SAE Aerospace
An SAE International Group

AEROSPACE RECOMMENDED PRACTICE

SAE ARP6199

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Method to Evaluate Aircraft Passenger Seats for the Test Requirements of 14CFR Part 25 Appendix F, Parts IV & V

RATIONALE

Commencing in 2007, regulatory agencies began issuing rulemaking related to heat release and smoke density (via special conditions) for seats on various model airplanes with non-traditional, large, non-metallic panels that would affect survivability during a post-crash fire. A common criterion for determining which panels on the seat must be evaluated and then substantiated to these requirements is needed.

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1. SCOPE

This SAE Aerospace Recommended Practice (ARP) provides an approach for determining which parts on aircraft seats are non-traditional, large, non-metallic panels that need to meet the test requirements of 14CFR Part 25 Appendix F, Parts IV & V.

Independent furniture related to seat installations is outside the scope of this document.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 Federal Publications

Available from U.S. Government Printing Office, Superintendent of Documents, Mail Stop SSOP, Washington, DC 20402-9328.

Code of Federal Regulations, Title 14 Part 25 (14CFR Part 25) Airworthiness Standards: Transport Category Airplanes

Federal Aviation Administration, Advisory Circular 25-17A (AC25-17A) Transport Airplane Cabin Interiors Crashworthiness Handbook

2.2 Acronyms

AC	Advisory Circular
ARP	Aerospace Recommended Practice
ATC	Amended Type Certificate
CFR	Code of Federal Regulations
CRI	Certification Review Item
EASA	European Aviation Safety Agency
EASA SC	European Aviation Safety Agency Special Conditions
FAA	Federal Aviation Administration
HRSC	Heat Release Special Conditions
HR/SD	Heat Release/ Smoke Density
MOC	Means of Compliance
OEM	Original Equipment Manufacturer
PBE	Protective Breathing Equipment
PCU	Passenger Control Unit
PC	Personal Computer
SRP	Seat Reference Point (see SAE AS8049)
STC	Supplemental Type Certificate
TC	Type Certificate
TTL	Taxi, Takeoff, and Landing

3. BACKGROUND

In 2007, the FAA released special conditions that held seats to the same heat release and smoke density standard as the rest of the cabin. EASA soon followed with similar regulations. The seat HRSC require heat release and smoke density tests for large, exposed, non-metallic, non-traditional panels that are part of the seat design.

In January 2010, the industry and regulators began meeting to develop common criteria that can be used to determine which panels on a seat require heat release and smoke density substantiation. This activity was concluded in December 2010 and the final criteria were subsequently distributed to all of the industry and regulatory participants.

The following assumptions and ground rules were used in developing this certification approach:

- When 14CFR Part 25.853(d) was added in the late 1980s, seats were exempted from the rule. It was accepted at that time that there was a certain amount of non-metallic material as part of seat design. It is understood that the Seat HRSC are intended to capture the increase (or delta) from that baseline to seats today.

- When determining “traditional” envelopes for different zones on the seat (e.g., center consoles, end bays, etc.), the collective experience of the industry determined reasonable estimates based on a variety of examples from seats of the mid-to-late 1980s era.

- It is assumed that there is some flexibility to meeting the Heat Release and Smoke requirements where safety-related items may not meet HRSC and also perform their basic function. These can be coordinated with the regulators on a project-specific basis.

- The requirement to test seat panels to the Heat Release and Smoke requirements does not include a requirement to test to 60-s vertical burn (14CFR Part 25 – Appendix F, Part I (a)(i)). TC/STC/ATC holders and suppliers can elect to step up to this requirement voluntarily.

- Seats are evaluated in the TTL position. This is the required position and orientation of the seat during taxi, takeoff, and landing as controlled by the seat manuals, placards and flight crew instructions for normal operations. Automatically stowed flight attendant seats are evaluated in the stowed position. Manually stowed flight attendant seats are evaluated in the TTL or stowed condition, whichever is most critical for non-metallic exposure.

4. SEAT CERTIFICATION

Understanding that the certification of a seat can be based on a similar seat that was previously certified, or may stand completely on its own, the following tables were generated to outline when there would be an airplane installation level showing of compliance by the TC/STC/ATC holder for the Heat Release Special Conditions. Table 1 depicts the scenarios for “new production programs” and Table 2 outlines the criteria for post-type-certificate modification programs.

TABLE 1 - NEW PRODUCTION PROGRAMS

	New Customer	Same Customer, New A/C Model (new family or new derivative)	Same Customer, New Block of A/C	Same Customer, Same Block, New seat count
Same Seat P/N				
New Seat P/N, no change to large panels	✓			
New Seat P/N, changes to large panels	✓	✓	✓	✓
New Seat Model	✓	✓	✓	✓

✓= seats must be shown compliant with Special Conditions

1. “New Customer” relates to a situation where Airline “A” has, for example, Model “X” airplanes certificated with seats with large non-metallic panels prior to the issuance of special conditions. Airline B, after the effective date of the special conditions, purchases Model “X” airplanes and may (or may not) have exactly the same seating configuration as Airline “A.”

2. “Same Customer, New A/C Model” means if Airline “A” has, for example, Model “X” airplanes certificated with seats with large non-metallic panels prior to the issuance of special conditions. The Airline now purchases Model “Y” or Model “Z” airplanes and installs seats in the new Model “Z” after the issuance of the special conditions.

3. “Same Customer, New Block of A/C” means if Airline “A” has, for example, Model “W” airplanes certificated with seats with large non-metallic panels prior to the issuance of special conditions. The Airline now purchases, after the effective date of the special conditions, additional Model “W” airplanes.

4. “Same Customer, Same Block, New seat count” means if Airline “A” has, for example purchased 50 Model “V” airplanes and the first of this block of 50 airplanes has been type certificated with seats with large non-metallic panels prior to the issuance of special conditions. Then on the 15th airplane to be delivered (which is after the effective date of the special conditions), the Airline decides to increase the number of first class seats in the airplane and reduce the number of economy class seats.

