SKANDIA

Flammability Testing & Certification Services

A resource for Skandia customers to improve their Flammability and Certification experience

Experience the Skandia Difference

Interactive Flammability Testing & Certification Services Resource

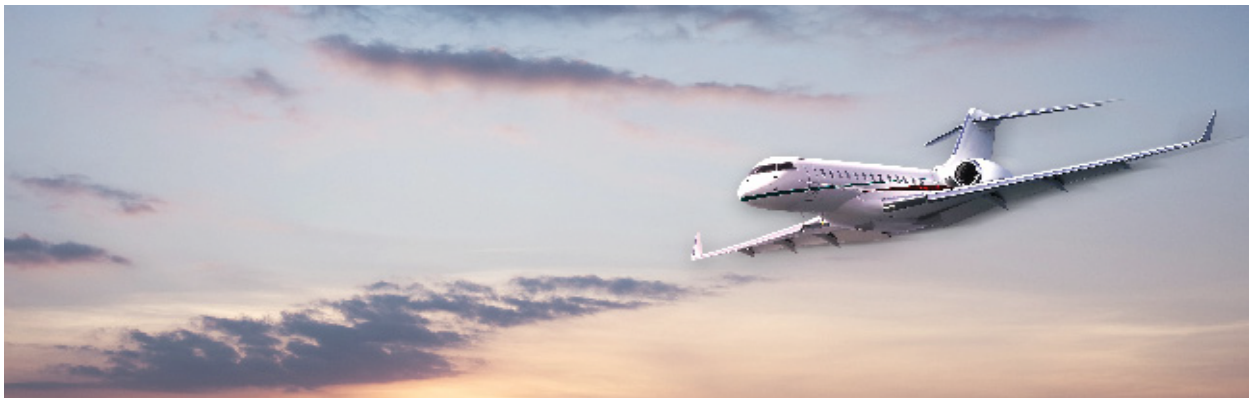
www.flammability.skandiainc.com

A single online resource providing you everything necessary to prepare for your flammability testing and certification.

- Answers to 'Frequently Asked Questions' guiding you through preparation process.
- Guidelines to understanding FAA Regulations 14 CFR 25.853 (a), (c) and (d) for Part 25 aircraft.
- A comprehensive list of all necessary testing preparation checklists in an interactive format.

Skandia's online interactive resource allows you save your work progress and retrieve as needed. You and our engineering team will be provided a version of your project's completed information for easy reference.

Introduction



Dear Valued Skandia Customer:

This manual is designed to give guidance and understanding of FAA Regulations 14 CFR 25.853 (a), (c) and (d) dealing with Part 25 aircraft seat flammability requirements in layman terms.

Skandia has also made available an online and interactive version of all the information and checklists you may need in preparing your flammability testing. The online resource can be found at: www.flammability.skandiainc.com. We consider this printed resource guide to be supplemental (yet identical and completely usable) to our online Flammability Testing & Certification Services tool.

The online & interactive information allows Skandia customers to complete necessary checklist information, save progress and retrieve as needed, as well as provide you and our engineering team a version of your project's completed information.

In both versions of these resources, we have included guidance for 14 CFR 25.856 and 14 CFR 23.856 testing for thermal/acoustic insulation. These manuals are considered guidance material. If you have regulatory questions, please refer them to your local FAA Office. Keep in mind, any materials going into an aircraft will have to meet some form of flammability requirement and that the materials have to be tested in the "as installed state."

Sincerely,
Jarod Triplett
President

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Rules, Definitions, & Highlights

The Rules
14 CFR 25.853 Compartment Interiors

For each compartment occupied by the crew or passengers, the following apply:

a) Materials (including finishes or decorative surfaces applied to the materials) must meet the applicable test criteria prescribed in part I of appendix F of this Part, or other approved equivalent methods, regardless of the passenger capacity of the airplane.

b) Reserved

c) In addition to meeting the requirements of paragraph (a) of this section, seat cushions, except those on the flight crew member seats, must meet the test requirements of Part II of the appendix F of this Part, or other equivalent methods, regardless of the passenger capacity of the airplane.

d) Except as provided in paragraph (e) of this section, the following interior compartments of airplanes with passenger capacities of 20 or more must also meet the test requirements of parts IV and V of appendix F of this part, or other approved equivalent method, in addition to the flammability requirements prescribed in paragraph (a) of this section:

   1) Interior ceiling and wall panels, other than lighting lenses and windows;

   2) Partitions, other than transparent panels needed to enhance cabin safety;

   3) Galley structure, including exposed surfaces of stowed carts and standard containers and the cavity of walls that are exposed when a full complement of such carts or containers is not carried; and

   4) Large cabinets and cabin stowage compartments, other than under-seat stowage compartments for stowing small items such as magazines and maps.

e) The interiors of compartments, such as pilot compartments, galleys, lavatories, crew rest quarters, cabinets and stowage compartments, need not meet the standards of paragraph (d) of this section, provided the interiors of such compartments are isolated from the main passenger cabin by doors or equivalent means that would normally be closed during an emergency landing condition.

Classification
9G & 16G Seats

Seats are manufactured to the Aircraft Type Certificate (TC), Supplemental Type Certificate (STC) or a Technical Standard Order (TSO). The data tag on the seat should clarify which.

TSO-C39 is for 9g seats and the TSO generally only certifies the seat frame.

