SUBPART A - GENERAL

1. APPLICABILITY

1.1 Requirements for the issue of European Technical Standard Order (ETSO) authorisations are found in Part-21, Section A, Subpart O.

1.2 Marking requirements for the issue of European Technical Standard Order authorisations are found in Part-21, Section A, Subpart Q.

2. ENVIRONMENTAL AND SOFTWARE STANDARDS TO MEET TECHNICAL CONDITIONS

2.1 Environmental standards


It is not permissible to mix versions within a given qualification programme.

2.2 Software standards

When the equipment includes airborne software

Unless otherwise stated in paragraph 3.1.3 of the specific ETSO, one acceptable means of compliance for the development of the airborne software is outlined in the latest revision of AMC 20-115 on software considerations in Airborne Systems and Equipment Certification.

Software level also called Item Development Assurance Level (IDAL) may be determined by using the guidance proposed in section 2.4. The applicant must declare the software level(s) to which the software has been developed and verified.

2.3 Airborne electronic hardware (AEH)

If the article contains a complex Application-Specific Integrated Circuit (ASIC) or complex programmable logic (e.g. Programmable Array Logic components (PAL), Field-Programmable Gate Array components (FPGA), General Array Logic components (GAL), or Erasable Programmable Logic Devices) summarised as Complex Electronic hardware to accomplish the function, develop the component according to EUROCAE/RTCA document ED-80/DO-254 ‘Design Assurance Guidance for Airborne Electronic Hardware’, dated April 2000.

Supplemental guidance material for all other Airborne Electronic hardware (including boards, SEH, use of COTS devices) included in the ETSO article may be found in ‘EASA CM-SWCEH-001 Development Assurance of Airborne Electronic Hardware’ Issue 01 revision 01, dated March 2012.

Design Assurance Level also called Item Development Assurance Level (IDAL) for Airborne Electronic Hardware (AEH) may be determined by using the guidance proposed in section 2.4. The applicant must declare the Design Assurance level (s) to which the AEH has been developed and verified.
2.4 Failure conditions classification and development assurance

During the development of equipment, consideration should be given to failure conditions, the equipment should then be developed in accordance with their possible effects at system and aircraft level (see AMC CSxx.1309 for further guidance, for CS-23 aircraft further guidance can be found in FAA AC 23.1309-1E).

The equipment shall be developed according to, at least, the development assurance level appropriate to the failure condition classifications expected for the intended installation.

Where the effects at system or aircraft level are not known, due to non-availability of aircraft or system design data, assumed failure classifications may be used but at a minimum to the level required in the ETSO.

Classification of failure conditions at equipment level may change as a result of particular aircraft installation architecture and characteristics.

EUROCAE/SAE document ED-79A/ARP 4754A ‘Guidelines for development of civil Aircraft and Systems’ dated December 2010 may be used to assign the Development Assurance Level of the equipment, software and AEH. The document may be used as well as guidance to ensure a proper development, validation and verification of the ETSO and the functional equipment requirements.

3. ADDITIONAL INFORMATION

3.1 In some ETSO’s, reference is made to an associated FAA standard. In these cases the corresponding FAA technical standard order (TSO) can be consulted on http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/Frameset?OpenPage.

3.2 The following addresses are provided below:

— EUROCAE documents may be purchased from:
  European Organisation for Civil Aviation Equipment
  102 rue Etienne Dolet, 92240 Malakoff, France
  Telephone: +33 1 40 92 79 30; Fax +33 1 46 55 62 65;
  (E-mail: eurocae@eurocae.net, website: www.eurocae.net)

— RTCA documents may be purchased from:
  Radio Technical Commission for Aeronautics, Inc.
  1828 L Street NW, Suite 805, Washington DC 20036, USA
  (Website: www.rtca.org)

— SAE documents may be purchased from:
  Society of Automotive Engineers, Inc.
  400 Commonwealth Drive, WARRENDALE, PA 15096-001, USA
  (Website: www.sae.org)

— NAS specifications may be obtained from:
  Aerospace Industries Association (AIA)
  1327 Jones Drive, Ann Arbor, MI 48105, USA
  (Website: www.techstreet.com)

— FAA Standards may be purchased from:
Superintendent of Documents, Government Printing Office
732N Capitol Street NW, Washington DC 20401, USA
(Website: www.gpoaccess.gov)

— MIL Specifications may be obtained from:
  DODSSP, Standardization Documents Order Desk
  Building 4D, 700 Robbins Avenue, PHILADELPHIA, PA 19111-5094, USA
  (Website: http://dodssp.daps.mil/)

— ASTM documents may be purchased from:
  American Society for Testing and Materials, ASTM International,
  100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania 19428-2959, USA
  (Website: www.astm.org)
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<td>ETSO-2C502</td>
<td>Helicopter Crew and Passenger Integrated Immersion Suits</td>
<td>CS-ETSO/1</td>
</tr>
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<td>ETSO-2C503</td>
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<td>CS-ETSO/1</td>
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<td>----------------</td>
</tr>
<tr>
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<td>Helicopter Life Rafts for Operations to or from Helidecks Located in a Hostile Sea Area</td>
<td>CS-ETSO/1</td>
</tr>
<tr>
<td>ETSO-2C509</td>
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<td>CS-ETSO/3</td>
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<td>ETSO-2C513</td>
<td>Tow Release</td>
<td>CS-ETSO/3</td>
</tr>
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<td>Airborne Systems for Non-Required Telecommunication Services (in Non-Aeronautical Frequency Bands) (ASNRT)</td>
<td>CS-ETSO/3</td>
</tr>
<tr>
<td>ETSO-2C515</td>
<td>Aircraft Halocarbon Clean Agent — Hand Held Fire Extinguishers</td>
<td>CS-ETSO/11</td>
</tr>
</tbody>
</table>
European Aviation Safety Agency

European Technical Standard Order

Subject: Aircraft Wheels And Wheel-Brake Assemblies (CS-23, -27 and -29 aircraft)

1 - Applicability
This ETSO gives the requirements which aircraft wheels and wheel-brake assemblies for CS-23, CS-27 and CS-29 aircraft that are designed and manufactured on or after the date of this ETSO must meet in order to be identified with applicable ETSO marking. The requirements which transport aeroplane wheels and wheel-brake assemblies (CS-25 aircraft) must meet are contained in ETSO-C135.

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 to this ETSO.
The MPS is based, in part, on the Society of Automotive Engineers (SAE), Aerospace Recommended Practice (ARP) 5381, Minimum Performance Recommendations for Part 23, 27, and 29 Aircraft Wheels, Brakes, and Wheel-Brake Assemblies, dated October 2000.
Where applicable, instead of the referenced FAA documents/paragraph the corresponding Part, CS or ETSO document/paragraph shall be used, when available.

3.2 - Specific
None.

4 - Marking

4.1 - General
Marking is detailed in CS-ETSO Subpart A paragraph 1.2. In addition and in lieu of the marking specified in 21.A.807(a), the following information shall be legibly and permanently marked on the major equipment components:
(1) Name of the manufacturer responsible for compliance;
(2) Serial number;
(3) Part number;
(4) Applicable ETSO number;
(5) Rim size (this marking applies to wheels only);
(6) Hydraulic fluid specification (this marking applies to hydraulic brakes only).

4.2- Specific
None.

5 - Availability of Referenced Document
Copies of SAE ARP5381 may be purchased from the Society of Automotive Engineers Inc., Department 331, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Copies also can be obtained through the SAE Internet website at: www.sae.org.
APPENDIX 1.

MINIMUM PERFORMANCE STANDARD for aircraft wheels, brakes and wheel/brake assemblies for small airplanes and rotorcraft.

This appendix prescribes the Minimum Performance Standard (MPS) of SAE ARP5381, ‘Minimum Performance Recommendations for Part 23, 27, and 29 Aircraft Wheels, Brakes, and Wheel-Brake Assemblies’, dated October 2000, as modified in this ETSO.

Additions to and one deletion from the standard, are shown in italics as follows:

Additions:

1. Page 3, a new paragraph is added after 3.6:
   Suitable Tire for Brake Tests, $TT_{BT}$
   $TT_{BT}$ is the rated tyre type and size.
   $TT_{BT}$ is the tyre type and size that has been determined as being the most critical for brake performance and/or energy absorption tests. The $TT_{BT}$ must be a tire type and size approved for installation on the wheel ($TS_{WR}$). The suitable tyre may be different for different tests.

2. Page 7, a new paragraph is added after 4.3:
   Fire Protection: Except for small parts (such as fasteners, seals, grommets, and small electrical parts) that would not contribute significantly to the propagation of a fire, all solid materials used must meet the applicable flammability rules for the part and category of aircraft.

