM of the Executive Director of the Agency of 24 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for European Technical Standard Orders (CS-ETSO). This NPA proposes to introduce new ETSO specifications related to various subjects and based on transposition of existing national equipment specifications. The scope of this rulemaking activity is outlined in ToR ETSO.001 (Validation of existing national equipment specifications) initially published on 15 December 2004 and is described in more detail below.

2. The Agency is directly involved in the rule-shaping process. It assists the Commission in its executive tasks by preparing draft regulations, and amendments thereof, for the implementation of the Basic Regulation[1] which are adopted as "Opinions" (Article 14(1)). It also adopts Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance and Guidance Material to be used in the certification process (Article 14(2)).

3. When developing rules, the Agency is bound to following a structured process as required by Article 43(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as "The Rulemaking procedure"[2].

4. This rulemaking activity is included in the Agency's rulemaking programme for 2007. It implements the rulemaking task ETSO.001 related to the transposition of national specifications into EASA CS-ETSO. Existing national approvals and certificates based on national equipment specifications, but not incorporated in CS-ETSO are deemed to be grandfathered in accordance with Article 2(13) of Commission Regulations (EC) No 1702/2003[3] if they are within the scope of the Agency as defined by Article 4(1) of the Basic Regulation and these parts and appliances fall under the definition stated in Article 3(d)) of the Basic Regulation. However new approvals or certificates cannot be granted if there is no detailed airworthiness specification issued by the Agency. The objective of this rulemaking task ETSO.001 is therefore to complete the transition from national aviation safety rules into EASA structure by formally incorporating, where appropriate, national specifications into CS-ETSO.

   Using a list of national specifications proposed by the Advisory Group of National Authorities (AGNA) and selected by EASA, this NPA deals with both the national specifications proposed to be transposed into CS-ETSO and the rationale for national specifications that will not be transposed.

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[1] Regulation (EC) No 1592/2002 of the European Parliament and of the Council of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, *OJ L 240, 7.9.2002, p.1*. Regulation as last amended by Regulation (EC) No 334/2007 *(OJ L 88, 29.3.2007, p. 39)*.

[2] Management Board decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material ("Rulemaking procedure"), EASA MB/7/03, 27.6.2003.

[3] Commission Regulation (EC) No 1702/2003 of 24 September 2003 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations, *OJ L 243, 27.9.2003, p.6.* Regulation as last amended by Regulation (EC) No 375/2007 (*OJ L 94, 4.4.2007, p. 3*).

The national specifications that were proposed for transposition were reviewed in detail. The conclusions of that review are summarised in the following table.

5. The text of this NPA has been developed by the Agency. It is submitted for consultation of all interested parties in accordance with Article 43 of the Basic Regulation and Articles 5(3) and 6 of the EASA Rulemaking procedure.

National Specification reference	**Title**	**Proposed ETSO reference**	**Proposed ETSO title**
DGAC–F QAC-59a	Satellite Radio Communications Systems Equipment	ETSO C132	Geosynchronous Orbit Aeronautical Mobile Satellite Services Aircraft Earth Station Equipment
LBA-D NTS-1	Child Restraint System (CRS)	ETSO C100b	Child Restraint System (CRS)
LBA -D NTS-4	Portable Gaseous Oxygen Supply	ETSO 2C512	Portable Gaseous Oxygen Supply (PGOS)
LBA-D NTS-9	Tow Release	ETSO 2C513	Tow Release
LBA-D NTS-16	Crewmember Constant Flow Oxygen Mask	ETSO 2C78	Crewmember Oxygen Mask
LBA-D NTS-22	Airborne Systems for Non Required Telecommunication Services (in Non Aeronautical Frequency Bands) (ASNRT)	ETSO 2C514	Airborne Systems for Non Required Telecommunication Services in Non Aeronautical Frequency Bands (ASNRT)
CAA-UK Specification No 9	Child's Flotation Cot	Proposal Not selected	
LBA-D NTS-17	Emergency Power Unit (EPU)	Proposal Not selected	
LBA-D NTS-19	Electrically operated Galley Equipment	Proposal Not selected	
DGAC-F QAC-157	Portable Halon 1211-1301 Type Fire Extinguishers	Proposal Not selected	
DGAC-F QAC-195	Quick Access Recorder	Proposal Not selected	

II. Consultation

6. To achieve optimal consultation, the Agency is publishing the draft decision of the Executive Director on its internet site. Comments should be provided within 3 months in accordance with Article 6(4) of the EASA Rulemaking procedure. Comments on this proposal should be submitted by one of the following methods:

CRT: Send your comments using the Comment-Response Tool (CRT) available at http://hub.easa.europa.eu/crt/

E-mail: In case the use of CRT is prevented by technical problems these should be reported to the CRT webmaster and comments sent by email to NPA@easa.europa.eu.

Correspondence: If you do not have access to internet or e-mail you can send your comment by mail to:
Process Support
Rulemaking Directorate
EASA
Postfach 10 12 53
D-50452 Cologne
Germany

Comments should be received by the Agency before 5 October 2007. If received after this deadline they might not be taken into account.

III. Comment response document

7. All comments received in time will be responded to and incorporated in a comment response document (CRD). This may contain a list of all persons and/or organisations that have provided comments. The CRD will be widely available on the Agency's website and in the Comment-Response Tool (CRT).

IV. Content of the draft decision

8. The text of this NPA was developed by EUROCAE in the framework of a specific contract awarded to EUROCAE by the Agency.

Amendments or introduction of new ETSOs proposed to Subpart B of CS-ETSO:

Index 1

ETSO-C100b: Child Restraint System (CRS)

At the end of 2003, the JAA Equipment Steering Group expressed already its willingness to set up a group to address such subject.
EASA decided to take up again the idea with a targeted new ETSO expected to be based on a German National Technical Standard (NTS), NTS-1 titled "Child Restraint System (CRS)".
However an FAA TSO-C100b with the same title is in existence from October 2003.

Considering the various options the Agency decided to adopt this existing FAA standard to develop a corresponding ETSO-C100b.
The current FAA standard is based on the SAE document AS 5276/1 "Performance Standard for Child Restraint Systems in Transport Category Airplanes," dated September 2000.
It should be noted that the FAA is revising TSO-C100b and is expected to issue in 2007/2008 a revised TSO under reference TSO-C100c. The Agency will consider updating its ETSO accordingly.

ETSO-C132: Geosynchronous Orbit Aeronautical Mobile Satellite Services Aircraft Earth Station Equipment

This new ETSO was initially proposed to be based on the French standard reference QAC- 59a specifically dedicated to the approval of satellite communications SATCOM which was designed only for use by passengers (voice and data).
However presently, SATCOM is being used for passenger service but also for airlines purposes. Therefore the Agency decided to use the FAA TSO-C132 issued in March 2004 as the basis for developing the ETSO.
The existing FAA TSO-C132 has been developed from the Radio Technical Commission for Aeronautics (RTCA) document DO-210D titled "Minimum Operational Performance Standards (MOPS) for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) avionics".
The ETSO considers DO-210-D at Change 1 and 2 as acceptable. This MOPS with Changes 1 and 2 is an acceptable standard for transposition into ETSO. Although there is a Change 3 issued on September 19, 2006 by RTCA, this Change is not necessary for the release of the ETSO since it mainly addresses the high speed data service not used for ATC purpose for the time being. For harmonisation reasons this ETSO is therefore kept consistent with the current issue of TSO-C132.

Index 2

ETSO-2C78: Crewmember Oxygen Mask

The initial idea was to create a new ETSO based on the German national standard NTS-16 specifically dedicated to the approval of Crewmember Constant Flow Oxygen Mask.
It should be noted that no ETSO on "Continuous Flow Oxygen Mask" was currently available for transport category aeroplanes and ETSO-C103 "Continuous Flow Oxygen Mask Assembly" is only available for Non-transport Category Aircraft.

