



Policy Statement

Subject: Flammability Testing of Interior
Materials

Date: August 16, 2012

Policy No:
PS-ANM-25.853-01

Initiated By:
ANM-100

Summary

This policy statement provides guidance on acceptable methods of compliance with the flammability requirements of Title 14, Code of Federal Regulations (14 CFR) part 25 for commonly constructed parts, construction details, and materials. The methods of compliance discussed in this policy apply to Amendment 25-32 and later for § 25.853(a) and Amendment 25-61 and later for § 25.853(d). In addition, where the same test method is used to meet other requirements, such as special conditions, or § 25.855, these methods of compliance (MOC) also apply. It should be noted, however, that these MOCs apply once there is a determination that compliance is required. So, in the case of certain special conditions, it is the special condition that will establish the need to show compliance, whereas these MOCs can be used to define the required test configurations.

Definition of Key Terms

In the policy statement below, the terms “must,” “should,” or “recommend” have a specific meaning that is explained in Attachment 1.

A consistent definition of terms is necessary to properly implement the guidance in this policy statement. Defined terms have an asterisk where they appear in the table in Attachment 2. The definitions are located in Attachment 3 and apply to the entire table, except where noted.

Current Regulatory and Advisory Material

The requirements for flammability testing of materials used in the interiors of transport category airplanes are in § 25.853 and part 25, appendix F. The regulations categorize materials either by use or type, and the requirements are defined accordingly. Most of the guidance on these flammability requirements is in Advisory Circular (AC) 25-17A, *Transport Airplane Cabin Interiors Crashworthiness Handbook*, dated May 18, 2009. In addition, since 1984, part 25, appendix F, has expanded from a single section to seven distinct parts, each addressing a

different test method(s). The flammability requirements apply to all materials, except for “*small parts...that would not contribute significantly to the propagation of a fire....*”

Neither the regulations nor AC 25-17A are comprehensive enough to include all of the parts and materials currently found in transport category airplanes. Historically, applicants have established what they considered to be the appropriate test requirement by identifying the particular provisions of the regulations and guidance that are closest to the actual part. While applicants have made these determinations in good faith, this approach has led to standardization issues. These standardization issues can be difficult to identify, since two installations are seldom, if ever, identical. In fact, installations that appear to be similar may actually have differences that warrant separate requirements. Conversely, installations that appear to be different may have only slight variations from each other and should meet the same requirements and be tested the same way.

The most significant regulatory language relative to this policy is in part 25, appendix F, part I, paragraph (b)(2) as follows: “*...materials must be tested either as a 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 same paragraph also states: “*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....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.*”

Relevant Past Practice

When conducting flammability testing, the common practice is to test the critical case. Much of the guidance and existing methods of compliance are aimed at identifying the critical case for a certain family of variations, for example, color, and then testing only that case. In some situations, testing is intended to envelope a range of variations, for example, panel thickness. The remaining variants are then qualified by comparison to the more critical case. This is because the possible parts and material combinations are numerous and could make the flammability test program unmanageable if each combination had to be tested. For some variations, tests have to be conducted because it is not obvious what the critical case is or if the variation has any influence on flammability.

Besides the challenges regarding tests to identify the most critical case, the following requirements for the test specimen, stated in part 25, appendix F, part I, have caused confusion:

- It must be tested as a section cut from a part,
- It may be cut from any location, and
- The finished or protected edge must not be included.

Section 25.853 and part 25, appendix F, part I, are clear that the intent is to address the cross section of the part or material, not to test panels with protected edges. This has led some applicants to conclude that any edge trim or material is excluded from testing altogether.

Similarly, the provision that the test specimen may come from “any” location in the fabricated part has been interpreted to mean that an applicant can choose a location from which to cut the section. In that case, certain local cross-section differences are ignored in favor of the primary cross-section, to represent the entire construction. The result is some cross-section constructions are not tested at all. The regulation essentially requires flammability testing of some kind for all interior materials, unless they are small and would not contribute to propagating a fire. This exclusion of “small parts” seems to be the basis whenever materials are not tested.

This combination of different provisions could be interpreted as being in conflict. Applicants and FAA offices have addressed this through various project-specific MOCs and case-by-case findings. As noted above, this process has led to differences in methods of compliance and a lack of standardization. There is no indication that this lack of standardization has caused significant safety issues, but the potential is there if the guidance continues to lack sufficient details and is open to interpretation.

Although the guidance in AC 25-17A remains valid, it is not sufficiently detailed to address the variations in material and installation common on transport category airplanes. Therefore, to provide a more standardized approach, the FAA has reviewed a listing of common design details and established acceptable MOCs for each. As discussed below, many of these MOCs can be broadly grouped.

Policy

Attachment 2 of this policy statement, *Acceptable Methods of Compliance*, is a table that summarizes acceptable MOCs for various constructed parts, construction details, and materials, based on the FAA’s technical judgment of what is acceptable and within the scope of current regulations. The information in the table is based on data supplied by the aviation industry. This final policy includes all items for which data are available. Based on data submitted by the aviation industry, several of the MOCs are different from what was in the proposed policy statement. In some cases, the basic approach is retained, but limitations are now associated with it. In other cases, there is more than one option for showing compliance. And, in a few cases, the proposed methods were not considered useful enough to pursue, so they were omitted.