Deletion:

1. Page 13, paragraph 5.3.3.2 is disregarded. Worn brake testing is not a requirement of Part 23, 27 or 29, so it cannot be included in this TSO.
**European Aviation Safety Agency**

**European Technical Standard Order**

**Subject:** Oxygen Mask Assembly, Continuous Flow, Passenger

1 - **Applicability**

This ETSO gives the requirements which new models of oxygen mask, continuous flow, passenger, that is designed and 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 - Minimum Performance Standard

Standards set forth in the Society of Automotive Engineers (SAE), Inc, Document Aerospace Standard (AS) no AS 8025A, ‘Passenger Oxygen Mask’ dated (revised) January 1999, as modified in Appendix 1 of this ETSO.

3.2 - Specific

None.

4 - **Marking**

4.1 - General

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

4.2 - Specific

The markings for each mask must, in addition to the requirements in CS–ETSO Subpart A, be marked with the words ‘Oxygen mask’ and performance classification number as specified in SAE AS 8025 Paragraph 1.3. Additionally, the elastomer cure date (AS 8025A, paragraph 3.3.4), as well as a picture in accordance with AS 8025A, paragraph 5.11, have to be marked on the article.

5 - **Availability of Referenced Document**

See CS-ETSO Subpart A paragraph 3.
APPENDIX 1.

MPS FOR PASSENGER OXYGEN MASK ASSEMBLY, CONTINUOUS FLOW

The applicable standard is SAE AS8025A, Passenger Oxygen Mask, dated (revised) January 1999 and shall be modified as follows:

<table>
<thead>
<tr>
<th>SAE AS8025A Paragraph</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1, SCOPE</td>
<td>To be disregarded.</td>
</tr>
<tr>
<td>Paragraph 3.2, Deviations</td>
<td>To be disregarded.</td>
</tr>
<tr>
<td>Paragraph 3.3.1, General</td>
<td>Shall be revised: ‘Construct the device, including packaging, of materials that will not contribute significantly to fire propagation and that comply with CS 25.853(a). Mask materials typically used should meet CS-25 Appendix F, Part I(a)(1)(ii) and/or Part I(a)(1)(iv).’</td>
</tr>
<tr>
<td>Paragraph 3.3.3, Cleaning and sterilization</td>
<td>Shall be revised: ‘Cleaning and Sterilizing: The material of the oxygen mask shall permit cleaning and sterilizing without adverse effects, and without major disassembly. The cleaning method must be either manufacturer-recommended, or according to SAE ARP 1176, Oxygen System Component Cleaning and Packaging. Cleaning and sterilizing procedures shall be included in the CMM.’</td>
</tr>
<tr>
<td>Paragraph 3.3.4, Elastomer Components</td>
<td>The following sentence shall be added: ‘Life limits and inspection procedures shall be included in the CMM.’</td>
</tr>
<tr>
<td>Paragraph 3.11, Identification Markings</td>
<td>To be Disregarded. Marking requirements are specified in paragraph 4 of this ETSO.</td>
</tr>
<tr>
<td>Paragraph 4.5.2</td>
<td>Flow indication must comply with AS 916B, Oxygen Flow Indicators, as applicable</td>
</tr>
</tbody>
</table>
Subject: Survivor Locator Lights

1 - Applicability
This ETSO gives the requirements which survivor locator lights that are designed and 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

3.1.2 - Environmental Standard
See CS-ETSO Subpart A paragraph 2.1

3.1.3 – Computer Software
None

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.
APPENDIX 1
MPS FOR SURVIVOR LOCATOR LIGHTS

The applicable standard is SAE AS4492, Survivor Locator Lights, dated January 1995, reaffirmed November 18, 2004 which shall be modified by adding the following:

a) Locator light and battery pack must be constructed of materials that comply with CS-25, Appendix F, Part I (a)(1)(v) or Appendix F, Part I (a)(1)(ii) instead.

b) Insulation on electrical wire connected to the locator light and battery pack must be self-extinguishing in compliance with CS 25.869(a)(4) respectively CS-25, Appendix F part I (a)(3).
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 designed and 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, Change 2, dated November 28, 2001, Change 3, dated September 19, 2006; and Change 4, dated March 24, 2015.

Functionality. This ETSO’s standards apply to AMSS AES equipment that provides direct worldwide communications between aircraft subnetworks and ground subnetworks using aeronautical mobile satellites in geosynchronous orbit and their ground earth stations. AMSS will support both data and voice communications between aircraft users and ground-based users, such as air route traffic control centers (ARTCC) and aircraft operators. Communication services with AMSS functions include four categories: air traffic services (ATS), aircraft operational control (AOC), aeronautical administrative communications (AAC), and aeronautical passenger communications (APC).

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

3.2.1 Failure Condition Classification
See CS-ETSO Subpart A paragraph 2.4.

(1) Failure of the function defined in paragraph 3.1.1 is a minor failure condition.

(2) Loss of the function defined in paragraph 3.1.1 of this ETSO is a minor failure condition. Satellite communication is a supplemental service operation, with high frequency (HF) radio required for primary communication. The loss of satellite communication is mitigated by availability of HF communications.

(3) AMSS equipment is intended for procedural airspace area operations. FAA determined the failure condition specified in paragraph 3.2.1 of this ETSO based on AMSS equipment operating as an approved long-range communication system (LRCS) in oceanic airspace area environments. Use of AMSS equipment in other operating environments (for example, high-density terminal/en route domestic airspace) may impact equipment performance and safety considerations.

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.
European Aviation Safety Agency

European Technical Standard Order

Subject: Traffic Advisory System (TAS) Airborne Equipment

1 - Applicability
This ETSO gives the requirements that new models of active traffic advisory system (TAS) airborne equipment that are designed and manufactured on or after the date of this ETSO must meet in order to be identified with applicable ETSO marking. Equipment Classes are:
- Class A. Equipment incorporating a horizontal situation display that indicates the presence and relative location of intruder aircraft, and an aural alert informing the crew of a Traffic Advisory (TA).
- Class B. Equipment incorporating an aural alert and a visual annunciation informing the crew of a TA.

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

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.

3.1.4 - Electronic Hardware Qualification
See CS-ETSO, Subpart A, paragraph 2.3.

3.2 - Specific
None
3.2.1 - Failure Condition Classification
See CS-ETSO, Subpart A, paragraph 2.4.
Failure of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a major failure condition for malfunctions causing the display or annunciation of hazardously misleading information in airborne aircraft.
Loss of the function defined in paragraph 3.1.1 is a minor failure condition.

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.
APPENDIX 1.


Note: This Appendix changes several sections of DO-197A that have been modified by DO-197A Change 1. However, the below changes adopt different requirements than those contained in DO-197A Change 1.

1.0 Changes Applicable to Both Class A and Class B Equipment.

1.1 Receiver Characteristics.

1.1.1 In-band Acceptance. In lieu of paragraph 2.2.2.1 of RTCA DO-197A, substitute the following requirement:

Given a valid transponder reply signal in the absence of interference or overloads, the minimum trigger level (MTL) is defined as the input power level that results in a 90% ratio of decoded to received replies.

The MTL over the frequency range of 1,087 to 1,093 MHz shall be no greater than -70 dBm.

1.1.2 In-band Acceptance. In paragraph 2.4.2.2.1 of RTCA DO-197A, eliminate the following:

- Under Intruder Aircraft, eliminate the last line: “Scenario C and D ≥ -78 dBm.”
- Under Test Description Success, eliminate the last sentence: “For scenarios C and D, the ratio of correctly decoded intruder replies to total input replies shall not exceed 10%.”

1.2 Transmission Frequency. In lieu of paragraph 2.2.3.1 of RTCA/DO-197A, substitute the following requirement:

“The transmission frequency of Mode C interrogations shall be 1,030 ±0.2 MHz.”

1.3 Transmitter RF Output Power. In lieu of paragraph 2.2.3.2 of RTCA/DO-197A, substitute the following requirement:

When transmitting at full (unattenuated) output power, the peak RF output power delivered to a quarter wave stub antenna shall be within the following limits:

- Maximum RF Power: 54 dBm (250W)
- Minimum RF Power: 50 dBm (100W)

In the event that antenna gain differs from that of a quarter wave stub antenna (3 dBi), the power limits shall be adjusted accordingly. These limits are based upon range and interference limiting requirements.

Note: When transmitting at full (unattenuated) power, the RF power radiated at the pattern peak shall be within the following limits:

- Maximum EIRP: 57 dBm (500W)
- Minimum EIRP: 53 dBm (200W)

It is assumed that the peak gain of a typical quarter wave stub antenna is 3 dBi.

Note: As an alternative to the above, an active TAS may choose to operate as a low power system at a fixed rate power product limit of 42 Watts per second, in which case the peak RF output power delivered to a quarter wave stub antenna shall not exceed 46 dBm (40W).

