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Superseded by AC25.562-1B and
ANM-115-05-005

Modification or Replacement of Components on Dynamically Certified Seat Systems

RATIONALE

The technical requirements of this document have been totally superseded by requirements in AC 25.562-1B Change 1 and FAA Memorandum ANM-115-05-005, dated August 9, 2005.

CANCELLATION NOTICE

This Technical Report has been declared "CANCELLED" as of February 2018 and has been superseded by AC 25.562-1B Change 1 and ANM-115-05-005. By this action, this document will remain listed in the respective index, if applicable. Cancelled Technical Reports are available from SAE.

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FOREWORD

Seat designs must be approved by the appropriate regulatory agency. The Federal Aviation Administration (FAA) approval process can take the form of a Technical Standard Order (TSO) authorization, and/or be part of a type certification approval (either in the original type certificate, a supplemental type certificate, or by amendment to the type certificate), or be under a Parts Manufacturer Approval (PMA). TSO authorization is currently based on qualification of the seat in accordance with the requirements of AS8049. Modification of an approved design creates a new configuration that must also be approved by the FAA.

In accordance with Title 14 of the Code of Federal Regulations (14 CFR), Part 21, Section 21.611, the manufacturer of an article under TSO authorization may make minor design changes without further FAA approval. TSO article design changes, whether major or minor, by a person other than the original manufacturer, are handled pursuant to 14 CFR, Section 21.611(c), and the modifier must apply for a separate authorization and must develop the article in accordance with DOT-FAA Document No. 8150.1A. If approval is sought under 14 CFR, Part 43 (specifically Appendix A(a)(4)), or under applicable airworthiness regulations, the design change is considered a major alteration. If the design change is being made to an article that has been in service or may have deteriorated while in storage, it must be shown that the altered article meets the original TSO requirements.

Design changes and their evaluation need to consider both the requirements for that specific article, such as the requirements outlined in a TSO, and the requirements for the installation of that article, which are specific to the aircraft and its interior arrangement. Approval in either case is necessary prior to the installation of the modified item on the aircraft. This may require that both the Installer and the Manufacturer obtain approval from the FAA.

1. SCOPE:

This document outlines the engineering evaluation appropriate for modifying or replacing components of a previously certified seat when the certification process is based on qualification to the requirements of AS8049, which includes dynamic testing. The engineering evaluation presented in this document may be used to determine if a modification (including replacement of a component) is a minor change with respect to meeting the dynamic testing requirements described in AS8049.

Whenever a modification is considered, the ability to meet all requirements of the applicable Federal Aviation Regulation (FAR) must be verified. For example, this would include the capability to meet requirements such as flammability and flotation. Analysis and/or test data supporting the ability of the new materials and/or configuration to meet the applicable requirements must be submitted with the change documentation.

This document addresses the evaluation of seat pan cushions, secondary components, and ancillary components. Other primary components such as restraint systems and primary structural components are not considered.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS8049A	Performance Standard for Seats in Civil Rotorcraft, Transport Aircraft, and General Aviation Aircraft
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2.1.2 U.S. Government Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

14CFR 21.605	Application and Issue
14CFR 21.611	Design Changes
14CFR 21.93	Classification of Changes in Type Design
14CFR 23.562	Emergency Landing Dynamic Conditions
14CFR 25.562	Emergency Landing Dynamic Conditions
14CFR 27.562	Emergency Landing Dynamic Conditions
14CFR 29.562	Emergency Landing Dynamic Conditions
DOT-FAA Order 8150.1A	Technical Standard Order Procedures
FAA Advisory Circular No. 20-137	Dynamic Evaluation of Seat Restraint Systems and Occupant Restraint for Rotorcraft (Normal and Transport)
FAA Advisory Circular No. 21-25A	Approval of Modified Seating Systems Initially Approved Under a Technical Standard Order
FAA Advisory Circular No. 23.562-1	Dynamic Testing of Part 23 Airplane Seat/Restraint Systems and Occupant Protection
FAA Advisory Circular No. 25-17	Transport Airplane Cabin Interiors Crashworthiness Handbook
FAA Advisory Circular No. 25.562-1	Dynamic Evaluation of Seat Restraint Systems and Occupant Protection on Transport Airplanes
TSO-C127a	Rotorcraft, Transport Airplane, and Normal and Utility Airplane Seating Systems

2.2 Definitions:

PRIMARY COMPONENT: Components that, if modified, could change the results of dynamic testing. Primary components include, but are not limited to, all components in the structural load path of the seat and those components that affect the spinal compression load, Head Injury Criterion (HIC) value(s), upper-torso restraint load, and femur compression load (when necessary) measured during dynamic testing. Examples of primary components include restraint system and its attachments, seat legs and other major structural members of the seat frame, fittings that interface with the aircraft, seat pan cushion cores, and items in the head strike area of the occupant of that seat or nearby seats.

SECONDARY COMPONENT: Components that, if modified, would not be expected to change the results of dynamic testing. Secondary components do not contribute to reacting the inertial loads generated during the test nor do they influence HIC values, upper-torso restraint load, or the spinal and femur (when appropriate) compression loads. Secondary components must be retained during the dynamic tests. Examples of items that could be secondary components include In-flight Entertainment (IFE) units, life jackets, fabric/leather upholstery or seat covers, seat back cushion cores, passenger control units, and power boxes.

2.2 (Continued):

In some cases the application or position of the component is critical to the determination of whether it is a primary or secondary component. A corded device placed in an armrest would likely be a secondary component, because while it must be retained on the seat during testing, it would not be supporting any inertial loads and is not in a position to influence the HIC values measured. However, a corded device in a seat back in front of an occupant would be a primary component if it is likely to be impacted and influence the HIC value measured in the dynamic test.

ANCILLARY COMPONENT: In order for an item to be considered an ancillary component, the mass of the item is so small that it is inconsequential to the dynamic test results. Detachment of these items during dynamic testing would not invalidate dynamic test results. Examples of ancillary equipment include in-arm ashtrays and pieces of decorative trim. It should also be noted that although detachment of a piece of ancillary equipment is not cause for failure or retest, the method of retaining the item should be improved so that the seat will retain the item under dynamic test conditions.

MAJOR CHANGE: A major change is defined by 14 CFR, 21.611(b) as “Any design change by the manufacturer that is extensive enough to require a substantially complete investigation to determine compliance with a TSO ...”

MINOR CHANGE: A minor change is defined in 14 CFR, 21.93(a) as a change “... that has no appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of the product.”

A minor change results in an item that is essentially the same as that which was dynamically tested. There may be a part number change in order to maintain configuration control, but the model number would not change. The performance of the system is supported by the original dynamic tests, although some additional analysis and/or testing may be necessary to verify that the change maintains the same level of performance as was demonstrated in the original dynamic tests.

BALLAST WEIGHT: Weight of mass added to the seat during the original seat certification dynamic test program.

SEAT ASSEMBLY WEIGHT: The seat assembly weight, based on the testing conducted, is the weight of the seat tested including any ballast that accounts for variations in production seat weight and future growth in the weight of the seat. The seat assembly weight does not include the weights of the anthropomorphic test dummies or the ballast added to the seat to represent specific items that may be attached to or retained by the seat such as magazines, life preservers, luggage, and other items.