Number：CTSO-C126b
Date of approval：June 12, 2015
Approved by：Yang Zhenmei

China Civil Aviation Technical Standard Order

This China Civil Aviation Technical Standard Order (CTSO) is issued according to Part 37 of the China Civil Aviation Regulations (CCAR-37). Each CTSO is a criterion which the concerned aeronautical materials, parts or appliances used on civil aircraft must comply with when it is presented for airworthiness certification.

406 MHz Emergency Locator Transmitter (ELT)

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for a 406 MHz emergency locator transmitter (ELT) CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards(MPS) that 406 MHz ELT must first meet for approval and identification with the applicable CTSO marking.

2. Applicability.

This CTSO affects new application submitted after its effective date. Major design changes to article approved under this CTSO will require a new authorization in accordance with section 21.310 of CCAR-21R3.

3. Requirements.

New models of 406 MHz ELT identified and manufactured on or after the effective date of this CTSO must meet the MPS qualification and documentation requirements in RTCA Inc. document, RTCA/DO-204A,

Minimum Operational Performance Standards (MOPS) for 406 MHz Emergency Locator Transmitters (ELTs), dated December 6, 2007, sections 2.2 and 2.4. The 406 MHz ELT must include a 121.5 MHz homing beacon. It is required that the applicant obtain a Cospas-Sarsat type approval certificate before applying for this CTSO. Additionally, the use of hook and loop fasteners is not an acceptable means of attachment in complying with the Crash Safety requirements of section 2.2.5 of RTCA/DO-204A for automatic fixed (AF) and automatic portable (AP) ELTs.

a. Functionality. This CTSO's standards apply to equipment intended to locate aircraft that terminate flight as a result of an accident.

b. Failure Condition Classifications.

(1) Failure of the function defined in paragraph 3.a resulting in signal outputs not meeting the requirements in paragraph 3 is a minor failure condition.

(2) Loss of the function defined in paragraph 3.a is a minor failure condition.

(3) Design the system to at least the design assurance level equal to these failure condition classifications.

c. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-204A, Section 2.6. The shock and crash safety tests in RTCA/DO-204A sections

2.3.4.1 and 2.6.3.2 require testing coincident with each orthogonal axes individually. Additionally, to better simulate more realistic aircraft crash scenarios, it is recommended that shock and crash safety testing be accomplished with simultaneous longitudinal and vertical cross-axis forces.

d. Environmental Qualification. Demonstrate the required performance under the test conditions specified in RTCA/DO-204A, sections 2.3 and 2.5 using standard environmental conditions and test procedures appropriate for airborne equipment. RTCA/DO-204A requires the use of RTCA/DO-160E(dated December 9, 2004); however, the applicant may use a different standard environmental condition and test procedure than RTCA/DO-160E, provided the standard is appropriate for the 406 MHz ELT.

Note: The use of RTCA/DO-160D (with Changes 1 and 2 only, incorporated) or earlier versions is generally not considered appropriate and will require substantiation via the deviation process as discussed in paragraph 3.g of this CTSO.

e. Software Qualification. If the article includes software, develop the software according to RTCA/DO-178B, Software Considerations in Airborne Systems and Equipment Certification, dated December 1, 1992 to at least the software level consistent with the failure condition classification defined in paragraph 3.b of this CTSO.

Note: The certification liaison process objectives will be considered satisfied after CAAC review of the applicable life cycle data.

f. Batteries. ELT manufacturers must specify half-life and battery replacement intervals. See also Appendix 1 of this CTSO.

g. Deviations. For using alternative or equivalent means of compliance to the criteria in this CTSO, the applicant must show that the equipment maintains an equivalent level of safety. Apply for a deviation under the provision of 21.310(b) in CCAR-21R3.

4. Marking.

a. Mark at least one major component permanently and legibly with all the information in 21.312(d) of CCAR-21R3. The marking must include the serial number.

b. Also, mark the following permanently and legibly, with at least the manufacturer’s name, subassembly part number, and the CTSO number:

(1) Each component that is easily removable (without hand tools); and,

(2) Each subassembly of the article that manufacturer determined may be interchangeable.

c. If the article includes software and/or airborne electronic hardware, then the article part numbering scheme must identify the software and airborne electronic hardware configuration. The part numbering scheme

can use separate, unique part numbers for software, hardware, and airborne electronic hardware.

d. Electronic part marking may be used to identify software or airborne electronic hardware components by embedding the identification within the hardware component itself (using software) rather than marking it on the equipment nameplate. If electronic marking is used, it must be readily accessible without the use of special tools or equipment.

5. Application Data Requirements.

The applicant must furnish the responsible certification personnel with the related data to support design and production approval. The application data include a statement of conformance as specified in section 21.310(c)(3) in CCAR-21R3 and one copy each of the following technical data:

A Manual(s) containing the following:

(1)Operating instructions and equipment limitations sufficient to describe the equipment’s operational capability.

(2)Describe in detail any deviations.