1.4 Transmitter Pulse Characteristics. In lieu of paragraph 2.2.3.5 of RTCA/DO-197A, substitute the following requirement:

ATCRBS interrogations from active TAS shall employ the Mode C format illustrated in Figure 2-1.
The rise and decay times may be less than shown in the following table, provided the sideband radiation does not exceed the spectral limits tabulated in this standard. The amplitude of P3 shall be within 0.5 dB of the amplitude of P1.

### ACTIVE TAS MODE PULSE SHAPES (All values in Microseconds)

<table>
<thead>
<tr>
<th>Pulse Designator</th>
<th>Pulse Duration</th>
<th>Duration Tolerance</th>
<th>Rise Time</th>
<th>Decay Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1, P3</td>
<td>0.8</td>
<td>+ 0.075</td>
<td>Min 0.05</td>
<td>Max 0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min 0.05</td>
<td>Max 0.2</td>
</tr>
</tbody>
</table>

The pulse spacing tolerances shall be as follows:
P1 to P3: 21 ± 0.10 microseconds

1.5 **Mode S Broadcast Reception.** In lieu of paragraph 2.2.4.2 of RTCA/DO-197A, substitute the following requirement:
The Active TAS shall have the capability to receive 1,030 MHz Mode S broadcast signals for the purpose of obtaining a count of TCAS interrogators in its vicinity. Mode S reception may reside in an associated Mode S transponder, or may be integral to the Active TAS equipment, in which case those functions necessary to receive and process Mode S broadcast signals for a TCAS count shall be implemented and tested in accordance with RTCA/DO-181A.

*Note: As an alternative to the above, an active TAS may choose to operate at a fixed rate power product limit of 42W/sec, in which case the requirement to obtain a count of TCAS interrogators for the purpose of interference limiting is eliminated.*

1.6 **Interference Limiting.** In lieu of paragraph 2.2.6 of RTCA/DO-197A, substitute the following requirement:

To assure that all interference effects from Active TAS equipment are kept to a low level, Active TAS equipment shall control its interrogation rate or power or both to conform to the following limits. These limits are given in terms of:

- \( RR \) = the Mode A/C reply rate of own transponder
- \( NT \) = the number of airborne TCAS interrogators detected via Mode S broadcast receptions with a receiver threshold of -74 dBm.

The Minimum Active TCAS shall have the capability to monitor \( RR \) and \( NT \) and to use this information in interference limiting. Once each scan period, \( NT \) shall be updated as the number of distinct TCAS addresses received within the previous 20 second period.

The limits are as follows:

<table>
<thead>
<tr>
<th>NT</th>
<th>Upper Limit for ( \Sigma P(k) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( k=1 )</td>
</tr>
<tr>
<td>0</td>
<td>250</td>
</tr>
<tr>
<td>1</td>
<td>250</td>
</tr>
<tr>
<td>2</td>
<td>250</td>
</tr>
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<tr>
<td>7</td>
<td>250</td>
</tr>
<tr>
<td>8</td>
<td>250</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If ( RR &lt; 240 )</th>
<th>If ( RR &gt; 240 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>118</td>
<td>113</td>
</tr>
<tr>
<td>108</td>
<td>103</td>
</tr>
<tr>
<td>98</td>
<td>94</td>
</tr>
<tr>
<td>89</td>
<td>84</td>
</tr>
<tr>
<td>84</td>
<td>79</td>
</tr>
</tbody>
</table>
P(k) = power (watts) of the kth interrogation each second. This is the total radiated power (after all losses in cabling and antenna). If the set of powers is not the same in each 1 second period, then \( \Sigma P(k) \) represents the average value. 

\[ K = \text{total number of interrogations in a 1 second period.} \]

**Note 1:** RR = the Mode A/C interrogation reception rate of own transponder may be used instead of RR = the Mode A/C reply rate of own transponder.

**Note 2:** As an alternative to the above, an active TAS may choose to operate as a low power system at a fixed rate power product limit of 42W/sec, in which case the requirement to further interference limit based on RR or IR is eliminated.

In lieu of paragraph 2.4.2.5 of RTCA/DO-197A, substitute the following:

This test verifies that Active TAS is able to monitor its own transponder reply rate and to derive a count of TCAS aircraft by listening to TCAS broadcast interrogations and, based on these values, adjust its transmit power-rate product to conform to the Active TAS interference limits.

**Inputs:**

**Active TAS**
- Aircraft Altitude = 8000 ft.
- Altitude Rate = 0 FPM

**Intruder Aircraft 1-22**
- Equipage = Active TCAS II
- Range = Not Applicable
- Relative Speed = Not Applicable
- Altitude = Not Applicable
- Altitude Rate = Not Applicable TCAS Broadcast Interrogation
- Power = -50 dBm

**ATCRBS Interrogation**
- Frequency = 1030 MHz
- Type = ATCRBS Mode C
- Power = -50 dBm
- Rate
- Scenario A = 230 per second

<table>
<thead>
<tr>
<th>NT</th>
<th>Upper Limit for ( \Sigma P(k) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If RR &lt; 240</td>
</tr>
<tr>
<td>9</td>
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<tr>
<td>10</td>
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<td>11</td>
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<td>12</td>
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<td>13</td>
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<td>20</td>
<td>74</td>
</tr>
<tr>
<td>21</td>
<td>60</td>
</tr>
<tr>
<td>&gt;22</td>
<td>42</td>
</tr>
</tbody>
</table>
Scenario B = 250 per second

Conditions:
Active TAS initialized and operating at T = 0 seconds. Each of the 22 intruders is assigned a discrete address and transmits only TCAS broadcast interrogations and only at the following times and rates:
- Intruders 1-10 every 10 sec starting at T = 30 sec.
- Intruders 11-15 every 20 sec starting at T = 70 sec.
- Intruders 16-22 every 20 sec starting at T = 130 sec.

The timing of the TCAS broadcast interrogations and the ATCRBS interrogations are controlled to prevent overlap of each other.

Scenario Description
The test involves use of an ATCRBS transponder which supplies reply rate information to Active TAS. The transponder is interrogated in Mode C at a 230 per second rate in Scenario A and at a 250 per second rate in Scenario B. During each scenario, the value of Total Radiated Power per second from Active TAS is measured by summing the transmitter output powers of each Active TAS interrogation over a scan period, determining the average per second value and accounting for cable and antenna losses.

Success: The Total Radiated Power per second shall not exceed the following values:

**Scenario A**
- 250 watts/sec measured at T = 20 sec
- 245 watts/sec measured at T = 60 sec
- 158 watts/sec measured at T = 120 sec
- 42 watts/sec measured at T = 180 sec

**Scenario B**
- 118 watts/sec measured at T = 20 sec
- 70 watts/sec measured at T = 60 sec
- 45 watts/sec measured at T = 120 sec
- 12 watts/sec measured at T = 180 sec

*Note: For fixed rate power systems, total radiated power is constant and shall not exceed 42 watts/sec.*

1.7 Active TAS Antenna System. In lieu of paragraph 2.2.10 of RTCA/DO-197A, substitute the following requirement:
The equipment shall transmit interrogations and receive replies from at least one directional antenna mounted on the top or bottom of the aircraft.

1.8 Pilot Advisory Functions. In lieu of paragraph 2.1.5 of RTCA/DO-197A, substitute the following requirement:

TAS is an airborne traffic alert system that interrogates ATC transponders in nearby aircraft and uses computer processing to identify potential and predicted collision threats. The system is designed to protect a volume of airspace around the TAS equipped aircraft. The system will provide appropriate aural and visual advisories to assist the flightcrew in visually acquiring the threat aircraft when TAS predicts a penetration of the protected airspace. Traffic advisories indicate the relative positions of intruding aircraft that meet certain range and altitude criteria and are approximately 30 seconds from closest point of approach. They assist the flightcrew in visually acquiring the intruding aircraft. The system provides a traffic display (Class A systems only) and aural and visual alerts. These indicate the relative position and altitude of ATC transponder-equipped aircraft. Traffic advisories can be generated for aircraft with operative Mode S, Mode C or Mode A (non-altitude reporting) transponders. The TAS equipment is viewed as a supplement to the pilot who, with the aid of the ATC system, has the primary responsibility for avoiding collisions. The TAS system provides no indication of...
aircraft without operative transponders. For Class A systems, it shall be acceptable for the TAS system to use shape as the only discriminate for traffic threat levels.

This will allow the use of a monochrome display representation of the TCAS symbology. For Class A systems, it shall also be acceptable to provide a blinking TA symbol to allow further discrimination of the traffic alert symbol.

2.0 Changes Applicable Only to Class A Equipment.

2.1 Pilot Advisory Functions, Active TCAS I Pilot Interface and Aural Alert.

In lieu of paragraphs 2.1.5, 2.2.12 and 2.2.15 of RTCA/DO-197A, substitute the following requirements:

1. A traffic display shall be provided to indicate the presence and location of intruder aircraft. The traffic display may be combined with other aircraft displays. The traffic display shall provide the crew with the intruder’s range, bearing, and, for altitude reporting intruders, relative altitude and vertical trend.