- With respect to the three bulleted items discussed above in the Relevant Past Practice section, the table in Attachment 2 addresses each item, directly and indirectly.
- The central theme of the MOCs is to define what a suitable cross-section of a “part” would be to show compliance with the regulations. Issues such as thickness, texture, fiber orientation, and color are all addressed in the table.
- Regarding the provision that a test sample may be cut from “any” location in a part, the intent is to not specify the location. This provision gives the applicant flexibility but does not relieve the applicant from test requirements. To the extent that this policy allows, certain construction variables can be substantiated without testing every permutation and combination. But, the provision that the sample may be cut from any location does not exclude distinct constructions from testing.

- Regarding edge trims, they do require testing unless they constitute a small part that would not significantly contribute to the propagation of a fire. The attached table provides methods of compliance for testing edge trims, as well as other bonded details.

Also, it is acceptable to identify a critical case and test it. However, for many of the items, identifying a critical case may effectively require testing all variations, so this policy provides alternatives.

Changes from the proposed policy statement: The most significant change is that Attachment 2 of the proposed policy statement contained two tables, part 1 for already accepted MOCs, and part 2 for MOCs requiring additional substantiating data. Attachment 2 of this final policy statement only contains one table. The MOCs included in the table are all substantiated. Since the FAA has data for these MOCs, the applicant may use them without further justification.

Some of the items in Attachment 2, part 2, of the proposed policy statement are not included in this final policy statement. Items 7 (Fiber reinforcement cloth), 18 (Decorative laminate on metal skin of sandwich panel), and 19 (Metal skinned foam/honeycomb panels) were revised. Now these items only include information related to § 25.853(a). The information pertaining to § 25.853(d) was deleted. Item 6 (Doublers, on-metallic, co-cured) was removed altogether.

Also, due to commonality of approach, several items from Attachment 2 of the proposed policy statement are combined in this final policy statement. Item 2, “panel thickness,” now includes item 24, “thermoplastic thickness.” Item 28, “bonded details,” now includes the following items:

- 29 - Rub Strips
- 30 - Non-Metallic Edge Trim
- 31 - Hook and Loop
- 32 - Non-Metallic Brackets/Clips
- 34 - Bonded Wire Raceways
- 35 - Kickstrips
- 37 - Felt
- 38 - Grommets
- 39 - Pre-Cured Doublers
- 40 - Bonded Metal Doublers
- 41 - Plastic Mirrors

Item 43a “ditch and pot” now includes the following items grouped as “bonded joints”:

- 43b - Tab and Slot
- 43c - Mortise and Tenon
- 43d - Cut and Fold
- 43e - T-Joints
- 43f - Bonded Pins

Item 5 was divided into two parts: “paint color” and “decorative laminate color.” Item 5b and item 12 Tedlar® are combined.

This consolidation results in fewer items listed in the table in this policy statement than were in the proposed policy statement. The same general ordering as in the proposed policy statement has been retained; however, the items have been renumbered.

As noted above, a number of the MOCs differ from what was in the proposed policy statement. The MOCs were revised based on the results of test data gathered or generated to support the policy. In all such cases, this final policy is more conservative than the proposed one. This results from either placing limits on applying the policy (for example, where the proposed policy might have applied to any type of panel, the final policy is applied to specific types of panels), or identifying the need for more testing than originally proposed. In particular, items 28 through 32, 34, 35, and 37 through 41 fall into this category. Items 43a through 43f identify more testing than proposed but do permit multiple approaches.

An important aspect of standardizing MOCs is a consistent definition of terms. As part of the data gathering effort for this policy statement, numerous terms were identified that could be easily confused or have numerous regulatory interpretations. Therefore, a list of definitions was created that is extensive and detailed. However, some of the definitions are so fundamental to properly implementing this policy that they must be included. Defined terms are highlighted where they appear in the table in Attachment 2. The definitions are located after the table and apply to the entire table, except where noted.

Another consideration regarding MOCs is using multiple MOCs for a part. In general, each MOC applies individually. However, some MOCs are based on certain parameters that do not make a difference in flammability results or have a clear critical case. For example, in Bunsen burner testing, thinner sandwich panels are more critical than thicker panels. Also, the color of *certain types* of decoratives does not make a difference in flammability results. Thus, a thin panel of an arbitrary color of a particular decorative could be used to substantiate thicker versions of the same panel using different colors of the same decorative.

Lastly, the MOCs are based on aerospace materials and processes currently used. Should new or novel materials and processes be developed, this policy may be reevaluated to account for any differences in material behavior that would affect these MOCs.

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 MOC 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 that meets this policy should not be

approved, the office must coordinate its response with the policy issuing office. Note that established methods of compliance are supported by test data.

Whenever a proposed method of compliance is outside this established policy, the project aircraft certification office has to coordinate it with the policy issuing office using an issue paper. Similarly, if the project aircraft certification office becomes aware of reasons that an applicant's proposal that meets this policy 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 guidance material, this policy statement 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, amended supplemental type certification, parts manufacturing approval projects and major type design changes (including major alterations) where compliance with § 25.853 is required. The compliance methods apply to those programs with an application or (if there is no formal application) initiation 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 MOCs or follow the guidance in this policy. In those cases where the compliance methods have not yet been coordinated with the FAA, the applicant should adopt this policy at the earliest opportunity in consultation with the FAA oversight office.

Each applicant would have to supply its own supporting rationale and data for any items not contained in this (or other published) policy, or to use a different MOC for any of the listed items. Other MOCs will need to be coordinated with the FAA.

