



# Federal Aviation Administration

---

---

## Memorandum

Date: April 16, 2009

To: See Distribution

From: Manager, Transport Airplane Directorate, Aircraft Certification Service,  
ANM-100

Prepared by: Jeff Gardlin

Subject: Policy Statement on certification for flammability of lightweight seat  
cushions

Memo No.: ANM-115-07-002

Regulatory Reference: 14 CFR 25.853(c), Advisory Circular 25.853-1

---

---

### Summary

This policy memorandum provides alternative flammability certification criteria for “lightweight” seat cushions, when tested in accordance with Appendix F, part II of part 25. Specifically, this policy defines what constitutes a “lightweight” seat cushion, and provides adjusted pass/fail criteria.

### Definition of Key Terms

In the policy statement below, the formatting (*italics*, plain text, or [square brackets]) and terms used (“must,” “should,” or “recommend”) have a specific meaning that is explained in Attachment 1.

### Current Regulatory and Advisory Material

*Section 25.853(c) requires that seat cushions (except for those on flight crewmember seats) comply with the oil burner test requirements of Appendix F, part II of part 25. In order to satisfy the requirement, seat cushions must have an average percentage weight loss of no more than 10%, and a burn length of no more than 17 inches. Advisory circular 25.853-1 provides methods of compliance for this section and the test method. As with all paragraphs in § 25.853, paragraph (c) provides for other equivalent test methods in addition to the test method in Appendix F, part II. This provision allows the FAA to accept deviations from the prescribed test methods without a formal equivalent level of safety finding, once they have been found acceptable.*

## Relevant Past Practice

Historically, seat cushions have been treated the same, regardless of their weight/density. The policy and guidance that exist for seat cushion tests have applied equally to all seat cushions, regardless of their type. Industry has expressed concern that the test method unfairly screens out lightweight cushions. For example, if the absolute weight loss in an oil burner test is consistent regardless of the initial weight of the test samples, this becomes a higher percentage weight loss, the lighter the initial weight of the test samples. This is likely because outer upholstery fabric contributes the same absolute amount to the weight loss, for cushions that have satisfactory performance. The relative contribution of the upholstery can be assessed by taking the pretest ratio of the weight of the core cushion material to the upholstery fabric.

Because some of the cushions in question seemed to have desirable fire resistant properties, the FAA conducted research to see whether alternative criteria might be appropriate for certain lightweight seat cushions. The program consisted of full-scale and laboratory scale fire tests to assess the impact on survivability of various cushion types, and correlate that with laboratory results. The results of this research are documented in DOT/FAA/AR-06/49, dated March 2007, and provide the basis for this policy.

## Policy

The following policy may be used in establishing the acceptability of lightweight seat cushions in accordance with § 25.853(c), and Appendix F, part II. In order to establish equivalent criteria as compared with cushions that literally satisfy Appendix F, both the weight loss and burn length criteria need to be adjusted. This is because weight loss alone does not capture the tendency of the cushion to spread a fire. The current pass/fail criteria, i.e., less than 10% weight loss, and no more than 17” burn length, provide a good indicator that the fire is having a relatively minor effect on the cushion. If the weight loss percentage is to be increased, another way of assessing the overall effect of the fire is needed. The burn length becomes a more direct indicator of the tendency to spread the fire. Therefore, while the weight loss percentages are increased based on the weight ratio of the cushion specimen set, the burn length criteria are decreased. The higher the percentage weight loss allowable, the more stringent the burn length criteria. Judging from the research data, there are several cushion types that provide satisfactory fire safety but would not be usable without these criteria.

1. The test method in Appendix F, part II (or DOT/FAA/AR-00/12, the Aircraft Materials Fire Test Handbook, chapter 7) is unchanged. Only the pass/fail criteria are altered if the seat satisfies the “lightweight” designation below.
2. A lightweight seat cushion is defined as one for which the total weight of the specimen set required by Appendix F, part II is less than 3 lbs.
3. The following table provides revised pass/fail criteria:

## Acceptance Criteria

Total specimen set weight (lbs)	Average Ratio of Cushion Weight to Cover Weight	Permissible Weight Loss (%)	Permissible Burn Length (Inches)
Less than 3	1.8 to 2.0	12	16
	1.5 to 1.79	14	15
	1.1 to 1.49	16	14
	.60 to 1.09	18	13
	0 to .59	20	12

4. Substantiation of substitute outer upholstery using the similarity provisions of Appendix F, part II should also consider the ratio noted above. The ratio of core cushion weight to outer fabric weight should be added to the criteria for similarity contained in AC 25.853-1. Note that the greater this ratio is (meaning the lighter the upholstery), the less allowable weight loss. On the other hand, the lower the ratio (heavier upholstery), the less allowable burn length. Substitute outer upholstery may therefore have slightly more restriction if the policy in this memorandum is utilized.
5. A lightweight cushion that satisfies the existing pass/fail criteria in Appendix F, part II is not required to follow the above criteria for lightweight cushions.