(3)Installation procedures and limitations sufficient to ensure that the 406 MHz ELT, when installed according to the installation or operational procedures, still meets this CTSO’s requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statements:

“This article meets the minimum performance and quality control standards required by a CTSO. Installation of this article requires separate approval.”

(4)For each unique configuration of software and airborne electronic hardware, reference the following:

(i)Software part number including revision and design assurance level;

(ii)Airborne electronic hardware part number including revision and design assurance level; and,

(iii)Functional description.

(5) A summary of the test conditions used for environmental qualifications for each component of the article. For example, a form as described in RTCA/DO-160E, Environmental Conditions and Test Procedures for Airborne Equipment, Appendix A.

(6) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of the 406 MHz ELT.

(7) List of replaceable components, by part number, that makes up the 406 MHz ELT. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair, for the continued airworthiness of 406 MHz ELT. Include recommended inspection intervals and service life, as appropriate.

c. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary.

d. A drawing depicting how the article will be marked with the information required by paragraph 4 of this CTSO.

e. Identify functionality or performance contained in the article not evaluated under paragraph 3 of this CTSO (that is, non-CTSO functions). Non-CTSO functions are accepted in parallel with the CTSO authorization. For those non-CTSO functions to be accepted, the applicant must declare these functions and include the following information with CTSO application:

(1) Description of the non-CTSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-CTSO function(s) don’t interfere with the article’s compliance with the requirements of paragraph 3.

(2) Installation procedures and limitations sufficient to ensure that the non-CTSO function(s) meets the declared functions and performance specification(s) described in paragraph 5.e.(1).

(3) Instructions for continued performance applicable to the non-CTSO function(s) described in paragraph 5.e.(1).

(4) Interface requirements and applicable installation test procedures

to ensure compliance with the performance data defined in paragraph 5.e.(1).

(5) Test plans, analysis and results, as appropriate, to verify that performance of the hosting CTSO article is not affected by the non-CTSO function(s).

(6)Test plans, analysis and results, as appropriate, to verify the function and performance of the non-CTSO function(s) as described in paragraph 5.e.(1).

f. The quality system description required by section 21.143 and 21.310(c)(2) of CCAR-21R3, including functional test specifications. The quality system should ensure that it will detect any change to the approved design that could adversely affect compliance with the CTSO MPS, and reject the article accordingly

g. Material and process specifications list.

h. List of all drawings and processes (including revision level) that define the article’s design.

i. Manufacturer’s CTSO qualification report showing results of testing accomplished according to paragraph 3.c of this CTSO.

j. Cospas-Sarsat type approval certificate.

6. Manufacturer Data Requirements.

Besides the data given directly to the authorities, have the following technical data available for review by the authorities:

a. Functional qualification specifications for qualifying each production article to ensure compliance with this CTSO.

b. Article calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph 3.d of this CTSO.

g. If the article includes software, the appropriate documentation defined in RTCA/DO-178B including all data supporting the applicable objectives in RTCA/DO-178B Annex A, Process Objectives and Outputs by Software Level.

h. If the article contains non-CTSO function(s), the applicant must also make available items 6.a through 6.g as they pertain to the non-CTSO function(s).

7. Furnished Data Requirements.

a. If furnishing one or more articles manufactured under this CTSO to one entity (such as an operator or repair station), provide one copy or on-line access to the data in paragraphs 5.a and 5.b of this CTSO. Add any other data needed for the proper installation, certification, use, or for continued compliance with the CTSO, of the 406 MHz ELT.

b. If the article contains declared non-CTSO function(s), include one

copy of the data in paragraphs 5.e.(1) through 5.e.(4).

8. Availability of Referenced Documents.

a. Order SAE documents from:

Society of Automotive Engineers, Inc.

400 Commonwealth Drive, WARRENDALE, PA 15096-001, USA.

You may also order them online from www.sae.org.

b. Order RTCA documents from:

Radio Technical Commission for Aeronautics, Inc.

1150 18th Street NW, Suite 910, Washington D.C. 20036.

You may also order them online from www.rtca.org.

Appendix 1. Battery Standards Requirements

1.The battery used in the 406 MHz ELT authorized under this CTSO must be appropriate for the intended operational environment, not pose a hazard to the aircraft, meet the requirements of acceptable battery standards and be approved by the Administrator.

a. If use nickel-cadmium or lead acid batteries, the battery must comply with CTSO-C173a, Nickel-Cadmium and Lead-Acid Batteries.

b. If use rechargeable lithium cells and lithium batteries, the battery must comply with CTSO-C179a, Permanently Installed Rechargeable Lithium Cells, Batteries and Battery Systems.

c. If use non-rechargeable lithium cells and batteries, the battery must comply with CTSO-C142a, Non-Rechargeable Lithium Cells and Batteries, for guidance.

d. If use a battery with a different chemistry, use an appropriate battery standard and identify that standard in CTSOA application or in a notification of a change in design.

2. See RTCA/DO-188, Emergency Locator Transmitter (ELT) Batteries Guidance and Recommendations, for guidance and recommendations to solve ELT battery problems.