Since the standard for "demand masks" is identical to the one for these "constant flow" masks (with only optional additional requirements), it is worthwhile to merge both variants in one ETSO which should be included in Index 2. Therefore this new ETSO replaces existing ETSO-C78 "Crewmember Demand Oxygen Masks". Its applicability is now extended for both "Crewmember Demand Oxygen Masks" and "Crewmember Constant Flow Oxygen Masks" with additional requirements as provided by NTS-16 "Crewmember Constant Flow Mask"

ETSO-2C512: Portable Gaseous Oxygen Supply

This is a new ETSO developed from the German national standard NTS-4, which is based on AS1046 (SAE).

This national standard is not covered by any Agency ETSO or by any FAA TSO. For the transposition into ETSO, the German national standard has been revised with the support of the DRAEGER Company to be in line with the ETSO format.

ETSO-2C513: Tow Release

This is a new ETSO developed from the German national standard NTS-9 "Tow Release".
This national standard is not covered by any Agency ETSO or by any FAA TSO.

ETSO-2C514: Airborne Systems for Non Required Telecommunication Services (in Non Aeronautical Frequency Bands)

This is a new ETSO developed from the German national standard NTS-22 "Airborne Systems for Non Required Telecommunication Services (in Non Aeronautical Frequency Bands)".
This NTS topic is not covered by any Agency ETSO or by any FAA TSO.
In comparison with the original German standard, a change has been introduced in the Performance Tests table on the 7th page of the Draft ETSO-2C514. The electrostatic discharge test has been changed to "mandatory test" instead of "if required" as specified in Section 25 of ED-14E / DO-160E.

9. Reviewed national specifications not adopted to be transposed into ETSO:

Apart from the proposed changes in the current CS-ETSO, the following existing national specifications have also been reviewed, but are considered by the Agency as not suited for transposition into ETSO:

Specification related to "Child's Flotation Cot"

This specification is not covered by any ETSO/any (FAA) TSO.
The National Equipment Specification from CAA-UK Number 9, titled "Child's Flotation Cot, issue 2, 09.04.1957" is considered to be no longer applicable (It is an old document and needs further review before being considered suitable for an ETSO).
Note: ETSO-C13f, Life Preservers is applicable for infants up to 16 kg (35 pounds).
The Agency has concluded that developing an ETSO for this specific equipment is not necessary.

Specification related to "Electrically operated Galley Equipment"

This specification is not covered by any ETSO/any (FAA) TSO.
It was proposed to develop an ETSO based on the German standard NTS-19, "Electrically operated Galley Equipment". In the mean time the FAA has however planned the development of TSO-C184 for Galley Equipment. EASA and EUROCAE are therefore planning to participate in this TSO development with the objective to develop a harmonised standard.

Specification related to "Portable Halon 1211-1301 Type Fire Extinguishers"

Currently no ETSO is available for HALON type Extinguishers.
There are two existing standards dealing with WATER type Extinguishers:
- an existing EASA ETSO-2C19b from October 2003;
- an existing FAA TSO-C19b from May 1958.

Both are based upon SAE AS-245A.

The French DGAC developed the QAC-157 for HALON type Extinguishers (based on TSO C19b and AC20-42C requirements) and QAC-117 equivalent to TSO C19b, which is only for WATER type extinguishers.
AC20-42D is however being developed and will replace the current AC20-42C. Since significant changes are introduced to AC20-42, the Agency has decided not to issue an ETSO based on the French standard QAC-157.
When updates of AC20-42 are available, development of a standard for hand held fire extinguishers will be considered.

Specification related to "Quick Access Recorder"

It was intended to draft an ETSO adopting the French national equipment specification titled "QAC 195". This standard was however never used and replaced by the specific "Helicopter flight data recorder" ("QAR Helico" document). The "QAR Helico" document uses requirements from EUROCAE ED-55, which is now superseded by ED-112.
In the mean time an update of ETSO-C124 "Flight Data Recorder Systems" is being developed by the Agency in a separate NPA, which will introduce the reference to ED-112. Since the scope of ED-112 also covers helicopters, this revision of ETSO-C124 will therefore in effect also cover the subject as intended by this ETSO proposal.
It is therefore not necessary to draft a separate ETSO for FDR specific for helicopters.

V. Regulatory Impact Assessment

10. Purpose and Intended Effect.

a) Issue which the NPA is intended to address

EASA has initiated this activity to transform certain national specifications into European level standards in the form of EASA CS-ETSOs on a variety of subjects as described. The calls for this have come from users (including airlines), ANSPs and a variety of aviation stakeholders and the specific recommendations put forward by the Advisory Group of National Authorities (AGNA).

b) Scale of the issue

With the "grandfathering" provisions in Commission Regulation 1702/2003 all national approvals of equipment issued before 28-09-03 are deemed to be EASA approvals. However some of the national standards used for the approval of the equipment do not exist at the European level. Without such a European standard for these equipments, it is not possible to design major changes or develop derivatives based on these equipments. This creates an economic disadvantage for the manufacturers of these equipments. A substantial number of manufacturers are facing this problem.

c) Brief statement of the objectives of the NPA

The objective of this NPA is to introduce new ETSO specifications related to various pre-selected subjects and based on transposition of existing national equipment specifications where no existing European level specifications exist.

11. Options.

The options identified are:

Option 1 Do nothing

Option 2 Adoption of selected National specifications.

Option 3 Analysis and if required amendment of the pre-selected National specifications in order to meet existing standards.

EASA decided to task EUROCAE (the European Organisation for the Civil Aviation Equipment) to analyse these pre-selected national specifications proposed by CAA United Kingdom, LBA Germany and DGAC France. On this basis the Agency drafted the present NPA proposing new or up-dated ETSOs or providing the rationale for those not selected.

12. Sectors concerned.

The introduction of these identified subjects into CS-ETSOs will mainly affect equipment manufactures and aircraft operators.

13. Impacts.

i Safety

The application of harmonised standards across Europe on particular identified subjects of interest is expected to provide minimum level or performance and characteristics leading to the improvement of safety through a consistent regulation and identified means of compliance for these issues. The existence of diverse standards leads to a lack of common understanding between operators, crew and maintenance personnel, which itself can have a negative effect on safety.

Option 2 and 3 will have an equal effect on safety.

ii Economic

The establishment and the application of harmonised standards across Europe (and most probably beyond) on subjects of common interest provides the basis for equipment approvals independent from aircraft approvals. This has a positive effect on the market value and applicability of these equipments. The transposition of the national standards into ETSO in this particular NPA in addition lifts the restriction for further development of equipments based on the existing “national specifications” equipments.

Option 2 will lift the restriction for further development or major changes of equipment based on the National standards. The applicability will in practice be limited since the standard will reflect a National standard.

Option 3 will provide the possibility for a transposition of the National standard into a more generally recognised standard if available. This will have a positive effect because restrictions for further development are lifted and at the same time a generally accepted standard provides the opportunity for a market increase.

iii Environmental

No impact expected.

iv Social

No impact expected.

v Other aviation requirements outside EASA scope

No impact expected.

vi Foreign comparable regulatory requirements

Option 3 provides the possibility to harmonise with US FAA TSO.

14. Equity and Fairness issues.

All applicants are equally affected.

15. Summary and Final Assessment.

The Agency concludes that option 3 is the preferred option.

Option 3 will lift the restriction of further developments and major changes to equipment designed to selected existing National standards. At the same, if this National standard can be substituted by technically equivalent existing globally accepted standard, it can provide an opportunity for harmonisation. This will increase the positive economic effect compared to Option 2.

