U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy

ORDER
8150.4

Effective Date:
8/29/07

SUBJ: Certification of Cargo Containers With Self-Contained Temperature Control Systems (Active ULDs)

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1. Purpose of this Order. This order will show you how to approve cargo containers that have a self-contained temperature control system for the container contents. We call cargo containers "unit load devices," or ULDs. Cargo containers with self-contained temperature control systems are called active ULDs.

2. Audience. Federal Aviation Agency (FAA) aircraft certification office (ACO) staffs.

3. Where Can I find this Order. You can find this order in the FAA Directive Management System at MyFAA employees website: https://employees.faa.gov/tools_resources/orders_notices/ or on the Regulatory and Guidance Library (RGL) website: http://rgl.faa.gov.

4. Deviations. Follow this order when approving active ULDs. If you want to deviate from this order, you must coordinate with the Aircraft Engineering Division (AIR-100). We must approve the deviation. Substantiate, document, and get concurrence from your manager to deviate before submitting it to AIR-100.

5. Requirements.

a. Active ULDs must fully meet all the requirements in the latest revision of FAA technical standard order (TSO)-C90, *Cargo Pallets, Nets, and Containers.* If you're approving a TSO application for an active ULD, you must also use current FAA policy on non-TSO function(s) integrated with a TSO article to evaluate the active ULD temperature control system. Require applicants to perform a system safety assessment referring to practices in SAE ARP 4761 and furnish to the FAA a Functional Hazard Assessment (FHA) and Failure Modes and Effects Analysis (FMEA) for the active ULD (including temperature control system) according to the latest revision of advisory circular (AC) 25.1309-1, *System Design and Analysis*.

b. Data that we accept under current policy (on non-TSO functions) must address all the aspects listed in appendix 1 of this order. Identify more aspects as appropriate, based on the specific design and limitations of the active ULD. You may accept foreign applications, if there is an applicable bilateral agreement with provisions for accepting all of the following:

(1) Appliance approvals (TSO),
(2) Non-TSO functions, and
(3) Transport category aircraft design data.

Check the applicable bilateral to verify specific provision language and limitations to determine if a foreign application can be accepted.

c. Current non-TSO functions policy gives you a means for collecting data supporting the additional functions within a TSO article. When approving the TSO article (the basic ULD only), you evaluate and accept the data collected for the non-TSO function (the environmental control system). *Accepting* the data means that we consider it valid. *Approving* the data for showing compliance to the applicable requirements is done during the installation. Generally for ULDs, the applicable installation requirements are operational regulations. In this case, we approve active ULDs under Title 14 of the Code of Federal Regulations (14 CFR) § 21.305(d). The requirements in this order define a "...manner acceptable to the administrator".

d. We don't usually require an installation approval under a type certificate or supplemental type certificate (TC or STC), because ULDs are generally not part of the aircraft type design. However, if a ULD is defined in the aircraft type design, then instead of using 14 CFR § 21.305(d), we evaluate the data validated under the non-TSO functions policy for installation approval under the TC/STC process.

e. Inform applicants that air carriers wanting to use active ULDs approved to 14 CFR § 21.305(d) must consult with their FAA Certificate Management Office (CMO) on operational requirements specific to their organization.

f. Inform applicants that air carriers who offer, accept, or carry the ULD in transportation must also comply with all applicable requirements of the US Department of Transportation (DOT) Hazardous Materials Regulations, 49 CFR, parts 100-185.

g. Since active ULDs are generally not addressed in the aircraft design and certification, and there is currently no TSO that addresses all the safety aspects of active ULDs in transport category aircraft, we must apply careful scrutiny during the initial approval of the active ULD.