Both the FAA and the aviation industry are continuously studying the subjects in this policy statement and new test data are continuously being generated. The FAA does not plan on revisiting how the data presented in this policy are applied or modifying the policy based on other interpretations of the existing data.

The information in this policy statement is only a summary of the extensive substantiating data gathered regarding flammability testing of interior materials. Since the information not included in this policy statement is valuable, the FAA intends to generate an advisory circular to provide more comprehensive guidance. When the advisory circular is issued, it will supersede this policy statement. In addition, the detailed reports generated by industry in response to the proposed policy are available in FAA report DOT/FAA/TC-12/10, which is available on the Federal Aviation Administration William J. Hughes Technical Center's Technical Library page: http://www.faa.gov/about/office_org/headquarters_offices/ato/tc/library/.

Trade or manufacturer's names appear in Attachment 2 solely because they are considered necessary to illustrate context, or reflect the limitations on the data available. Mention of a manufacturer's or trade name in no way implies endorsement by the FAA.

Conclusion

The MOCs proposed in this policy statement supplement existing MOCs and expand the policy to include more types of material and part variations.

/s/ KC Yanamura (for)

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Attachment 1: Definition of Key Terms

Attachment 2: Acceptable Methods of Compliance for § 25.853

Attachment 3: Technical Definitions for Policy Statement PS-ANM-25.853-01

Definition of Key Terms

Table A-1 defines the use of key terms in this policy statement. The table describes the intended functional impact.

Table A-1 Definition of Key Terms

	Regulatory Requirements	Acceptable Methods of Compliance (MOC)	Recommendations
Language	Must	Should	Recommend
Meaning	Refers to a regulatory requirement that is mandatory for design approval.	Refers to instructions for a particular MOC.	Refers to a recommended practice that is optional.
Functional Impact	No Design Approval if not met.	Alternative MOC has to be approved by issue paper.	None, because it is optional.

**Attachment 2 to Policy Memorandum PS-ANM-25.853-01
Acceptable Methods of Compliance for § 25.853**

Acceptable Methods of Compliance

Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
Final			
1	Panels, general	60-second vertical Bunsen burner test data will substantiate configurations that only require 12-second vertical Bunsen burner data. Vertical Bunsen burner test data will substantiate configurations that only require horizontal Bunsen burner testing.	Test requirement is decided based on size criteria. ¹ 1) Test required if greater than 2 sq ft, 2) No test if less than 1 sq ft, and 3) Specific determination required between 1 and 2 sq ft.
2	Material versus installation	The criteria based on installation overrides the test method applicable to the material. For instance, carpet is substantiated using the 12-second Bunsen burner test unless the carpet is installed on the sidewall. Then it is tested as part of the sidewall using the 60-second Bunsen burner test. Appendix F contains an explicit exception for certain items constructed from elastomeric materials.	Not applicable - the requirement is <u>based on</u> the installation, not the material.

¹ As a general rule, components with exposed-surface areas of one square foot or less may be considered small enough that they do not have to meet the standards of § 25.853(d). Components with exposed-surface areas greater than two square feet may be considered large enough that they do have to meet these standards. Those with exposed-surface areas greater than one square foot, but less than two square feet, must be considered in conjunction with the areas of the cabin in which they are installed. From the final rule *Improved Flammability Standards for Materials Used in the Interiors of Transport Category Airplane Cabins* (60 FR 6616, February 2, 1995).