B. DRAFT DECISION.

The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

1. ~~Text to be deleted is shown with a line through it.~~
2. New text to be inserted is highlighted with grey shading.
3. ….

   Indicates that remaining text is unchanged in front of or following the reflected amendment.

   ….

I. Draft Decision CS-ETSO

SUBPART B – LIST OF ETSOs (INDEX 1 AND INDEX2)

INDEX 1

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~~ETSO-C78 Crewmember Demand Oxygen Masks~~

….

ETSO-C100b: Child Restraint System (CRS)

….

ETSO-C132: Geosynchronous Orbit Aeronautical Mobile Satellite Services Aircraft Earth Station Equipment.

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ETSO-2C78: Crewmember Oxygen Mask

….

ETSO-2C512: Portable Gaseous Oxygen Supply (PGOS)

ETSO-2C513: Tow Release

ETSO-2C514: Airborne Systems for Non Required Telecommunication Services (in Non Aeronautical Frequency Bands) (ASNRT)

ETSO-C100b

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: CHILD RESTRAINT SYSTEM (CRS)

1 - Applicability

This ETSO gives the requirements which Child Restraint System (CRS) that is manufactured on or after the date of this ETSO, must meet in order to be identified with the applicable ETSO marking.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in applicable standard is SAE AS5276/1, “Child Restraint Systems in Transport Category Airplanes” dated October 2000, as modified, in attached APPENDIX 1 “MINIMUM PERFORMANCE STANDARD FOR CRS” and APPENDIX 2 “TEST CONDITIONS”.

3.1.2 - Environmental Standard

See CS-ETSO Subpart A paragraph 2.1

3.1.3 - Computer Software

See CS-ETSO Subpart A paragraph 2.2

3.2 - Specific

None.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

None.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

49CFR571 and 49CFR572 may be obtained from U.S. Government Printing Office (web-site: www.gpoaccess.gov).

APPENDIX 1. MINIMUM PERFORMANCE STANDARD (MPS) FOR CHILD RESTRAINT SYSTEM (CRS)

This appendix prescribes the MPS for CRS, modified by the Agency in this ETSO. The applicable standard is SAE AS5276/1, "Performances Standard for Child Restraint Systems in Transport Category Airplanes" dated November 2000, and is modified with additions in ***bold italics***, as follows:

1. Page 1, paragraphs 1. (SCOPE), 1.1 (PURPOSE), and 1.2 (APPLICABILITY), page 2, paragraph 2. (REFERENCES), 2.1 and 2.1.1. Disregard these paragraphs as similar text appears in TSO.

2. Page 2, paragraph 2.1.2 reads as follows:

ETSO C22g, Safety Belts

DOT/FAA/AAM/-94/19, The Performance of Child Restraint Devices in:

Transportation Category Seats. Gowdy and DeWeese, FAA Office of Aviation Medicine Report, September 1994

3. Page 4, replace paragraph 3.2 as follows:

To secure a CRS in an airplane passenger seat, the device shall rely upon the passenger seat lap belt (pelvic restraint) or possibly rigid bar lower anchorages if the airplane seat is so equipped, as prescribed by 49 CFR § 571.225 S9. The latter would require the CRS to be equipped with lower anchorage hardware per 49 CFR § 571.213 S5.9(a), that is, adjustable webbing attachments or retractable/stowable rigid prongs.

4. Page 5, paragraph 3.2.5 reads as follows:

3.2.5 Where a CRS is equipped with prongs that attach the CRS to a rigid bar anchorage system in automobiles***, as referenced in 49 CFR § 571.225*** those prongs shall be retractable, in order to ensure proper positioning of the CRS in the airplane passenger seat and to avoid damage to the airplane seat.

5. Page 5, paragraph 3.3, Fire Protection, with modification reads as follows:

3.3 Cushions, upholstery, and all other exposed materials ***except small parts (knobs, triggers, fasteners, seals and electrical parts) that would not contribute significantly to the propagation of a fire*** shall meet the fire protection provisions of CS 25.853(a)

[Appendix F, Part *I* (a)(1)(ii)]. ***Seat belts and shoulder harnesses shall meet [Appendix F, Part I (a)(iv)]***

6. Page 5, replace paragraph 4, Performance Test Specifications, as follows:

The dynamic test described in this section is used to evaluate the performance of the CRS in a horizontal impact where the force is applied against the longitudinal axis of a forward facing airplane passenger seat that holds the CRS. The structural adequacy of the CRS, the effectiveness of the CRS attachments, and the adequacy of restraint of the child occupant, as prescribed in 4.1, are the issues evaluated. ***One dynamic impact test shall be performed, with the CRS secured using the passenger seat lap belt, for each category of child-occupant, as defined in paragraph 2.3 of this AS, for which the CRS is intended for use. In addition, CRS that are equipped with lower anchorage attachment hardware per 49 CFR § 571.213 S5.9(a) may be tested with each category of child-occupant when secured using the rigid bar lower anchorages.***

7. Page 6, paragraph 4.2, Test Fixtures, reads as follows:

4.2 The fixture on which the CRS is installed for the dynamic test is based on the seat fixture defined in 49 CFR § 571.213. s61.1(a)(1), (FMVSS-213) ***or a fixture that has been modified to accept the rigid bar lower anchorages per 49 CFR § 571.225 S9***. For the test specified by

this AS, the back cushion, seat cushion, lap belts and belt anchor points are different from the standard FMVSS-213 seat configuration. Appendix A of this AS presents the locations, dimensions, and materials used to configure the FMVSS-213 fixture for the test specified by this AS.

8. Page 6, paragraph 4.2.1 reads as follows:

4.2.1 Passenger Seat Restraints: Airplane passenger seat lap belts shall be installed on the test fixture ***as the primary means of attaching the CRS to the seat fixture depicted in Appendix A of this AS.*** The buckle shall be a lift latch type release mechanism. The belts shall meet the requirements of ETSO-C22g and conform to the length dimensions shown in Appendix A, Figure A5 of this AS. The webbing shall be made of nylon.

9. Page 6, new paragraph 4.2.2 reads as follows:

4.2.2 Rigid Bar Lower Anchorages: Alternatively, CRS equipped with lower anchorage attachment hardware may be tested using the aforementioned modified test procedure.

10. Page 7, the last sentence of paragraph 4.5, Photometric Instrumentation, reads as follows:

The resolution of the images shall be sufficient to enable accurate measurements of the maximum excursion of the head and knee of the ATD in Type ***III*** CRS tests, or the maximum rotation of the CRS in Type I and aft facing Type II CRS tests.

11. Page 7, new paragraph heading 5.1.1 reads as follows:

5.1.1 Passenger Seat Restraint: The CRS shall be installed in the test fixture and secured using the passenger seat lap belt in the manner specified by the manufacturer's instructions provided with the CRS. The maximum force applied to the free end of the lap belt webbing being pulled through the belt buckle tension retention mechanism shall not exceed 67 N (15lb) and the maximum force shall be applied for a period no longer than 3s. No other force may be applied to the CRS during the adjustment of the passenger seat lap belt. The CRS shall not be repositioned after the passenger seat lap belt has been tightened.

12. Page 7, new paragraph 5.1.2 reads as follows:

5.1.2 Rigid Bar Lower Anchorages: The CRS may be installed in the modified test fixture and secured to the rigid bar lower anchorages as follows:

13. Page 7, new paragraph 5.1.2.1 reads as follows:

5.1.2.1 Flexible Lower Anchorage CRS Attachment: CRS equipped with adjustable webbing and latch plates may be secured to the rigid bar lower anchorages on the passenger seat. The maximum force applied to the free ends of the CRS's lower anchorage attachment webbing when pulled through the tension retention mechanism shall be the same as paragraph 5.1 of this AS. These types of CRS may also be secured to the passenger seat by attaching them to the passenger seat lap belt anchorage in the manner specified by the manufacturer's instructions provided with the CRS.