TSO-C127a is for 16g seats and the TSO certifies the completely upholstered seat and must have 14 CFR 25.853 (c) testing to meet the TSO. TSO-C127a was created by the addition of 14 CFR 25.562 in amendment 25-64. Any part 25 aircraft certified after 6/16/88 requires either 16g seats that meet TSO-C127a or seats meeting 14 CFR 25.562 that are TC to the aircraft.

Aircraft Operation

Part 91 Aircraft only require 14 CFR 25.853 (c) if they have 16g seats.

Part 135 Aircraft do require that the seats in these aircraft meet 14 CFR 25.853 (c).

Guidance Material

14 CFR 25.562

- 14 CFR 25.853
- 14 CFR Part 25 Appendix F Part I and Part II
- Aircraft Materials Fire Test Handbook DOT/FAA/AR-00/12
- Advisory Circular AC 25.853-1 Flammability Requirements for Aircraft Seat Cushions
- Advisory Circular AC 25-17A Transport Airplane Cabin Interiors
- Crash Worthiness Handbook
- Advisory Circular AC 21-25B Approval of Modified Seating
- Systems Initially Approved under a Technical Standard Order
- FAA Policy Statement PS-ANM-25.853-01
- FAA Order 8110.113
- FAA Memorandum 97-112-39

General FAQ

What is a 16g seat and which aircraft have them?

Any Part 25 Transport category aircraft certified after 1988 is required to have passenger seats that meet TSO-C127a or be Type Certificated with seats that meet SAE 8049A and 14 CFR 25.562

All 16g aircraft seats are certified for use in aircraft as a complete upholstered seat. Any changes to the seat, including upholstery, will affect the aircraft's certification. Even minor changes, such as changing the leather color, are considered a modification to the seat and its certification.

How do you re-upholster 16g seats?

First, Skandia suggests that the shop planning on re-upholstering 16g seats contact either the seat manufacturer if the seat has TSO or the aircraft manufacturer if the seat is part of the aircraft type certificate.

If neither is willing to provide guidance, then the FAA Advisory Circular 21-25B "Approval of Modified Seating Systems Initially Approved under a Technical Standard Order" would need to be followed. If you have a TSO seat and desire to follow AC 21-25B, Skandia can provide guidance. Skandia has developed a procedure to show compliance to the required regulations for "dress cover only" change.

You may want to contact your FAA FSDO (Flight Standards District Office) or FAA ACO (Aircraft Certification Office) for additional guidance.

Flammability testing will always be required when changing materials, but this is not the only requirement. It is the modifier's responsibility to ensure that the modified article is approved by the FAA.

16G Aircraft Seat Manufacturer Models

Aircraft seats are either manufactured and approved by technical standard order (TSO) or type certificate (TC) of aircraft (please check seat data tag)

The following is a comprehensive list of aircraft that have 16g seats:

Bombardier

- Challenger CL-300 (Continental)
- Global Express
- Global 5000

Cessna

- Citation seats are covered under the aircraft TCDS
  (Type Certificate Data Sheet)
- Mustang, Model 510
  (Normally Category Part 23)
  (see TCDS note 4)
- Citation Excel/XLS 560 (S/N 560-5001 and up)
- Citation Sovereign 680
- Citation X 750
- Citation Columbus 850

Dassault

- 2000
- 2000EX
  (2000EX EASy and 2000DX are still 2000EX with additional modification packages for marketing designation)
- 7X

Galaxy Aerospace

- Astra/Galaxy

Gulfstream

- G100
- G150
- G200
- G280
- Gulfstream V
- G450
- G550
- G650

Hawker Beechcraft

- 4000

Learjet

- 40
- 45
- 70
- 75
- 85

Embraer

- 135BJ
- 145BJ

Skandia Capabilities

Skandia's in-house Flammability Testing is performed by highly trained technicians utilizing state-of-the-art equipment. Rapid turnaround times result from our in-house staff of DERs and DARs with the authority to perform conformity inspections and issue 8110-3 flammability certification

14 CFR 25.853 (a)

- 45 Degree Panel Testing
- 60 Degree Wire Testing
- 12- and 60-Second Composite Panel Testing
- Test to Boeing and Airbus Specifications

14 CFR 25.853 (c)

- Total Fireblocking Test Program

14 CFR 25.853 (d)

- Heat Release
- Smoke Density

14 CFR 25.853 (h)

- Trash Containers

14 CFR 25.856 (a)

- Radiant Panel Testing with DER Certification

Plus

- Experienced Staff DERs and DARs
- State-of-the-Art Testing Equipment
- Re-qualify Existing Foam Cushions with New Dress Covers
- Test Plan Generation
- Test Specimen Fabrication
- Conformity Inspection
- 8110-3 Approval
- Similarity Approvals

Features & Benefits

Skandia's experience as an aircraft interiors specialist has enabled our insider's understanding of the aircraft refurbishing industry. From this foundation, Skandia has emerged as a high quality supplier, delivering products and services in an ASAP environment.

Quality Assurance

Our commitment to quality ensures services are performed accurately and products arrive at our customer's dock on time, with the required documentation.

Flammability Testing

Quick turnaround with FAA-approval for flammability testing of aircraft interior materials is achieved by Skandia's staff and sophisticated testing equipment. Full-time personnel include: experienced project coordinators, lab personnel, staff DERs and DARs with the authority to perform in-house conformity inspections and issue FAA-approval for a broad range of tests. Flammability certification is performed quickly and efficiently.

Skandia offers a wide range of Flammability Testing and Certification Services for all aviation needs.