5. “Same seat P/N” means a seat that is unchanged. In the case where the same P/N is retained, but changes are made to all seats with that p/n (i.e., the prior configuration is eliminated on the drawing and in the field), this is considered as “New” for the purposes of implementation of the special conditions.

6. “Customer” refers to the end user, and not a leasing company, that supplies many operators.

TABLE 2 - POST-TC MODIFICATIONS

	Installation of existing arrangement for fleet commonality	Re-arrangement (or removal) of existing seats (no additional seat installations)	New Installation of seats
Same Seat P/N			
New Seat P/N, no change to large panels			✓
New Seat P/N, changes to large panels	✓	✓	✓
New Seat Model	✓	✓	✓

✓= seats must be shown compliant with Special Conditions

1. "Same," or "new" with respect to seat P/N refers to authority approval status, and whether there is an installation approval, even if it was granted to someone else. The applicant is responsible for both identifying and supplying evidence of the prior approval

2. "Fleet commonality" means the installer already has this arrangement in their fleet, and is configuring other airplanes to match. Modification is being performed by other than airframe manufacturer.

3. "Re-arrangement" means the seats are moved around, or maybe some are removed, but no additional seats are installed.

4. "New Installation of seats" means that the modification includes installation of more (Row 1) or different (Rows 2-4) seats than the current arrangement. Includes both a new installation as well as adding to an existing arrangement.

5. With respect to Row 2, column 3, when the same operator/user obtains a post-TC approval (e.g., via STC) to essentially provide fleet commonality with the arrangement as delivered from the factory, R2:C1 would apply instead. Where a customer/user is obtaining a new installation approval for a new P/N, which happens to be similar to another customer's approval, the special conditions would apply.

4.1 Meeting the Test Requirements of 14CFR Part 25 Appendix F, Parts IV & V

Determining the parts to be evaluated using the test requirements of 14CFR Part 25 Appendix F, Parts IV & V is a two step process. First, determine which parts on the seat require evaluation and, second, determine the method of substantiation. Each component of the seat must be examined against the criteria in Section 5 of this document and, if necessary, substantiated using one of the methods listed in Section 6.

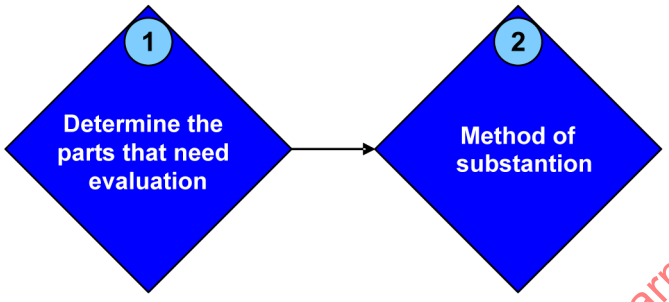


FIGURE 1 - DIAGRAM OF APPROACH

Section 5 of this document defines the criteria used for the first step and Section 6 the acceptable methods for the second step.

5. DETERMINATION OF MATERIALS AND SEAT PARTS THAT REQUIRE EVALUATION USING 14CFR PART 25 APPENDIX F, PARTS IV & V

Seats shall be evaluated in their TTL position, if this position is controlled. “Controlled” means that there is a means (e.g., placard, crew instruction) to ensure the seat is in a specific position for TTL. If no such means exist, the seat shall be evaluated in all positions.

Seat parts that satisfy all of the following five criteria must be evaluated using the methods of 14CFR Part 25 Appendix F Parts IV & V. The criteria are listed in no particular order and it is likely to be expeditious to work through the “easy to calculate” criteria first.

1. Non-metallic
2. Exposed
3. Large
4. A panel
5. Non-Traditional

If *any* of these criteria are *not* true, the part does not need to be evaluated.

In addition to the above five criteria, a sixth “Overall Limit” condition must be satisfied to ensure that seats are not point designed around these requirements and contain excessive amounts of material not meeting the test requirements of 14CFR Part 25 Appendix F Parts IV & V. Seats not meeting this overall limit must be changed until the limit is met before submitting the seat for approval. For example, such changes may include testing a part to obtain data, altering a part, so that it is manufactured from material that meets the test requirements of 14CFR Part 25 Appendix F Parts IV & V, reducing the size of a part, or removing it from the seat.

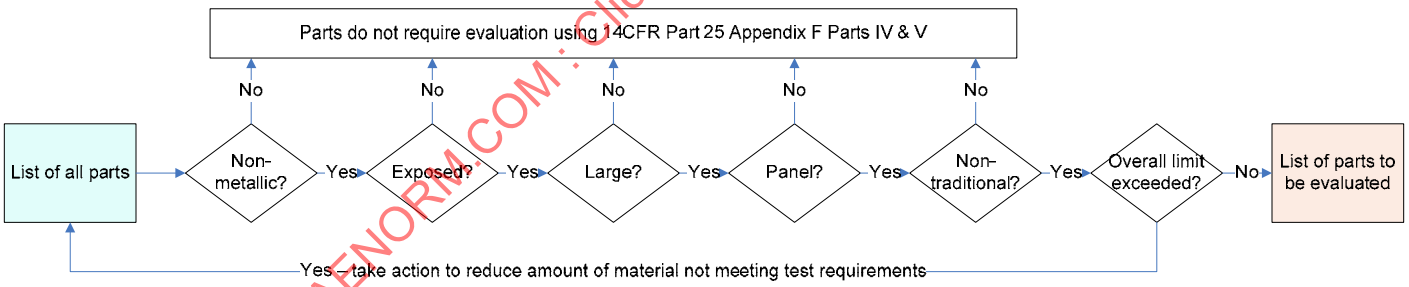


FIGURE 2 - ILLUSTRATION OF CRITERIA USED TO DETERMINE PARTS THAT REQUIRE EVALUATION

Features not specifically included in Section 5 and its subsections are automatically non-traditional.