14. Page 7, new paragraph 5.1.2.2 reads as follows:

5.1.2.2 Rigid Lower CRS Attachment: CRS equipped with rigid prongs may be secured to the rigid bar lower anchorages in the manner specified by the manufacturer's instructions provided with the CRS.

15. Page 9, new second paragraph 6.1.2 reads as follows:

All portions of the Anthropophic Test Dummy (ATD) torso shall be retained within the CRS. The ***centre point of the*** target points on either side of the ATD head shall pass through the transverse orthogonal planes whose intersection contains the forward-most and top-most points on the CRS surfaces.

16. Page 10, new paragraph 6.5.1 reads as follows:

6.5.1 Post Test Release of Integral Restraints on the CRS: The force to release the buckle on the CRS integral restraints **(*see 5.4*)** shall not exceed ***7,3 kg (16 pounds).***

17. Page 10, disregard paragraphs 7.1a through e. Marking of the article shall be in accordance with paragraphs 7.1f through ***7.1h,*** and the paragraph 4 of this ETSO.

18. Page 11, disregard paragraphs 7.1h through m. New paragraph 7.1h reads as follows:

h. The following statement on yellow background with black text, regarding the installation and use of CRS:

"WARNING! DEATH OR SERIOUS INJURY CAN OCCUR. Follow all instructions on this child restraint and in the manufacturer's written instructions located _____.

• Do not place this device behind any wall or seat back in an airplane that has an airbag.

• Do not use in any passenger seat that has an inflatable seat belt.

• Use only in a forward facing seat. Do not use in a rear facing seat or a side facing seat.

• Attach this child restraint with the airplane passenger seat lap belt or rigid bar anchorage system if so equipped. This child restraint is not designed to be used with a shoulder strap or any other tether strap to the seat or airplane.

• Snugly adjust the belts provided with this child restraint around your child.

19. Page 12, paragraph 7.1l. Disregard this paragraph, as it has been included in the new paragraph 7.1h.

20 Page 16, Figure A6. Disregard this Figure, as it no longer applies. The substance of this warning is now in paragraph 7.1h.

APPENDIX 2. TEST CONDITIONS

SAE AS 5276/1 incorporates, as references, the following test standards:

- SAE RP J211, Instrumentation for Impact Tests;
- SAE AS8049A, Performance Standard for Seats in Civil Rotorcraft, Transport Aircraft and General Aviation Aircraft;
- SAE ARP4466, Dimensional Compatibility of Child Restraint Systems and Passenger Seat Systems in Civil Transport Airplanes;
- 49 CFR Part 572, Anthropomorphic Test Dummies;
- CS 25.853(a) [Appendix F, Part I(a)(iv)].

ETSO-C132

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: GEOSYNCHRONOUS ORBIT AERONAUTICAL MOBILE SATELLITE SERVICES AIRCRAFT EARTH STATION EQUIPMENT

1 - Applicability

This ETSO gives the requirements which Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) aircraft earth station equipment that is manufactured on or after the date of this ETSO, must meet in order to be identified with the applicable ETSO marking.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in the Federal Aviation Administration standard “Geosynchronous Orbit Aeronautical Mobile Satellite Services Aircraft Earth Station Equipment”.
This standard is based on RTCA document DO 210D “MOPS for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) avionics” Section 2.0 dated April 19, 2000 including Change 1, dated December 14, 2000, and change 2, dated November 28,2001.

3.1.2 - Environmental Standard

See CS-ETSO Subpart A paragraph 2.1.

3.1.3 - Computer Software

See CS-ETSO Subpart A paragraph 2.2.

3.2 - Specific

None.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

None.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

ETSO-2C78

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: CREWMEMBER OXYGEN MASK

1 - Applicability

This ETSO gives the requirements which the crewmember constant flow mask or crewmember demand oxygen masks that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Both crewmember constant flow mask and crewmember demand oxygen masks must meet the standards set forth in the attached Appendix 1: “Federal Aviation Administration Standard TSO-C78 Crewmember Demand Oxygen Masks” and, when applicable, additional specific requirements as described here after in paragraph 3.2 – Specific.

3.1.2 - Environmental Standard

None.

3.1.3 - Computer Software

None.

3.2 – Specific

3.2.1 - Breathing Bag Volume

If a breathing bag is installed it shall meet the requirements of the Society of Automotive Engineers Inc (SAE) Aerospace Standard (AS) N° AS 8025, “Passenger Oxygen Mask”, Rev. A, dated January 1999, paragraphs 4.3 (volume) and 5.5.1 (strength).

3.2.2 - Oxygen Flow Indicators

If an oxygen flow indicator is installed it shall meet the requirements of the Society of Automotive Engineers Inc (SAE) Aerospace Standard (AS) N° AS 916, “Oxygen Flow Indicators”, Rev. B, dated July 1996, paragraph 3.2 (Low pressure continuous flow type).

3.2.3 - Flammability

For flammability the applicable paragraphs of CS 25, Appendix F shall apply.

4 - Marking

4.1. - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

4.2. - Specific

4.2.1 - Each constant flow mask shall be marked with:

(i) the term “Constant Flow Mask”;

(ii) the maximum environmental (cabin) altitude the mask is qualified for.

4.2.2 - Each demand flow mask shall be marked to indicate:

(i) whether it is a “non-pressure demand” or a “pressure demand” mask;

(ii) the maximum environmental (cabin) altitude for which it is qualified.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

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.

2.0 Design and Construction of Mask.

To be eligible for approval under a Technical Standard Order authorization, 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 30" hg. and 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 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 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 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 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 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 0.1" H_2O and not more than 0.15 LPM, STPD, when subjected to a suction pressure differential of 12.0" H_2O.

(c) The oxygen supply tube assembly must not leak when subjected to an internal pressure of 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 (inches H_2O)	**Flow Rate (LPM)**
0.6	**20**
1.5	**70**
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 (inches H_2O)	**Flow Rate (LPM)**
1.0	**20**
2.0	**70**
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 20 mm Hg and the pressure in the supply tube is 15 to 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 70° F. within 15 minutes after being stored at a temperature of 160° F. for 12 hours, and within 15 minutes after being stored at 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 70° F. after being stored at a temperature of 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 20° F. after being stored at a temperature of 70° 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 12 p.s.i.a. to not less than 2.7 p.s.i.a. for a straight or diluter-demand kind, or to not less than 2.1 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 value 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 17" H_2O and must relieve the differential pressure to a value not exceeding l6" H_2O within 5 seconds. During the 5-second interval, the pressure differential must not exceed a value of 20" H_2O. The pressure relief valve must close at a differential pressure of 14" H_2O.

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 Federal Aviation Administration (see FAR § 37.5), on the basis of evaluation of the applicant's quality control systems (see § 37.5 (a) (3)).5.0 Maximum Environmental (Cabin) Altitude.

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, 32.2 feet/second^2.
Tidal volume	Volume of air inspired per breath.

ETSO-2C512

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: PORTABLE GASEOUS OXYGEN SUPPLY (PGOS)

1 - Applicability

This ETSO gives the requirements which the Portable Gaseous Oxygen Supply that are manufactured on or after the date of this ETSO must meet in order to be identified with applicable ETSO marking.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in the Society of Automotive Engineers (SAE), Inc, Document Aerospace Standard (AS) no AS 1046, "Minimum Standard for Portable Gaseous Oxygen Equipment", Rev. B, dated 13 September 1989.