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity																		
3	Thickness ranges (panels, thermoplastics, foams)	Data from testing a thinner construction substantiates a thicker construction made of the same materials.	<p>Except for foam core panels with prepreg facesheets — where each thickness must be tested, the following approach is acceptable:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Part or material thickness</th> <th style="padding: 5px;">Thicknesses tested to show compliance</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">0.02 - 0.06 inch 0.5 -1.5 mm</td> <td style="padding: 5px;">0.02 inch & 0.06 inch or 0.5 mm & 1.5 mm</td> </tr> <tr> <td style="padding: 5px;">0.06 - 0.1 inch 1.5 - 2.5 mm</td> <td style="padding: 5px;">0.06 inch & 0.1 inch or 1.5 & 2.5 mm</td> </tr> <tr> <td style="padding: 5px;">0.1 - 0.25 inch 2.5 - 6 mm</td> <td style="padding: 5px;">0.1 inch & 0.25 inch or 2.5 mm & 6 mm</td> </tr> <tr> <td style="padding: 5px;">0.25 - 0.5 inch 6 - 12.5 mm</td> <td style="padding: 5px;">0.25 inch & 0.5 inch or 6 mm & 12.5 mm</td> </tr> <tr> <td style="padding: 5px;">0.5 - 1.0 inch 12.5 - 25.5 mm</td> <td style="padding: 5px;">0.5 inch & 1.0 inch or 12.5 mm & 25.5 mm</td> </tr> <tr> <td style="padding: 5px;">1.0 - 1.75 inch 25.5 - 44.5 mm</td> <td style="padding: 5px;">1.0 inch & 1.75* inch or 25.5 mm & 44.5* mm</td> </tr> <tr> <td style="padding: 5px;">1.75 inch & thicker 44.5 mm & thicker</td> <td style="padding: 5px;">1.75* inch or 44.5* mm</td> </tr> <tr> <td colspan="2" style="padding: 5px;">* 1.75 inch or 44.5 mm specimens are not tested for smoke.</td> </tr> </tbody> </table>	Part or material thickness	Thicknesses tested to show compliance	0.02 - 0.06 inch 0.5 -1.5 mm	0.02 inch & 0.06 inch or 0.5 mm & 1.5 mm	0.06 - 0.1 inch 1.5 - 2.5 mm	0.06 inch & 0.1 inch or 1.5 & 2.5 mm	0.1 - 0.25 inch 2.5 - 6 mm	0.1 inch & 0.25 inch or 2.5 mm & 6 mm	0.25 - 0.5 inch 6 - 12.5 mm	0.25 inch & 0.5 inch or 6 mm & 12.5 mm	0.5 - 1.0 inch 12.5 - 25.5 mm	0.5 inch & 1.0 inch or 12.5 mm & 25.5 mm	1.0 - 1.75 inch 25.5 - 44.5 mm	1.0 inch & 1.75* inch or 25.5 mm & 44.5* mm	1.75 inch & thicker 44.5 mm & thicker	1.75* inch or 44.5* mm	* 1.75 inch or 44.5 mm specimens are not tested for smoke.	
Part or material thickness	Thicknesses tested to show compliance																				
0.02 - 0.06 inch 0.5 -1.5 mm	0.02 inch & 0.06 inch or 0.5 mm & 1.5 mm																				
0.06 - 0.1 inch 1.5 - 2.5 mm	0.06 inch & 0.1 inch or 1.5 & 2.5 mm																				
0.1 - 0.25 inch 2.5 - 6 mm	0.1 inch & 0.25 inch or 2.5 mm & 6 mm																				
0.25 - 0.5 inch 6 - 12.5 mm	0.25 inch & 0.5 inch or 6 mm & 12.5 mm																				
0.5 - 1.0 inch 12.5 - 25.5 mm	0.5 inch & 1.0 inch or 12.5 mm & 25.5 mm																				
1.0 - 1.75 inch 25.5 - 44.5 mm	1.0 inch & 1.75* inch or 25.5 mm & 44.5* mm																				
1.75 inch & thicker 44.5 mm & thicker	1.75* inch or 44.5* mm																				
* 1.75 inch or 44.5 mm specimens are not tested for smoke.																					

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
			Note that the smallest thickness range shown is 0.04" (1mm). Using this minimum range, it is acceptable to qualify thicknesses with different minimum and maximum values. So, data for two thicknesses 0.04" apart can be used to substantiate any thicknesses in between, regardless of the absolute thickness.
4	Core, density	Data from testing a lower density honeycomb core substantiates a higher density honeycomb core of the same material, provided the core is made from phenolic aramid (e.g., Nomex® and Kevlar®, paper, phenolic fiberglass, or aluminum).	Data from testing a core's lightest and heaviest densities substantiates all densities in between for a given core material.
5	Core, cell size/shape	Data from testing any core cell size/shape within a specific thickness range substantiates other core cell sizes/shapes of the same material, provided the core is made from phenolic aramid (e.g., Nomex® and Kevlar®) paper, phenolic fiberglass, or aluminum).	Data from testing a core's smallest and largest cell sizes within a specific thickness range substantiates all cell sizes in between.
6	Skin ply layup - orientation	Data from testing one panel construction substantiates any orientation of the skin plies for the same panel construction.	Data from testing one panel construction substantiates any orientation of the skin plies for the same panel construction. Data from testing a skin buildup is valid for use in any orientation of the same skin ply materials.
7	Paint color	Testing a part with one color substantiates other colors of the same paint chemistry. Additionally, testing a painted part substantiates an unpainted part with the same construction.	Testing a part with one color substantiates any other color with the same paint chemistry, provided the peak and total heat release measurement are 55 KW/m ² and 55 KW-min/m ² or below, respectively and specific optical density D _s is no more than 180. Additionally, testing a painted part with

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
			those limitations substantiates an unpainted part with the same construction. Parts with higher heat release values may also be used to substantiate unpainted parts, if the paint is known to increase heat release.
8	Decorative Laminate color*	Test the part with same chemistry paint/ink system. Testing one color substantiates other colors of the same paint/ink system.	Testing a part with one color substantiates any other color with the same decorative laminate chemistry.
9	Thermoplastic, elastomers and decorative non-textile floor coverings color	Data from testing an integrally colored material substantiates the same material type and thickness for a different color.	Data from testing an integrally colored thermoplastic substantiates the same thickness thermoplastic of a different color, provided the peak and total heat release measurement are 55 KW/m ² and 55 KW-min/m ² or less, respectively, and specific optical density D _s is no more than 180.
10	Skin testing (FASE - Face As Separate Entity)	Data may be collected from each face of a sandwich panel independently when the panel thickness is greater than 0.25" and the thickness is the only difference between the core materials. NOTE: The test coupon is a completed sandwich panel.	Not applicable.
11	Backside decorative treatment	Test data from a panel tested with a decorative (decorative laminate or paint) on the backside substantiates a panel with no decorative on the backside.	Test data from a panel tested with a decorative (decorative laminate or paint) on the backside substantiates a panel with no decorative on the backside.

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
11	Decorative texture*	Data from testing one texture of a decorative type substantiates a panel with the same decorative type with a different texture.	Data from testing one texture of a decorative type substantiates a panel with the same decorative type that has a different texture.
12	Decorative laminate orientation	Data from testing one decorative laminate orientation substantiates a panel with the same decorative laminate that has a different orientation.	Data from testing one decorative laminate orientation substantiates a panel with the same decorative laminate that has a different orientation.
13	Synthetic leather/suede	For Tapis Ultra leather™ and E-Leather Group Superlight™ products, testing one color substantiates all other colors because all values have significant margin with respect to the pass/fail criteria for the 12-second vertical test.	Testing each color of synthetic leather/suede material is required.