2. Two levels of intruder aircraft shall be displayed; those causing a TA, and other traffic. Other traffic is defined as any traffic within the selected display range and not a TA.

Note: The use of TCAS threat levels as defined in DO-197A is an acceptable alternative to the requirements defined in this section.

3. As a minimum, the traffic display shall depict the following information to aid in the visual acquisition of traffic and assist in determining the relative importance of each aircraft shown:

   a. Symbolic differentiation among traffic of different relative importance. TA, other traffic (see i, j, k, l, & m below).

   b. Bearing

   c. Relative altitude (for altitude reporting aircraft only)
      (1) Above or below own aircraft (+ and - signs)
      (2) Numerical value

   d. Vertical trend of intruder aircraft (for altitude reporting aircraft only).

   e. Range. The selected range shall be depicted.

   f. The display must be easily readable under all normal cockpit conditions and all expected ambient light conditions from total darkness to bright reflected sunlight.

   g. The display shall contain a symbol to represent own aircraft. The symbol shall be different from those used to indicate TA and other traffic. The display shall be oriented such that own aircraft heading is always up (12 o’clock).
h. A ring shall be placed at a range of 2 NM from own aircraft symbol when a display range of 10 NM or less is selected. The ring shall have discrete markings at each of the twelve clock positions. The markings shall be of a size and shape that does not clutter the display.

i. Symbol fill shall be used to discriminate traffic by threat levels

j. The symbol for a TA is a filled rectangle, and, when appropriate, a data field and vertical trend arrow as described in m. & n. below.

k. The symbol for other traffic shall be an open rectangle, and, when appropriate, a data field and vertical trend arrow as described in m. below.

l. Overlapping traffic symbols should be displayed with the appropriate information overlapped. The highest priority traffic symbol should appear on top of other traffic symbols. Priority order is;
   1) TA traffic in order of increasing tau, i.e., the time to closest approach and the time to coaltitude,
   2) other traffic in order of increasing range.

m. A data field shall indicate the relative altitude, if available, of the intruder aircraft and shall consist of two digits indicating the altitude difference in hundreds of feet. For an intruder above own aircraft, the data field shall be preceded by a “+” character. For an intruder below own aircraft, the data field shall be preceded by a “-” character. For coaltitude intruders, the data field shall contain the digits “00”, with no preceding “+” or “-” character. The data field shall be wholly contained within the boundaries of the rectangular traffic symbol. For TA traffic, (filled symbol), the data characters shall be depicted in a color that contrasts with the filled symbol color. For other traffic, the data field shall be the same color as the symbol. The height of the relative altitude data characters shall be no less than 0.15 inches.

n. A vertical arrow should be placed to the immediate right of the traffic symbol if the vertical speed of the intruder is equal to or greater than 500 fpm, with the arrow pointing up for climbing traffic and down for descending traffic. The color of the arrow shall be the same as the symbol.

o. Neither a data field nor a vertical arrow shall be associated with a symbol for traffic which is not reporting altitude.

p. The display shall be capable of depicting a minimum of three intruder aircraft simultaneously. As a minimum, the display shall be capable of displaying aircraft that are within 5 NM of own aircraft.

q. The display may provide for multiple crew-selectable display ranges.

r. When the range of the intruder causing a traffic advisory to be displayed is greater than the maximum range of the display, this shall be indicated by placing no less than one quarter of the traffic advisory symbol at the edge of the display at the proper bearing. The data field and vertical trend arrow shall be shown in their normal positions relative to the traffic symbol.
s. The size of the traffic symbol shall be no less than 0.2” High.

4. “No bearing” advisories shall be presented for an intruder generating a TA when the intruder’s relative bearing cannot be derived. The “no bearing” advisory shall be an alphanumeric display shown in tabular form. The display shall be in the form of “TA 3.6 -05”, which translates to a TA at 3.6 nautical miles, 500 feet below. “No bearing” TA’s against non-altitude reporting intruders shall include the range only, e.g. “TA 2.2”, which translates to a non-altitude reporting, no bearing TA at 2.2 nautical miles. The advisory shall be centered on the display below the own aircraft symbol. The display shall include provisions to display at least two “no bearing” TA’s.

5. Aural Alerts. Each TAS aural alert shall be announced in a high-fidelity, distinguishable voice.
   a. The aural alert message “Traffic-Traffic”, spoken once, shall be used to inform the crew of a TA.
   b. All TAS aural alerts should be inhibited using the following order of precedence;
      (1) Below 400 ±100 feet AGL when TAS is installed on an aircraft equipped with a radio altimeter.
      (2) For aircraft without a radio altimeter, the aural annunciations shall be inhibited when the landing gear is extended.

      Note: When the TAS is installed on a fixed gear aircraft without a radio altimeter, the aural annunciations will never be inhibited.

2.2 Traffic Advisory Criteria. Replace the second section in paragraph 2.2.14 of RTCA/DO-197A, with the following text:
The TAS equipment shall provide two levels of advisories: Other Traffic (OT), and Traffic Advisories (TA). TAs are issued based on either tau, i.e., the time to closest approach and the time to coaltitude, or proximity to an intruder aircraft. The range tau is defined as the range divided by range rate and the vertical tau is defined as the relative altitude divided by the altitude rate.

2.3 Display Overload. In lieu of paragraph 2.2.17 of RTCA/DO-197A, substitute the following requirements:
   If the number of targets exceeds the display capability, excess targets shall be deleted in the following order:
   a. Other traffic beginning with the intruder at the greatest range.
   b. TAs beginning with the intruder having the largest tau. Once a TA has been generated against an intruder, it cannot be removed as a TA until the TA criteria are no longer satisfied even though it may be dropped from the display.

      Note: This exception does not apply when TCAS I symbology and threat levels are used.

3.0 Changes Applicable Only to Class B Equipment.

3.1 Pilot Advisory Functions, Active TCAS I Pilot Interface, and Aural Alert.
   In lieu of paragraph 2.1.5, 2.2.12, and 2.2.15 of RTCA/DO-197A, substitute the following requirements:
   1. A visual “Traffic” annunciation, shall be provided for the duration of the TA.
   2. Aural Alerts. For aircraft without a radio altimeter, the aural annunciations shall be inhibited when the landing gear is extended.

      Note: When the TAS is installed on a fixed gear aircraft without a radio altimeter, the aural annunciation will never be inhibited.

   a. Aural alert messages shall be annunciated in threat priority sequence, greatest threat first.
(1) Initial aural traffic advisories shall be spontaneous and unsolicited. The unsolicited annunciations shall be as follows: “Traffic-<X>O’Clock”, spoken once, (where <X> is the clock position of the intruder, such as 1 o’clock, etc.). If surveillance bearing information is not available on the intruder, “Traffic, No Bearing”, shall be annunciated.

(2) The current relative bearing to intruder aircraft shall be annunciated as a traffic advisory update upon crew command. Additional information such as relative altitude, range of intruder, and vertical trend (i.e. climbing, descending) may also be annunciated.

(3) The acceptability of these aural annunciations must be reviewed during flight test. The following factors, at a minimum, must be evaluated for acceptability: quantity of unsolicited annunciations, duration of annunciations, annunciation clarity, and volume. This evaluation shall occur under normal cockpit workload conditions during departure, cruise, and approach and landing phases of flight and should include evaluation of suitability in a normal air traffic control voice communication environment.

(4) Control means shall be provided to request a traffic advisory update, mute a current aural advisory, and cancel/restore aural advisories (turning the equipment off is an acceptable means of providing the cancel aural advisories function). The default condition of the equipment at power on shall be aural advisories active.

b. All TAS aural alerts should be inhibited using the following order of precedence;

   (1) Below 400 ±100 feet AGL when TAS is installed on an aircraft equipped with a radio altimeter.

   (2) For aircraft without a radio altimeter, the aural annunciations will never be inhibited in flight but may be inhibited on the ground when the aircraft is equipped with a weight-on-wheels system.

3.2 Traffic Advisory Criteria. Replace the first and second sections in paragraph 2.2.14 of RTCA/DO-197A, with the following text:

The Active TAS equipment shall provide two levels of advisories: Other Traffic (OT), and Traffic Advisories (TA). Other traffic is defined as any traffic within the selected display range and not a TA. TAs are issued based on either tau, i.e., the time to closest approach and the time to co-altitude, or proximity to an intruder aircraft. The range tau is defined as the range divided by range rate and the vertical tau is defined as the relative altitude divided by the altitude rate.