Radiant Panel Testing Facts

for Thermal/Acoustic Insulation

Part 23 Aircraft – Radiant Panel Testing

As of December 2, 2011, the FAA added the requirement for Part 23 aircraft thermal/acoustic materials to meet the radiant panel test requirements. This testing requirement is the same as what has been previously required for Part 25 aircraft. 14 CFR 23.856 Thermal/Acoustic insulation materials states – "Thermal/acoustic materials installed in the fuselage must meet the flame propagation test requirements of part II of Appendix F to this part or other approved equivalent test requirements. This requirement does not apply to "small parts" as defined in 14 CFR 23.853 (d)(3)(v)." [Amdt 23-62, 76 FR 75759, December 2, 2011]

The major difference between the Part 23 14 CFR 23.856 and 14 CFR 25.856(a) is that "Part 23" 23.856 only applies to newly type certificated aircraft which the type design includes Part 23 amendment 23-62. Older Part 23 aircraft are not affected by this new rule. If you are replacing thermal/acoustic insulation, you are not required to meet this rule. This testing is only required for newly type-certificated aircraft that are certified after the December 2, 2011 rule.

The new rule, 14 CFR 23.856, is the same test and requirements as defined in 25.856(a) which is for flame propagation testing. The detailed FAQ questions that follow apply to both 23.856 and 25.856(a).

Part 25 Aircraft – Radiant Panel Testing

As of September 2, 2005, the new FAA standard for Thermal/Acoustic materials used in Transport Category Airplanes went into effect per www.fire.tc.faa.gov/pdf/handbook/00-12_ch24new.pdf. See page 16.

From Part 91 – General Operating and Flight Rules, §91.613 Materials for Compartment Interiors. For transport category airplanes type certificated after January 1, 1958:

- For airplanes manufactured before September 2, 2005, when thermal/acoustic insulation materials are installed in the fuselage as replacements after September 2, 2005, those materials must meet the flame propagation requirements of 14 CFR Part 25.856(a), referred to as Radiant Panel.

- For airplanes manufactured after September 2, 2005, thermal/acoustic insulation materials installed in the fuselage must meet the flame propagation requirements of 14 CFR Part 25.856(a), effective September 2, 2003.

From Part 121 – Operating Requirements: Domestic, Flag and Supplemental Operations §121.312 Materials for Compartment Interiors:

- For airplanes with a passenger capacity of 20 or greater, manufactured after September 3, 2007, thermal/acoustic insulation materials installed in the lower half of the fuselage must meet the flame penetration resistance requirements of 14 CFR Part 25.856, which was later postponed to September 2, 2009.

Radiant Panel Testing Summary

The FAA extended, by 24 months, the date for operators to comply with the fire penetration resistance requirements of thermal/acoustic insulation used in transport category airplanes manufactured after September 2, 2007. This extension was from September 2, 2007 to September 2, 2009. This action was necessary to allow airframe manufacturers enough time, after getting an acceptable certification test facility, to select and certificate appropriate installations.
For additional information: www.epa.gov/epa-impact/2007/january/day-12/i338.htm

25.856(a) Thermal/Acoustic Insulation Materials Testing

Thermal/acoustic insulation material installed in the fuselage must meet the flame propagation test requirements of Part VI of Appendix F Part 25, or other approved equivalent test requirements. This requirement does not apply to “small parts,” as defined in Part I of Appendix F Part 25.

Summary

The FAA has upgraded flammability standards for thermal/acoustic insulation materials used in transport category airplanes. These standards include new flammability tests and criteria that address flame propagation and entry of an external fire into the airplane. This action was necessary because current standards did not realistically address situations in which thermal/acoustic insulation materials contributed to the propagation of a fire.

What kind of test is it?

Think of it as a vertical burn test in a toaster oven. Flame is applied for 15 seconds down on the sample which is under a radiant heat source. This test is more demanding than the 12- and 60-second verticals and measures both flame propagation and after flame time.

Per the Advisory Circular, under certain conditions, we are given the latitude to apply the burner flame for 30 seconds or 60 seconds.

As with any test method, there will be good material that for some unknown reason has a slight after flame and does not meet the pass/fail requirements. To reach passing criteria, should any of the initial three specimens fail; a minimum of seven additional specimens may be tested. None of the additional specimens can fail either criterion. In addition, the average of all of the specimens, including the original failed specimen, must meet the pass/fail criteria as called out in AC25.856-1.

What materials have to be tested?

Thermal/acoustic insulation in the aircraft that cannot be accessed in-flight (entry curtains, under carpet pads do not have to meet this requirement).

Any fiberglass insulation, bagged or not, tapes used to assemble or repair insulation bags, skin damping materials, hook and loop (Velcro) used in the assembly and installation of insulation, sound blankets, or any other materials in the fuselage for thermal/acoustic insulation.

What about having to meet 14 CFR 25.853 (A) and (D)?

Thermal/acoustic materials may have to meet additional testing requirements dependent on what they are attached to. If thermal/acoustic material is glued, adhered, or attached to something that must meet the requirements 14 CFR 25.853, then it will need to be tested as a complete (composite) build-up as installed to 14 CFR 25.853(a) and (d).

14 CFR 25.853(a) is the Vertical Burn requirement. If the aircraft has 20 or more seats, then it would also have to meet 14 CFR 25.853(d) Heat Release and Smoke Density requirement.

Does existing material have to be replaced?