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
14	Aluminum/steel/ titanium parts (excluding powder coating)	<p>Unfinished metal parts do not require testing, unless they contain more than 10% magnesium.</p> <p>Finished metal parts do not require testing provided:</p> <ol style="list-style-type: none"> 1) standard paint/finishes are used, and 2) the parts do not contain more than 10% magnesium. <p>Standard paint/finishes are defined as inorganic finishes (e.g., anodize, alodine), epoxy primers and topcoats, urethane topcoats, and corrosion inhibiting dry films. See item 17, below, for powder coatings.</p>	The test requirement is decided based on size criteria. (See footnote 1.)
15	Powder coated metal	Powder coated metal parts do not require testing unless they contain more than 10% magnesium.	Testing each color of powder coating material is required.
16	Embedded metal detail	No test requirement, provided the detail is at least 0.01" thick and is not constructed of more than 10% magnesium.	No test requirement.

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
17	Edge trim, metal (including metal joint covers)	No test required provided edge trim is at least 0.02" thick.	No test requirement.
18	Doubler, metal, co-cured	No test requirement. Data from base panel substantiates provided the detail is at least 0.01" thick and is not constructed of more than 10% magnesium.	No test requirement. Data from base panel substantiates.
19	Clear plastic windows and signs	Test per appendix F, part I, (a)(1)(iv).	No test requirement.
20	Printed wiring boards (PWB)	The test coupons must replicate the PWB laminate; however, the copper tracing may be excluded from the coupon configuration. The test must include the PWB material with solder mask and conformal coating, if a conformal coating is used. Testing of the laminate in the thinnest cross section will substantiate other PWBs with thicker constructions. Made of the same laminate and conformal coating.	No test requirement.
21	Bonded details*	Unless it can be concluded that the part is small and would not contribute to the propagation of a fire in accordance with appendix F, part I (a)(1)(v), the following four methods of compliance are available to substantiate the bonded construction. <u>OPTION #1:</u> Adhesive, Detail, and Substrate tested separately: Test the adhesive by itself (see item 23) to 12-	The test requirement for bonded details is decided based on size and installation/proximity criteria defined below. See footnote 1 for a discussion of the size-based requirement. A bonded detail can be excluded from testing if:

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
		<p>second Vertical Bunsen Burner (VBB) and separately test the detail and substrate, without adhesive, to the applicable requirements in appendix F, part I (a)(1)(i), (a)(1)(ii) or (a)(1)(iv).</p> <p>NOTE: This MOC is not applicable to hook/loop, placards, or other thin polymer films. These bonded details need to be substantiated using option 3 or 4.</p> <p>NOTE: This MOC is also valid when adhesive is not used and the bonded construction is created from co-curing with a composite panel (e.g., no adhesive).</p> <p>OPTION #2: Non-metallic Bonded Construction of specific adhesive: Without adhesive, separately test the detail and substrate to the applicable requirements in appendix F, part I (a)(1)(i), (a)(1)(ii) or (a)(1)(iv), and show compliance of the specific adhesive using data created when two non-metallic materials are bonded together.</p> <p>NOTE: This option is not applicable to hook and loop, placards, or thin films. These bonded details need to be substantiated using option 3 or 4.</p> <p>OPTION #3: Specific Detail Bonded to a Worst Case Substrate:</p>	<ul style="list-style-type: none"> a) It is a bond line less than 1.0" wide on an individual item b) It is located fully within 2.0" of panel edge c) It is located fully within 4.0" of cabin floor d) It is lineally* applied and less than 2 sq ft in total surface area on a panel surface.

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Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
		<p>Test the specific detail bonded to a thin laminate at a thickness of 0.20” or less (considered worst case) in accordance with appendix F, part I (a)(1)(ii). Once qualified in this manner, the detail/adhesive combination may be bonded to other substrates without further test. Data substantiates the bonded detail/adhesive combination on any substrate. Test data on the minimum thickness of the detail substantiates any thicker detail of the same material.</p> <p>OPTION #4: As Installed Configuration</p> <p>Test the “as installed” configuration to the applicable requirements in appendix F, part I (a)(1)(i), (a)(1)(ii) or (a)(1)(iv) based on the detail being bonded. If the bonded area of the detail is greater than 2 square feet, test the bonded construction to 60-second VBB.</p> <p>NOTE: If the base panel is over 0.25” thick, the back side would be either tested to the same test requirement, or by using item # 10 (FASE) to the base panel testing.</p>	

