

European Aviation Safety Agency

European Technical Standard Order

Subject: ROTORCRAFT, TRANSPORT AEROPLANE, AND NORMAL AND UTILITY AEROPLANE SEATING SYSTEMS

1 - Applicability

This ETSO prescribes the minimum performance standards (MPS) that rotorcraft, transport aeroplane, and normal and utility aeroplane seating systems of the following designated types that are manufactured on or after the date of this ETSO, must meet in order to be identified with the applicable ETSO marking.

- Type A - Transport Aeroplane
- Type B - Rotorcraft
- Type C1 - Normal & Utility Aeroplane - Crew Seats
- Type C2 - Normal & Utility Aeroplane - Passenger Seats

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - General

3.1.1 - Minimum Performance Standard

Standards 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 ETSO.

Additions :

Additional information on the dynamic testing of seating systems is contained in Advisory Circular (AC) 20-137, „Dynamic Evaluation of Seat Restraint Systems & Occupant Restraint for Rotorcraft (Normal & Transport)“, AC 23.562-1, „Dynamic Testing of Part 23 Airplane Restraint/Systems and Occupant Protection“, and AC 25.562-1A, „Dynamic Evaluation of Seat Restraint Systems & Occupant Protection on Transport Airplanes“. Compliance with these AC's is not necessary to receive a ETSO authorization under this ETSO. However, the applicant for a seat installation approval should be aware that any seating system may be required to meet the criteria contained in these AC's in order to qualify for installation in an aircraft.

3.1.2 - Environmental Standard

None.

3.1.3 - Computer Software

None

3.2 - Specific

None

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2. In addition, each seating system shall be legibly and permanently marked with the following :

- (i) the applicable seat type : „Type A-“, „Type B-“, „Type C1-“, or „Type C2-“ followed by the appropriate seat facing direction designation : „FF“-forward; „RF“-rearward; or „SF“-sideward,
- (ii) for Type A passenger seating systems, the approved seat pitch necessary to maintain clearance to assure an effective emergency evacuation, as defined in AC 25.562-1A, Appendix 2. Use appropriate statement as follows : „See installation limitations in component maintenance manual (CMM) or drawing number (insert number)“ or „Minimum or Allowable range (if applicable) seat pitch (insert number/range).“,
- (iii) each separate component that is easily removable (without hand tools, except those components that are ETSO articles), each interchangeable element, and each separate sub-assembly of the article that the manufacturer determines may be interchangeable with other seating systems must be permanently and legibly marked with at least the name of the manufacturer, manufacturer’s sub-assembly part number, and the ETSO number,
- (iv) 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 CS 25.853(c), or CS 29.853(b), as applicable“ when tested in accordance with the requirements of Section 3.4.2 of SAE AS 8049A, as revised by subparagraph 2.2.3 of Appendix 1 of this ETSO.

4.2 - Specific

None.

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

APPENDIX 1. TRANSPORT AEROPLANE, AND NORMAL AND UTILITY AEROPLANE SEATING SYSTEMS

1. Purpose. This appendix prescribes the MPS for seating systems, as modified by the FAA for reference in this TSO.

2. Requirements. The standards applicable to this TSO are set forth in the industry standard specified in paragraph 3 of this TSO. SAE AS 8049A, „Performance Standards for Seats in Civil Rotorcraft and Transport Airplanes,“ dated September 1997, which is the applicable standard is modified as follows:

2.1 Exceptions.

2.1.1 The information contained in Section 1. SCOPE: and Section 2. REFERENCES: of SAE AS 8049A is duplicative and shall be disregarded.

2.1.2 Compliance with Section 3.1 Guidance: of SAE AS 8049A is not required, except for Subsections 3.1.4, 3.1.8, 3.1.11, 3.1.14 (passenger seats only), 3.1.15 and 3.1.17 through 3.1.20.

2.1.3 Compliance with the dynamic test procedures and documentation of Subsection 5.3.1 Dynamic Impact Test Parameters: through Subsection 5.3.9.2 Impact Pulse Shape: of SAE AS 8049A may be demonstrated by equivalent procedures such as those described in either AC 23.562-1 or 25.562-1A. The simplified procedures for head injury criteria (HIC) outlined in policy letter TAD-96-002 dated February 16, 1996 also may be used in lieu of the selection of test conditions described in Subsection 5.3.6.2 of SAE AS 8049A. The use of any equivalent procedures must be established by the applicant and accepted in advance by the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration (FAA), having geographic purview of the applicant's facility (See subparagraph 2.2.1 of this Appendix).

2.1.4 Compliance with the dynamic impact test pass/fail criteria of Subsections 5.4.3, 5.4.4, and 5.4.9 of SAE AS 8049A for permanent deformation limits, HIC, and femur loads, respectively, is not required. However, the data must be reported, as required by subparagraph 5.a(12) of this TSO.

2.1.5 Disregard the marking requirements specified in Section 6. MARKINGS: of SAE AS 8049A. Marking of the article shall be in accordance with paragraph 4 of this TSO.

