



Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C.

TSO-C39c

Effective
Date:

Proposed Technical Standard Order

Subject: AIRCRAFT SEATS AND BERTHS

1. **PURPOSE.** This Technical Standard Order (TSO) tells persons seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) that rotorcraft, transport airplane, and normal and utility airplane seating systems of the following designated types must first meet in order to obtain approval and be identified with the applicable TSO marking:

- Type A - Transport Airplane
- Type B - Rotorcraft
- Type C1 - Normal & Utility Airplane - Crew Seats
- Type C2 - Normal & Utility Airplane - Passenger Seats
- Type D - Acrobatic

2. **APPLICABILITY.**

a. This TSO is effective for new applications submitted after the effective date of this TSO. All prior revisions to this TSO are no longer effective and, in general, applications will not be accepted after the effective date of this TSO. However, applications submitted against the previous version of this TSO may be accepted up to six months after the effective date of this TSO, in cases where we know that the applicant was working against the earlier MPS before the new change became effective.

b. Seating systems approved under a previous TSO authorization may continue to be manufactured under the provisions of their original approval, as specified in 14 CFR § 21.603(b). However, major design changes to seating systems approved under previous versions of this TSO requires a new authorization under this TSO, per Title 14 of the Code of Federal Regulations (14 CFR) § 21.611(b).

3. **REQUIREMENTS.** New models of seating systems that are to be so identified and that are manufactured on or after the effective date of this TSO must meet the MPS, qualification requirements, and minimum documentation requirements set forth in Society of Automotive Engineers, Inc. (SAE), Aerospace Standard (AS), Document No. AS 8049A, "Performance

Standards for Seats in Civil Rotorcraft and Transport Airplanes,” dated September 1997, as amended by Appendix 1 of this TSO.

a. Environmental Qualification. There are no environmental test procedures referenced in this TSO or SAE AS 8049A.

b. Deviations. The FAA has provisions for using alternative or equivalent means of compliance to the criteria set forth in the MPS of this TSO. Applicants invoking these provisions shall demonstrate that an equivalent level of safety is maintained and shall apply for a deviation per 14 CFR § 21.609.

4. MARKING. Under 14 CFR § 21.607(d), articles manufactured under this TSO must be marked as follows:

a. At least one major component must be permanently and legibly marked with all of the information listed in 14 CFR § 21.607(d), except for the following: the option in 14 CFR § 21.607(d)(2), where the name, type and part number must be used in lieu of the optional model number; and the option in 14 CFR § 21.607(d)(3), where the date of manufacture must be used in lieu of the optional serial number, and

(1) The applicable seat type: “Type A-,” “Type B-,” “Type C1-,” “Type C2,” or “Type D” followed by the appropriate seat facing direction designation: “FF”-forward; “RF”-rearward; or “SF”-sideward.

b. In addition to the requirements of 14 CFR § 21.607(d), each separate component that is easily removable (without hand tools), each interchangeable element, and each separate sub-assembly of the article that the manufacturer determines may be interchangeable must be permanently and legibly marked with at least the name of the manufacturer, manufacturer's subassembly part number, and the TSO number.

c. If the component includes a digital computer, the part number must include hardware and software identification, or a separate part number may be utilized for hardware and software. Either approach must include a means for showing the modification status. Note that similar software versions, which have been approved to different software levels, must be differentiated by part number.

d. In addition to the requirements of 14 CFR 21.607(d), for Type A and Type B transport passenger, flight attendant, and observer seating systems, each seat cushion required for qualification of the seating system must be marked with “Complies with 14 CFR 25.853(c) effective March 6, 1995, or 14 CFR 29.853(b) effective October 26, 1984, as applicable” when tested in accordance with the requirements of Section 3.4.2 of SAE AS 8049A, as revised by subparagraph 2.2.1 of Appendix 1 of this TSO.

5. DATA REQUIREMENTS.

a. Application Data. Under 14 CFR § 21.605(a)(2), the manufacturer must furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration (FAA), responsible for the manufacturer's facilities, one copy each of the following technical data to support the FAA design and production approval:

(1) Operating instructions and equipment limitations. The limitations shall be sufficient to describe the operational capability of the equipment. In particular, operational or installation limitations resulting from specific deviations granted must be described in detail.

(2) Installation procedures and limitations. The limitations shall be sufficient to ensure that the seating system, when installed according to the installation procedures, continues to meet the requirements of this TSO. The limitations shall identify any unique aspects of the installation. Finally, the limitations also shall include a note with the following statement:

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to 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 if performed under 14 CFR part 43 or the applicable airworthiness requirements.

(3) Schematic drawings, as applicable to the installation procedures.

(4) Wiring diagrams, as applicable to the installation procedures.

(5) List of the components, by part number, that make up the seating system complying with the standards prescribed in this TSO. Manufacturers should include vendor part number cross-references when applicable.

(6) Instructions, in the form of a Component Maintenance Manual (CMM) containing information on the periodic maintenance, calibration and repair, for the continued airworthiness of installed seating system, including recommended inspection intervals and service life. The CMM must include specific guidance on the limits of wear and damage permissible to the seat cushions and safety belt webbing material which would warrant replacement, i.e., explain how and/or when these materials lose their system effectiveness and when the strength of the webbing would be expected to drop below the specified abrasion breaking strength. Details of deviations granted, as noted in paragraph 5a(1) of this TSO, may also be described in the CMM

(7) Material and process specifications list.

(8) The quality control system description required by 14 CFR §§ 21.605(a)(3) and 21.143(a) including functional test specifications to be used to test each production article to ensure compliance with this TSO.