In the determination of non-traditional (5.5), the term “orthogonally projected area” is used to describe the process by which a three dimensional object is rendered into two dimensional surfaces for which the area can be easily calculated. This process involves a perpendicular projection of the object onto three planes (horizontal, vertical and lateral) to create a two dimensional area.

5.1 Metallic Versus Non-Metallic

All non-metallic panels must be considered.

In order to be excluded from this evaluation, a panel must be all metallic (and may include non-decorative corrosion inhibitors) and not a construction that may include both metallic and non-metallic layer(s) and components.

Examples of acceptable non-decorative corrosion inhibitors are alodine and anodize. Primer, paint and powder coating are examples of coatings that cause a part to be included in the non-metallic category.

5.2 Exposed Versus Unexposed

The following list defines exposed and unexposed parts.

- Exposed panels are those that are directly exposed to the passenger cabin in the traditional sense, and those that are enveloped, such as by a dress cover.
- Any panel completely laying behind an exposed panel that meets the test requirements of 14CFR Part 25 Appendix F Parts IV & V, or that otherwise does not require evaluation, and separated by a gap of 1 in (25 mm) or less, does not itself require evaluation.
- Seat backs, seat bottoms, legrest structure, and headrest structure that are covered by cushions that meet the requirements of 14CFR Part 25 Appendix F, Part II are unexposed.
- Panels covered by a construction of *foam* and *dress cover* that meet the requirements of 14CFR Part 25 Appendix F, Part II are unexposed.
- Panels that are entirely below the seat pan level (NOTE: this is the pan, not the cushion) and are covered by traditional panels or those that do not otherwise require evaluation are unexposed.
- Except for features stored inside of endbays, consoles and armrest closeouts, surfaces of panels that are partially or entirely above the seat pan level (NOTE: this is the pan, not the cushion) and are covered by traditional panels are exposed unless such traditional panels meet the test requirements of 14CFR Part 25 Appendix F Parts IV & V. For example, portions of panels covered by compliant food trays are unexposed. Items covered by non-traditional panels that are otherwise excluded from evaluation, are also unexposed.
- If a center console, end bay or armrest is determined to be traditional, anything inside of the calculated surface-envelope is also traditional and does not need to be evaluated.
- Panels, hidden through installed contact with the floor, are unexposed. NOTE: panels remain unexposed with up to 1 in (25 mm) gap to the floor. This includes all panels, not just the center console depicted in Figure 3.

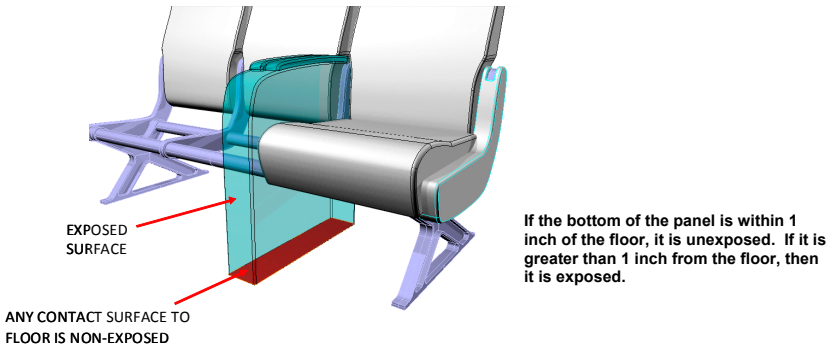


FIGURE 3 - EXAMPLE OF HIDDEN PANELS IN CONTACT WITH THE FLOOR

5.3 Large Versus Not Large

The following list defines small parts that do not need to be evaluated. The list uses size and separation from other similar items, as well as adjoining surfaces, as criteria for whether the part should be evaluated.

- Small items having a specific function (e.g., cup holders, coat hooks, placards, hook and loop tape, screw caps, snaps, tie straps etc.) and sized as necessary to serve their intended function will not be evaluated.

- In general, the following items are not evaluated:

  - Items that occur once per seat place and have an exposed surface area less than 36 in^2 (232 cm^2);

  - Items occurring more than once per seat place that have an exposed surface area less than 9 in^2 (58 cm^2) and are at least 12 in (30 cm) apart from each other.

NOTE: The above criteria apply to both exposed parts and small parts mounted on, or butted up against (with no gap), the unexposed side of exposed panels (see Figure 4).

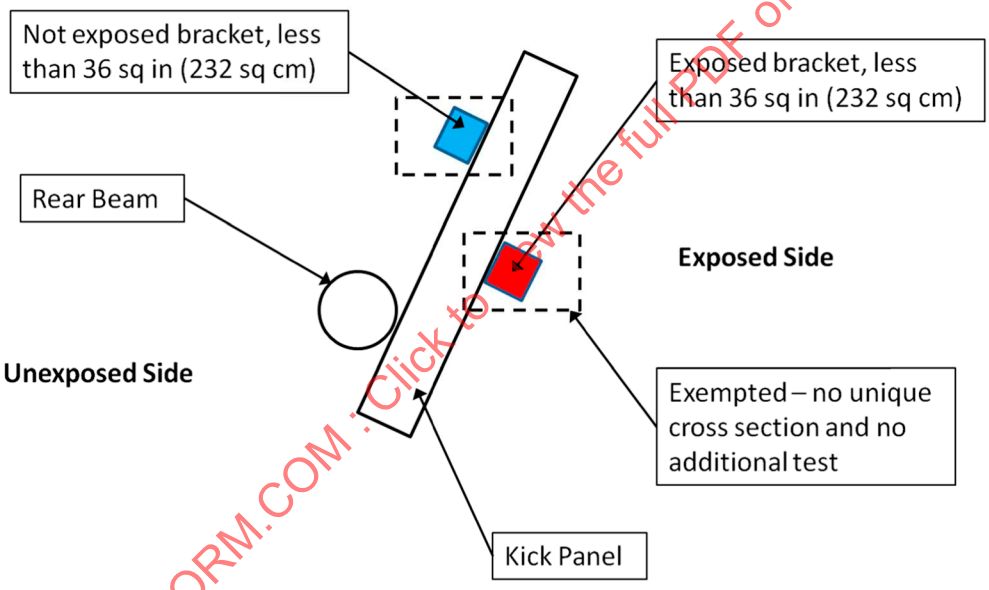


FIGURE 4 - EXAMPLE OF EXPOSED AND UNEXPOSED SMALL PARTS ATTACHED TO A SINGLE PANEL

5.4 Panel Versus Not a Panel

A panel is defined as the surface of single or multiple components that may be attached to or be integral to seat structure.

