



Number: CTSO-C179a
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.

Permanently Installed Rechargeable Lithium Cells, Batteries and Battery Systems

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers of permanently installed rechargeable lithium cells, batteries and battery systems applying for a CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards(MPS) that permanently installed rechargeable lithium cells, batteries and battery systems 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 permanently installed rechargeable lithium cells, batteries and battery systems 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-311 Minimum Operational Performance Standards (MOPS) for Rechargeable Lithium Battery Systems, dated March 13, 2008, sections 2.0 and 3.0. Refer to Table 4-1 of DO-311 for test schedule information.

a. **Functionality.** This CTSO's standards apply to permanently installed rechargeable lithium cells, batteries and lithium battery systems intended to provide power for aircraft equipment.

b. **Failure Condition Classification.** Failure of the function defined in paragraphs 3 and 3.a of this CTSO is a major failure condition. Develop lithium cells, batteries and battery systems to, at least, the design assurance level equal to this failure condition classification.

c. **Functional Qualification.** Demonstrate the required performance under the acceptance test procedure in section 2.3 of RTCA/DO-311, Minimum Operational Performance Standards (MOPS) for Rechargeable Lithium Battery Systems, dated March 13, 2008.

d. **Environmental Qualification.** Test the equipment according to Section 3 of RTCA/DO-311, Minimum Operational Performance Standards (MOPS) for Rechargeable Lithium Battery Systems, dated

March 13, 2008.

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

f. Electronic Hardware Qualification. If the article includes a complex custom micro-coded component, develop the component to the RTCA/DO-254, Design Assurance Guidance for Airborne Electronic Hardware, dated April 19, 2000. The hardware design assurance level should be consistent with the failure condition classification determined in paragraph 3.b 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.

Mark each cell battery or battery system permanently and legibly with all the information in 21.312(d) of CCAR-21R3 and RTCA/DO-311, Section 1.9.7.

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. Operating instructions and equipment limitations, sufficient to describe the cell or battery's operational capability. Describe any deviations in detail. If needed, identify the cell or battery by part number, version, revision, and criticality level of software/hardware, classification for use, and environmental categories.

b. Installation procedures and limitations, sufficient to ensure that the cells, batteries or battery systems, when installed according to the installation procedures, still meet this CTSO's requirements. The limitations must identify any unique aspects of the installation. Finally, the limitations must include a note with the following statement:

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

c. Schematic drawings of the installation procedures.

d. Wiring diagrams of the installation procedures.

e. List of components, by part number, that make up the lithium cells, batteries and battery systems complying with the standards in this CTSO.

Include vendor part number cross-references, when applicable.

f. A component maintenance manual (CMM), covering periodic maintenance, calibration, and repair, for the continued airworthiness of installed lithium cells, batteries and battery systems. Include recommended inspection intervals and service life. Describe the details of deviations granted, as noted in paragraph 5.a of this CTSO.

g. Material and process specifications list.

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

i. Manufacturer's CTSO qualification test report.

j. Nameplate drawing with the information required by paragraph 4 of this CTSO.

k. A list of all drawings and processes (including revision level), to define the article's design.

l. 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-160F, Environmental Conditions and Test Procedures for Airborne Equipment, Appendix A.

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. Equipment calibration procedures.
- c. Corrective maintenance procedures within 12 months after CTSO authorization.
- d. Schematic drawings.
- e. Wiring diagrams.
- f. Material and process specifications.
- g. The results of the environmental qualification tests conducted per RTCA/DO-160F or the most current revision.

7. Furnished Data Requirements.

If furnishing one or more articles manufactured under this CTSO to one entity (such as an operator or repair station), provide one copy of the data in paragraphs 5.a through 5.g of this CTSO for each article manufactured under this CTSO.

8. Availability of Referenced Documents.

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.