3.3 Display of intruders on the ground. In lieu of paragraph 2.2.16 of RTCA/DO-197A, substitute the following requirements:

The Active TAS equipment shall provide logic to inhibit TAs of altitude reporting intruders which are on the ground. This logic shall be used when the TAS-equipped aircraft is below 1,700 feet AGL. The 1,700 foot threshold shall include hysteresis of + 50 feet.

Note: This represents a requirement for a capability within the Active TAS avionics. When Active TAS is installed on an aircraft which does not have a radio altimeter, there is not a requirement for this logic to function.

3.4 Display overload. In lieu of paragraph 2.2.17 of RTCA/DO-197A, substitute the following requirements:

If the number of intruders exceeds aural memory storage capacity, excess intruders shall be deleted in the following order:

   a. Other traffic beginning with the intruder at the greatest range.

   b. TAs beginning with the intruder having the largest tau. Once a TA has been generated against an intruder, it cannot be removed as a TA until the TA criteria is no longer satisfied even though it has been dropped from the list of aural warnings.
European Aviation Safety Agency

European Technical Standard Order

Subject: Flight Information Services-Broadcast (FIS-B) Equipment

1 - Applicability
This ETSO gives the requirements which Aircraft Flight Information Services-Broadcast (FIS-B) Data Link Systems and Equipment that are designed and 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
This standard apply to equipment intended to display weather and other non-air traffic control-related flight advisory information to pilots in a manner that will enhance their awareness of the flight conditions.


Demonstrate the required functional performance under the test conditions as specified in table 1.

<table>
<thead>
<tr>
<th>Equipment Class</th>
<th>Equipment Name</th>
<th>Functionality</th>
<th>Test conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FIS-B Equipment using Universal Access Transceiver (UAT) and Interoperable with the Surveillance and Broadcast Services (SBS) Provider</td>
<td>RTCA/DO-358 Sections 2.2.</td>
<td>RTCA/DO-358, Sections 2.3 and 2.4.</td>
</tr>
<tr>
<td>2</td>
<td>FIS-B Equipment not</td>
<td>RTCA/DO-267A Section 2</td>
<td>RTCA/DO-267A,</td>
</tr>
</tbody>
</table>
Table 1. Equipment Classes for FIS-B

<table>
<thead>
<tr>
<th>Equipment Class</th>
<th>Equipment Name</th>
<th>Functionality</th>
<th>Test conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interoperable</td>
<td>with the SBS</td>
<td>(except 2.1.4; 2.2.12; and 2.2.13) and Section 3.8.</td>
<td>Section 4.</td>
</tr>
</tbody>
</table>

Note: This ETSO is intended for equipment used in the US National Airspace System. UAT is not intended to be operated in European Airspace.

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.

3.1.4 - Electronic Hardware Qualification
See CS-ETSO Subpart A paragraph 2.3.

3.2 - Specific

3.2.1 - Failure Condition Classification
See CS-ETSO Subpart A paragraph 2.4.

Failure of the function defined in paragraph 3.11 resulting in misleading weather or flight information is a minor failure condition.

Loss of the function defined in paragraph 3.1.1 is a minor failure condition.

3.2.2 - Manual
The applicant shall produce a manual including operating instructions and equipment limitations. This manual must state the following:

‘FIS-B information may be used for pilot planning decisions focused on updating the pilot’s awareness of the dynamic flight environment; including avoiding areas of inclement weather that are beyond visual range and pilot near-term decisions where poor visibility precludes visual acquisition of inclement weather. FIS-B weather and NAS status information may be used as follows:

(a) To promote pilot awareness of ownship location with respect to reported weather, including hazardous meteorological conditions; NAS status indicators to enhance pilot planning decisions; and pilot near-term decision-making.

(b) To cue the pilot to communicate with Air Traffic Control, Flight Service Station specialist, operator dispatch, or airline operations control center for general and mission critical meteorological information, NAS status conditions, or both. FIS-B information, including weather information, NOTAMs, and TFR areas, are intended for the sole purpose of assisting in long-/near-term planning and decision making. The system lacks sufficient resolution and updating capability necessary for aerial maneuvering associated with immediate decisions. In particular, in extreme scenarios, the oldest weather radar data on the display can be up to 15 to 20 minutes older than the display’s age indication for that weather radar data. Therefore, do not attempt to use FIS-B weather information to maneuver the aircraft at minimum safe distances from hazardous weather. FIS-B information must not be used in lieu of a standard preflight briefing.’
In addition to the above operating instructions and equipment limitations, the following paragraph should be added for FIS-B Class 1 equipment only.

(c) ‘FIS-B uplink is an FAA approved source for METAR, TAF, WINDS, PIREPs, NEXRAD, AIRMET, SIGMET, and TFR information subject to the range limits for the broadcast of these products. FIS-B uplink is not an FAA approved source for NOTAMs.’

In addition to the above operating instructions and equipment limitations, the following paragraph should be added for FIS-B Class 2 equipment only.

(d) ‘This FIS-B Class 2 equipment is not interoperable with the FAA SBS provider.’

4 - Marking

4.1 - General
Marking as 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.
European Aviation Safety Agency

European Technical Standard Order

Subject: Cargo Restraint Strap Assemblies

1 - Applicability
This ETSO gives the requirements which Cargo Restraint Strap Assemblies that are designed and 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 SAE AS 5385C, Cargo Restraint Straps - Design Criteria and Testing Methods, dated January 2007, as amended by Appendix 1 of this ETSO.

3.1.2 - Environmental Standard
Cargo restraint strap assemblies must meet the minimum performance requirements of this ETSO at any time during the service life.

(1) The environmental degradation due to aging, ultra-violet (UV) exposure, weathering, etc. shall be determined, for any non-metallic materials used in the construction of cargo restraint strap assemblies.

(2) For textile performance, refer to SAE Aerospace Information Report (AIR) 1490B, Environmental Degradation of Textiles, dated December 2007, for available data when exposed to environmental factors. It shall be determined when the environmental effects of degradation on cargo restraint strap assemblies commensurate with the expected storage and service life become unacceptable for the minimum performance requirements.

NOTE: Environmental degradation data other than that documented in AIR1490B may be used if it can be substantiated and considered acceptable for the ETSO authorisation.
3.1.3 – Computer Software
None.

3.1.4 - Electronic Hardware Qualification
None.

3.2 - Specific

3.2.1 Failure Condition Classification
N/A

4 - Marking

4.1 - General
Marking as detailed in CS-ETSO Subpart A paragraph 1.2. In addition, each Cargo Restraint Strap Assemblies shall be legibly and permanently marked in accordance with SAE AS 5385C, section 7.3 with the following:

(i) dates of manufacture and expiration per SAE AS 5385C, section 4.5.2. Format the dates per SAE AS 5385C, section 7.2.

(ii) the rated ultimate load in daN and lbf.

(iii) a unique identifier if required by SAE AS 5385C, section 4.5.2(b).

Also mark permanently and legibly, with at least the manufacturer’s name, subassembly part number, and the ETSO number:

(1) each component that is easily removable (without hand tool), and

(2) each subassembly of the article that may be interchangeable.

NOTE 1: any extra information listed in SAE AS 5385C, section 7, not specifically required in this paragraph, may be marked.

NOTE 2: Compliance with this ETSO does not necessarily indicate compliance with SAE AS 5385C. To make the cargo strap assembly as complying with SAE AS 5385C, the cargo strap assembly must be shown to meet the requirements of SAE AS 5385C in conformance with SAE AS 5385C, Para 7.1 and Note 8.

4.2 - Specific
None.

5 - Availability of Referenced Document
See CS-ETSO Subpart A paragraph 3.
APPENDIX 1.
MINIMUM PERFORMANCE STANDARD FOR CARGO RESTRAINT STRAP ASSEMBLIES

This Appendix prescribes the MPS for cargo restraint strap assemblies. The applicable standard is SAE AS 5385C “Cargo Restraint Straps – Design Criteria and Testing Methods”, dated January 2007 modified as follows:

<table>
<thead>
<tr>
<th>ASS585C Section</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disregard</td>
</tr>
<tr>
<td>2</td>
<td>Modify Paragraph 2. “REFERENCES” by disregarding the last sentence.</td>
</tr>
<tr>
<td>3</td>
<td>Modify Paragraph 3.6 to omit reference to D6 in the first sentence. Modify Figure 1. to disregard D6 end fitting Disregard 3.14</td>
</tr>
<tr>
<td>4</td>
<td>Modify 4.4 to read as follows: The webbing, as used in the restraint strap assembly, i.e., including sewing and any treatment, shall meet the flammability test criteria of CS-25 Appendix F, Part I, paragraph (a)(1)(iv): it may not have a burn rate greater than 63.5 mm (2.5 in) per minute when tested horizontally with the apparatus and test procedures required in Appendix F, Part I, paragraph (b)(5) (see 5.8). Disregard 4.5.4 and 4.9.1 Modify 4.5.1 by adding the following note: “NOTE: Environmental degradation data other than that documented in AIR490B may be used if substantiated by the Applicant and approved by the Agency.”</td>
</tr>
<tr>
<td>5</td>
<td>Disregard 5.9, 5.10 and 5.11 Modify 5.1 by adding the following note: “NOTE: Equivalent alternate methods must be approved by the Agency”.</td>
</tr>
<tr>
<td>6</td>
<td>Disregard</td>
</tr>
<tr>
<td>7</td>
<td>Apply per Paragraph 4 of this ETSO</td>
</tr>
<tr>
<td>8</td>
<td>Disregard</td>
</tr>
<tr>
<td>9</td>
<td>Disregard</td>
</tr>
<tr>
<td>10</td>
<td>Disregard</td>
</tr>
</tbody>
</table>
European Aviation Safety Agency