Non-metallic seat structure such as shown in Figure 5 is not a panel.

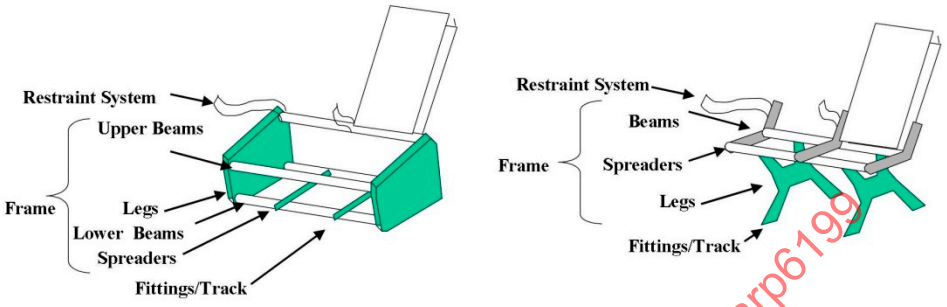


FIGURE 5 - EXAMPLES OF NON-METALLIC SEAT STRUCTURE THAT ARE NOT PANELS

NOTE: Seat backs, cushions, and seat pans are not addressed by this definition and are addressed separately in this document. This document applies only to metallic structure being replaced by non-metallic components.

Fabric (woven or non-woven) or leather coverings are not panels. Construction features of the dress cover materials such as local reinforcement, stitching, surging and welting, are also not panels.

5.5 Traditional Versus Non-Traditional

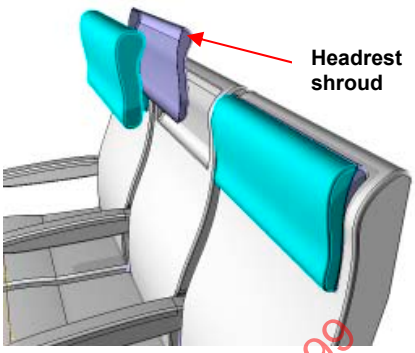
5.5.1 Flight Attendant Seats

- All flight attendant seats current at the time of initial publication of this document are traditional and do not require evaluation using 14CFR Part 25 Appendix F, Parts IV & V.
- Flight attendant seats may be a single entity or several assemblies that are separately installed to perform their function (e.g., a wall mounted head rest).
- Attributes common to traditional flight attendant seats may include but are not limited to:
  - Standalone (track or floor mounted) or wall mounted seats
  - Seats that are sized for their function and location
  - Have stowage for emergency equipment (e.g., lifevest, flashlight, handset, smoke hood, PBE, fire extinguisher)
  - May include miscellaneous stowage
- Non-traditional flight attendant seats:
  - Possess a total surface area greater than 23 ft^2 (2.14 m^2) of exposed non-metallic material. Features covered by a cushion that meets the requirements of 14CFR Part 25 Appendix F, Part II are unexposed.
  - Are larger than necessary and not located to serve their intended function
  - Functional design is blended with other interior appliances and the seat functions as more than a place for an attendant to sit and/or store essential equipment related to their duties (e.g., clothing closet, etc.)
  - Size of seat is driven by decorative requirements

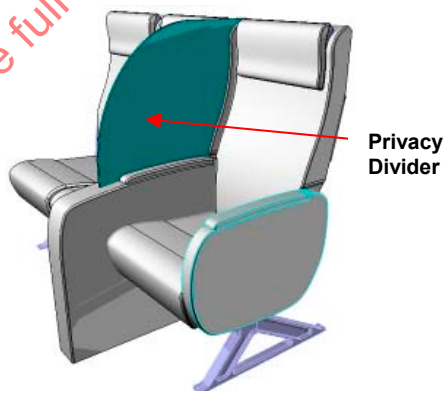
FIGURE 6 - EXAMPLE OF TRADITIONAL FLIGHT ATTENDANT SEAT – HIGH COMFORT SEAT SHOWN

FIGURE 7 - EXAMPLE OF TRADITIONAL FLIGHT ATTENDANT SEAT – STANDARD SEAT SHOWN

5.5.2 Headrests

Controlled cushion and structure supporting the passenger head can be evaluated in the TTL position. If uncontrolled, then evaluation in all positions is necessary. All exposed non-metallic structure and shrouds must be evaluated for 14CFR Part 25 Appendix F, Parts IV & V. Features covered by a cushion that meets the requirements of 14CFR Part 25 Appendix F, Part II are unexposed. "Controlled" is defined as a means (e.g., placard, crew instruction) to ensure the headrest is in a specific position for TTL. NOTE: Headrest "ears" must be evaluated in all conditions unless also "controlled".	 FIGURE 8 - EXAMPLE OF HEADREST SHROUD FOR EVALUATION

5.5.3 Privacy Dividers

Privacy dividers are non-traditional and evaluated in their TTL position.	 FIGURE 9 - EXAMPLE OF PRIVACY DIVIDER

5.5.4 Center Console

A calculation of the orthogonally projected area of the center console is used to determine if it is traditional or non-traditional. Alternatively, other more detailed computational methods may be used to calculate the actual surface area of the exposed surfaces.

The purpose of this calculation is to determine the overall size of the feature by surface area without respect to the materials used or the position of the seat cushions.

The surface area is calculated using the sum of the projected areas on all sides of the item.