3.1.2 - Environmental Standard

The equipment must be tested according to the applicable environmental standards contained in EUROCAE ED-14E (RTCA/DO-160E) "*Environmental Conditions and Test Procedures for Airborne Equipment"* from March 2005.

3.1.3 - Computer Software

None.

3.2 - Specific

3.2.1 - Proof and Ultimate Strength Factors

For proof and ultimate strength factors CS 25.1453 (a) shall apply.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

As per AS 1046 Rev. B, dated 13 September 1989.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

ETSO-2C513

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: TOW RELEASE

1 - Applicability

This ETSO specifies the requirements which Tow Releases that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standard given in the Minimum Performance Standard for Tow Release given in the **Appendix 1.**

3.1.2 - Environmental Standard

The equipment must be tested according to the applicable environmental standards contained in EUROCAE ED-14E (RTCA/DO-160E) "*Environmental Conditions and Test Procedures for Airborne Equipment"* from March 2005.

3.1.3 - Computer Software

See CS-ETSO Subpart A paragraph 2.2

3.2 - Specific

None.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

None.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

A copy of the reference LN (Luftfahrt-Norm) may be obtained from the web-site: www.normung.din.de

APPENDIX 1. TOW RELEASE

1. GENERAL

1.1 Type and applicability of airworthiness requirements

These airworthiness requirements for tow releases (ETSO-2C513) are valid for proof of airworthiness of tow releases that are used for:

a) towing steerable or non-steerable tow or built into such tow;

b) or for towing by winch or motor vehicle.

Note: Gliders and powered gliders are examples of steerable tows.
Banners are examples of non-steerable tows.

All the individual specifications listed below for ensuring the airworthiness of tow releases are minimum requirements that have been derived from operating experience and have been quantified as practical numerical values.

Deviations from these requirements may be approved or requested by the Agency, if justified by new findings or safety considerations.

1.2 Type approval

1.2.1. A tow release type can be approved on application in the form of an ETSO entitlement, provided that the airworthiness requirements are fully met, or, in the event of non-compliance of one or more requirements, if proof is provided that an equivalent safety level is achieved.

The decision of the Agency is final.

1.2.2. The burden of proof is borne by the applicant, who also has to compile the type documentation.

1.2.3. The type documentation includes all the documentation necessary for the design specification of the tow release and all its design features that are subject matters of this ETSO.

2. DESIGN AND CONSTRUCTION

2.1 Materials

The suitability and reliability of the materials used must be shown based on operating experience or materials testing.

All materials used for stressed parts must correspond to descriptions and specifications recognized by the Agency.

2.2 Protection of parts

Each part of the load transmitting assembly must

a) be protected as fully as possible against influences that could cause damage or diminish strength during operation, including corrosion and wear;

b) and designed in such a way that:
- no water can be collected and that;
- any dirt inside the tow release can be removed without disassembly.

2.3 Securing connecting elements

Accepted security devices must be used for all non permanent connecting elements of the tow release.

2.4 Connecting ring pair

For each tow release with a hook, a connecting ring pair according to LN (Luftfahrt-Norm) 65091 in the current valid version must be used.

2.5 Attachment to the aircraft

The tow release must be designed to be attached to the aircraft using non permanent connecting elements.

2.6 Special requirements

2.6.1 Tow releases with a moveable or fixed ring jaw must be designed in such a way that it is impossible to hook up the large oval ring of the connecting ring pair. It must be also impossible for the connecting ring pair to jam behind or either side of the hook.

2.6.2 It must not be possible, in any operating state, for the connecting ring pair to jam in the tow release jaw and thus inhibit the release.

2.6.3 Tow releases installed near the centre of gravity of the aircraft must have a mean for automatic release.

2.7 Long-term performance

The documentation must include proof of at least 10,000 actuations of the tow release under operating conditions. No damage should occur during this time.

3. STRENGTH

3.1 Strength calculations

Load tests according to § 4.2.5 and § 4.2.6 must show that the strength of the tow release is adequate to withstand any loads that may be put on it in any operating state that experience has shown may occur.

3.2 Criteria for sufficient dimensioning and safety factor

3.2.1 The strength requirements are specified by the safe test load (the maximum expected cable load during operation) and the calculated breaking load (the maximum cable load multiplied by the specified safety factor) defined in § 3.3.

These loads are specified as limiting values in the test schedules for the functional tests.

3.2.2 A safety factor of 1.5 is specified.

The unit must be able to:

a) accept the safe test load without permanent damage in the form of deformation, notches, cracks, etc.;

b) withstand the calculated breaking load without failure for at least 3 seconds.

3.3 Safe test load

Tow releases used for the purposes as listed in § 1.1 must be designed for a safe test load L_{max} N that is derived as follows from CS 22.581 and CS 22.583:

L_{max} = 1.2 x 1.3 x m x 9.81 [N]

where	1.2 and 1.3:	safety factors
	m:	max. take-off weight
	9.81 m/s²	gravitational acceleration/conversion to Newton

Note: For a maximum towed mass of, for instance, 850 kg the safe test load is thus:
L_{max} = 1.2 x 1.3 x 850 x 9.81 = 13,008 N = L_{max}

In-line weak links are ignored when determining the safe test load.

4. OPERATING BEHAVIOUR

4.1 Performance under load

4.1.1 Safe operating range

Within the limits of cable loads and cable angles specified in § 5.1, every tow release must be able both to withstand the resultant load without impairing operational reliability and to release reliably.

4.1.2 Automatic release angle

For tow releases for installation in gliders or powered gliders for towing by winch or motor vehicle the tow cable must release reliably at the automatic release angle specified in § 5.1.

4.1.3 Release force

When loading the hook of the tow release within the limits specified for cable loads and cable angles, the maximum permissible release F_K measured at the release lever with a reference length l of 68 mm (see Fig. 1) must lie between 60 and 140 N.

4.2 Functional tests

4.2.1 Type of tests

The aim of the functional tests using a suitable test rig is to prove that the tow release for which type approval is to be granted meets the requirements as listed above in § 4.1.1 to § 4.1.3.

The available restoring force after releasing the tow cable must be measured according to § 4.2.4.

Note: Type testing of a tow release should include its use in actual flight operations in order to gain more information on its operating performance.

4.2.2 Load schedule

Test loads must be applied according to the load schedule in Fig. 1

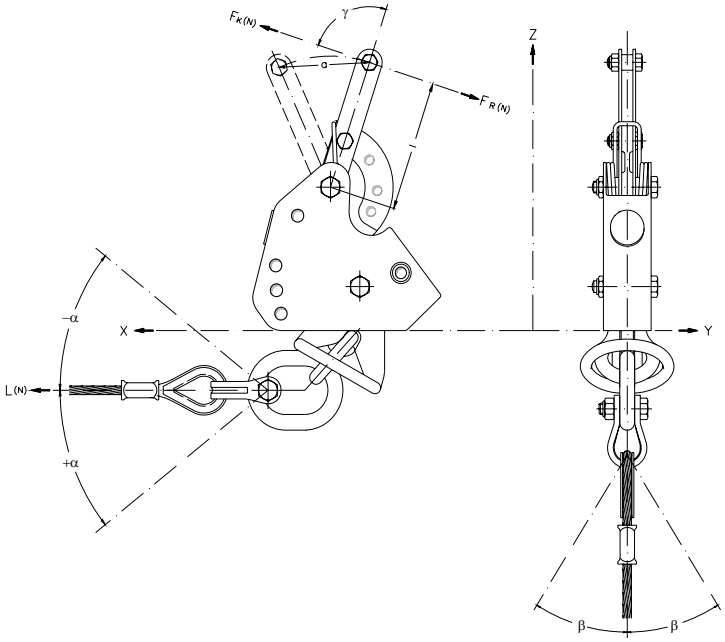


Fig. 1: Load schedule

x-axis	=	Longitudinal axis (in flight direction)			
y-axis	=	Lateral axis (in wing span direction)			
z-axis	=	Vertical axis			
L	=	Cable load in N	l	=	Original lever length of type in mm
F_K	=	Release force of release lever in N	F_R	=	Restoring force in N
			α	=	Angle between L and x-y plane
a	=	Travel of release lever	β	=	Angle between L and x-z plane

between stops in mm

The normal or 0-degrees cable angle is parallel to the x-y plane

4.2.3 Test rig

Using only the bore holes and bearing surface provided for installation in the aircraft, mount the tow release in a suitable test rig in such a way that the cable loads can be applied via the connecting ring pair for all specified load angles and that in each case the required release force F_K can be measured at the release lever.