Acceptable Methods of Compliance

Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
22	Surfacing materials (pin-hole filler, sweep and sand, Bondo)	No test required when surfacing material is controlled within an approved process specification. The process specification must establish the threshold quantity of surfacing material that does not adversely influence flammability properties.	No test required when surfacing material is controlled within an approved process specification. The process specification must establish the threshold quantity of surfacing material that does not adversely influence flammability properties.
23	Edge potting and/or edge foam	<p>The edge fill in a panel may be shown compliant using one of the following options:</p> <p>OPTION #1: Test a plaque of edge fill material by itself per appendix F, part 1, (a)(1)(ii) (12-second) (Plaque of nominal size: 0.25" x 3" x 12").</p> <p>OPTION #2: Test a standard panel containing the edge fill material per appendix F, part I, (a)(1)(i). (60-second vertical burn). (Standard Panel 3" x 12" with 0.125" to 1" of the edge fill material), configured with the edge fill along the bottom and one vertical edge of the test samples.</p>	No test required when edge fill material less than 1" deep into the panel measured from the edges than 1" is used (looking at the panel's face).
24	Bonded Joints* (Ditch and pot ,Cut and fold, Tab and slot, Mortise and tenon, T-joints, Bonded pins)	<p>Compliance of a bonded joint construction can be shown by:</p> <p>OPTION #1: similarity to the base panel when the following are met:</p> <ol style="list-style-type: none"> 1) The adhesive is an epoxy-based material 2) The panel is a honeycomb core panel with composite skins meeting § 25.853(a), appendix F, part 1 (a)(1)(i), 60-second VBB, which is the compliance data used for similarity analysis. 	<p><u>For ditch and pot and cut and fold joints:</u></p> <p>No test requirement, if the exposed adhesive is 1" wide or less and a single cut.</p> <p>If outside this scope then the need for test is decided based on the size criteria-see footnote 1.</p> <p><u>For tab and slot, mortise and tenon, T-joints, bonded pins:</u></p>

Acceptable Methods of Compliance

Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
		<p>3) The exposed adhesive is inside the bent/joined panel (e.g., inside cut)</p> <p>OPTION #2: Test a plaque of adhesive by itself (see item 23) per appendix F, part I,(a)(1)(ii).(12-second)</p> <p>OPTION #3: Test the adhesive in a standard honeycomb panel in accordance with appendix F, part I (a)(1)(i); per Figure IV in 4.1 above. Once qualified using this test method, the adhesive may be used in any other honeycomb panel configuration and shown to be compliant by similarity.</p> <p>OPTION #4: Test the adhesive in a standard honeycomb panel in accordance with the Foam Block Test Method defined in appendix A and meet the appendix F, part 1 (a)(1)(i) 60-second VBB requirement for burn length and drip extinguishing time. Once qualified using this test method the adhesive may be used in another honeycomb panel configuration and shown compliant by similarity.</p> <p>OPTION #5: Test the “as installed” configuration to the applicable requirements in appendix F, part 1(a)(1)(i).</p> <p>NOTE: certain parts on seats may only be subject to the 12-second vertical Bunsen burner test.</p>	<p>No test requirement.</p>

Acceptable Methods of Compliance

Reference Number	Feature / Construction	25.853(a) Bunsen Burner Test Requirement/Similarity	25.853(d) Heat Release and Smoke Test Requirement/Similarity
25	Bonded inserts ²	No test required.	No test required.
26	Sealant, fillet seals*	No test required.	No test required.

NOTE: Criteria for metallic parts do not apply to parts containing 10% or more magnesium, or if the metal is known to be flammable. The value of 10% is based on differentiating common magnesium-containing alloys with alloys making significant use of magnesium. There are no known alloys in use as interior materials with 10% magnesium. Use of such alloys may be acceptable in certain applications, but must be substantiated.

² “Bonded inserts” refers to individually potted/bonded inserts, where the diameter of the adhesive is not more than 3 times the diameter of the insert. In addition, this guidance does not apply to installations with an essentially uniform distribution of fasteners over an entire surface... this guidance is therefore limited to localized installations where the potting/adhesive is a minority of the panel core area.

Attachment 2

Cross reference between proposed and final policy reference numbers

Final	Proposed
1	1
2	27
3	2 and 24
4	3
5	4
6	8
7	5(a)
8	5(b), 12
9	23
10	9
11	13
12	14
13	15
14	16
15	17
16	20
17	21
18	22
19	25
20	26
21	28,29, 30, 31,32, 34, 35,37,38,39,40,41
22	10
23	33

Attachment 2

24	43a-f
25	42
26	44

Technical Definitions for Policy Statement PS-ANM-25.853-01

Item (item number)

Bonded Detail (21) - A metallic or non-metallic element that is either internal to the panel, or attached to the panel surface or cutout areas/pockets of the panel using adhesive. Types of adhesives include, but are not limited to, epoxies, urethanes, silicones, and pressure sensitive adhesives (PSA). PSAs include double-sided tapes with carriers such as foam and fabric. In some cases bonded details may be co-cured with a composite panel. Bonding hook tape or loop tape individually to a panel is addressed in this policy, but attaching the hook to the loop is not considered, as it is a mechanical attachment method. Typical Bonded Details include, but are not limited to, rub strips, edge trims, hook and loop fasteners, placards, brackets, clips, external wire raceways, kickstrips, felt, doublers, and mirrors. Note that bonded inserts, while technically meeting this definition, have their own MOC, applicable within certain limits.

Decorative Laminate Color (8) - The complete visual appearance of a decorative laminate, including base color, prints, pearl effects, text, images, pattern or design. Color is the result of combinations of pigments in the embossing resin, pigments in the plastic film layers, and printing inks on a surface layer. Inks used in decorative laminates are typically a liquid containing a mixture of various pigments and other ingredients (such as solvents, resins, lubricants) used for printing on a thin surface layer to produce an image, text or design.