Traditional center consoles have a surface area of 1008 in^2 (6503 cm^2) or less.

Non-traditional consoles have a surface area greater than 1008 in^2 (6503 cm^2) excluding traditional features mounted on the console described in this document.

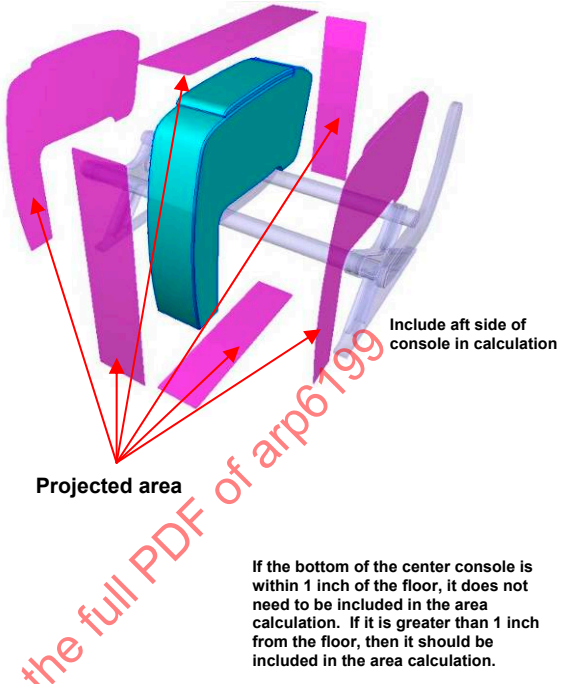


FIGURE 10 - CENTER CONSOLE AREA CALCULATION

5.5.5 Seat End Closeouts (typically used on Economy Class Seats)

A calculation of the orthogonally projected area of the item is used to determine if it is traditional or non-traditional. Alternatively, other more detailed computational methods may be used to calculate the actual surface area of the non-metallic exposed surfaces.

The purpose of this calculation is to determine the overall size of the feature by surface area without respect to the materials used or the position of the seat cushions.

The surface area is calculated using the sum of the projected areas on all sides of the item.

Traditional items have a surface area of 344 in^2 (2219 cm^2) or less.

Non-traditional items have a surface area greater than 344 in^2 (2219 cm^2) excluding traditional features mounted on the item described in this document.

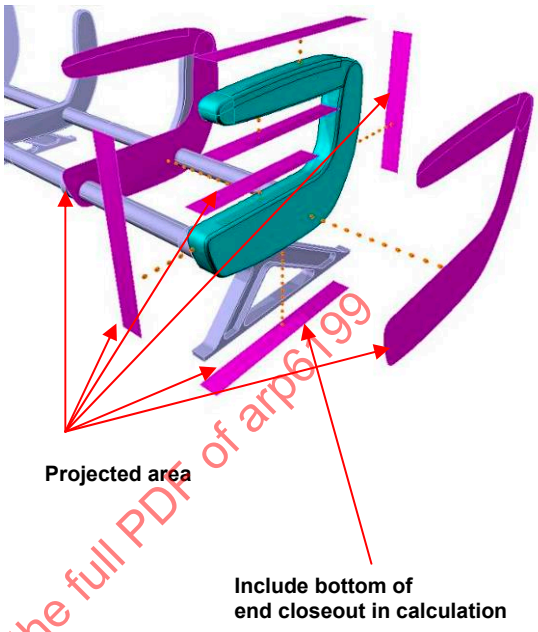


FIGURE 11 - SEAT END CLOSEOUT AREA CALCULATION

5.5.6 End Bay and Armrest Closeouts

End bay and armrest closeouts are typically used on front and exit row economy class seats, premium economy and business and first class seating. They often (but not always) contain video monitors, tray tables and other items.

A calculation of the orthogonally projected area of the item is used to determine if it is traditional or non-traditional. Alternatively, other more detailed computational methods may be used to calculate the actual surface area of the non-metallic exposed surfaces.

The purpose of this calculation is to determine the overall size of the feature by surface area without respect to the materials used or the position of the seat cushions.

The surface area is calculated using the sum of the projected areas on all sides of the item.

Traditional items have a surface area of 1008 in^2 (6503 cm^2) or less (end bay) or 432 in^2 (2787 cm^2) or less (armrest closeout).

Rotating armrests are by definition traditional.

Non-traditional items have a surface area greater than the area identified above excluding traditional features mounted on the item described in this document.

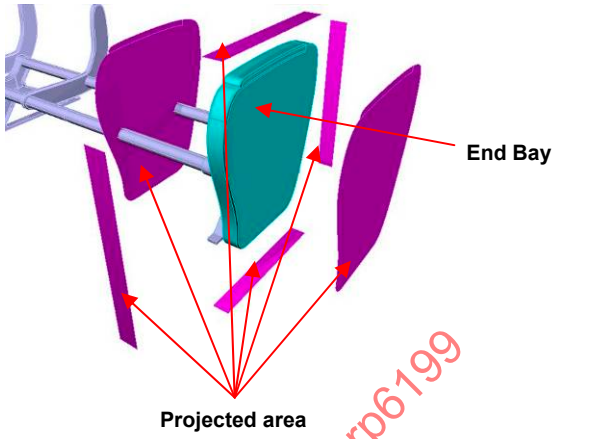


FIGURE 12 - End Bay Area Calculation

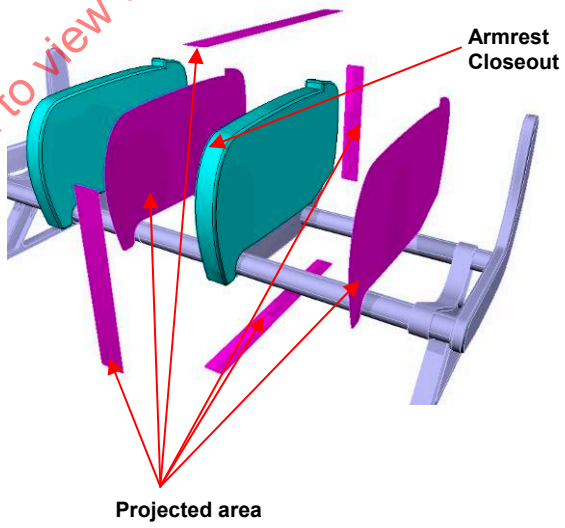


FIGURE 13 - ARMREST CLOSEOUT AREA CALCULATION

5.5.7 Traditional Features Mounted on Seat Consoles, Armrest Closeouts or End Bays

Whether a center console, armrest closeout or end bay is determined to be traditional or non-traditional, the following features mounted on them are traditional:

- Padded Arm Caps and Armrests
- Escutcheons (the close-out cap for the front of an armrest)
- Cocktail trays
- Cup holders
- Electronic devices with any cradle features

Details inside or underneath the above traditional items are unexposed.

