



Memorandum

U.S. Department
of Transportation

**Federal Aviation
Administration**

Subject: Type Certificate (TC)/ Technical Standard Order (TSO)
Seat Issues and Their Resolution

Date:

From: AIR-100

Reply to
Attn. of: Hal Jensen, AIR-120,
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To: Directorate Managers
Aircraft Certification Office Managers

A congressionally mandated joint FAA-industry team was formed in August 2000 to assess the certification process of aircraft seats. A goal was to identify areas within industry and the FAA that have proven to be the greatest hurdles in the seat approval process and make recommendations for improvements for a more effective and efficient process.

Within the FAA, the seat approval process is typically a shared responsibility between the Aircraft Certification Office (ACO) granting the seat approval under the Technical Standard Order (TSO) system and the ACO granting approval of that seat's installation under the aircraft's type certification (TC) basis. Under this joint approval process it is sometimes difficult to determine where the TSO office responsibility ends and where the TC office responsibility begins.

In the case of TSO-C127 and TSO-C127a (TSO-C127/127a), Rotorcraft, Transport Airplane, and Normal and Utility Airplane Seating Systems, it is further complicated by the TSO requirement to collect data that will not be evaluated until the installation assessment is made against the aircraft's certification basis. Therefore part of the seating system evaluation must be completed by the ACO granting the Technical Standard Order Authorization (TSOA) or Letter of Design Approval (LODA) and part of the evaluation must be completed by the ACO granting installation approval for the product. It is understandable that this can lead to differences in the interpretation of compliance to the TSO or to the applicable airworthiness regulations based on data collected under the TSO approval.

As with any TSO article, the TSOA approves the article to a specific standard while a separate evaluation to the airworthiness standards is required to approve the TSO article for installation in the aircraft. However, the Minimum Performance Standards (MPS) for TSO-C127 were developed, and revised in TSO-C127a, as the basis by which a dynamic seat gains FAA approval for its intended use in an aircraft. The MPS for TSO-C127/127a specify criteria toward meeting the regulatory airworthiness requirements of Title 14 of the Code of Federal Regulations (CFR) such as but not limited to §§ 25.561, 25.562 and some of 14 CFR § 25.785

for transport category aircraft - similar requirements exist for rotorcraft, and normal and utility category aircraft.

Improving the existing seat certification process requires: (1) increased communication between ACOs; (2) an increased willingness to understand the unique problems each ACO faces; (3) active ACO management of their TSO holders and applicants; (4) and considerable effort to follow new and existing seat policy guidance, including the methodology for reporting seat discrepancies as outlined in Attachment 1, "Reporting Discrepancies in Seat Data".

To give this process its greatest chance for success, a few basic assumptions should be made. First, the ACO responsible for the type certification and installation of the TSO article should recognize the approval made by the TSO ACO for each item specifically required by the MPS of the TSO. Secondly, the TSO ACO should recognize that there are part 23, 25, 27, and 29 airworthiness requirements that affect seats that are not included or evaluated under the MPS of the TSO.

An integral part of identifying problems within the process relies on discrepancy reporting. For the purpose of this memorandum a discrepancy is any item on a TSO-approved article that is determined to not comply with either the MPS of the TSO or the airworthiness requirements for the applicable aircraft or both. Discrepancies that involve production issues should be brought to the attention of the responsible MIDO.

How a discrepancy is resolved will depend on whether it is non-compliant with the TSO (including those requirements coextensive with the airworthiness requirements) or non-compliant with the applicable airworthiness regulations outside of the TSO requirements. A discrepancy is considered to fall within the TSO MPS if an assessment of the discrepant item can be made completely using only the criteria defined in the TSO including any installation limitations for that item. A few examples of items that are completely defined within the TSO include ashtrays, preventing fold-up armrests from extending beyond seatbacks, self-aligning restraint system anchorages, and identification of tested seat track.

A discrepancy is considered to fall outside the TSO MPS if an assessment of the discrepant item cannot be made completely using only the criteria defined in the TSO. In this case either the MPS of the TSO does not address the particular concern or is insufficient to make a complete assessment. A review of the installation limitations may determine if the item meets the airworthiness requirements.

For items that fall outside the TSO, the criteria for assessment is in the applicable airworthiness standards for that aircraft type. A few examples of items that are addressed by the transport aircraft airworthiness standards include ensuring occupant protection in side-facing seats, the additional criteria for flight attendant seats including adequate support for head and arms, assessment of deformed seats on rapid evacuation, and HIC assessment.