European Technical Standard Order (ETSO)

SUBJECT: Data Link Recorder Equipment

1 – Applicability
This ETSO gives the requirements that new models of data link recorder systems that are designed and 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 applicable sections of EUROCAE document ED-112A ’Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems’ dated September 2013 that pertain to the data link recorder types as defined in table 1 below, except for the following exclusions: Chapters IV-1 and IV-6, and Sections 2-1.1, 2-1.5, 2-1.6, 2-1.11, 2-1.12, 2-3.1, 2-5, 3-1.1, 3-1.2, 3-1.3, 3-1.4, 3-1.5, 3-1.7, 3-4 and Annex IV-B

<table>
<thead>
<tr>
<th>Recorder Type</th>
<th>ED-112A Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single DLR</td>
<td>Section 2 and Part IV</td>
</tr>
<tr>
<td>DLR function in a deployable recorder</td>
<td>Section 2, Section 3 and Part IV</td>
</tr>
<tr>
<td>DLR function in a combined recorder</td>
<td>Section 2, Section 4 and Part IV</td>
</tr>
</tbody>
</table>

Table 1: MPS Requirements per recorder type

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

3.1.4 Electronic Hardware Qualification.
See CS-ETSO, Subpart A, paragraph 2.3

3.2 - Specific

3.2.1 Failure Condition Classification
See CS-ETSO, Subpart A, paragraph 2.4.
Loss or erroneous behaviour of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a minor failure condition.
Note: The failure classification is driven by the accident investigation need.

4 - Marking

4.1 - General
Marking is detailed in CS-ETSO, Subpart A, paragraph 1.2

4.2 – Specific
See EUROCAE document ED-112A 2-1.16.3.

5 - Availability of Referenced Document
See CS-ETSO, Subpart A, paragraph 3
European Aviation Safety Agency

European Technical Standard Order

Subject: Avionics Supporting Automatic Dependent Surveillance - Broadcast (ADS-B) Aircraft Surveillance Applications (ASA)

1 - Applicability
This ETSO gives the requirements which Avionics Supporting Automatic Dependent Surveillance - Broadcast (ADS-B) Aircraft Surveillance Applications (ASA) that are designed or 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

Functional equipment classes for this ETSO are defined by the avionics equipment functionality they provide for one or more of the applications listed in Table 1. The four equipment functionalities are Cockpit Display of Traffic Information (CDTI) (Surface Only), CDTI, Airborne Surveillance and Separation Assurance Processing (ASSAP) and ADS-B Traffic Advisory System (ATAS) Annunciator Panel. Applicable performance standards for these classes are identified per equipment class in Appendix L of ED-194A/DO-317B and are based on Section 2 of ED-194A/DO-317B. The functional equipment classes are shown in Table 1.
<table>
<thead>
<tr>
<th>Application</th>
<th>Criticality</th>
<th>Equipment Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Enhanced Visual Acquisition (EVAcq)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Basic Surface (Runways)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Basic Surface (Runways + Taxiways)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Visual Separation on Approach (VSA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Basic Airborne (AIRB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) In-Trail Procedures (ITP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7) ADS-B Traffic Advisory System (ATAS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) CDTI Assisted Visual Separation (CAVS)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Loss of Function</th>
<th>Hazardous &amp; Misleading Information</th>
<th>CDTI (Surface Only) (A)</th>
<th>CDTI (B)</th>
<th>ASSAP (C)</th>
<th>ATAS Annunciator Panel (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>Major</td>
<td>Not Permitted</td>
<td>B1</td>
<td>C1</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Minor</td>
<td>Major (&gt; 80 Knots)</td>
<td>A2</td>
<td>B2</td>
<td>C2</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Minor</td>
<td>Major (&lt; 80 Knots)</td>
<td>A3</td>
<td>B3</td>
<td>C3</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Minor</td>
<td>Major</td>
<td>Not Permitted</td>
<td>B4</td>
<td>C4</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Minor</td>
<td>Major</td>
<td>Not Permitted</td>
<td>B5</td>
<td>C5</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Minor</td>
<td>Major</td>
<td>Not Permitted</td>
<td>B6</td>
<td>C6</td>
<td>Not Applicable</td>
</tr>
<tr>
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<td>Major</td>
<td>Not Permitted</td>
<td>B7</td>
<td>C7</td>
<td>D7</td>
</tr>
<tr>
<td>Minor</td>
<td>Major</td>
<td>Not Permitted</td>
<td>B8</td>
<td>C8</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Table 1 – ASA Functional Equipment Classes (per ED-194A/DO-317B)

The in-trail procedures (ITP) application (item 6 in Table 1) supports a new separation standard in procedural airspace. ITP application enables aircraft that desire flight level changes in procedural airspace to achieve these changes on a more frequent basis, thus improving flight efficiency and safety. The ITP achieves this objective by permitting a climb-through or descend-through maneuver between properly equipped aircraft, using a new distance-based longitudinal separation minimum during the maneuver.

ASSAP equipment authorised under this ETSO must contain or support an interface to an ADS-B receiver. If the receiver is embedded in the equipment, it must meet ETSO-C154c, Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B) Equipment Operating on Frequency of 978 MHz or ETSO-C166b, Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Service - Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz). If the receiver is not embedded, the installation manual must have a requirement to interface to an ETSO-C154c or ETSO-C166b approved ADS-B receiver.

If intended for installation on aircraft with traffic advisory system (TAS) or traffic alert and collision avoidance system (TCAS) equipment, ASSAP equipment authorised under this ETSO must contain or support an interface to equipment complying with ETSO-C147(), Traffic Advisory System (TAS) Airborne Equipment, ETSO-C118(), Traffic Alert and Collision Avoidance System (TCAS) Airborne Equipment, TCAS I, or ETSO-C119(), Airborne Collision Avoidance System II (ACAS II). If the ASSAP
equipment does not support this functionality, the installation manual must prohibit installation on an aircraft equipped with TAS or TCAS.

Class A and B equipment authorised under this ETSO must comply with ETSO-C165a Electronic Map Systems For Graphical Depiction Of Aircraft Position when implementing surface applications. This ETSO shall take precedence where it differs from ETSO-C165a. Databases used to support moving maps integrated with the SURF application must meet at least 5 meter accuracy and 1 meter resolution. Databases used to support moving maps integrated with the SURF application must meet EUROCAE ED-76/RTCA DO-200A Data Process Assurance Level 2 for state-provided data with essential integrity as defined in RTCA DO-272B.

Equipment authorised under this TSO may include or interface with airborne multipurpose electronic display equipment complying with ETSO-C113 a.

Equipment authorised under this ETSO must contain or support an interface to position sources that meet one of the following ETSOs: ETSO-C129(), ETSO-C145(), ETSO-C146(), ETSO-C196() or equivalent.

3.1.2 - Environmental Standard
See CS-ETSO Subpart A paragraph 2.1. The system performance to be demonstrated during the environmental testing is defined in EUROCAE ED-194A/RTCADO-317 section 2.4.
Explosion testing in accordance with EUROCAE ED-14( )/RTCA DO-160( ) section 9 is considered optional.
Electrostatic discharge testing in accordance with EUROCAE ED-14( )/RTCA DO-160( ) Section 25 is required for all equipment having control elements and are expected to be touched during operation.

3.1.3 – Computer Software
See CS-ETSO Subpart A paragraph 2.2.

3.1.4 - Electronic Hardware Qualification
See CS-ETSO Subpart A paragraph 2.3.

3.2 - Specific

3.2.1 Failure Condition Classification
See CS-ETSO Subpart A paragraph 2.4.

Failure of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a major failure condition for malfunctions causing the display of hazardously misleading information in airborne aircraft and aircraft on the ground greater than 80 knots. Failure of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a minor failure condition for malfunctions causing the display of hazardously misleading information in aircraft on the ground less than 80 knots groundspeed. Loss of function has been determined to be a minor failure condition.

4 - Marking

4.1 - General
Marking as 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.
APPENDIX 1.

Amendment to ED-194A/DO-317B

A2.1 - Introduction
This Appendix amends ED-194A/DO-317B to address specific issues raised since publication of the document.