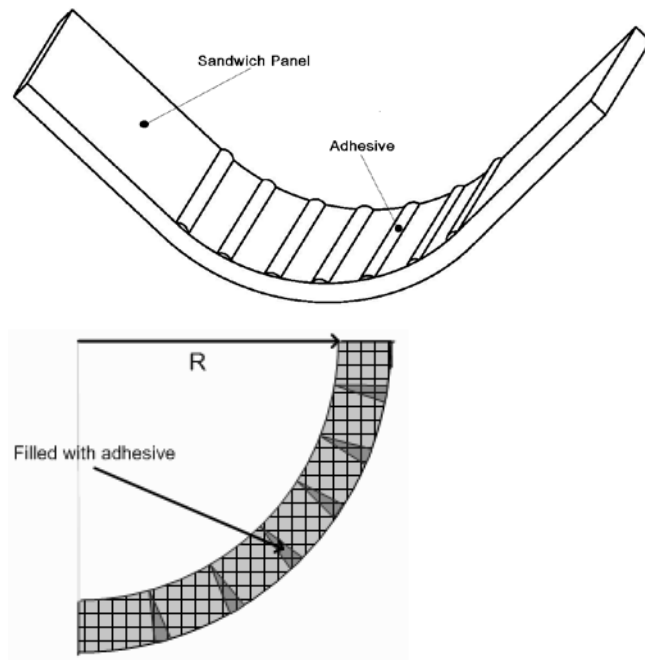
Decorative Laminate (11, 12) - A polymer-based, non-fibrous, single or multilayer, thin-gauge, non self-supporting decorative sheet that typically contains at least one layer of a fluoropolymer-based film material. Decorative laminates are always applied to the surface of a part and never form “self-supporting” parts. Decorative laminates are typically used on surfaces of sidewalls, lavatories, galleys, closets, linings, partitions, bin doors and ceilings. Other words used within the industry for the term decorative laminate are Tedlar®, Decorative Tedlar Laminate (DTL), Declam, Airdec®, Panlam®, AerFilm®, Flexde®c, Decor or Decorative Film.

Fillet Seal (26) - A seal applied after assembly at the junction of two adjoining parts or surfaces, or along the edges of faying surfaces as a continuous bed of sealing material. It can be applied over, along the edges of, and between installed parts. A fillet seal can also be formed as a result of squeezing a bonded joint.

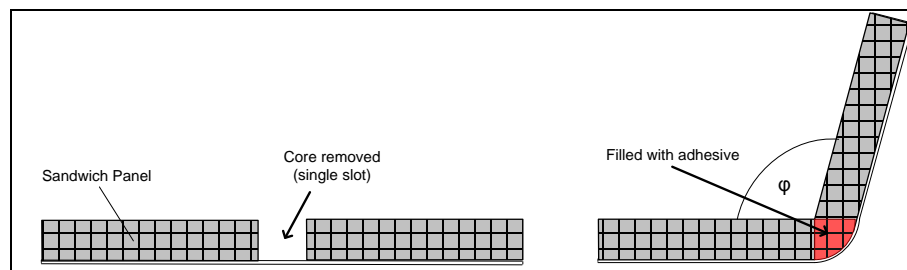
Joint Types (24) – The following illustrations define Ditch and Pot, Cut and Fold, Mortise and Tenon, Tab and Slot, T-joints and Bonded Pin joints.

a. Ditch and Pot

Multiple Slot

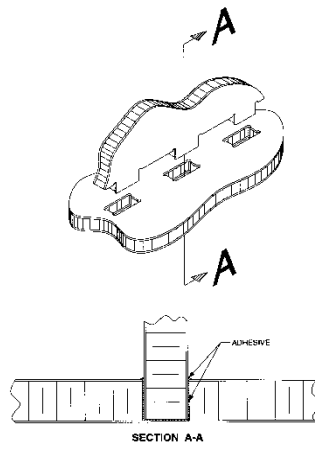


Single Slot

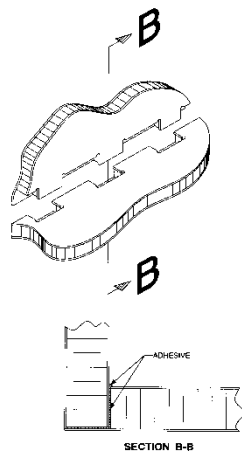


b. Tab and Slot

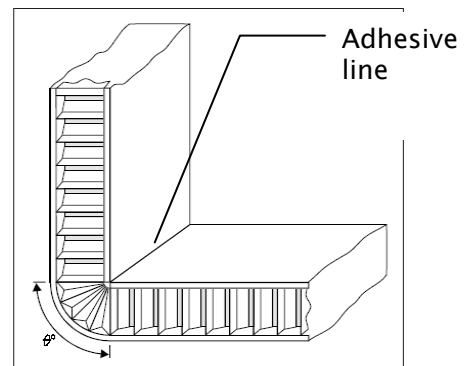
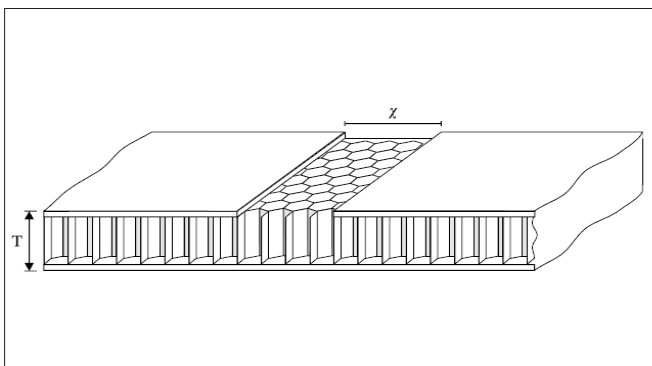
Attachment 3