No, only new materials being installed after September 2, 2005 have to meet this requirement. Aircraft do not have to be retrofitted.

What aircraft are affected?

Aircraft that were built to CFR Part 25 requirements (includes commercial airliners, larger corporate aircraft, etc.).

What information is needed for testing to 14 CFR 25.856(A)?

A checklist can be downloaded from our website at SkandiaInc.com in the Forms and Checklists section. Specimen size is 12.5" x 23" for flexible materials; 11.5" x 23" for rigid materials and 4" x 12" for hook and loop fasteners. Three specimens are required for each test.

Testing Of Tape

A separate procedure has been developed to show compliance for the use of tape. Each type of tape requires qualification on each material on which it is used. If tape is to be tested, please follow specimen fabrication of draft Advisory Circular 25.856-1 on the Fire Tech Center website www.fire.tc.faa.gov

Testing of Hook And Loop Fasteners

A test procedure has been developed to simplify the certification process for hook and loop fasteners (Velcro). Hook and loop specimens are tested as mated components. Specimen sizes are 4" x 12". Three specimen of each are required. If hook and loop fastener (Velcro) is to be tested, please follow specimen fabrication of draft Advisory Circular 25.856-1 on the Fire Tech Center website www.fire.tc.faa.gov and later revisions.

Who has to comply?

Anyone installing or changing thermal/acoustic insulation after September 2, 2005 and aircraft manufacturers building new aircraft after September 2, 2005 must comply with the regulations.

Can I get an FAA 8110-3 form for this test?

An FAA Form 8110-3 can be issued for aircraft specific for U.S. registered or U.S. State of Design aircraft when a burn test is in support of an FAA project or in support of a major repair or alteration. Many of the thermal/acoustic insulation materials are used in combinations and must be tested in a composite build-up form. In this case Skandia can provide a test plan for the materials or accept customer conformed specimens for testing.

Composite Panel Testing Facts

Composite panel burn testing and why it is required

Single element vertical burn tests do not meet all of the requirements for installing materials in aircraft or on aircraft seating. The following is a look at the rule and details on what is required, though each FAA Flight Standard District Office or Aircraft Certification Office may have slight variations or interpretation. This information is for guidance only and any specific questions should be directed to your local FAA FSDO or ACO office. Additional reference materials are Advisory Circulars AC 25.853-1, AC 21-25B, AC 23-2A and Aircraft Materials Fire Test Handbook DOT/FAA/AR-00/12.

The rule §25.853 Compartment interior

For each compartment occupied by the crew or passengers, the following apply: Materials (including finishes or decorative surfaces applied to the materials) must meet the applicable test criteria prescribed in Part I of Appendix F of this part, or other approved equivalent methods, regardless of the passenger capacity of the airplane.

Frequently Asked Questions

What and how is it to be complied with appendix f to part 25?

Part I – Test Criteria and Procedures for Showing Compliance with §25.853, or §25.855 (a) Material test criteria

(1) Interior compartments occupied by crew or passengers.

> *(i) Interior ceiling and wall panels, partitions, galley structure, large cabinet walls, structural flooring, and materials used in the construction of stowage compartments (other than under-seat stowage compartments and compartments for stowing small items such as magazines and maps) must be self-extinguishing when tested vertically in accordance with the applicable portions of Part I of this appendix. The average burn length may not exceed 6 inches and the average flame time after removal of the flame source may not exceed 15 seconds. Drippings from the test specimen may not continue to flame for more than an average of 3 seconds after falling. (60-second burn)*

(ii) Floor covering, textiles (including draperies and upholstery), seat cushions, padding, decorative and non-decorative coated fabrics, leather, trays and galley furnishings, electrical conduit, air ducting, joint and edge covering, liners of Class B and E cargo or baggage compartments, floor panels of Class B, C, D or E cargo or baggage compartments, cargo covers and transparencies, molded and thermo-formed parts, air ducting joints, and trim strips (decorative and chafing), that are constructed of materials not covered in subparagraph (iv) below, must be self-extinguishing when tested vertically in accordance with the applicable portions of Part I of this appendix or other approved equivalent means. The average burn length may not exceed 8 inches, and the average flame time after removal of the flame source may not exceed 15 seconds. Drippings from the test specimen may not continue to flame for more than an average of 5 seconds after failing. (12-second burn)

(iv) Clear plastic windows and signs, parts constructed in whole or part of elastomer materials, edge lighted instrument assemblies consisting of two or more instruments in a common housing, seat belts, shoulder harnesses, and cargo and baggage tie-down equipment, including containers, bins, pallets, etc., used in passenger or crew compartments, may not have an average burn rate greater than 2.5 inches per minute when tested horizontally in accordance with the applicable portions of this appendix. (horizontal)

(v) Except for small parts (such as knobs, handles, rollers, fasteners, clips, grommets, rub strips, pulleys, and small electrical parts) that would not contribute significantly to the propagation of a fire and for electrical wire and cable insulation, materials in items not specified in paragraphs (a)(1)(i), (ii), (iii), or (iv) of part I of this appendix may not have a burn rate greater than 4.0 inches per minute when tested horizontally in accordance with the applicable portions of this appendix. (horizontal)

(b) Test Procedures–(2) Specimen configuration

Except for small parts and electrical wire and cable insulation, materials must be tested either as section cut from a fabricated part as installed in the airplane or as a specimen simulating a cut section, such as a specimen cut from a flat sheet of the material or a model of the fabricated part. The specimen may be cut from any location in a fabricated part; however, fabricated units, such as sandwich panels, may not be separated for test. Except as noted below, the specimen thickness must be no thicker than the minimum thickness to be qualified for use in the airplane. Test specimens of thick foam parts, such as seat cushions, must be ½-inch in thickness. Test specimens of materials that must meet the requirement of Paragraph (a)(1)(v) of Part I of this appendix must be no more than 1/8-inch in thickness.

