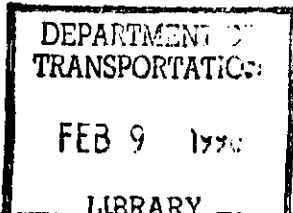




U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular



Subject: APPROVAL OF MODIFIED SEATS AND
BERTHS INITIALLY APPROVED UNDER
A TECHNICAL STANDARD ORDER

Date: 4/24/89

Initiated by: AIR-120

AC No: AC 21-25

Change:

1. PURPOSE. This advisory circular provides information and procedural guidance concerning the approval and installation of modified Technical Standard Order (TSO) seats and berths in U.S. type certificated aircraft.
2. RELATED FEDERAL AVIATION REGULATIONS (FAR) SECTIONS. Sections 21.101, 21.303, 21.305, 21.601, 21.611, 23.785 (former CAR 3.390), 23.853, 25.785 (former CAR 4b.358), 25.853, 27.785, 27.853, 29.785, 29.853, and 43.13 and FAR Part 25, Appendix F, Parts I and II.
3. BACKGROUND.
 - a. The design of seats and berths installed on an aircraft must be approved by the Federal Aviation Administration (FAA). Under Section 21.305, this approval may be obtained under a parts manufacturer approval (PMA), under a TSO authorization, in conjunction with type certification procedures (in original type certificate, by supplemental type certificate, or by amendment to the type certificate), or in any other manner approved by the Administrator. A seat or berth approved as part of the type design or under a PMA is approved for installation on an aircraft type; however, an article initially approved under TSO procedures is approved for design and production of the article only, and a separate approval is required for installation of that TSO'd article in an aircraft.
 - b. Seats produced by a manufacturer holding a TSO authorization must meet the minimum performance standards described in TSO-C39b, which incorporates parts of National Aircraft Standard (NAS) 809.
 - c. Many aircraft owners and operators choose to alter seats and berths by incorporating such features as different upholstery. Any change to these seats or berths constitutes a modification which must be separately approved by the FAA, regardless of whether the original article had a TSO approval or was approved only as part of a type design. It is the installer's responsibility to ensure that the modified article is approved. It must be emphasized that either replacement of a seat cushion or replacement of a dress cover on a seat cushion constitutes a modification to an article which requires approval.

4. DISCUSSION.

a. Approval Considerations.

(1) Applicable Regulations. Each applicant seeking approval of a modified TSO seat or berth for installation in an aircraft must show that the modified article meets the design alteration requirements of FAR Part 43, the applicable airworthiness requirements for that aircraft as specified in paragraphs (a) and (b) of Section 21.101, or the requirements of Section 21.305(b) if the applicant is the seat or berth manufacturer and elects to show that the modified article still meets the TSO standards.

(2) General Design. The modifier of an aircraft seat or berth should evaluate two aspects of design: the design of the article itself and the design of its installation.

(i) Design of the article. Compliance with the requirements of TSO-C39b or the airworthiness standards in the FAR may not, alone, ensure that the article has no unsafe features that experience has shown to be hazardous. The person modifying the seat should determine that the design contains no hazardous features.

(ii) Installation. A seat which, of itself, has no unsafe design features may still create a hazard as installed (for example, if it blocks an exit). Thus, the design of the installation should be evaluated to ensure that it results in no hazard.

(3) Materials and Workmanship. Subpart D of FAR Parts 23, 25, 27, and 29 describe the standards for materials and workmanship to be used in fabricating or modifying aircraft parts. The materials used on the modified seat or berth should continue to be of a quality that meets those standards or the TSO standards. Workmanship also should be consistent with high-grade aircraft manufacturing practice. Any component of the modified article requiring protection because of the type material used should be protected against deterioration or loss of strength that may result in service from weathering, corrosion, abrasion, or other causes.

(4) Structural Tests. For each seat or berth previously produced, tested, and certified to structural specifications (i.e., NAS 809), the effect of the modification on the validity of those tests should be addressed. For example, in NAS 809, subparagraph 4.3.1, side-load and up-load tests assume seat and back cushions are in place and the seat cushion is compressed 2 inches for the location of the load application. Modification of a seat cushion may necessitate an analysis to verify that the NAS 809 specifications are still met. If the specifications are not met, additional tests or analyses will be necessary.

(5) Fire and Flammability Tests. The modified seat or berth assembly should be shown, by demonstration, to meet the fire and flammability requirements applicable to the aircraft for which installation approval is desired. In addition, consideration should be given to the flammability requirements that may be applicable based on the type of operations (e.g., FAR Part 91, 121, or 135). Federal Aviation Regulations Part 25, Appendix F, which is incorporated by reference in TSO-C39b, requires that the flammability tests be conducted with the dress cover installed on the seat cushion.

(6) Marking.

(i) If the modified seat or berth incorporates only a minor change by the manufacturer holding the TSO authorization, the provisions of Section 21.611(a) apply, and the TSO marking need not be changed, except as the manufacturer elects with respect to changed part numbers.

(ii) If the modified seat or berth incorporates a major change by the manufacturer holding the TSO authorization and if the modified seat or berth continues to meet the TSO requirements, the provisions of Section 21.611(b) apply. The manufacturer must remark the modified article to show the new type or model designation and must obtain a new TSO authorization.

(iii) If a person other than the original manufacturer incorporates any design change in a previously TSO'd seat or berth, the provisions of Section 21.611(c) apply. If that person is a manufacturer, that manufacturer must apply for a separate TSO authorization to obtain TSO approval under FAR Part 21. Marking of the modified article would be the same as for any other newly-authorized TSO article, with all previous markings deleted. A person other than a manufacturer seeking TSO authorization may obtain approval for either a design alteration under FAR Part 43 or a design change under the applicable airworthiness regulations (FAR Parts 23, 25, 27, 29, etc.); however, in either case, the article for which approval is obtained will have no TSO markings. Permanent removal of the TSO number only is sufficient.

(iv) If a modified seat or berth does not continue to meet TSO standards, the TSO identification on the original manufacturer's nameplate should be permanently removed in a manner such that it cannot be restored (Permanent removal of the TSO number only is sufficient). A seat or berth so modified and installed in an aircraft should be approved as part of the aircraft type design in conjunction with the type certification procedures of FAR Part 21.

(v) A seat cushion may also receive separate TSO approval as a floatation device under TSO-C72b. If either a seat cushion is replaced or a seat cushion dress cover is replaced, this constitutes a modification requiring approval. In either event, after approval, the cushion's dress cover should be remarked to indicate that the entire cushion, including the dress cover, meets Section 25.853(c), when necessary, and, if appropriate, TSO-C72b.

b. Conclusion.

(1) After successfully showing compliance with the applicable regulations, the installer will receive approval from the FAA for the design change or alteration.

(2) The installer may receive manufacturing authorization under one of the methods specified in Section 21.305 after successfully showing compliance with the applicable regulations.



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