In addition, for tow releases with automatic release (so-called safety tow releases), the cable angle and the magnitude of the cable load that results in automatic release must be measured.

4.2.4 Measurement of the restoring force

Measure the restoring force as follows prior to the start of the actual functional tests:

a) Fully open the unloaded tow release mounted in the test rig using the release lever (lever length l = 68 mm).

b) Measure the restoring force between the release lever stops, in relation to the release travel a.

Enter the measurement results in a diagram.

The restoring force F_R must not be greater than 100 N nor less than 60 N.

4.2.5 Test schedules and determination of the load diagram:

Tow releases for aero tow of steerable and non-steerable tows (use according to § 1.1.a)

a) Test up to safe test load

- With the tow release mounted in the test rig, load the hook via the connecting ring pair according to the cable (test) load schedule in Table 1.
  Apply the load at a rate of 300 N/s.

  Apply the load for 5 seconds at each load stage and measure the release force F_K using a reference release lever length of l = 68 mm.

Table 1

Cable (test) load L		Cable angle α	± β	Cable (test) load L		Cable angle α	± β
N		Degrees	Degrees	N		Degrees	Degrees
1500		-45	0	1500		+30	0
6000		-45	0	6000		+30	0
7500		-45	0	7500		+30	0
9000		-45	0	9000		+30	0
11700		-45	0				
				0,80	Lmax	+30	0
	Lmax	-45	0	0,60	Lmax	+30	30
0,60	Lmax	-45	30	0,80	Lmax	+30	30
0,80	Lmax	-45	30	0,60	Lmax	+30	45
0,60	Lmax	-45	45	0,80	Lmax	+30	45
0,80	Lmax	-45	45	1500		+45	0
				6000		+45	0
1500		-30	0	7500		+45	0
6000		-30	0	9000		+45	0
7500		-30	0	11700		+45	0
9000		-30	0				
					Lmax	+45	0
0,80	Lmax	-30	0	0,60	Lmax	+45	30
0,60	Lmax	-30	30	0,80	Lmax	+45	30
0,80	Lmax	-30	30	0,60	Lmax	+45	45
0,60	Lmax	-30	45	0,80	Lmax	+45	45
0,80	Lmax	-30	45	0,80	Lmax	+30	60
				0,80	Lmax	+30	75
1500		0	0	0,80	Lmax	+45	60
6000		0	0	0,80	Lmax	+45	75
7500		0	0	0,80	Lmax	+60	0
9000		0	0	0,80	Lmax	+60	30
11700		0	0	0,80	Lmax	+60	45
	Lmax	0	0	0,80	Lmax	+60	60
				0,80	Lmax	+60	75
1500		0	30				
6000		0	30	9000		+60	87
7500		0	30	11700		+60	87
9000		0	30		Lmax	+60	87
11700		0	30	0,40	Lmax	+120	0
	Lmax	0	30	0,40	Lmax	-120	0
1500		0	45				
6000		0	45				
7500		0	45				
9000		0	45				
11700		0	45				
	Lmax	0	45				
0,60	Lmax	0	90				

0,80	Lmax	0	90					

- Disassembly test

Disassemble the tow release completely on completion of the load test. Inspect the tow release to ensure that

- no part of it is permanently deformed and that no notches, cracks, etc., have appeared and that
- on reassembly the tow release is once again fully functional.

b) Test to calculated breaking load

Subsequent to the disassembly test and with the tow release remounted in the test rig, load the hook via the connecting ring pair up to the calculated breaking load with cable angles $\alpha = 0$ degrees and $\beta = 0$ degrees.

Maintain the calculated breaking load for 3 seconds. Then release and measure the release force F_K. Then disassemble the tow release completely and inspect it for any permanent deformation, notches, cracks, etc.

4.2.6 Test schedules and determination of the load diagram:

Tow release for installation in gliders or powered gliders for towing by winch or motor vehicle (use according to § 1.1.b)

a) Test up to safe test load

With the tow release mounted in the test rig, load the hook via the connecting ring pair according to the cable (test) load schedule in Table 2. Apply the load at a rate of 300 N/s. Apply the load for 5 seconds at each load stage and measure the release force F_K using a reference release lever length of l = 68 mm.

Automatic release of the tow release is not allowed during this test schedule.

Table 2

Cable (test) load L		Cable angle α	± β		Cable (test) load L		Cable angle α	± β
N		**Degrees**	**Degrees**		**N**		**Degrees**	**Degrees**
1500		0	0		1500		+45	0
6000		0	0		6000		+45	0
7500		0	0		7500		+45	0
9000		0	0		9000		+45	0
11700		0	0					
	Lmax	0	0		0,80	Lmax	+45	0
1500		0	30		1500		+45	30
6000		0	30		6000		+45	30
7500		0	30		7500		+45	30
9000		0	30		9000		+45	30
11700		0	30		11700		+45	30
						Lmax	+45	30
	Lmax	0	30					
					1500		+45	45
1500		0	45		6000		+45	45
6000		0	45		7500		+45	45
7500		0	45		9000		+45	45
9000		0	45		0,80	Lmax	+45	45
11700		0	45					
					1500		+45	60
	Lmax	0	45		6000		+45	60
					7500		+45	60
1500		+30	0		9000		+45	60
6000		+30	0		11700		+45	60
7500		+30	0			Lmax	+45	60
9000		+30	0					
0,80	Lmax	+30	0		1500		+45	75
					6000		+45	75
1500		+30	30		7500		+45	75
6000		+30	30		9000		+45	75
7500		+30	30		11700		+45	75
9000		+30	30			Lmax	+45	75
11700		+30	30		0,60	Lmax	+60	0
	Lmax	+30	30		0,80	Lmax	+60	0
					0,60	Lmax	+60	30
0,60	Lmax	+30	45		0,80	Lmax	+60	30
0,80	Lmax	+30	45					
0,60	Lmax	+30	60		1500		+60	45
0,80	Lmax	+30	60		6000		+60	45
					7500		+60	45
1500		+30	75		9000		+60	45
6000		+30	75		11700		+60	45
7500		+30	75			Lmax	+60	45
9000		+30	75					
11700		+30	75					
	Lmax	+30	75					

Table 2 (cont.)