Electrical wire and cable specimens must be the same size as used in the airplane. In the case of fabrics, both the warp and fill direction of the weave must be tested to determine the most critical flammability condition. Specimens must be mounted in a metal frame so that the two long edges and the upper edge are held securely during the vertical test prescribed in subparagraph (4) of this paragraph and the two long edges and the edge away from the flame are held securely during the horizontal test prescribed in subparagraph (5) of this paragraph. The exposed area of the specimen must be at least 3 inches wide and 12 inches long, unless the actual size used in the airplane is smaller. The edge to which the burner flame is applied must not consist of the finished or protected edge of the specimen but must be representative of the actual cross-section of the material or part as installed in the airplane. The specimen must be mounted in a metal frame so that all four edges are held securely and the exposed area of the specimen is at least 8 inches during the 45-degree test prescribed in subparagraph (6) of this paragraph.

I thought that 14 CFR 25.853(C) "the oil burn test" took care of the flammability testing for aircraft seats?

14 CFR 25.853(c) is for the seat cushions (backrest, bottom cushion, footrest, and headrest). It was developed for what was considered large volumes of foam. Seat armrest, base shrouds, back shell, etc. have to meet 14 CFR 25.853(a)(ii) or the 12-second vertical burn requirements as installed in the aircraft.

So footrests and headrests have to meet 14 CFR 25.853(C) even if they have no foam or a very small amount?

Footrests and headrests that are made up of substrate and dress cover only would have to be tested to 14 CFR 25.853(a)(ii) as a composite assembly. If there are any other components, the assembly would have to be burned to 14 CFR 25.853 (c).

Do armrests, base shrouds, back shells, etc, have to be tested even though I had the test done on the dress cover material?

Seat components that are upholstered such as armrests, shrouds, back shells, etc. have to be tested in the "as installed state" which includes substrate, foams, glues, dress cover material, etc. to the test requirements of 14 CFR 25.853 (a)(ii), which are the 12-second vertical burn requirements.

I'm just replacing the dress cover material on the headliner; so can't I just use single element vertical burn test results for that?

No, you will need to test the completed build-up in the "as installed state" which would include all materials that make up the headliner panel such as the dress cover, foam, glue and substrate material that makes up the headliner. Some FSDO will let you fabricate surrogate panels to replicate the substrate panel or foam, some will not. Those that won't may require samples to be cut from the part to be tested. You will have to get guidance from your FSDO. Headliners, window liners, and sidewalls all have to be tested to 14 CFR 25.853(a)(i) 60-second vertical test.

What if I cannot provide the substrate and the FSDO/ACO won't let me use a surrogate?

You would need to cut enough material from existing panels to perform the testing and then make a repair to replace what was used. Flammability testing would then be required for the repair.

What if I have the same material combinations but in different thicknesses, do I have to test them all?

Per 14 CFR Appendix F Part 1(b)(2) "Except as noted below, the specimen thickness must be no thicker than the minimum thickness to be qualified for use in the airplane. Test specimens of thick foam parts, such as seat cushions, must be ½-inch in thickness. Test specimens of materials that must meet the requirements of Paragraph (a)(1)(v) of Part I of this appendix must be no more than 1/8-inch in thickness. Electrical wire and cable specimens must be the same size as used in the airplane. In the case of fabrics, both the warp and fill direction of the weave must be tested to determine the most critical flammability condition." (This is only for Part I burns.) For further clarification, please see FAA Policy Statement PS-ANM-25.853-01.

What about cabinetry and bulkheads?

Cabinetry, bulkheads, and any large structures have to meet the requirements of 14 CFR 25.853(a)(i) 60-second vertical testing. This would include the cabinet structure, along with decorative finish as installed in the aircraft.

What has to be tested if we are just changing the finish?

Any time you are refinishing cabinetry, composite testing is required. This testing would have to include the cabinet structure, materials being added, glues used to attach, any finish material such as stains, paints, clear coat, etc. We would need to know the process specifications and material used, plus the mixing ratios for paints and stains. Some FSDO will let you fabricate surrogate panels to replicate the substrate panel or foam, some will not. Those that won't may require samples to be cut from the part to be tested. You will have to get guidance from your FSDO.

What about similarity testing for cabinetry in different aircraft?

Skandia's policy is not to do any similarities for different aircraft as substrate material, mix ratios and veneers can vary.

Can I just get an FAA 8110-3 for stock so that I can use the material or composite in many different aircraft?

No, an FAA form 8110-3 can only be issued aircraft specific for U.S. registered or U.S. State of Design aircraft. An 8110-3 can only be issued when a burn test is in support of an FAA project or in support of a major repair or alteration. An authorized DER must know how the material or part will be installed on an end product and identify that use on the FAA form 8110-3. DER's must follow order 8110.113 when issuing an 8110-3.

Flammability Certification
of Dynamic Certified Seats

Seats manufactured to meet Dynamic test criteria have additional requirements or restrictions. These seats would have been manufactured to either TSO C127A or 14 CFR 25.562. It is the responsibility of the upholsterer/fabricator to ensure that the work performed is compliant with the original certification. These seats are dynamically certified as an assembly which includes the detailed foam construction and dress cover. Any changes can affect the certification.