(9) Manufacturer's TSO qualification test report.

(10) Nameplate drawing providing the information required by paragraph 4 of this TSO.

(11) A list of all drawings and processes, including revision level, necessary to define the article's design. In the case of a minor change, any revisions to the drawing list need only be made available upon request.

(12) Detailed seat cushion drawing and test results used to establish approval as follows:

(i) Configuration drawings including foam, fire blocking layer, as required, and dress cover of the seat back and seat pan cushions.

(ii) Materials specification for the seat back and seat pan cushions.

(iii) Flammability test results on representative seat cushions with dress covers conducted per Section 3.4.2 of SAE AS 8049A, as revised by subparagraph 2.2.1 of APPENDIX 1 of this TSO.

(iv) Static qualification test results on the seating system as per Section 5.1 of SAE AS 8049A.

b. Manufacturer Data. In addition to the data to be furnished directly to the FAA, each manufacturer must have available for review by the manager of the ACO responsible for the manufacturer's facilities the following technical data:

(1) The functional qualification specifications to be used to qualify each production article to ensure compliance with this TSO.

(2) Equipment calibration procedures.

(3) Corrective maintenance procedures within 12 months after TSO authorization.

(4) Schematic drawings.

(5) Wiring diagrams.

(6) Material and process specifications.

c. Furnished Data.

(1) One copy of the technical data and information specified in paragraphs 5.a(1) through 5.a(6) of this TSO and any other data or information necessary for the proper installation, certification and use and/or for continued airworthiness of the seating system, must accompany each article or multiple articles, if furnished to one source, i.e. operator, repair station, etc., manufactured under this TSO.

(2) It is the responsibility of the TSO holder to coordinate with the operator/installer to determine if the information and data in paragraph 5.a(12) of this TSO are wanted by the

operator/installer. That documentation must be sent when requested by the person receiving the article or the FAA office responsible for certification of the seat installation.

6. AVAILABILITY OF REFERENCED DOCUMENTS.

a. You may buy copies of SAE AS 8049A from the Society of Automotive Engineers Inc., Department 331, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Copies also can be obtained through the SAE Internet website @ www.sae.org.

b. You may buy copies of Federal Aviation Regulations 14 CFR part 21, Subpart O, 14 CFR Part 23, 14 CFR Part 25, 14 CFR Part 29, and 49 CFR Part 572 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402-9325. Copies also can be obtained from the Government Printing Office (GPO), electronic CFR Internet website @ www.access.gpo.gov/ecfr/.

c. Advisory Circular (AC) 20-110, "Index of Aviation Technical Standard Orders," and AC 20-36, "Index of Articles Certified under the Technical Standard Order System" may be obtained from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785, telephone (301) 322-4477 or FAX (301) 386-5394. Copies also may be obtained from the FAA Internet website at www.faa.gov/avr/air/airhome.htm and select from the "Available Information" drop down list.

David Hempe
Manager, Aircraft Engineering Division
Aircraft Certification Service

APPENDIX 1. MINIMUM PERFORMANCE STANDARD FOR AIRCRAFT SEATS AND BERTHS

This appendix prescribes the MPS for seating systems, modified by the FAA in this TSO. The applicable standard is SAE AS 8049A, "Performance Standards for Seats in Civil Rotorcraft and Transport Airplanes," dated September 1997, and is modified with FAA changes as follows:

1. Page 3, disregard Section 1. SCOPE.
2. Page 4, disregard Section 2. REFERENCES.
3. Page 5, disregard paragraphs 3.1.1, 3.1.2, 3.1.3, 3.1.5, 3.1.6, 3.1.7, 3.1.9, 3.1.10, 3.1.12, and 3.1.13.
4. Page 6, disregard paragraph 3.1.16.
5. Page 7, disregard paragraphs 3.1.21, 3.1.22, 3.1.23, 3.1.24, 3.1.25, 3.1.26, and 3.1.27.
6. Page 8, disregard paragraphs 3.1.28 and 3.1.29.
7. Page 9, disregard paragraph 3.1.30.
8. Page 10, disregard paragraph 3.1.31.
9. Page 11, replace paragraph 3.4.2 to read as follows:
Type A-Transport Airplane and Type B-Transport Rotorcraft passenger, flight attendant, and observer seat cushion systems shall be tested and shall meet the fire protection provisions of Appendix F, Part II of 14 CFR Part 25, as required in 14 CFR 25.853(c) effective March 6, 1995 and 14 CFR 29.853(b) effective October 26, 1984 respectively, or the equivalent shall be demonstrated by analysis (similarity) to provide equivalent protection. Type B- Normal Rotorcraft upholstery shall be self extinguishing when tested to meet the fire protection provisions of 14 CFR 27.853(b) effective February 4, 1980. Type C1- and C2- Normal & Utility Airplane seat cushions shall be self extinguishing when tested to meet the fire protection provisions of paragraph (c) of Appendix F of 14 CFR Part 23, as required in 14 CFR 23.853(d)(3)(ii) effective February 9, 1995.
10. Page 14, disregard Section 3.5 Allowable Permanent Deformations
11. Page 19, disregard Section 4.2 Dynamic Strength/Occupant Protection.
12. Page 24, disregard Section 5.3 Dynamic Qualification Tests
13. Page 58, disregard Section 5.4 Dynamic Impact Test Pass/Fail Criteria.

14. Page 59, disregard Section 6. MARKINGS. Marking of the article shall be in accordance with paragraph 4 of this TSO.
15. Page 60, disregard Appendix A, Procedure for Evaluating Pulse Shapes.