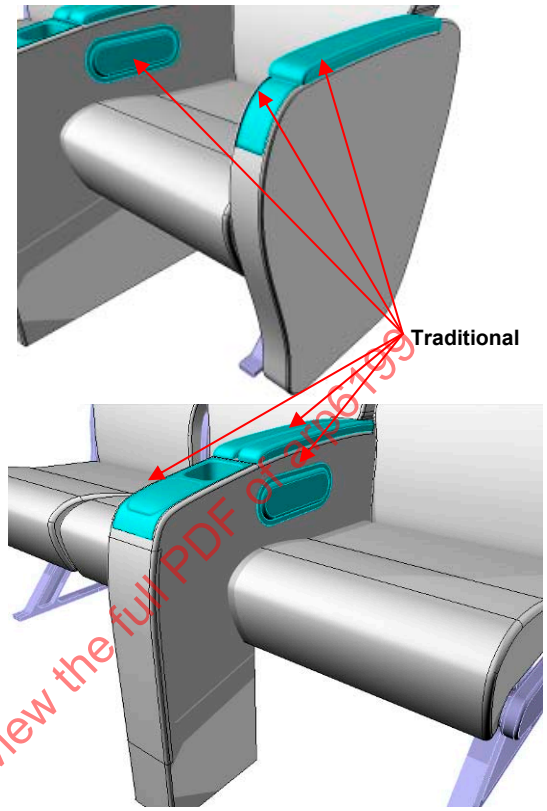


FIGURE 14 - TRADITIONAL ITEMS MOUNTED ON A CONSOLE OR END BAY

5.5.8 Rub Strips and Trim Strips

Rub Strip - the material (typically non-metallic) attached to a panel for the purpose of protecting that panel from an impact of another object (e.g., a galley cart or luggage).

Trim Strip - a capping material (metallic or non-metallic) attached to the edge or between panels for the purpose of closing out or protecting an edge.

Rub and trim strips installed on traditional panels are themselves traditional.

Rub strips installed on non-traditional panels and trim strips installed on traditional or non-traditional panels shall be evaluated in accordance with the size criteria below:

– Non-traditional strips have a surface area greater than 144 in^2 (929 cm^2)

– Traditional strips have a surface area of 144 in^2 (929 cm^2), or less

5.5.9 Shrouds

Traditional: Shrouds provide protection to seat components and reduce risk of injury to passengers.

Protection is often provided to or from seat features such as electrical components, mechanical actuator cables, moving parts (e.g., if the seat or seat features move by any type of actuation with respect to the base assembly), seat belt alignment shrouds, drip shields, and shrouds to protect from injuries such as finger pinch.

Shrouds may be located anywhere on the seat, provided they are sized as necessary to serve their intended protective function throughout all phases of flight.

Material selection does not impact determination.

Shrouds for electrical equipment are traditional provided they are sized as necessary to allow for wire routing, connectors, bend radii and cooling. A traditional shroud shall not exceed 6 in (15 cm) greater than the electrical component on sides where connections are made or wires are routed and not exceed 2 in (5 cm) greater than the electrical component on sides that do not have connectors or wire routing.

Non-traditional: Primary purpose is to screen or hide items which are not specifically listed in the traditional category. Decorative shrouds are non-traditional.

NOTE: Consoles are not shrouds although they may have shrouds incorporated into their design.

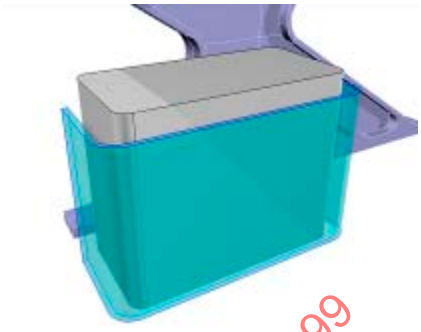


FIGURE 15 - EXAMPLE OF TRADITIONAL SHROUD

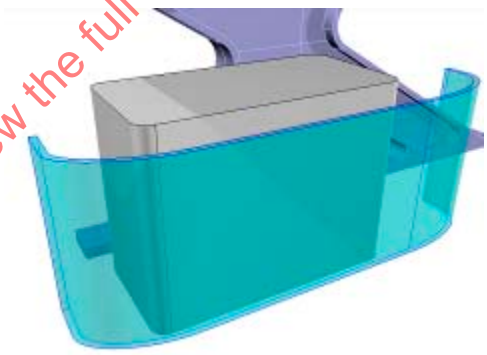
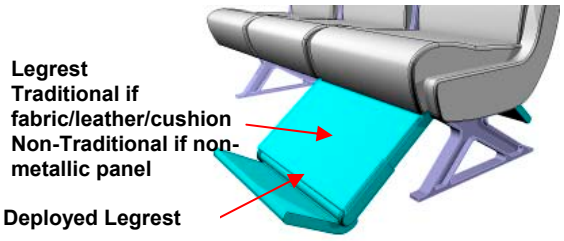
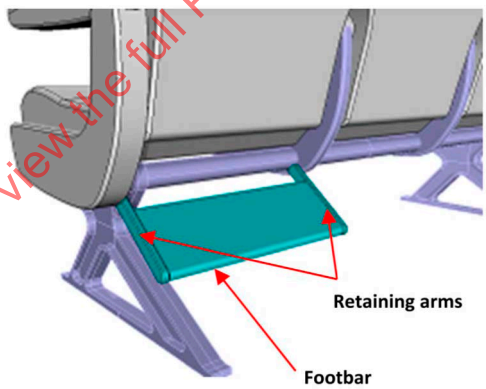
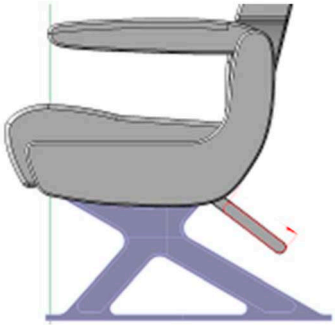