A2.2 - TCAS II Integration with TSAA
TCAS integration is addressed in ED-194A/DO-317B section 2.2.4.5.3.3, titled ‘TSAA Traffic Caution alerts on Correlated TCAS Tracks’. Replace the current section 2.2.4.5.3.3 with the following text:
The TSAA application may be integrated with TCAS I, TCAS II, or TAS systems.
If an ADS-B/ADS-R/TIS-B track is correlated with a TCAS track, then the alerts shall (2223) only be presented from either the TSAA application or the TCAS system (i.e., not both).
If TSAA and TCAS II are installed on the same aircraft, TCAS II resolution advisories (RAs) shall (####) have priority over all other alerts.
If TSAA and TCAS II are installed on the same aircraft, TCAS II traffic advisories (TAs) shall (####) be generated for the TCAS tracks by the TCAS II TA function. TSAA may generate traffic alerts for ADS-B only traffic not correlated with a TCAS track.
TSAA alerts should take precedence over TCAS I or TAS traffic alerts (TAs) when the TCAS track is correlated with an ADS-B or ADS-R track; but, TCAS traffic alerts should take precedence over TSAA alerts when the TCAS track is correlated with a TIS-B track.

A2.3 - TCAS Validation of ITP Traffic
TCAS validation of ITP traffic is addressed in ED-194A/DO-317B section 2.2.4.4.2.1, titled ‘Validation of Traffic Position with TCAS Data’. Add the following text to the end of the second paragraph.
ASSAP is not required to support ADS-R or TIS-B traffic for use with the ITP application.

A.2.4 - TCAS Validation of CAVS Traffic
TCAS validation of CAVS traffic is addressed in ED-194A/DO-317B section 2.2.4.6.2.1, titled ‘Validation of Traffic Position with TCAS Data’. Remove all instances of the text ‘/ADS-R’ from this section and add the following text to the end of the second paragraph.
ASSAP is not required to support ADS-R or TIS-B traffic for use with the CAVS application.
European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: Low-Frequency Underwater Locating Devices (Acoustic) (Self-Powered)

1 — Applicability
This ETSO gives the requirements which Low-Frequency Underwater Locating Devices (Acoustic) (Self-Powered) that are designed and 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

3.1.2 — Environmental standard
See CS-ETSO, Subpart A, paragraph 2.1.

3.1.3 — Software
See CS-ETSO, Subpart A, paragraph 2.2.

3.1.4 — Airborne electronic hardware
See CS-ETSO, Subpart A, paragraph 2.3.

3.2 — Specific
The battery used in the ULD authorised under this ETSO must meet the minimum performance standard found in the applicable battery ETSO such as ETSO-C142a, Non-Rechargeable Lithium Cells and Batteries for ULD powered by Lithium primary batteries. Lithium powered ULD must also meet the requirements in Appendix 1 of this ETSO in addition to its battery meeting ETSO-C142a.

3.2.1 Failure condition classification
Failure or loss of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a minor failure condition.

4 — Marking

4.1 — General
Marking as 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.
APPENDIX 1.

Lithium Battery Containment Requirements

The Airframe Low Frequency ULD must provide the containment of any hazardous products of the failure of its internal lithium battery without additional external containment devices other than the mounting bracket. Include the following note in the installation instructions and in the DDP.

Note: The ULD is intended to be mounted to the structure of the aircraft and provide a locating signal after a crash in water. Placing the ULD inside a containment vessel will prevent it from performing its intended function of transmitting low frequency ultrasonic pulses to aid the location of the mishap aircraft.

Sections 1.5, 1.6, 1.7 and 2 of RTCA/DO-347, Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Batteries and Battery Systems, dated December 18, 2013, provide safety, design and qualification requirements and guidelines pertinent to designing safe batteries meeting CS-23, CS-25, CS-27 and CS-29 requirements and additional Special Conditions (SC) required for installation for the low frequency ULD on aircraft. Consider each of these requirements and guidelines when designing cells and batteries.

The requirements below include tests from RTCA/DO-347. Although written for rechargeable lithium batteries, EASA and the FAA consider these tests appropriate for demonstrating that non-rechargeable lithium batteries meet the SCs where indicated below. When conducting these tests and the test method states ‘charge the battery in accordance with the manufacturer’s instructions’, use a battery with a 100% state of charge instead.

1) Lithium Primary Batteries used in Airframe Low Frequency ULD must independently:
   a. Meet the requirements in ETSO-C142a, Non-rechargeable Lithium Cells and Batteries, including the tests in Appendix 1, Table 2, and
   b. Pass the following tests in RTCA/DO-347, Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Batteries and Battery Systems, dated December 18, 2013, as follows:
      (1) Section 2.3.7 Short-circuit Test of a Cell
      (2) Section 2.3.9 Short-circuit Test with Protection Disabled (required only for multi-cell batteries)
      (3) Section 2.3.10 Insulation Resistance Test

Note: EASA published a proposed special condition on ‘Non-rechargeable Lithium Battery Installations’ requiring each individual cell within a battery be designed to maintain safe temperatures and pressures (SC1). The SC 2 addresses these same issues but at the battery level. SC 2 requires the battery to be designed to prevent propagation of a thermal event (i.e., self-sustained, uncontrolled increases in temperature or pressure) from one cell to adjacent cells.

2) The Airframe Low Frequency ULD with a primary lithium battery by itself or installed in its mounting bracket must pass the Section 2.3.15 Thermal Runaway Containment Test in RTCA/DO-347, Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Batteries and Battery Systems, dated December 18, 2013. Do not compromise the integrity of the ULD to instrument or trigger the internal battery. Induce thermal runaway with either a. or b. below then complete c.

---

a. Perform step e. of test method RTCA/DO-347 2.3.15.1 in lieu of RTCA/DO-347 2.3.15.1 steps c. and d. Step b is not required to complete step e. Apply the heating element to the exterior of the Airframe Low Frequency ULD or heat the ULD in a test chamber for this test to maintain the integrity of the item under test. Use of a test chamber heated to just above the triggering temperature will facilitate more accurate measurements of the ULD case temperature during the runaway.

b. Alternate method to induce a thermal runaway

In a cell closest to the center of the battery:

(1) Connect the terminals of a single electrically isolated cell to a power supply set to a constant voltage of at least 1.5 times the rated nominal cell voltage and charge with a current limit of I1 (or Imax if less than I1) of a single cell (+/- 50mA).

(2) Monitor the battery voltage during charge and terminate the charge when the peak voltage is reached.

(3) Subject the cell to a direct short circuit of less than 5 mOhm.

(4) Install the battery into the ULD (and bracket, as necessary) prior to the onset of Thermal Runaway.

(5) Monitor and record the battery voltage and current, the ULD case temperature, the ULD bracket temperature and continue with RTCA/DO-347 2.3.15.2 step g.

c. For RTCA/DO-347 2.3.15.1 steps g. and h., monitor and record the test chamber temperature and the external temperature of the ULD. Verify post-test that the battery did in fact experience thermal runaway by observing the ULD contained decomposition products akin to those obtained from conducting this test on a bare battery.

3) The ULD or the ULD in its mounting bracket must contain all non-gaseous products of 2 above. O-ring residue is acceptable. If any gasses are emitted, they must be emitted through a consistent, repeatable location such as around the closure threads or through a venting port.

Note 1: SC 3 of the proposed special condition on ‘Non-rechargeable Lithium Battery Installations’ does allow explosive and toxic gases to be uncontained and not vented overboard if they do not accumulate in hazardous quantities.

Note 2: EASA and the FAA may impose additional special condition requirements for installation. Installers may use ETSO test data, including the battery containment test data as part of the certification package in showing compliance with an EASA or FAA installation special condition.

4) The applicant shall document and make available to EASA and to the installer:

a. The test results to include the nature and volume of any gasses emitted, maximum case temperature during a thermal runaway, and whether or not the mounting bracket was required to attain containment.

b. If venting occurs, the venting location so that installers may design and fabricate appropriate venting systems that will not interfere with the intended function of the ULD as described in the Note at the beginning of this Appendix.

c. If the applicant choses to incorporate a venting port in the ULD and/or ULD mounting bracket, the interface in the installation instructions or drawing.

5) Develop a means to prevent inadvertent opening of ULDs with failed batteries that may be under internal pressure. This may include voltage or external temperature checks prior to opening the device. The applicant shall include any appropriate cautions and warnings and document them in the installation and maintenance instructions.
European Aviation Safety Agency

European Technical Standard Order

Subject: Fire Containment Covers (FCC)

1 - Applicability
This ETSO gives the requirements which fire containment covers (FCC) that are designed and 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 SAE International AS6453, Fire Containment Cover-Design, Performance, and Testing Requirements, August 2013, as amended by Appendix 1 of this ETSO.