6. Background.

a. Historically, airlines have carried cargo in ULDs, which were containers or pallet-and-net combinations. Over the last year, ULD manufacturers have asked us to approve cargo containers that include a self-contained temperature control system for the contents--an active ULD. Active ULD temperature control systems can heat, cool, (or both) the containers to maintain a specific temperature. The temperature control systems are battery-powered, so active ULDs do not interface with any aircraft systems for power. The goal for ULD manufacturers is for airlines to use active ULDs just as they currently use ULDs without temperature control systems.

b. In general, we approve ULDs to TSO-C90, which prescribes performance standards for structural interface with the aircraft and flammability characteristics. TSO-C90 cites the Aerospace Industries Association of America's National Aerospace Standard (NAS) 3610, *Cargo Unit Load Devices—Specification For,* yet TSO-C90 (and NAS3610) lack performance standards for the temperature control systems in active ULDs, or for that system's interaction with critical aircraft systems. TSO-C90c and NAS3610 are not sufficient to fully address all certification requirements of active ULDs.

c. ULD design is generally not included in the aircraft's approved type design. ULD use is controlled by aircraft weight and balance manuals. Those manuals typically allow ULDs meeting the requirements of TSO-C90/NAS3610 but don't cover, or restrict, using active ULDs. We have been certifying transport aircraft based on the assumption that ULDs *without* temperature control systems will be carried in the cargo compartment as inert containers.

7. Distribution. Distribute this order to the division level in the Aircraft Certification Service and Flight Standards Service in Washington headquarters; to the branch level in the Aircraft Certification directorates and regional Flight Standards Service; to all aircraft certification and flight standards district offices.

8. Suggestions for Improvement. If you find any deficiencies, need clarification, or want to suggest improvements to this directive, send a copy of FAA Form 1320-19, Directive Feedback Information (written or electronically) to the Aircraft Certification Service, Planning and Financial Resources Management Branch, AIR-530, Attention: Directives Management Officer. You may also send a copy to the Aircraft Engineering Division, AIR-100, Attention: Comments to Order 8150.4. If you urgently need an interpretation, contact the Technical Programs and Continued Airworthiness Branch, AIR-120, at (202 267-9557. Always use FAA Form 1320-19 to follow up each verbal conversation.

9. Records Management. Refer to Orders 0000.1, FAA Standard Subject Classification System; 1350.14, Records Management; and 1350.15, Records, Organization, Transfer, and Destruction Standards; or your office Records Management Officer or Directives Management Officer for guidance regarding retention or disposition of records.

David W. Hempe
Manager, Aircraft Engineering Division
Aircraft Certification Service

Appendix 1. Aspects to Address

ACOs must require applicants to address the following aspects when they seek certification of active ULDs. We require ACOs to coordinate with the Transport Airplane Directorate standards staff on developing and approving specific methods of compliance (MOC) for lithium batteries and substantiating the effect of the active ULD on aircraft fire detection/suppression systems. We encourage ACOs to coordinate with the Transport Airplane Directorate standards staff on developing and approving specific MOC to the other requirements in this appendix.

- FHA and FMEA submitted by applicant per latest revision of AC 25.1309-1.

- Electromagnetic interference (EMI) (see latest revision of RTCA, Inc. document RTCA/DO-160, *Environmental Conditions and Test Procedures for Airborne Equipment,*. Section 21 Cat H is required – no aircraft testing necessary.

- How the applicant will address Hazmat (For example, lithium batteries, refrigerant, etc.).

- Aircraft fire detection/suppression system: Evaluate the effect of airflow changes produced by the active ULD on the aircraft fire detection/suppression system performance and system integrity – including multiple ULDs, in multiple configurations, on multiple aircraft. Both normal dispatch and master minimum equipment list (MMEL) dispatch conditions must be addressed. ACOs **must** coordinate specific requirements and methods of compliance with the Transport Airplane Directorate.

- Affect on smoke containment (penetration) characteristics: Evaluate the effect of airflow changes produced by the active ULD on smoke containment characteristics of the cargo compartment – including multiple ULDs, in multiple configurations, on multiple aircraft.

- Behavior of the ULD in a cargo compartment fire --for example:
    - Explosion potential.
    - Potential for significant contribution to the fire.
    - Potential for release of toxic or flammable gasses.