FIGURE 16 - EXAMPLE OF NON-TRADITIONAL SHROUD

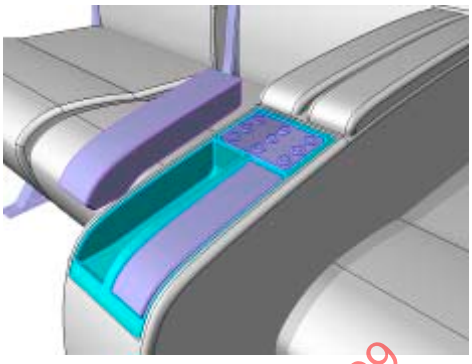
5.5.10 Legrests

Legrest structures, their fabrics, leathers, and cushions are traditional. Non-metallic panels, integral to the legrest construction, as well as shrouds and decorative features are non-traditional unless the shrouds provide protective functionality. Traditional lifevest pockets contained within traditional legrests are themselves traditional. See 5.5.14. NOTE: Surfaces covered by cushions that meet the requirements of 14CFR Part 25 Appendix F, Part II are unexposed. See 5.2.	 FIGURE 17 - EXAMPLE OF TRADITIONAL LEGREST

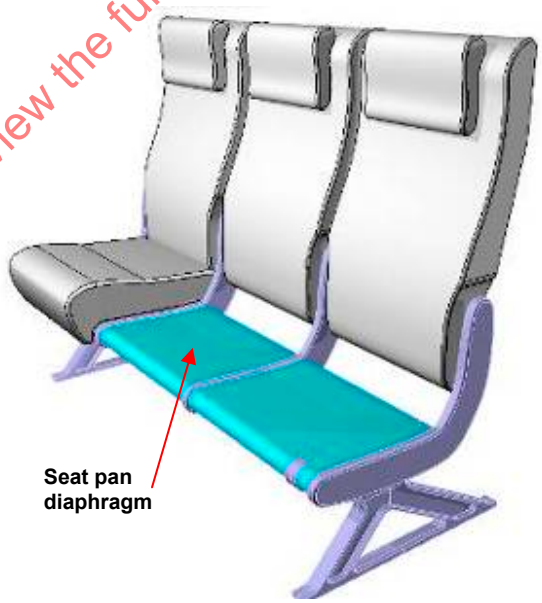
5.5.11 Footbars

Footbars (either leg rest-mounted or aft-mounted) with a surface area of no more than 72 in^2 (465 cm^2) are traditional. NOTE: Retaining arms are not included in this evaluation.	  FIGURE 18 - DEPLOYED FOOTBAR

5.5.12 Electrical Accessories

Electrical accessories are items such as PCUs, PC power outlets, touch pads, handsets, card readers, reading lights, etc. If the total exposed area of all electrical accessories (including buttons and housings) exceeds 270 in^2 (1742 cm^2), then the area in excess of 270 in^2 (1742 cm^2) is non-traditional. The seat supplier can designate which accessories fall inside the limit and which do not. See 5.5.17 for monitors.	 FIGURE 19 - ELECTRICAL ACCESSORIES

5.5.13 Seat Pans

Seat pan structure covered by cushions meeting the test requirements of 14CFR Part 25 Appendix F, Part II, including any diaphragm in the design, is traditional.	 FIGURE 20 - TRADITIONAL SEAT PANS

5.5.14 Lifevest Containers

Lifevest containers manufactured from soft material, such as fabric or leather, located below the seat pan or center console, used for direct protection of a lifevest and sized as necessary to serve their intended protective function are traditional.

Lifevest containers manufactured from hard material, such as metal or sheet plastic, accommodating a single lifevest and having a total surface area (all sides, irrespective of exposure) no more than 270 in^2 (1742 cm^2) are traditional. Lifevest containers manufactured from hard material, such as metal or sheet plastic, accommodating a dual lifevest and having a total surface area (all sides, irrespective of exposure, but not including internal construction) no more than 414 in^2 (2671 cm^2) are traditional.