Resolution also depends on whether the discrepancy is discovered before or after the aircraft has been issued a type design approval. Attachment 2, “Resolving a Discrepancy Found on a TSO-Approved Seat”, shows a process to determine how a discrepancy on a TSO-approved seat should be resolved. The following steps provide additional information and correspond, by number, to the steps in the flowchart.

- 1. Seat has been issued a TSO Authorization or Letter of Design Approval.**
The process starts with the assumption that the seat has already received a TSOA or LODA. Any deficiencies found during the application for TSO approval must be resolved prior to issuing the TSO approval.
- 2. Does the airplane with the TSO seats installed need a type design approval?**
The first determination to be made is whether the installation of the TSO seats on the aircraft has been issued a type design approval (TC, STC, ATC).
- 3. Does the seat comply with the aircraft's applicable airworthiness regulations?**
For TC applicants that have not been issued type design approval for the seat and its installation, a finding must be made to determine if the aircraft meets the applicable airworthiness regulations. Although the TC ACO is expected to utilize the TSOA or TSO LODA where possible to streamline seat certification, any non-compliances to the airworthiness requirements that are also associated with the TSO MPS can not be overlooked in the type design approval process.
- 4. Bring discrepancy into compliance before issuing type design approval.**
If the discrepancy of the TSO seat results in a finding of non-compliance to the aircraft's airworthiness regulations, then the aircraft must be brought into compliance before the type design approval can be issued.
If the discrepancy falls outside of the TSO MPS, then the TC ACO accepts FAA responsibility for overseeing the resolution with the TC applicant/holder and coordinating resolution with TSO ACO. The TSO ACO defers FAA responsibility for overseeing resolution to the TC ACO. The TC ACO coordinates corrective action (AD's) as necessary.
- 5. Is there a non-compliance on a previously approved seat installation?**
For TC applicants that have been issued type design approval for the seat and its installation, determine if there is a non-compliance of the aircraft to the applicable airworthiness regulations attributed to the seat and its installation. This does not imply that a separate and new evaluation should be done to find compliance to the airworthiness regulations on a previously approved type design. It recognizes that non-compliances are sometimes discovered on an aircraft that has already received type design approval. When those non-compliances are known, they must be addressed per the process outlined in the flowchart.
- 6. Has a TSO-only non-compliance been discovered?**
On rare occasions, a non-compliance to the TSO MPS that is not required by the airworthiness requirements is discovered by the TC applicant upon installation. This does not imply that a separate and new evaluation should be done to find compliance to the TSO on a previously approved TSO article. When those non-compliances to TSO

MPS that are not required by the airworthiness requirements are known, they must be addressed per the process outlined in the flowchart.

7. Aircraft eligible for type design approval.

If there are no non-compliances to either the applicable airworthiness regulations or the TSO then the aircraft is eligible for a type design approval.

8. Resolve discrepancy in a manner satisfactory to TSO ACO.

If there are no non-compliances to the applicable airworthiness regulations (including those that are coextensive with TSO MPS) but there is a non-compliance to the TSO (not coextensive with the airworthiness requirements), the aircraft is still eligible for a type design approval. In addition the non-compliance to the TSO must be resolved by the ACO that granted the TSO approval. In cases where the seat discrepancy involves production issues, the responsible MIDO must be notified so they can resolve the production issue. If the discrepancy is determined to be a TSO design issue then the ACO must require the TSO holder to bring the article into compliance with the TSO. The ACO can use appropriate engineering judgment to decide how soon the TSO design changes will be integrated into the TSO holder's production of seats.

If the discrepancy falls within the TSO MPS and outside of the airworthiness requirements, then the TSO ACO accepts FAA responsibility for overseeing the resolution with the TSO applicant/holder and coordinating resolution with TC ACO. In this case, the TC ACO defers FAA responsibility for overseeing resolution to the TSO ACO. The TSO ACO coordinates corrective action (AD's) as necessary. (Brussels may decide to rely upon New York ACO or Boston ACO to help with AD activity)

9. Does the non-compliance create an unsafe condition?

For a configuration that the TC applicant has previously been granted type design approval, all seat discrepancies that create non-compliances to the airworthiness regulations of an aircraft must be evaluated to determine if they constitute an unsafe condition.