How do I know if a seat is dynamically certified?

In order to determine what the seat is certified to, we suggest you inspect the seat frames for TSO tags and also review the aircraft Type Certificate Data Sheet (TCDS).

What if there is no TSO tag on the seat?

You should review the TCDS and/or aircraft equipment list to verify the correct seat is installed. Some aircraft manufacturers include the dynamic seat approval on the aircraft Type Certificate (TC). In this case, there may not be a TSO tag on the seat, however, the seat could be dynamic certified and you should contact the aircraft manufacturer for guidance.

Additionally, Advisory Circular AC21-25B provides guidance utilizing a DER with 14 CFR25.562 authorization to generate acceptable data that the work can be performed in accordance with.

How do I perform re-upholstery and show FAA-compliance?

In general, FAA-compliance can be separated into two categories:

1. Upholstery Practices and Build-ups

The upholstery/foam build-ups must be performed in accordance with approved data. Contact the TSO holder or aircraft manufacturer for guidance.

2. Flammability

Flammability Testing and Certification is similar to non-dynamic seats and can be performed by Skandia. Skandia DERs are authorized to generate acceptable data for Flammability only.

Skandia, Inc. tests combinations of materials to show compliance to 14 CFR 25.853(c). Skandia does not approve production.

Additional testing of seat components is required to show compliance when seat armrests, wraparound shrouds, base shrouds, etc. are upholstered. These items need to comply with 14 CFR 25.853 (a) Appendix F Part I (a)(I)(ii) per the installed configuration, i.e., composite panels.

Headrests and leg rests are required to meet the requirements of 14 CFR 25.853(c) as called out in Advisory Circular AC 25.853-1.

For Flammability testing that is not performed under an FAA Project (FAA Project Number) or has FAA Request for Conformity, Skandia's Quality department will perform a company conformity inspection.

Additional reference material:

- Advisory Circular AC 25.853-1
- Advisory Circular AC 21-25B
- Advisory Circular AC 25-17A
- Technical Standard Order TSO-C127a
- Technical Standard Order TSO-C39b
- Aircraft Materials Fire Test Handbook DOT/FAA/AR-00/12

This information can be found either on the FAA website, www.faa.gov or on the FAA Fire Tech Center website, www.fire.tc.faa.gov. Skandia, Inc. offers this information only as guidance.

TSO-C127a Dynamic Seats

14 CFR 25.562 became effective May 17, 1988 (Amendment 25-64) requiring dynamic testing of seats. These requirements incorporate the foam cushion build-ups and dress cover materials as an integral part of the seat certification. Upholstery and foam build-ups cannot deviate from the original configuration without an approval process, typically controlled by the TSO holder or aircraft manufacturer.

TSO-C39c Non-Dynamic Certified Seats

The certification for TSO-C39c seats is limited to the seat structure and does not incorporate the foam build-up and dress cover materials. These seats can be re-upholstered without interaction of the TSO holder or aircraft manufacturer.

Heat Release
and Smoke Density Requirements

For Part 25 aircraft at Amendment 25-61 (8/20/1986), the FAA developed the following requirements for Heat Release:

"(a-1) For aircraft with a passenger capacity of 20 or more, interior ceiling and wall panels (other than light lenses), partitions, and outer surface galleys, large cabinets and stowage compartments (other than under-seat stowage compartments and compartments for stowing small items, such as magazines and maps) also must meet the test requirements of Part IV of Appendix F of this Part, or other approved equivalent method, in addition to the flammability requirements prescribed in paragraph (a) of this section."

For Part 25 aircraft at Amendment 25-66 (9/26/1988), aircraft must meet the requirement of Part V for Smoke Density.

These requirements only apply to aircraft with a capacity of 20 or more passengers.

Are the heat release and smoke density requirements applicable to seats?

The pre-amble of rule 25.853 exclude seats from the requirements of Part IV and Part V. However, with the invention of larger seats with integral stowage compartments and other console assemblies, the FAA has issued additional guidance.

On October 17, 1997, the FAA issued Memorandum 97-112-39 "Guidance for Flammability Testing of Seat/Console Installations." This document provide guidance as to when Heat Release and Smoke Density testing is required for aircraft seating, with capacity of 20 or more passengers.

Seat Fireblocking Checklist

User Guide

The following is the Seat Fireblocking Checklist and completion details. All information is very important for the development of a Flammability Test Plan. Please take the time to review each section as you are completing the checklist so that we receive complete and accurate information.

1) **Company Name:**
   Requesting the work.

2) **Contact Name:**
   Point of contact.

3) **Phone**

4) **Fax**

5) **Email:**
   to contact #2.

6) **Date Sent:**
   Date complete checklist is submitted.

7) **PO#:**
   Purchase Order that Skandia is to reference for this work.

8) **A/C Completion Date:**
   The date the aircraft is to be delivered.

9) **Aircraft Make:**
   Enter the aircraft make as listed on the type certificate data sheet.

10) **Aircraft Model:**
    Enter either the aircraft model series or the specific aircraft model number, as appropriate and as listed on the type certificate data sheet.

11) **S/N#:**
    Aircraft serial number.

12) **Tail#:**
    The registration number of the aircraft. (If the aircraft is not United States Registered or United States State of Design, an 8110-3 cannot be issued unless it is an FAA project).