3.1.2 - Environmental Standard
The required performance under the test conditions specified in SAE AS6453 Section 4.6 and Sections 6.1.2 through 6.1.5 as modified in the appendix of this TSO shall be demonstrated.

3.1.3 - Computer Software
None.

3.1.4 - Electronic Hardware Qualification
None.

3.2 - Specific

3.2.1 - Failure Condition Classification
N/A

4 - Marking
4.1 - General
Marking as detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific
Each fire containment cover conforming to this Standard shall bear at least the following markings near the bottom edges on the two opposite long sides:
  — ‘FIRE CONTAINMENT COVER’, in bold characters at least 150 mm (6 in) high,
  — Substantiated protection time (e.g. ‘Minimum protection duration 6 hours’),
  — The IATA ULD ID (size) codes for the pallets and nets with which the FCC can be used.
  — Expiration date in the format ‘EXP YYYY-MM’.
In addition each fire containment cover conforming to this Standard shall bear the markings identified in SAE AS6453 Section 7.3 and Section7.4 as amended in Appendix 1 of this ETSO.

5 - Availability of Referenced Document
See CS-ETSO Subpart A paragraph 3.
APPENDIX 1.

MINIMUM PERFORMANCE STANDARD (MPS) FOR FIRE CONTAINMENT COVERS

This Appendix prescribes the MPS for Fire Containment Covers. The applicable standard is SAE International AS6453, Fire Containment Cover – Design, Performance, and Testing Requirements dated August 2013 and modified as follows:

<table>
<thead>
<tr>
<th>AS6453 Section</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 – 1.2</td>
<td>Disregard</td>
</tr>
<tr>
<td>1.4</td>
<td>Disregard</td>
</tr>
<tr>
<td>1.7</td>
<td>Disregard</td>
</tr>
<tr>
<td>2</td>
<td>Disregard references to Japanese Airworthiness Standard Part 3 and Civil Aviation Agency of China Regulations CAAC CCAR-25 and CTSO C90</td>
</tr>
<tr>
<td>3.2</td>
<td>Disregard second sentence</td>
</tr>
<tr>
<td>4.1</td>
<td>Disregard</td>
</tr>
<tr>
<td>4.2.1</td>
<td>Disregard Note 4 and Note 6</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Add to the end of the sentence “which is sufficiently flexible to allow the FCC to collapse with the fire load”</td>
</tr>
<tr>
<td>4.3.3 – 4.3.6</td>
<td>Disregard</td>
</tr>
<tr>
<td>4.4</td>
<td>Disregard</td>
</tr>
<tr>
<td>4.5.3</td>
<td>Disregard</td>
</tr>
<tr>
<td>4.5.4</td>
<td>Disregard</td>
</tr>
<tr>
<td>4.5.6 – 4.5.8</td>
<td>Disregard</td>
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<tr>
<td>4.6.5</td>
<td>Disregard the phrase ‘as part of the required traceability code (see 7.2)’</td>
</tr>
<tr>
<td>4.6.7</td>
<td>Disregard</td>
</tr>
<tr>
<td>4.7</td>
<td>Disregard</td>
</tr>
<tr>
<td>5.1.1</td>
<td>Add ‘seams and corners’ after ‘The fire container cover’s material’</td>
</tr>
<tr>
<td>5.1.1</td>
<td>Disregard references to CCAR-25 and JAS Part 3</td>
</tr>
<tr>
<td>5.1.2</td>
<td>Disregard</td>
</tr>
<tr>
<td>5.1.3</td>
<td>Disregard</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Disregard references to CCAR-25 and JAS Part 3</td>
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<tr>
<td>5.2.4</td>
<td>Disregard</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Disregard second sentence</td>
</tr>
<tr>
<td>5.3</td>
<td>Disregard</td>
</tr>
<tr>
<td>6.1.1.1</td>
<td>Disregard references to CCAR-25 and JAS Part 3</td>
</tr>
<tr>
<td>6.1.1.2.b</td>
<td>Disregard references to CCAR-25 and JAS Part 3</td>
</tr>
<tr>
<td>6.1.1.5</td>
<td>Add the following sentence to the end of this section ‘The FAA Aircraft Materials Fire Test Handbook includes an allowance for a brief ignition on the upper surface of the test specimen as long as the 400 degree F requirement is not exceeded.’</td>
</tr>
<tr>
<td>AS6453 Section</td>
<td>Action</td>
</tr>
<tr>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>6.1.1.6 – 6.1.1.7</td>
<td>Disregard</td>
</tr>
<tr>
<td>6.1.6</td>
<td>Disregard</td>
</tr>
<tr>
<td>6.2.1</td>
<td>Replace the words in the end of the second sentence ‘paragraph 4.3.2 of the US DOT/FAA/AR-TN05/20 document (see reference [16] in Bibliography).’ with the following, ‘the bulk load fire scenario section of report US DOT/FAA/TC-TN12/11.’</td>
</tr>
</tbody>
</table>
European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: Aeronautical Mobile Airport Communication System (AeroMACS)

1 — Applicability
This ETSO gives the requirements which Aeronautical Mobile Airport Communication System (AeroMACS) that are designed and 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 EUROCAE ED-223, minimum operational performance standard (MOPS) for aeronautical mobile airport communication system (AeroMACS), dated October 2013. Note: AeroMACS provides data link communication services over spectrum reserved for aeronautical mobile route services (AMRS). This includes aeronautical operational control (AOC) and non-safety of flight airline administrative communication (AAC) via data link while on the airport surface only. Air traffic services (ATS) are excluded from this ETSO. AeroMACS is considered supplemental equipment to communication equipment required by the operating rules. AeroMACS is based on the Institute of Electrical and Electronics Engineers 802.16-2009 standard: Air interface for broadband wireless access systems and can only operate on the airport surface.

3.1.2 — Environmental standard
See CS-ETSO, Subpart A, paragraph 2.1.

3.1.3 — Software
See CS-ETSO, Subpart A, paragraph 2.2.

3.1.4 — Airborne electronic hardware
See CS-ETSO, Subpart A, paragraph 2.3.
3.2 — Specific
None.

3.2.1 Failure condition classification
See CS-ETSO, Subpart A, paragraph 2.4.
Failure of the function defined in paragraph 3.1.1 of this ETSO resulting in misleading data link communication is a minor failure condition. Loss of this function is a minor failure condition.

4 — Marking
4.1 — General
Marking as 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.
European Aviation Safety Agency

European Technical Standard Order

Subject: Portable Water-Solution Type Hand Fire Extinguishers

1 — Applicability
This ETSO gives the requirements which new models of portable water-solution type hand fire extinguishers that are designed and 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 SAE Aerospace Standard document: AS245A AS-245B, 'Water Solution Type Hand Fire Extinguisher', dated November 1, 1948, revised December 15, 1956 and supplemented by this ETSO (revised) April 2004, as modified in Appendix 1 of this ETSO.

3.1.2 — Environmental Standard
See CS-ETSO Subpart A paragraph 2.1

3.1.3 — Computer Software
None.

3.2 — Specific
none

4 — Marking

4.1 — General
Marking is detailed in CS-ETSO Subpart A paragraph 1.2.
Instead of optional serial number the date of manufacture has to be marked.
4.2 — Specific
As specified in the SAE Aerospace Standard document AS245A AS245B paragraph 3.2.

5 — Availability of Referenced Document
See CS-ETSO Subpart A paragraph 3
APPENDIX 1.

MPS FOR PORTABLE WATER SOLUTION TYPE HAND FIRE EXTINGUISHERS

The applicable standard is SAE AS245B, Water Solution Type Hand Fire Extinguisher, dated (revised) April 2004 shall be modified as follows:

<table>
<thead>
<tr>
<th>AS245B section</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paragraph 4.1.2: Burst</td>
<td>to be revised as follows:</td>
</tr>
<tr>
<td>pressure</td>
<td>Burst pressure must be equal or greater than ‘b’ times Design pressure (see table 1 below). Design pressure is compatible with maximum pressure encountered in use of extinguisher and ensures a long service of equipment when charged.</td>
</tr>
<tr>
<td>Paragraph 5. Individual</td>
<td>to be revised as follows:</td>
</tr>
<tr>
<td>Performance Requirements:</td>
<td>All extinguishers, or extinguisher components shall be subject at a minimum to the following tests:</td>
</tr>
<tr>
<td></td>
<td>Requirement to be added:</td>
</tr>
<tr>
<td></td>
<td>proof pressure must be equal or greater than ‘p’ times Design pressure (see table 1 below).</td>
</tr>
</tbody>
</table>

Table 1:
‘b’ and ‘p’ factors indicated depend on extinguisher type

<table>
<thead>
<tr>
<th></th>
<th>b</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>2.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Type II</td>
<td>2.4</td>
<td>1.2</td>
</tr>
</tbody>
</table>