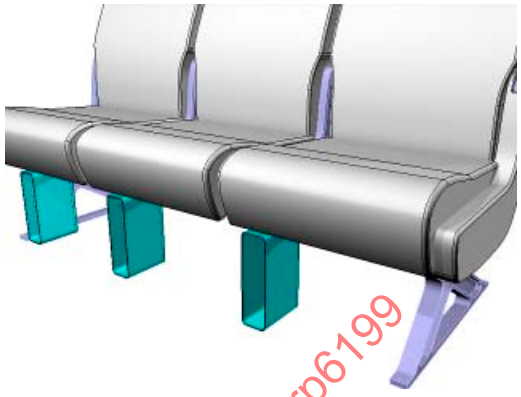


FIGURE 21 - TRADITIONAL LIFEVEST CONTAINER EXAMPLE 1

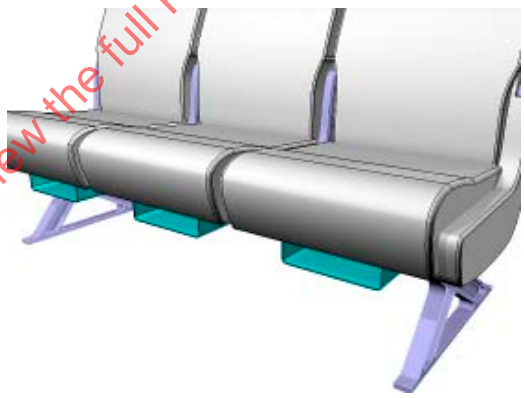


FIGURE 22 - TRADITIONAL LIFEVEST CONTAINER EXAMPLE 2

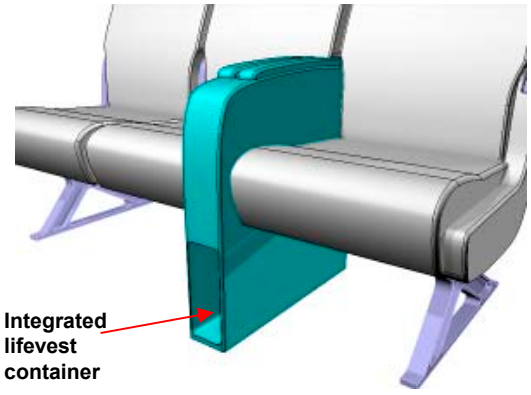


FIGURE 23 - CONSOLE MOUNTED LIFEVEST CONTAINER

5.5.15 Seat Backs

Seat back structure covered by cushions meeting the test requirements of 14CFR Part 25 Appendix F, Part II, including any diaphragm in the design, is traditional.

Non-traditional seat backs include non-metallic features beyond the frame/diaphragm, including decorative components and other features.

In summary:

Traditional: If covered with fabric and/or cushion covers

Non-Traditional: If not covered with fabric and/or cushion covers and therefore exposed directly to the cabin

FIGURE 24 - TRADITIONAL SEAT BACK EXAMPLE 1

FIGURE 25 - TRADITIONAL SEAT BACK EXAMPLE 2

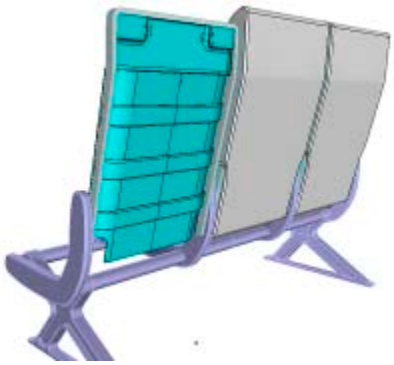
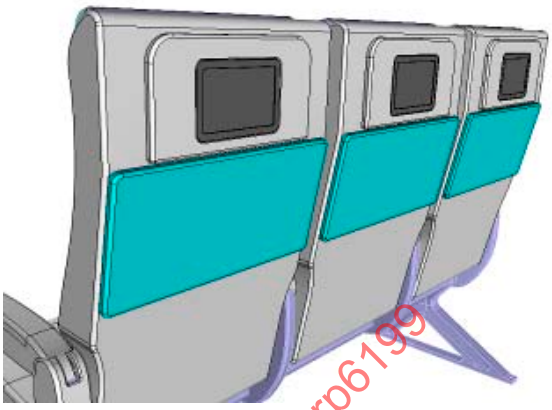
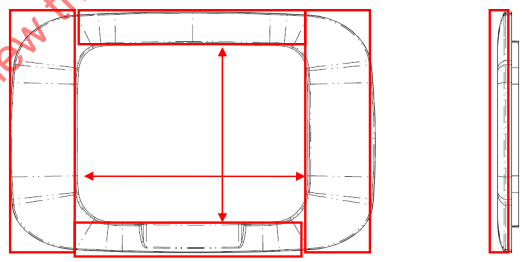


FIGURE 26 - TRADITIONAL SEAT BACK EXAMPLE 3

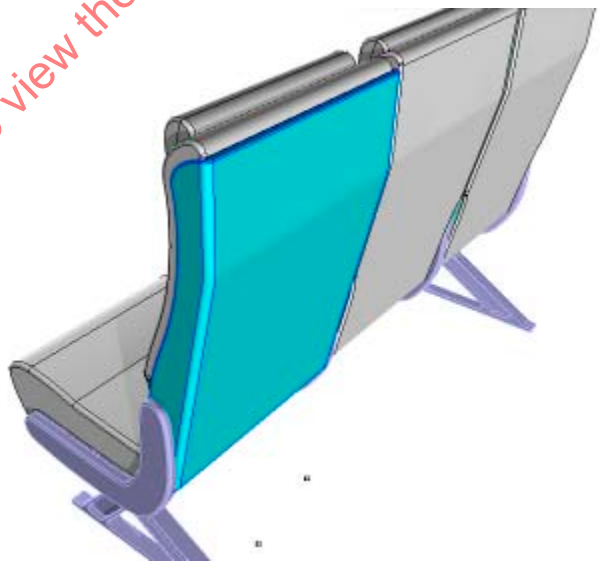
5.5.16 Food Trays

All food trays are traditional up to 200 in^2 (1290 cm^2) per seat place. The surface area is calculated using the sum of the orthogonally projected area (excluding retention knobs) of the exposed areas on all sides of the item when in TTL position. Alternatively, other more detailed computational methods may be used to calculate the actual surface area of the exposed surfaces.	 FIGURE 27 - TRADITIONAL FOOD TRAYS

5.5.17 Monitors and Bezels

Monitors are traditional. Seat-back mounted monitor bezels and shrouds, with surface areas not exceeding 115 in^2 (742 cm^2) on any given side that capture or surround the monitor face are traditional.	 FIGURE 28 - TRADITIONAL MONITOR BEZEL

5.5.18 Surrounds and Back Shell Shrouds

Seat surround shells or seat back shell shrouds are non-traditional.	 FIGURE 29 - NON-TRADITIONAL SEAT SURROUND SHELL  FIGURE 30 - NON-TRADITIONAL SEAT BACK SHELL