13) **Test Data is in support of:**
    This tells us how the aircraft is being returned to service. If Skandia is fabricating the test specimens, an FAA form 8130-9 will need to be issued and signed. Authorization from you, the customer, will allow Skandia to sign the Statement of Conformity on your behalf.

14) **FAA Project#:**
    If testing is performed for either a Supplemental Type Certificate or Organization Designation Authorization, we require the FAA Project number and FAA Aircraft Certification Office involved with the project.

15) **Seating Configuration:**
    Skandia needs to know how many seats/divans/lav/jumpseats are being produced for inclusion in this test plan.

16) **Seat Manufacturer:**
    Please list the seat manufacturer as this helps us to better understand the testing that may be required.

17) **Seat Testing:**
We need to understand if the seats are being tested to comply with a TC/STC, a TSO or neither.

18) **Seat Part Numbers:**
If the seats are being tested to support TSO C-127, we need the model number and serial number of each seat. This information can be found on the seat's data tag.

19) **Seat Composite Tests:**
All components of a seat must also meet the requirements of 14 CFR 25.853 (a)(ii) 12-second vertical burn test as a composite representing the actual build-up. Skandia can perform this additional testing.

20) **Cushion Packing List:**
Copies of all packing lists or invoices are required for each material used within the seat upholstery. Without traceability, conformity cannot be performed and test specimens will not be burned.

21) **Cushion Production Drawings:**
Skandia requires production drawings or a sketch of what the production cushion foam build-up will be in each of the different components, including; back, bottom, headrest or legrest.

22) **Cushion Dress Cover:**
Dress cover material is needed for each fireblock test. In some cases, we may have to perform multiple tests with the same dress cover material.

23) **Padding/Muslin:**
We need to know if padding or batting is attached to the dress cover or if you have batting placed between the dress cover and the foam cushion, as well as how it is attached. If this is different for various cushions (seat back, bottom, headrest or legrest) we also need to know this.

24) **Fireblocking Material:**
If a fireblocking material is being used, we need to know how.

25) **Adhesives:**
Skandia may require you to provide us with your adhesive if we are fabricating the burn specimens. Skandia tries to maintain inventory of many common adhesives.

26) **Seat Seam Closures:**
This section deals with how the dress cover is closed after it is installed on the foam cushion in order to ensure proper testing.

27) **Armrests/Shrouds:**
If Skandia is performing flammability testing of armrests and shrouds, we need the same information as required for seat cushions. B/E Aerospace requires that these items are all tested for their 16g seats.

28) **Packing List:**
Again, invoices or packing lists for each component that comprise the armrests, shrouds, seat base, etc. are required. Some of these items may need to have several tests if different combinations of material are used.

29) **Production Drawings:**
As with the seat cushion, we require a production drawing or sketches of each component (armrests, shrouds, etc.).

30) FAA Form 8130-9:
If you are supplying Skandia with fabricated test specimens, we require an original completed FAA Form 8130-9.

31) Vertical Burn Test:
When performing FAA flammability testing, three samples for each test are needed. However, if the material is woven, we need to burn six (three fabricated with the warp of the material and three with the fill. Warp is up the roll, fill is across the roll.).

32) Substrate Material Information:
We need to know what the substructures of the armrest, shrouds, etc. (B/E Aerospace and Decrane Aerospace can provide substrate lists for their seats). When testing armrests, shrouds, and seat bases we need to know everything that makes up the component.

33) Seat Production Buildup Matrix:
On this chart please list all materials used and where. Any special notes should be listed in the comment area.

34) Production Cushion Build-Up:
This is a simplified sketch that you may use if you do not have production drawings or sketches. If you use this template, please identify on the drawing the various layers of materials utilized and identify them in the table below. One of these would be needed for each cushion (back, bottom, headrest, legrest) for all seats, divans, lavs, and jumpseats.

35) Composite Panel Production Build-Up:
This information is the same as required for the cushion drawing and needs to be completed for each component armrest, seat shroud, seat base, etc. Some components may require several tests for one armrest; in many cases there are different build-ups or the substrate will change the combination. For example; in armrests there are frequently different build-ups or changes in the substrate that will require multiple tests.

16G Replacement Dress Cover

Fire-Blocking Checklist

The following is Skandia's 16g Dress Cover Replacement Checklist and details of how to complete it. All this information is important to the development of the Certification and Flammability Test Plan. Please take the time to review each section as you are completing the checklist to be able to give Skandia the most complete and accurate information.

1) **Company Name:**
   Requesting the work.

2) **Contact Name:**
   Point of contact.

3) **Phone:**

4) **Fax:**

5) **Email:**
   to contact #2.

6) **A/C Completion Date:**
   The date the aircraft is to be delivered.

7) **PO#:**
   Purchase Order that Skandia is to reference for this work.

8) **Aircraft Make:**
   Enter the aircraft make as listed on the type certificate data sheet

9) **Aircraft Model:**
   Enter either the aircraft model series or the specific aircraft model number, as appropriate and as listed on the type certificate data sheet.

10) **S/N#:**
    Aircraft serial number.

11) **Tail#:**
    The registration number of the aircraft. (If the aircraft is not United States Registered or United States State of Design, an 8110-3 cannot be issued unless it is an FAA project).

12) **Test Data in Support Of:**
    If Skandia is fabricating the test specimens, an FAA Form 8130-9 will need to be issued and signed. Authorization from you, the customer, will allow Skandia to sign the Statement of Conformity on your behalf.