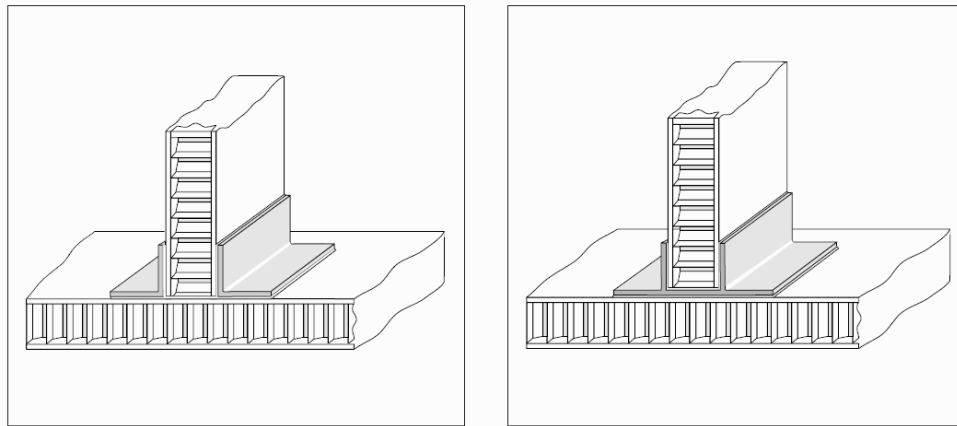
c. Mortise and Tenon



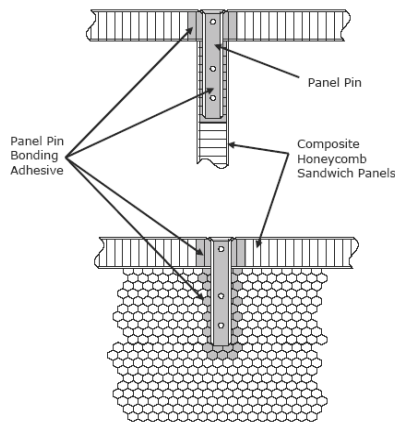
d. Cut and Fold



e. T Joints



f. Bonded Pins



Lineally Applied (21) - A bonded detail is considered to be lineally applied when it is a long thin part typically with a width of 2.0” or less and the surface area is spread out in a long, narrow band. Examples of bonded details that commonly meet this definition include, but are not limited to, rub strips/trims, edge trim/non-metallic, exterior wire raceways, felt, kickstrips, metal and plastic bracket, hook and loop fastener, and grommets.

Same - Use of the term “the same” means the only differences between compared materials/constructions are those properties defined by the one or more MOCs that are being applied (e.g., color of decorative and/or thickness of material). Materials that are qualified to the same type, class, grade, etc. of a specification that controls the physical, chemical and, in particular, flammability properties are considered the same for the

purposes of the comparison. Decorative laminates and synthetic leather, because of their inherent, unique to the manufacturer, multi-material constructions, cannot be considered “the same” based on their qualification to the same specification type, class, grade etc.

These materials must be from the same manufacturer and product line to be considered the same.

Examples:

Example 1. Phenolic prepregs from two different manufacturers qualified to the same type, class, grade, etc of a material specification that controls the physical (e.g., tensile and compression strength), chemical (Phenolic resin system) and flammability (meets a specified level of vertical burn and or heat release and smoke) properties can be considered the same when comparing two sandwich panel constructions to show compliance for a change in decorative color and texture as shown below:

Compliant Panel

..... SkyFlite 140 series dec, Cream Color 1643, Mesa Texture, by SkyFilm LLC
----- 1 Ply DMS 2296 Type 1, Class 1 prepreg
XXXXXXXXXXXXX 0.5” DMS 1974 Type 3, Class 2, Grade A core
----- 1 Ply DMS 2296 Type 1, Class 1 prepreg

Panel to be shown compliant by similarity

..... SkyFlite 140 series dec, Blue Color 2387, Canvas texture, by SkyFilm LLC
----- 1 Ply DMS 2296 Type 1, Class 1 prepreg
XXXXXXXXXXXXX 0.5” DMS 1974 Type 3, Class 2, Grade A core
----- 1 Ply DMS 2296 Type 1, Class 1 prepreg

The only differences between the two items being compared are the MOCs being applied, Decorative Color, and Decorative Texture. The base panels are considered the “same” regardless of which source of material was purchased to the prepreg and honeycomb specifications.

Example 2. When comparing two thermoplastic sheet materials, one vinyl-based and one polycarbonate-based, they cannot be considered the same even if they meet the same type, class and grade of a specification because they are not of the same chemical family, even if they have the same strength and flammability characteristics.

Standard Panel (23) - A panel with one or two-ply non-metallic skins, nominally 6.35 to 13 mm (0.25” - 0.51”) thick non-metallic honeycomb core, which meets § 25.853(a), appendix F, Part 1(a)(1)(i).

Texture (11) - The physical surface structure of a Decorative Type created by a mechanical transfer tool. Texture is a physical characteristic of a surface. It describes the way a surface feels to touch. Texture influences the physical surface structure and

Attachment 3

appearance of a decorative type. It does not change the build-up or chemical composition of the finished product.