



Technical Standard Order

PROPOSED

Subject: **NICKEL-CADMIUM AND LEAD-ACID BATTERIES**

1. **PURPOSE.** This Technical Standard Order (TSO) is for manufacturers of permanently installed rechargeable nickel-cadmium and lead-acid batteries. In it, we (the Federal Aviation Administration, or FAA) prescribe minimum performance standards (MPS) that nickel-cadmium and lead acid batteries must meet if you apply for a TSO authorization or letter of design approval.

2. **APPLICABILITY.** This TSO's standards apply to rechargeable nickel-cadmium and lead-acid batteries for which an application for authorization is submitted after this TSO's effective date.

3. **REQUIREMENTS.** New batteries identified and manufactured on or after the TSO effective date must meet the standards in RTCA/DO-293, "Minimum Operational Performance Standards (MPS) for Nickel-Cadmium and Lead-Acid Batteries," dated July 29, 2004.

a. Functionality. This TSO's standards apply to permanently installed, rechargeable nickel-cadmium and lead-acid batteries intended to supply power for aircraft equipment, including emergency and standby systems, and engine or APU starting when required.

b. Environmental Qualification. Test nickel-cadmium and lead-acid batteries to the conditions specified in RTCA/DO-160E, "Environmental Conditions and Test Procedures for Airborne Equipment," dated December 9, 2004, or RTCA/DO-293. The test conditions in RTCA/DO-160E take precedence over RTCA/DO-293.

c. Deviations. We have provisions for using alternate or equivalent means of compliance to the MPS of this TSO. If you invoke these provisions, you must show that your batteries maintain an equivalent level of safety. Apply for a deviation under Title 14 Code of Federal Regulations (CFR) §21.609.

4. **MARKING.** Mark each nickel-cadmium and lead acid battery permanently and legibly with all the information in 14 CFR §21.609 (d) and RTCA/DO-293, Section 1.10.

5. **APPLICATION DATA REQUIREMENTS.** Under 14 CFR § 21.605 (a), if you are a manufacturer-applicant, you must give the FAA Aircraft Certification Office (ACO) manager

responsible for your facilities, one copy each of the following technical data to support our design and production approval:

- a. Operating instructions and battery limitations, sufficient to describe the operational capability of the battery in accordance with RTCA/DO-293, paragraph 1.13.3.
- b. Installation procedures and limitations, sufficient to ensure that the battery, when installed in accordance with the installation procedures, still meets the TSO's requirements. The limitations must include a note with the following statement:

The conditions and tests for this TSO approval of this battery are minimum performance standards. Those installing this battery, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only according to part 43 or the applicable airworthiness requirements. Nickel-cadmium and lead-acid battery safety concerns include the possibility of fire, and venting violently.

- c. Schematic drawings of the installation procedures.
- d. Wiring diagrams of the installation procedures.
- e. Specifications.
- f. List of components by part number.
- g. Instructions for periodic maintenance and calibration necessary for continued airworthiness once the equipment is installed per RTCA/DO-293, paragraph 1.15.
- h. An environmental qualification form describing the environmental tests conducted in accordance with RTCA/DO-160E, or RTCA/DO-293.
- i. Manufacturer's TSO qualification test report.
- j. Nameplate drawing with information required by paragraph 4 of this TSO.
- k. A list of all drawings and processes, (including revision level) to define the article's design.

6. MANUFACTURER DATA REQUIREMENTS. Besides the data given directly to the FAA, a manufacturer must have the following technical data available for review by the responsible ACO:

- a. The functional qualification specifications for qualifying each production article to ensure compliance with this TSO.
- b. Equipment calibration procedures.

- c. Corrective maintenance procedures within 12 months after TSO authorization.
- d. Schematic drawings.
- e. Wiring diagrams.
- f. The results of qualification tests conducted in accordance with RTCA/DO-293.

7. FURNISHED DATA REQUIREMENTS. Send one copy of the data and information specified in paragraphs **5a** through **k** to each person receiving one or more batteries manufactured under this TSO.

8. HOW TO GET REFERENCE DOCUMENTS.

a. Buy copies of RTCA Document Nos. DO-160E and DO-293 from RTCA Inc., 1140 Connecticut Avenue NW, Suite 1020, Washington D.C. 20036-4001, or online at: <http://www.rtca.org>.

b. Copies of Title 14 CFR part 21, Subpart O, may be purchased from: Superintendent of Documents, Government Printing Office, Washington DC 20402-9325.

c. Order (free of charge) FAA advisory circular (AC) 20-110 (current revision), "Index of Aviation Technical Standard Orders," from: U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover MD 20785.

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