



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

# Memorandum

Subject: **ACTION:** Application of TSO-C127a Data requirements.

Date: OCT 26 2001

From: Acting Manager, Aircraft Engineering Division,  
AIR-100

Reply to: Hal Jensen  
Attn. of: (202) 267-8807

To: Directorate Managers , Aircraft Certificaton Office  
Managers

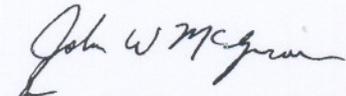
Technical Standard Order (TSO) C127a, "Rotorcraft, Transport Airplane, and Normal and Utility Airplane Seating Systems", Section 5, Data Requirements, specifies the data a manufacturer must develop gain TSO approval. The data falls generally in three categories: Application Data, Manufacturer Data, and Furnished Data. Application Data is submitted by the manufacturer when application for TSO approval is made. Manufacturer Data is retained by the manufacturer to be available for review by the ACO upon request. Furnished Data is provided by the manufacturer to each user receiving a seat produced under the TSO approval.

The Aircraft Certification Service is working closely with industry to streamline the data processes for the seat's initial approval under the TSO its subsequent approval for installation in the aircraft. One of the goals of this work is development of a standardized format by which TSO approval holders may convey data on installation limitations to the seat installers.

Several seat manufacturers have asked us to clarify the data requirements of TSO-C127a. The attachment to this memorandum is in response to that request. It is taken from the streamlining work. It provides additional information regarding the submittal of Application Data and Furnished Data. The Application Data concerns limitations on seat deformation and cushion wear and damage. The Furnished Data concerns the quantity of data that must be given the user.

We recommend that the contents of this memorandum and attachment be brought to the attention manufacturers producing seats under TSO-C127a.

We expect to issue guidance on standardized limitations in the near future.

  
Dave Hempe

### Application Data

#### **Permanent deformation data**

A description of any installation limitations must be included. Installation limitations should account for "head strike path or permanent structural deformations, as reported in subparagraph 5.a (12)(iv), that may have an impact on emergency evacuation" per TSO-C127a subparagraph 5.a.(2). Subparagraph 5.a (12)(iv) refers to the test results from the static and dynamic tests.

One intent of subparagraph 5.a (2) is to insure that any permanent deformation to the seat resulting from the dynamic tests is brought to the attention of those required to verify or perform the installation so an evaluation of post-test occupant egress can be made. The seat manufacturer must specify the data from the test results that will be included in the installation instructions and limitations to assist operators/installers in maintaining minimum aisle width clearances to insure that egress is not compromised. It is acceptable to reference the test report that includes all seat permanent deformation data in lieu of listing those results in whole or in part in the installation instructions and limitations document. It is also acceptable to define a zone around the seat that must remain clear of any other equipment or structure that the occupant could hit in the event of an impact resulting from an aircraft accident. This zone must be based on the results of the dynamic test results and the report must also be referenced.

It is also intended in subparagraph 5.a (2) to identify any installation limitations for seats based on data collected for head strike path. For front row seat installations it is acceptable to list in the installation limitations a minimum setback distance to preclude the occupant's head from striking any structure, equipment, or object that might cause injury. When considering occupant protection criteria for row-to-row installations the range of installation seat pitches must be considered and data must be provided to substantiate that range. It is recommended that the test report that substantiates front-row setback and row-to-row seat pitch be referenced in the installation limitations.

#### **Seat cushion wear and damage**

Subparagraph 5.a (6) requires "specific guidance on the limits of wear and damage permissible to the seat cushions...which would warrant replacement, i.e. explain how and/or when these materials lose their system effectiveness...".

The understanding of the characteristics of the foams which make up seat cushions has not developed to the point that recommendations can easily be made for seat cushion replacement based on wear or life limits. In the case of seat cushions we are unaware of any simple criteria that can accurately determine the stage at which cushion wear has a detrimental effect on the results of a dynamic seat test (for example, lumbar load). There has also been some

evidence that worn seat cushions, even to the extent that the thickness is reduced and the firmness is increased from the original cushion, may not exhibit any measurable difference on lumbar loads. Reduced cushion thickness may play an important factor in occupant positioning in the seat and consideration should be given for cushion thickness reduction that might ultimately expand the head strike zone for HIC evaluation. From a practical standpoint that scenario is probably rare and many operators replace cushions often enough to preclude any effects to occupant safety from seat cushion wear becoming an issue.

However, until data exist that can adequately prescribe conditions for seat cushion replacement a methodology should still be recommended in the Component Maintenance Manual (CMM) for evaluating the effectiveness of a worn seat cushion. This may be in the form of procedures for visual and hands-on inspections for indications of wear or damage to the cushion the manufacturer would find unacceptable for use of their product. Damage to seat cushions that warrant replacement include any failure of the cushion to provide padded separation between the

occupant and any part of the seat structure that would be provided by the original cushion. Examples include holes, gouges, tears and separations, crumbling or flaking, and splits. Seat cushion manufacturers may also elect to prescribe a time period or date at which they recommend the cushion be replaced when no other signs of damage or wear are obvious.

The effectiveness of the seat cushion fireblocking to meet the flammability requirements as prescribed in Appendix 1 subparagraph 2.2.3 may be affected by normal wear and cleaning of the article. Recommendations should be included in the CMM for the service life of seat cushions to insure that the fireblocking will continue to meet these requirements.

### **Furnished Data**

#### **Quantity of data per article**

The TSO indicates that one copy of the data must accompany each manufactured article. The intent of that requirement is to ensure that the necessary data are available for reference during seat installation or replacement and available as needed for inspection. The requirement to ship the necessary data and information with each article was originally developed for, and applicable to, most TSO's in which one unit per aircraft was the norm. For shipments containing multiple articles of the same seat part number to one operator/installer, for installation on the same aircraft, it is acceptable for the TSO holder in coordination with the end customer of the TSO article (eg. an air carrier) to determine a minimum, but not less than one, set of data and information as specified in TSO-C127a 5.c to meet their needs.

## Application of TSO-C127a Data Requirements

Attachment 1  
Page 3 of 3

It is no longer mandatory that the TSO holder ship a copy of the documentation specified in subparagraph 5.a (12) since any concerns over these data must be addressed in the installation limitations and/or Component Maintenance Manuals. The TSO holder is responsible for coordination with the operator/installer of the TSO article to determine how many copies of the data are acceptable to the operator/installer. The TSO holder must send the data and information as specified in subparagraph 5.a(12) if so requested by the operator/installer or the FAA office responsible for certification of the seat installation.

An acceptable revision of 5.c Furnished Data of TSO-C127a should read as follows:

**c. Furnished Data.** One copy of the data and information specified in subparagraphs 5.a(1) through 5.a(6) of this TSO must go to each person receiving for use one or more articles manufactured under this TSO. It is the responsibility of the TSO holder to coordinate with the operator/installer to determine if the information and data in subparagraph 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.