It is not the intent of this memorandum to define what constitutes an "unsafe" condition. A determination as to whether an unsafe condition exists should be made by the appropriate ACO and the directorate responsible for the airworthiness standards for the aircraft.

Discrepancies that do not constitute an unsafe condition but are non-compliance issues should be evaluated on a case-by-case basis. Non-compliance issues can vary widely in their significance and shall require a safety assessment from the TSO and/or the TC applicant/holders and an aggressive plan for their resolution.

10. Resolve discrepancy in a manner satisfactory to TC ACO.

If the non-compliance does not result in an unsafe condition of the aircraft then the type design holder must resolve the non-compliance in a timely manner and satisfactory to the ACO that issued the type design approval. This resolution must occur before the aircraft's type design eligibility can be determined.

11. Initiate Airworthiness Directive in accordance with Part 39.

If it is determined that the discrepancy results in an unsafe condition then the ACO that issued the type design approval must initiate an Airworthiness Directive (AD) in accordance with 14 CFR Part 39.

12. Aircraft eligible for type design approval.

The resolution of the AD action will determine the aircraft that have continued type design eligibility and the aircraft that are eligible for a new type design approval.

Discrepancy reporting serves to enhance safety and improve the overall certification process as a tool in identifying systemic problems within the seat certification process for both the FAA and the seat industry. They should not serve as a forum to place blame on a particular organization.

Fundamentally, it is the responsibility of the party, FAA or non-FAA, identifying a seat discrepancy to bring it to the attention of other parties involved in the seat TSO and TC approval process. This is important so that resolutions can be developed that will have long term effect and avoid recurrence of the same problems.

Any questions or comments regarding this memo or its attachment should be directed to Hal Jensen, AIR-120, (202) 267-8807.

Attachment
Attachment

David Hempe
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Aircraft Certification Service

Type Certificate (TC)/ Technical Standard Order (TSO) Seat Issues and Their Resolution

Reporting Discrepancies in Seat Data

Attachment 1

When the domestic TSO applicant or TSO holder (also known as TSO applicant/holder) discovers a discrepancy...

- The TSO applicant or TSO holder notifies the TSO ACO and the TC applicant
- The TC applicant or TC holder notifies the TC ACO
- The TSO ACO notifies the TC ACO (this action completes the communication loop)

When the foreign TSO applicant/TSO holder discovers a discrepancy...

- The TSO applicant/holder notifies their local authority - foreign Civil Aviation Authority (CAA), TSO ACO, and TC applicant or TC holder (aka TC applicant/holder)
- TC applicant/holder notifies the TC ACO
- The TSO ACO verifies that CAA is aware of discrepancy (this action completes the communication loop internationally)
- The TSO ACO notifies the TC ACO (this action completes the communication loop domestically)

When the TSO ACO discovers a discrepancy...

- The TSO ACO notifies the TSO applicant/holder (and TSO applicant's/holder's local authority-CAA) and the TC ACO
- The TSO applicant/holder notifies the TC applicant/holder
- The TC ACO notifies the TC applicant/holder (this action completes the communication loop)

When the CAA for TSO applicant/holder discovers a discrepancy...

- The CAA notifies the TSO applicant/holder and the TSO ACO
- The TSO applicant/holder notifies the TSO ACO (this action completes the communication loop)
- The TSO ACO notifies the TC ACO
- The TSO applicant/holder notifies the TC applicant/holder
- The TC ACO notifies the TC applicant/holder (this action completes the communication loop)

When the TC applicant/holder discovers a discrepancy...

- The TC applicant/holder notifies the TC ACO and the TSO applicant/holder
- The TSO applicant/holder notifies the TSO ACO (and the CAA if foreign)
- The TSO ACO verifies that the CAA is aware of the discrepancy (this action completes the communication loop)
- The TC ACO notifies the TSO ACO (this action completes the communication loop)

When the TC ACO discovers a discrepancy...

- The TC ACO notifies the TC applicant/holder and the TSO ACO
- The TC applicant/holder notifies the TSO applicant/holder
- The TSO ACO notifies the TSO applicant/holder (and the TSO applicant's local authority - CAA)

Type Certificate (TC)/ Technical Standard Order (TSO) Seat Issues and Their Resolution

Resolving a Discrepancy Found on a TSO-Approved Seat

Attachment 2

