



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Application of TSO-C127a Marking
Requirements

Date: FEB 15 2000

From: Manager, Aircraft Engineering Division, AIR-100

Reply
Attn.
of:

To: Directorate Managers
Aircraft Certification Office Managers

Technical Standard Order (TSO) C127a, "Rotorcraft, Transport Airplane, and Normal and Utility Airplane Seating Systems" contains information regarding the marking of seats and seat system components needed to gain TSO approval. TSO-C127a incorporates Society of Automotive Engineers (SAE) document AS8049A and references 14 CFR part 21 - all of which specify marking requirements and optional marking considerations. The application of TSO required and optional markings is subject to interpretation. At the request of several seat manufacturers this memo was written to provide guidance to clarify the applicability of both mandatory and optional markings as they relate to seating systems.

The attachment lists those items considered mandatory and optional for each seating system area of concern. The list contains all mandatory items identified by TSO-C127a, SAE AS8049A, and 14 CFR § 21.607(d). Each section also shows a list of optional items often requested by the customer or desired by the manufacturer and are typical for that component of the seat system. These items are not required by TSO-C127a or 14 CFR § 21.607(d) and are listed to provide examples of items that might be considered for inclusion on any labels or markings.

We recommend that ACO Managers forward this memo and attachment to the appropriate industry representatives. Any questions or comments regarding this memo or its attachment should be forwarded through the ACO to Hal Jensen, AIR-120, (202) 267-8807.

Attachment


for James C. Jones

**Application of TSO-C127a Marking Requirements
and Optional Marking Considerations**

1. Marking Items on Manufacturer Seat Labels

Mandatory Items

- (a) Manufacturer name and address
- (b) Name, type, model or seat assembly part number
- (c) Date of manufacture
- (d) "Complies with TSO-C127a"
- (e) Seat type (A, B, C1, C2) and orientation (FF, RF, SF, or combination)
- (f) Restraint system part number
- (g) Seat cushion assembly (foam, fire blocking, cover) part number(s)
- (h) Approved seat pitch for Type A passenger seats

Optional Items

- (i) Seat assembly serial number
- (j) Manufacturer quality stamps
- (k) Customer seat part number
- (l) "See CMM for Installation Limitations"
- (m) "Complies with 14 CFR 25.853(c), effective 3/6/95"
- (n) Static load factors above those required by 14 CFR 25.561

2. Marking Items on Manufacturer Cushion and Cover Assembly Labels (cushion and cover considered a single item)

Mandatory Items

- (a) Manufacturer name and address
- (b) Seat cushion assembly (foam, fire blocking, cover) part number
- (c) "Complies with TSO-C127a"
- (d) "Complies with 14 CFR 25.853(c), effective 3/6/95"

Optional Items

- (e) Seat type (e.g. Type A)
- (f) Date of manufacture (e.g. 5/99)
- (g) Work order number (e.g. DOC #38973)
- (h) Revision level of cushion and cover assembly drawing
- (i) Manufacturer cage code (e.g. MFR CODE: 31218)
- (j) Provider of dress cover material (e.g. BAC Prop)
- (k) Cushion-cover compatibility label (e.g. "Cushion Assembly 2A7023-1GGZ complies with 14 CFR 25.853(c), effective 3/6/95, when Cover 2A7023-101GGZ is used with Cushion 2A7020-1")

3. Marking Items on Manufacturer Cushion (Foam Unit) Part Labels and Dress Cover Assembly Labels (cushion and cover considered different items)

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Mandatory Items

- (a) Manufacturer name and address
- (b) Part number
- (c) "Complies with TSO-C127a"
- (d) "Complies with 14 CFR 25.853(c), effective 3/6/95"

Optional Items

- (e) Seat type (e.g. Type A)
- (f) Manufacturer address
- (g) Date of manufacture (e.g. 5/99)
- (h) Work order number (e.g. DOC #38973)
- (i) Revision level of cushion and cover assembly drawing
- (j) Manufacturer cage code (e.g. MFR CODE: 31218)
- (k) Provider of cover material (e.g. BAC Prop)
- (l) Cushion-cover compatibility label (e.g. "Cushion Assembly 2A7023-1GGZ complies with 14 CFR 25.853(c), effective 3/6/95, when Cover 2A7023-101GGZ is used with Cushion 2A7020-1")
- (m) "Seat certification is invalid unless manufacturer approved cushion is used"

4. Marking Items on Labels for Manufacturer Easily Removable or Interchangeable Parts (other than cushion and cover assemblies, cushion assemblies, and the restraint system)

Mandatory Items

- (a) Manufacturer name
- (b) Part number
- (c) "Complies with TSO-C127a"

Optional Items

- (d) "Complies with 14 CFR 25.853(c), effective 3/6/95"
- (e) Seat type (e.g. Type A)

Part Numbering

Part numbers need not include the color code designations on seat cushion covers and restraints if the color coding identifies color or pattern only and includes no identification of material composition. However, if a change in color or pattern identified by this coding is known or suspected to adversely effect the flammability characteristics of the material to which it is applied then the color coding must be included in the marking. Additionally if the effects to material flammability of changing a color are unknown then the TSO applicant should provide the necessary data to the responsible ACO to make this determination.

Seat labels must be marked with the appropriate seat cushion and cover assembly part numbers (item 1.(g)) or the individual part numbers for both the seat cushion and the seat cushion cover. In the case where there is no number for the combination of the seat and the cover as an assembly then the individual part numbers for both the seat cushion and the seat cushion cover must be included.