Cable (test) load		**Cable angle**	
L		**α**	**± β**
N		**Degrees**	**Degrees**
0,60	Lmax	+60	60
0,80	Lmax	+60	60
1500		+60	75
6000		+60	75
7500		+60	75
9000		+60	75
11700		+60	75
	Lmax	+60	75
11700		+60	87
	Lmax	+60	87
1500		+75	0
6000		+75	0
7500		+75	0
9000		+75	0
11700		+75	0
	Lmax	+75	0
0,60	Lmax	+75	30
0,80	Lmax	+75	30
0,60	Lmax	+75	45
0,80	Lmax	+75	45
0,60	Lmax	+75	60
0,80	Lmax	+75	60
0,80	Lmax	0	75
1500		0	87
6000		0	87
7500		0	87
9000		0	87
11700		0	87
	Lmax	0	87

- Disassembly test

Disassemble the tow release completely on completion of the load test. Inspection the tow release to ensure that

- no part of it is permanently deformed and that no notches, cracks, etc., have appeared and that
- on reassembly the tow release is once again fully functional.

b) Determining the angle for automatic release

- With the tow release mounted in the test rig, load the hook via the connecting ring pair according to the cable (test) load schedule in Table 3.
- At each load stage measure the angle α_s, at which release occurs automatically.

Table 3

Cable (test) load L N	Cable angle β Degrees		Cable (test) load L N	Cable angle β Degrees
20	0		100	75
20	45		150	0
20	75		150	45
30	0		150	75
30	45		500	0
30	75		500	30
40	0		500	45
40	45		500	60
40	75		500	75
50	0		1000	0
50	45		1000	0
50	75		2000	0
100	0		2000	60
100	45		3000	0
			3000	80

c) Test to calculated breaking load

On completion of the load test according to a) with subsequent disassembly test and the determination of the angle at which automatic release occurs according to b), remount the tow release in the test rig and load the hook via the connecting ring pair up to the calculated breaking load with cable angles $\alpha = 0$ degrees and $\beta = 0$ degrees.
Maintain the calculated breaking load for 3 seconds. Then release and measure the release force F_K. Then disassemble the tow release completely and inspect it for any permanent deformation, notches, cracks, etc.

5. OPERATING LIMITS, MARKINGS AND DOCUMENTATION

5.1 Operating limits

5.1.1 The operating limits listed in § 4.2.5 and § 4.2.6 must be specified for every tow release and be provided to the holder of the aircraft in which a tow release of the type in question is being installed (see also Table 4).

Table 4

Tow release according to §	1.1.a)	1.1.b)
Cable angle at which the tow cable can be reliably released		
α (upwards)	-90°	-,-
α (downwards)	+90°	+75°
β (to either side)	0-87°	0-87°
Maximum permissible cable load at which the tow cable can be reliably released		
L_{max}	Cable load	Cable load
Automatic release angle		
α_s	-,-	75°-90°

5.2 Operating and maintenance documentation

5.2.1 On delivery, each tow release must be accompanied by operating and maintenance documentation. This documentation must contain all the information necessary to maintain the tow release in a fully operational condition.

5.2.2 A copy of the service and maintenance documentation must be shown to the Agency.

5.2.3 All the information in § 5.1 and any further information necessary for safe and reliable operation of the tow release must be included in the operating documentation.

5.2.4 As a minimum, the maintenance documentation must cover the following:

a) Installation of the tow release in the aircraft

b) Set-up data necessary for the safe and reliable functioning of the tow release

c) Checks and tests to be carried out after installation

d) Cleaning and care of the tow release

e) Detailed description and frequency of maintenance work (inspection schedules)

ETSO-2C514

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: AIRBORNE SYSTEMS FOR NON REQUIRED TELECOMMUNICATION SERVICES (IN NON AERONAUTICAL FREQUENCY BANDS) (ASNRT)

1 - Applicability

This ETSO gives the requirements which Airborne Systems to be installed on Aircraft for Non Required Telecommunication Services (in Non Aeronautical Frequency Bands) (ASNRT) that are manufactured on or after the date of this ETSO must meet in order to be identified with applicable ETSO marking.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in the **Appendix 1.**

3.1.2 - Environmental Standard

The equipment must be tested according to the applicable environmental standards contained in EUROCAE ED-14E (RTCA/DO-160E) "*Environmental Conditions and Test Procedures for Airborne Equipment"* from March 2005.

3.1.3 - Computer Software

See CS-ETSO Subpart A paragraph 2.2.

3.2 - Specific

None.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

The label shall indicate the communication system or network used.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

APPENDIX 1. AIRBORNE SYSTEMS FOR NON REQUIRED TELECOMMUNICATION SERVICES (IN NON AERONAUTICAL FREQUENCY BANDS) (ASNRT)

1. GENERAL

PURPOSE AND SCOPE

This minimum operational performance specification defines the minimum performance expected from an Airborne System to be installed on Aircraft for Non Required Telecommunication Services in Non Aeronautical Frequency Bands (ASNRT). The performance of specific equipment may be enhanced or superior to this specification depending on the intended application and configuration.

Chapter 1 describes typical equipment applications and operational objectives and is the basis for the performance criteria specified in Chapter 2 and Chapter 3. Definitions essential to proper understanding of this document are also provided in Chapter 1.

Chapter 2 contains general design requirements.

Chapter 3 contains the minimum performance specification for the equipment, defining performance under standard operating conditions.

Chapter 4 prescribes the environmental test conditions which provide a laboratory means of determining the performance characteristics of the equipment under conditions representative of those which may be encountered in actual operations.

Chapter 5 specifies the performance of the equipment and gives guidance for the installation.

APPLICATION

Compliance with this minimum operational performance specification by manufacturers, installers and users is recommended as a means of ensuring that the equipment will satisfactorily perform its intended functions under the conditions normally encountered in routine aircraft operations.

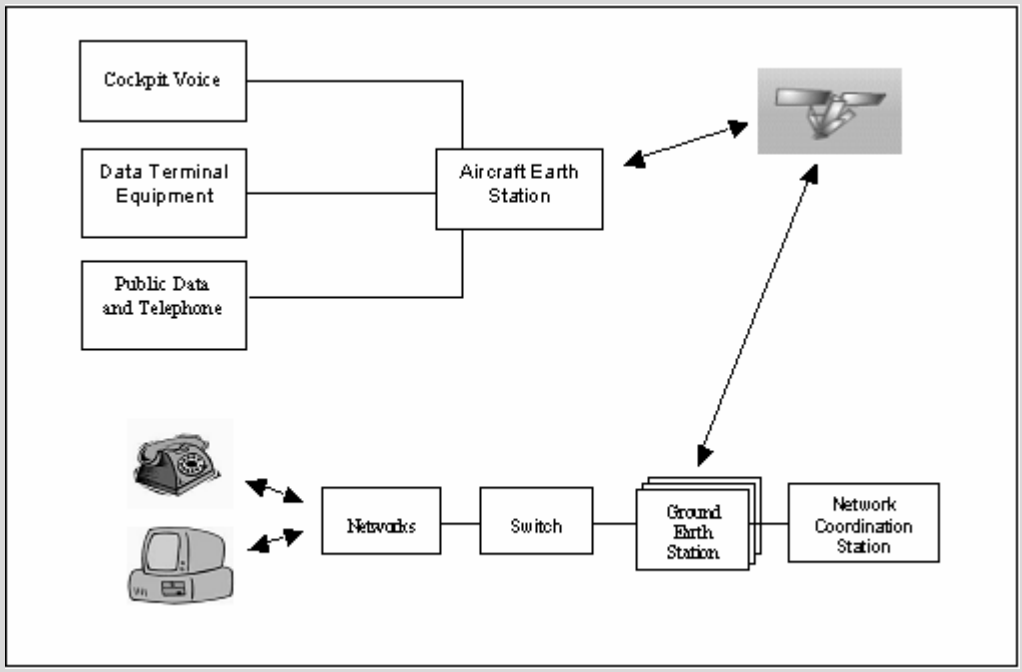
This specification does not cover telecommunication aspects. It is the responsibility of the manufacturer as well as the operator to obtain the necessary approvals from the responsible telecommunication authority and from the network provider, if applicable.