13) **AC 21-25A TSO:**
    Skandia must know if Test Data is in support of AC 21-25A TSO Modification.

14) **Existing TSO Tags:**
    Are there existing modification tags on the seats next to the original tags? This will let Skandia know if the original seats have been modified.

15) **Seating Configuration:**
    Skandia needs to know how many seats/divans/lavs/jumpseats are being produced for inclusion in this test plan. Depending on your aircraft, all or some of your seats may be 16g.3

16) Dress Cover Replacement:
Skandia must have verification that this is for dress cover change only.

17) Seat Manufacturer:
Please list the seat manufacturer as this helps to better understand what testing may be required.

18) Seat Composite Tests:
All components of a seat must also meet the requirements of 14 CFR 25.853 (a)(ii) 12-second vertical burn test as a composite representing the actual build-up. Skandia can perform this additional testing.

19) Seat Serial Numbers:
You must list all of the seat model numbers and serial numbers. This information can be found on the seat data tag.

20) Packing List:
Copies of all packing lists or invoices are required for each material used within the seat upholstery. Without traceability, conformity cannot be performed and the test specimens will not be burned.

21) Cushion Images:
Skandia requires that pictures be taken to verify all cushion build-ups, including back, bottom, headrest and legrest. This information, along with the information you provide on pages 6-9 will be the basis for verification of existing materials. Please make special note of hook and loop tape placement as stated on the checklist.

22) Cushion Dress Cover:
Dress cover material is needed for each fireblock test. In some cases, Skandia may have to perform multiple tests with the same dress cover material.

23) Muslin/Padding:
We need to know if padding or batting is attached to the dress cover. It is permissible to add up to 0.25” of padding to allow for a padded dress cover. We need to know if the padding or batting is attached to the dress cover or if it is placed between the dress cover and the foam cushion, as well as, how it is attached. If this is different for various cushions (seat back, bottom, headrest or legrest) we also need to know this information.

24) Fireblocking Material:
If a fireblocking material is being used, we need to know how it is used in the build-up.

25) Production Drawings:
If you have a copy of the original report or copies of the original production drawings, Skandia will require you to provide this information. Please list the original foam assembly drawing numbers in the table provided.

26) Seam Closure:
On page 4, Skandia has listed various types of seam closures, please list the number of seam closure on page 4 to the corresponding description. Example: If the single back cushion has a fully encapsulated back cushion and hook and loop for a final seam closure, please put #3 next to the Single Back.

27) Production Article Matrix:
On this chart, please list all materials used and where. Any special notes should be listed in the comment area.

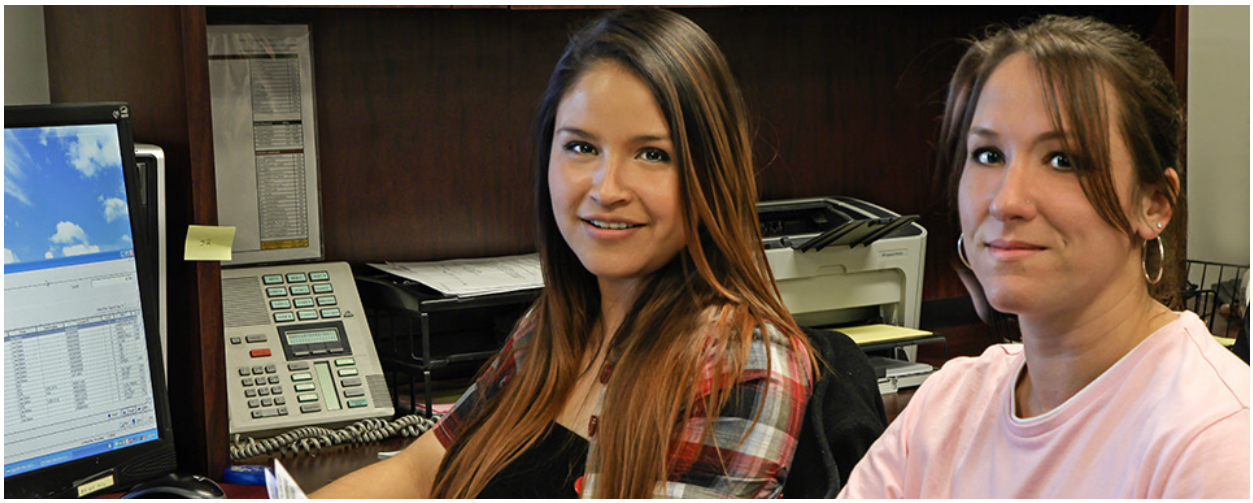
28) Seat Dimensions:
On pages 7-10 you will list all of the dimensions of the finished cushion assemblies. It is very important to complete the entire page.

29) Substrate Build-Ups:
On pages 11-13 list all build-ups for the armrest and include any substrate information. It may be permissible to refoam armrests, seat bases and seat shrouds, if needed.

30) Seat Location:
On page14 indicate each seating location. List seat part numbers and serial numbers for each seat.

31) Hook & Loop:
Page 15 is an example of how hook and loop attach strips may be shown. It is a requirement that this be an accurate representation of the production articles. Since these attach strips are examples, it may be more accurate to submit your own sketch with dimensions.

Skandia Support



Our team of engineers and support technicians are ready to clarify or help with any issues you experience with Skandia's flammability testing system. Please don't hesitate to contact us.

Hours of Operation

We are open from 8am to 4:30pm CST

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