- Battery safety:
    - Evaluate the safety of all battery types under the environmental and load conditions that the ULD will be exposed. Address dead short testing, corrosive chemical containment, flammability, vibration testing, thermal runaway, taxi-flight-landing loads, grounding and bonding , and any other conditions identified in the FMEA.

    - For lead acid or Nickel Cadmium batteries see latest revision of RTCA/DO-293 *Minimum Operational Performance Standards for Nickel-Cadmium and Lead Acid Batteries.*

Appendix 1. Aspects to Address

- ACOs **must** coordinate specific requirements and methods of compliance with the Transport Airplane Directorate for battery types not covered by RTCA /DO-293.
- Lithium batteries require additional substantiation, including, but not limited to, Hazmat and United Nations testing requirements. ACOs **must** coordinate specific requirements and methods of compliance with the Transport Airplane Directorate.
- Address the requirements for batteries in 14 CFR § 25.1353

- Decompression testing (6,000 to 45,000 ft in 1 second). See International Air Transport Association (IATA) *ULD Technical Manual* 19th edition, May 2004).
- Software (dependent on hazard)--see latest revision of RTCA/DO-178, *Software Considerations in Airborne Systems and Equipment Certification.*
- Environmental conditions, including, but not limited to, vibration, temperature, humidity, altitude, shock, salt spray, and fluids susceptibility. See latest revision of RTCA/DO-160.
- Other issues identified in applicant's FMEA analysis. **NOTE:** ULD tracking systems that include a transmission device must be coordinated with the Transport Airplane Directorate standards staff.
- Operating instructions for both the ULD and the temperature control system.
- Instructions for continued airworthiness (ICA) (includes ICA for temperature control system).
- Marking requirements
  - Placard for TSO and 14 CFR § 21.305(d) approval (see appendix 2), or mark as required under TC/STC process if applicable.
  - Safety information required for proper use, operation and limitations.
- ULDs approved under 14 CFR § 21.305(d) in conjunction with TSO-C90c approval must have a quality system that meets 14 CFR § 21.143 for both TSO and Non-TSO aspects:
  - For TSOA: MIDO must review and approve the production and quality control system.
  - For LODA: Applicable bilateral agreement must provide for oversight of applicant's design control and production/quality control of the non-TSO functions.

Appendix 2. Additional Marking on Containers

ACOs ensure that manufacturers adhere to the following marking requirements:

a. Attach a label next to the TSO label, or as a completely separate section of the TSO label, with the following additional information:

(1) Name of manufacturer

(2) "FAA Approved 14 CFR§21.305(d)" or, " FAA Approved TC/STC "*insert TC/STC number*""

(3) FAA-approved data (such as the master drawing list) used to substantiate the additional equipment