DESCRIPTION OF SYSTEM

The purpose of the Airborne System for Non-Required Telecommunication Services (ASNRT) is to provide flight crew and passengers with additional air-ground / air-air voice and data communication service. The system does not support safety related applications like Air Traffic Service (ATS).

It consists of electronic on board equipment which is not required for any phase of flight by any aviation rule. It is normally not connected to nor interacted with any aircraft system except the intercom, electrical power and mechanical mounting. In special cases it may be useful to establish additional interfaces to other systems. Examples are communication management Systems for transmission of data such as position, heading, etc. as well as company data. Furthermore it might be useful to connect the ASNRT to devices serving as antenna steering units.

The following drawing shows an example of such a system utilising Iridium satellite network. It does not define a requirement.



Example Block Diagram:
Airborne System for Non-Required Communication Services
using the IRIDIUM satellite network

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.

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.

3. MINIMUM PERFORMANCE SPECIFICATON UNDER STANDARD CONDITIONS

GENERAL

The Aeronautical System for Non-Required Telecommunication Services (ASNRT) must meet the basic requirement not to interfere with on-board systems.

It must be ensured that the equipment can neither become a source of danger in them nor threaten the proper functioning of any essential system or service.

Note: It is assumed that the manufacturer also consults the telecommunication administration and (if applicable) the network provider as early as possible for approval of the technical parameters and requirements for the usage of the equipment.

SYSTEM SPECIFIC PARAMETERS

If appropriate, the manufacturer shall define details to show compliance with "GENERAL" subpart of this document.

A set of technical parameters showing that the system performs its intended functions shall be declared by the manufacturer. This set of data should include the quality, availability and reliability of the information channel and all the requirements which may be defined by the telecommunication administration or network provider for such equipment. However, when agreed by EASA, compliance demonstration is only necessary for a very basic requirement like "communication link established".

If the system interfaces to other on board equipment, compliance with the interface related requirements for that equipment has to be shown in order to exclude adverse effects on connected systems and the aircraft itself. In case of the intercom system electrical interface related parts of RTCA DO-214 (Audio Systems Characteristics and Minimum Operational Performance Standards for Aircraft Audio Systems and Equipment) Section 2.4 apply.

Means to disconnect the equipment from power bus or other systems (if applicable) shall be provided (i.e. Master Switch) for the case of unexpected interference, fire, smoke or other hazards.

Note: Compliance with this requirement can be achieved by the design of the equipment itself or measures described in the Installation Manual.

CLASSES OF EQUIPMENT

There are two classes defined in accordance with technical means to ensure the proper operation of the equipment. There may be additional operational requirements which are not covered by this specification.

- Class 1: Equipment with the operation restriction to parked and (air-) taxiing aircraft:

  Technical means shall be provided to ensure that the equipment cannot be operated during other phases of flight (eg. by connection to sensors for airspeed, weight on wheels, etc.).

  Note: Equipment which can, due to interference problems, only be allowed to operate in a parked aircraft with engines and other systems switched of, is not in the scope of this specification.

- Class 2: Equipment for operation during all phases of flight:

The manufacturer shall obtain concurrence for the intended operation from the telecommunication authority or network provider (if applicable) before applying for an airworthiness approval.

4. MINIMUM PERFORMANCE SPECIFICATION UNDER ENVIRONMENTAL TEST CONDITIONS

INTRODUCTION

The environmental tests and performance requirements described in this chapter provide a laboratory means of determining the performance characteristics of the equipment under conditions representative of those which may be encountered in actual operations.

The Airborne System for Non-Required Telecommunication Services in Non Aeronautical Frequency Bands (ASNRT) needs to comply with environmental tests so far as it is necessary to ensure that the equipment cannot become a source of danger under environmental conditions.

Some of the tests contained in this chapter are identified with the phrase “if required“. They do not have to be performed unless the manufacturer wishes to qualify the equipment to these additional environmental conditions or if requested by EASA.

Unless otherwise specified, the test procedures applicable to a determination of equipment performance under environmental test conditions are specified in ETSO-2C514 § 3.1.2

EQUIPMENT PERFORMANCE COMPLIANCE

The performance requirements as defined in chapter 3 are not required to be tested under all of the conditions specified in CS-ETSO Subpart A paragraph 2.1.

When exposed to high temperature and/or pressure as well as power input and voltage spike test, it shall be ensured that there is no risk of fire, smoke or similar induced by the equipment.

During all shock and vibration tests the equipment shall remain in its mounting and no part of the equipment or its mounting shall have become detached and free of the shock test table.

Direct lightning tests for antennas or other equipment to be mounted outside the aircraft are only intended to ensure that a lightning strike is already blocked at the antenna itself and cannot influence other installations or the aircraft itself.

PERFORMANCE TESTS

The equipment is sorted in two categories. Category 1 is for devices which are to be installed inside the aircraft, e.g. in the avionics bay. Category 2 covers subsystems to be installed outside, especially antennas.

EUROCAE ED-14 / RTCA-DO160 Test	Section	Category 1	Category 2
Temperature and Altitude	4	+	+
Temperature Variation	5.0	-	-
Humidity	6.0	-	-
Operational Shocks and Crash Safety	7.0	+	+
Vibration	8.0	+	+
Explosion Proofness	9.0	-	-
Water proofness	10.0	-	-
Fluids Susceptibility	11.0	-	-

EUROCAE ED-14 / RTCA-DO160 Test	Section	Category 1	Category 2
Sand and Dust	12.0	-	-
Fungus Resistance	13.0	-	-
Salt Spray	14.0	-	-
Magnetic Effect	15.0	+	+(1)
Power Input	16.0	+	-
Voltage Spike	17.0	+	-
Audio Frequency Cond. Susceptibility	18.0	-	-
Induced Signal Susceptibility	19.0	-	-
Radio Frequency Susceptibility	20.0	-	-
Emission of Radio Frequency Energy	21.0	+	+(1),(3)
Lightning Induced Transient Susceptibility	22.0	-	-
Lightning Direct Effects	23.0	-	+(2)
Icing	24.0	-	-
Electrostatic Discharge	25.0	+	+

\+ mandatory test
\- if required
(1) active antenna only
(2) This test can be omitted if compliance with the requirement is ensured by other means
(3) non intended radiation

The tests marked with "if required" may become mandatory in case of specific technical reasons. This shall be agreed with EASA.

Note: the above table is based on ED-14E / DO-160E and test conditions should be revaluated should the CS-ETSO require compliance with a later revision.

5. INSTALLED EQUIPMENT PERFORMANCE

The material contained in the following paragraphs is intended as guidance material only and does not have direct significance in the type certification of the equipment concerned. The aircraft installation must comply with the applicable airworthiness requirements and needs to be agreed by EASA.

EQUIPMENT INSTALLATION

General guidance on installation which can be found in FAA AC 25-10, 25-16, 43.13-1b (or later editions) should be applied. Special care should be taken in selecting the antenna installation location in relation to other receiving and transmitting RF systems. Non interference tests are required. Aircraft lightning zones and system lightning protection has to be determined. Additionally, for satellite systems a free sight to the sky is necessary for good system performance. Covering the antenna by structural elements will directly influence the installed communication performance. The interface to the on board intercom or other systems shall be installed in a manner so that a malfunction of the communication system does not cause conditions which prevent the safe continuation of the flight. The equipment shall be installed in accordance with the manufacturer's installation instructions.

OPERATING RESTRICTIONS

All operation restrictions which are defined e.g. by the rules of telecommunication authority and/or network provider should be enforced by technical provisions and procedures stated in Installation Manual as well as Operation Manual.