2.2 Additions.

2.2.1 As applicable, at least 30 days prior to conducting any required TSO testing and prior to submitting an application for TSO authorization per 14 CFR 21.605(a), the applicant shall submit, to the FAA ACO manager, a proposed plan for demonstrating compliance with the requirements of this TSO for the following:

2.2.1.1 Any procedures that the applicant has identified in consideration of the design guidance in the SAE AS 8049A Subsections identified in subparagraph 2.1.2 of this Appendix; and

2.2.1.2 Those equivalent procedures the applicant has proposed to use to demonstrate compliance with dynamic test requirements of subparagraph 2.1.3 of this Appendix.

2.2.2 Under Section 3.2 Requirements: of SAE AS 8049A, add a new Subsection 3.2.15 to read as follows: Except for rearward facing seats, the pelvic restraint system shall be designed such that the vertical angle subtended by the projection of the pelvic restraint centerline and the seat reference point (SRP) water line shall not be greater than 55 degrees. The SRP water line is a line/plane passing through the SRP parallel to the horizon. The pelvic restraint centerline is formed by a line from the pelvic restraint anchorage to a point located 9.75 inches forward of the SRP and 7.00 inches above the SRP water line. In addition, the pelvic restraint anchorage point(s) must be located no further than 2.0 inches forward of the SRP (ref Figure 1A of SAE AS 8049A).

2.2.3 Replace Subsection 3.4.2 of SAE AS 8049A with the following: 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 February 2, 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.

2.2.4 The following two items shall be included in Subsection 5.3.10.3 Test Data: of SAE AS 8049A: o. Post test retrieval of life preserver; and p. Evaluation of seat egress (See adjustable features in Subsection 3.2.6 and baggage stowed under seat in Subsection 3.2.7 of SAE AS 8049A. These two items will be part of the data submittal required by subparagraph 5.a(12)(iv) of this TSO.

2.2.5 Under APPENDIX A PROCEDURES FOR EVALUATING PULSE SHAPES, revise Subsection A.6 STEP 5 (REFERENCE FIGURE 5A): of SAE AS 8049A to read: Construct a line parallel to the ideal (minimum regulatory requirement) pulse and offset by 2 g in magnitude less than the ideal during the time interval between T_1 and T_3 . Likewise construct a line parallel to the ideal pulse and offset by 2 g in magnitude less than the ideal (minimum regulatory requirement) pulse on the trailing side of the pulse from:

$$T_3 < t < T_1 + 1.33(T_3 - T_1)$$

If the magnitude of the acquired pulse is 2 g less than the ideal pulse shape at any point along the acquired pulse shape during the period $T_1 < t < T_1 + 1.33(T_3 - T_1)$, the pulse is unacceptable.

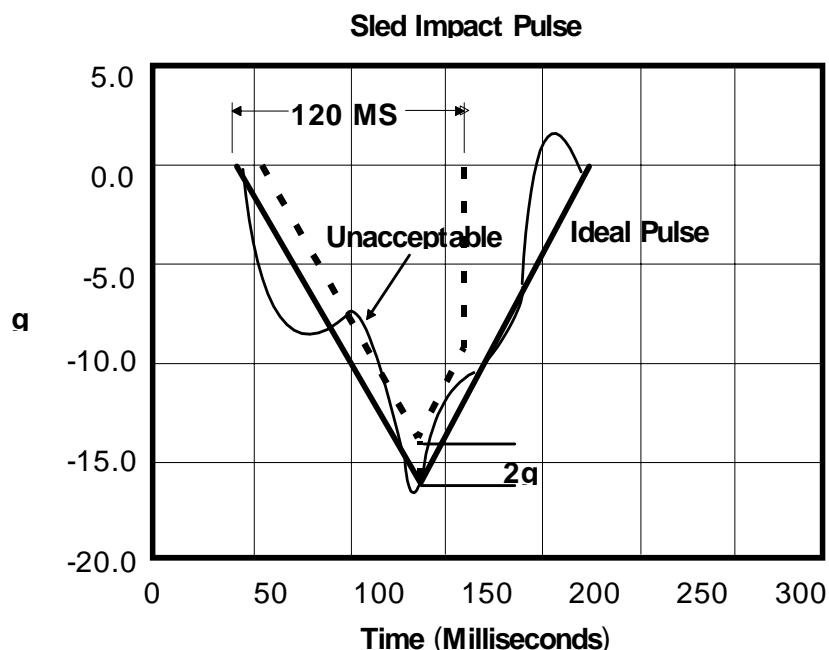


FIGURE 5A

APPENDIX 2. TEST CONDITIONS

SAE AS 8049A incorporates, as a reference, the following test standards for which a more recent version of these standards may be substituted, if approved by the FAA ACO manager having geographical purview over the manufacturer's facilities.

1. SAE J211- Instrumentation for Impact Tests.
2. Code of Federal Regulations, Title 49, Part 572, Anthropomorphic Test Dummies.