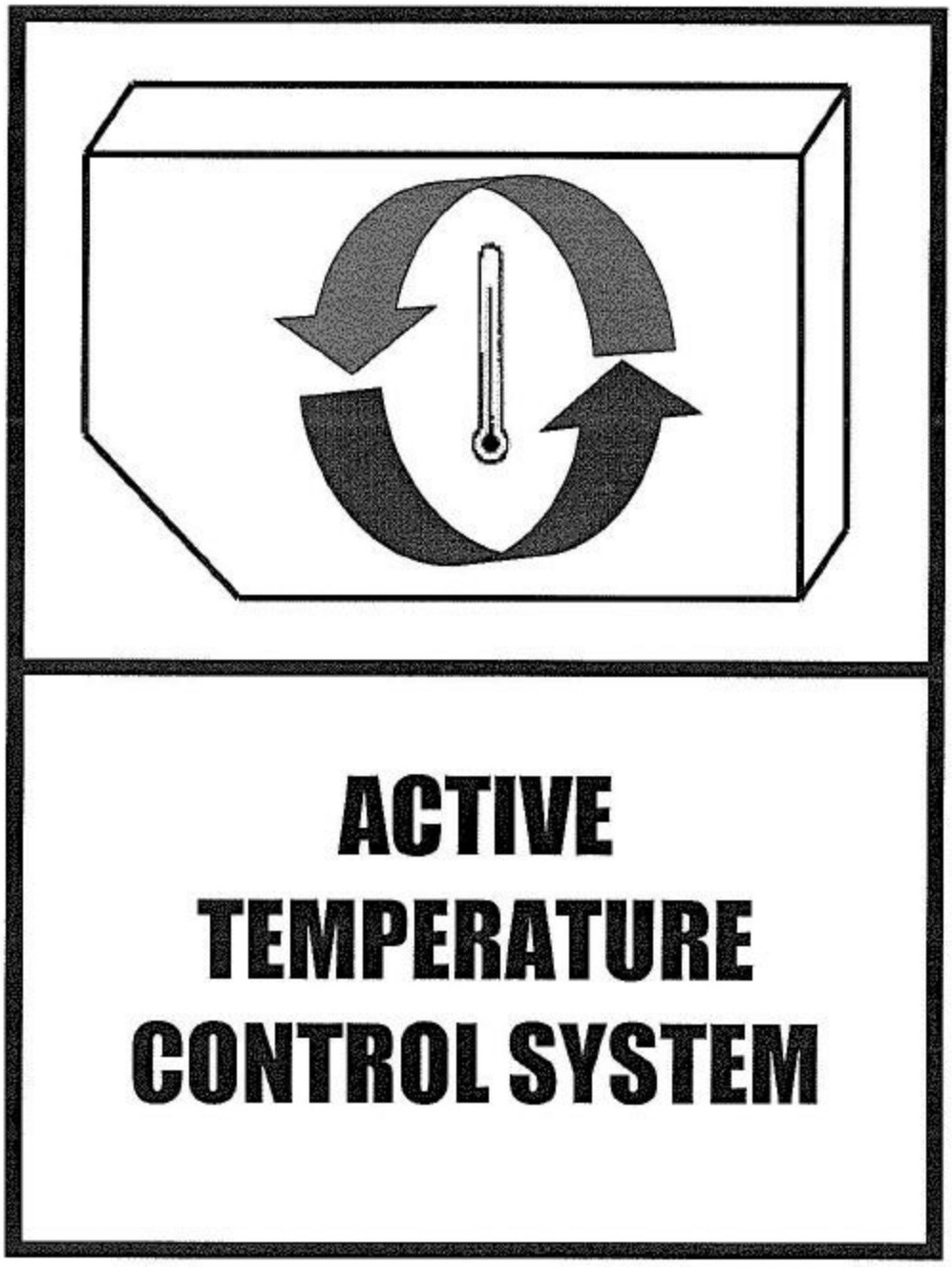
(4) Instructions for continued airworthiness (ICA) required: list FAA-approved ICA document(s)

(5) Any additional limitations or information needed by user to safely transport ULD

b. Affix the marking shown in appendix 3, on the upper part of each vertical face (four locations) of the ULD:

- Marking is approximately 5 inches wide and 7 inches long
- Upper arrow in the figure is colored red and the lower arrow is blue
- Text must be black and approximately 0.5 inches high

Appendix 3. Required Marking Label



Appendix 4. Sample Directive Feedback Information, FAA Form 1320-19

U.S. Department
of Transportation
Federal Aviation
Administration

Directive Feedback Information

Please submit any written comments or recommendations for improving this directive, or suggest new items or subjects to be added to it. Also, if you find an error, please tell us about it.

Subject: Order

To: Directive Management Officer, AIR-530

(Please check all appropriate line items)

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows:
(attach separate sheet if necessary)

☐ In a future change to this directive, please include coverage on the following subject
(briefly describe what you want added):

☐ Other comments:

☐ I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____

FTS Telephone Number: _____ Routing Symbol: _____

FAA Form 1320-19 (8-89)(Representation)