The seat label should include all seat cushion assembly part numbers which have an effect on occupant injury criteria as described in TSO-C127a which includes HIC, lumbar load, femur load, upper torso restraint loads, and lap belt position on pelvis during impact. As a minimum this would probably include seat pan cushion for lumbar and backrest cushion for lap belt positioning. Including a headrest cushion part number on the seat label would only be necessary if rebound HIC is significant during dynamic testing.

Interchangeable Parts and Components

Paragraph "b." under MARKING in TSO-C127a was included as part of the newest revisions to TSO boilerplate information. Although the intent of this paragraph is easier to apply to TSO parts that are less performance sensitive to interchangeable parts, it must still be considered in regards to TSO-C127a. The TSO applicant should provide the responsible ACO with a determination of those parts it considers interchangeable. For any parts the applicant is uncertain in regards to being classified as interchangeable, assistance from the ACO should be requested.

The interpretation of paragraph "b." under MARKING in TSO-C127a in regards to seats is to insure that elements of a specific seat model that can be interchanged with other seat models can be readily traced back to the revision of TSO-C127 to which they were approved. This marking requirement will help to identify any occurrence of "swapping" parts from different seats approved to different levels of TSO-C127 (or TSO-C39) resulting in a seat of unknown occupant protection.

In any evaluation of an interchangeable part the primary issue is whether it influences occupant protection. For instance, if the interchangeable component in question were a seat leg sub-assembly then certainly this element has an impact on seat performance and ultimately occupant protection. If the interchangeable component in question were a seatback recline return spring assembly that added little or no contribution to overall seat stiffness and therefore did not appreciably influence deformation limits then the component would not need to be marked per 4.b. When determining those interchangeable parts that

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need to be marked, consider parts that are likely to be replaced in service and the extent to which changing that element influences the overall performance of the seat. The degree to which a seat component change will influence performance may not be completely recognized by the maintenance, service technician, or aircraft owner in the field.

It is not the intent to have every possible part or component that could be considered interchangeable marked with TSO-C127a. Only those parts that are critical to occupant safety and are easily replaced need a label. If a seat part to be replaced would normally require that a mechanic consult the CMM for instructions then an acceptable method would be to incorporate that list of parts in the CMM with a brief description explaining why these parts are critical to occupant safety.

Finally there are no absolute rules in regards to marking of interchangeable parts so there will be instances which create uncertainty in the interpretation of paragraph "b." under MARKING in TSO-C127a. One example is for airlines that have seats that are approved to TSO-C127a that use the same spare parts as seats that were approved to TSO-C39b. Does that mean that the spares with the same part number but no TSO-C127a label cannot be used for replacement on a TSO-C127a seat? Remember that the intent is to identify any cases where the replacement of parts could produce a seat of unknown (or reduced) safety. In this case replacement with the same part number, even though unmarked to TSO-C127a, should be considered acceptable.

Flammability Labels

Items 2.(d) and 3.(d) specify that the label showing compliance to the flammability requirements for TSO-C127a read "Complies with 14 CFR 25.853(c), effective 3/6/95". TSO-C39b and TSO-C127 listed the label requirement as "Complies with 14 FAR 25.853(c), effective 11/26/84". Some manufacturers have asked if the "CFR" used in TSO-C127a is acceptable for use in place of the "FAR" stipulated in TSO-C39b and TSO-C127. CFR (Code of Federal Regulations) is an acceptable substitute for FAR (Federal Aviation Regulations) for TSO marking requirements but is not a mandatory replacement of FAR where previously allowed. Although FAR is a term that is used to indicate the regulations, the correct reference should be to the Code of Federal Regulations so technically "CFR" is correct.

Questions have also arisen in regards to the date of effectivity that is associated with the different TSO labels. It is acceptable to replace the label "Complies with 14 FAR 25.853(c), effective 11/26/84" with "Complies with 14 CFR 25.853(c), effective 3/6/95" on seat cushions since the requirements under each set of regulations have remained the same for seat cushions. However, this may not apply to other cabin interior materials and citing the more recent effectivity date may not be acceptable for other materials or components. In general the regulations in place on a given date may not be the same as those in place on a later date even though they are referring to the same CFR section. As the CFR evolves a section may be altered to the extent that the meaning or applicability of the regulation has changed. Any questions regarding this issue should be directed through the responsible ACO.

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As shown above the effective date quoted is "3/6/95" although TSO-C127a lists the effective date as "2/2/95". February 2, 1995 is the date amendment 25-83 was published in the Federal Register but the effective date of the rule is "3/6/95". Therefore it is acceptable and preferred to use "3/6/95" in place of "2/2/95". TSO-C127a was inadvertently issued with this error.

Backward Compatible Part Labeling

In order to reduce the amount of labeling required among different levels of TSO approval, backward compatible labeling for seat cushions and covers is acceptable. Seat cushions and covers that have been approved to TSO-C127a are acceptable for use in seats approved to TSO-C127 and TSO-C39b. This will promote the use of the latest and safest product among earlier seat designs. The basis for backward compatibility is with the understanding that using a part approved to TSO-C127a provides an equivalent or higher level of safety than the parts approved under TSO-C127 or TSO-C39b. Should any evidence be found to the contrary due to using backward compatible parts it is required that this matter be brought to the attention of the manager of the responsible ACO.