### Effect of Policy

The general policy stated in this document does not constitute a new regulation. The FAA individual who implements policy should follow this policy when it is applicable to a specific project. Whenever a proposed method of compliance is outside this established policy, that individual has to coordinate it with the policy issuing office using an issue paper. Similarly, if the implementing office becomes aware of reasons that an applicant's proposal should not be approved, the office must coordinate its response with the policy issuing office.

Applicants should expect that certificating officials would consider this information when making findings of compliance relevant to new certificate actions. In addition, as with all advisory material, this statement of policy identifies one means, but not the only means, of compliance.

### Implementation

This policy discusses compliance methods that should be applied to type certificate, amended type certificate, supplemental type certificate, and amended supplemental type certification programs. The compliance methods apply to those programs with an application date that is on or after the effective date of the final policy. If the date of application precedes the effective date of the final policy, and the methods of compliance have already been coordinated with and approved by the FAA or its designee, the applicant may choose to either follow the previously acceptable methods of compliance or follow the guidance contained in this policy.

**Conclusion**

Note that use of this guidance is entirely voluntary. The criteria of Appendix F, part II can be applied to any seat cushion, regardless of whether it is lightweight as defined in this policy. If the cushion is lightweight, however, this guidance may provide a means of approval that did not previously exist.

/s/

Ali Bahrami

Attachment: Definition of Key Terms

**Distribution List:**

Manager, Los Angeles Aircraft Certification Office, ANM-100L

Manager, Denver Aircraft Certification Office, ANM-100D

Manager, Seattle Aircraft Certification Office, ANM-100S

Manager, Anchorage Aircraft Certification Office, ACE-115N

Manager, Wichita Aircraft Certification Office, ACE-115W

Manager, Chicago Aircraft Certification Office, ACE-115C

Manager, Atlanta Aircraft Certification Office, ACE-115A

Manager, Ft. Worth Airplane Certification Office, ASW-150

Manager, Ft. Worth Special Certification Office, ASW-190

Manager, New York Aircraft Certification Office, ANE-170

Manager, Boston Aircraft Certification Office, ANE-150

Manager, International Branch, ANM-116

Manager, Brussels Aircraft Certification Staff, AEU-100

Manager, Standardization Branch, ANM-113

Manager, Rotorcraft Directorate Standards Staff, ASW-110

Manager, Small Airplane Directorate Standards Office, ACE-110

Manager, Engine and Propeller Directorate Standards Staff, ANE-110

## Definition of Key Terms

Table A-1 defines the use of key terms in this policy statement. The table describes the intended functional impact, and the formatting used to highlight these items.

- The term “must” refers to a regulatory requirement that is mandatory for design approval. Text communicating a requirement is in *italics*.
- The term “should” refers to instructions for a particular method of compliance. If an applicant wants to deviate from these instructions, he has to coordinate the alternate method of compliance with the Transport Standards Staff using an issue paper. There is no special text formatting used for methods of compliance.
- The term “recommend” refers to a recommended practice that is optional. Enclose recommendations in [ ] brackets.

Table A-1 Definition of Key Terms

	<b>Regulatory Requirements</b>	<b>Acceptable Methods of Compliance</b>	<b>Recommendations</b>
<b>Language</b>	Must	Should	Recommend
<b>Format</b>	<i>Italics</i>	Regular text (No special formatting)	[Square brackets]
<b>Functional Impact</b>	No Design Approval if not met	Alternative has to be approved by issue paper.	None, because it is optional

Examples from policy on Power Supply Systems for Portable Electronic Devices (PSS for PED):

- *Even though PSS for PED systems may use wiring that is produced for the consumer market, the wiring must meet the flammability requirements of § 25.869.*
- Although multiple power control switches may be used (e.g., zonal control of system power), there should be a single master switch that allows for the immediate removal of power to the entire PSS for PED
- [We recommend that you provide a means of indication to enable the cabin crew to determine which outlets are in use or which outlets are available for use.]