

- (3) Galley structure, including exposed surfaces of stowed carts and standard containers and the cavity 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 underseat 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 sub-paragraph (d) of this paragraph, 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.
- (f) Smoking is not allowed in lavatories. If smoking is allowed in any area occupied by the crew or passengers, an adequate number of self-contained, removable ashtrays must be provided in designated smoking sections for all seated occupants.
- (g) Regardless of whether smoking is allowed in any other part of the aeroplane, lavatories must have self-contained removable ashtrays located conspicuously on or near the entry side of each lavatory door, except that one ashtray may serve more than one lavatory door if the ashtray can be seen readily from the cabin side of each lavatory served.
- (h) Each receptacle used for the disposal of flammable waste material must be fully enclosed, constructed of at least fire resistant materials, and must contain fires likely to occur in it under normal use. The ability of the receptacle to contain those fires under all probable conditions of wear, misalignment, and ventilation expected in service must be demonstrated by test.

[Amdt No: 25/12]

[Amdt No: 25/23]

## AMC 25.853 Compartment interiors

*ED Decision 2020/024/R*

The relevant parts of FAA Advisory Circular (AC) 25-17A Change 1, *Transport Airplane Cabin Interiors Crashworthiness Handbook*, dated 24.5.2016, AC 25.853-1 *Flammability Requirements for Aircraft Seat Cushions*, dated 17.9.1986, and AC 25-18, *Transport Category Airplanes Modified for Cargo Service*, dated 6.1.1994, and AC 20-178, *Flammability Testing of Aircraft Cabin Interior Panels After Alterations*, dated 4.6.2012, are accepted by the Agency as providing the acceptable means of compliance with [CS 25.853](#).

Note: ‘The relevant parts’ means ‘the parts of AC 25-17A Change 1 that address the applicable FAR/CS-25 paragraph’.

[Amdt 25/11]

[Amdt 25/17]

[Amdt 25/26]

## CS 25.854 Lavatory fire protection

ED Decision 2017/015/R

(See AMC 25.854)

For aeroplanes with a passenger capacity of 20 or more, or with a cabin length of 18.29 m (60 ft) or more:

- (a) Each lavatory must be equipped with a smoke detector system or equivalent that provides a warning light in the cockpit, or provides a warning light or audible warning in the passenger cabin that would be readily detected by a cabin crew member; and
- (b) Each lavatory must be equipped with a built-in fire extinguisher for each disposal receptacle for towels, paper, or waste, located within the lavatory. The extinguisher must be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in that receptacle.

[Amdt 25/19]

## AMC 25.854 Lavatory Fire Protection

ED Decision 2017/015/R

The cabin length should be measured parallel to the aeroplane centre line from the most forward to the most aft point accessible to passengers or crew.

However, points within in-flight accessible cargo compartments, approved as meeting one of the classifications of CS 25.857, do not need to be considered.

On the flight deck, the most forward seat reference point (SRP) of the pilots' seats (with the seats adjusted to the most forward possible positions) should be used as the most forward point.

[Amdt 25/19]

## CS 25.855 Cargo or baggage compartments

ED Decision 2013/010/R

(See [AMC 25.855](#) and [25.857](#))

For each cargo or baggage compartment, the following apply:

- (a) The compartment must meet one of the class requirements of [CS 25.857](#).
- (b) The following cargo or baggage compartments, as defined in CS 25.857, must have a liner that is separate from, but may be attached to, the aeroplane structure:
  - (1) Class B through Class E cargo or baggage compartments; and
  - (2) Class F cargo or baggage compartments, unless other means of containing the fire and protecting critical systems and structure are provided.
- (c) (1) Ceiling and sidewall liner panels of Class C cargo or baggage compartments, and ceiling and sidewall liner panels in Class F cargo or baggage compartments, if installed to meet the requirements of sub-paragraph (b)(2) of this paragraph, must meet the test requirements of [Part III](#) of Appendix F or other approved equivalent methods.

- (2) Cockpit voice and flight data recorder systems, windows and systems or equipment within, or in the vicinity of, Class E cargo compartments shown to be essential for continued safe flight and landing according to [CS 25.1309](#) must be adequately protected against fire. If protective covers are used, they must meet the requirements of [Appendix F, Part III](#)
- (d) All other materials used in the construction of the cargo or baggage compartment must meet the applicable test criteria prescribed in [Part I](#) of Appendix F, or other approved equivalent methods.
- (e) No compartment may contain any controls, lines, equipment, or accessories whose damage or failure would affect safe operation, unless those items are protected so that –
  - (1) They cannot be damaged by the movement of cargo in the compartment; and
  - (2) Their breakage or failure will not create a fire hazard.
- (f) There must be means to prevent cargo or baggage from interfering with the functioning of the fire protective features of the compartment.
- (g) Sources of heat within the compartment must be shielded and insulated to prevent igniting the cargo or baggage.
- (h) Flight tests must be conducted to show compliance with the provisions of [CS 25.857](#) concerning –
  - (1) Compartment accessibility;
  - (2) The entry of hazardous quantities of smoke or extinguishing agent into compartments occupied by the crew or passengers; and
  - (3) The dissipation of the extinguishing agent in Class C compartment or, if applicable, in Class F compartment.
- (i) During the above tests, it must be shown that no inadvertent operation of smoke or fire detectors in any compartment would occur as a result of fire contained in any other compartment, either during or after extinguishment, unless the extinguishing system floods each such compartment simultaneously.
- (j) Cargo or baggage compartment electrical wiring interconnection system components must meet the requirements of [CS 25.1721](#).

[Amdt 25/3]

[Amdt 25/5]

[Amdt 25/8]

[Amdt 25/12]

[Amdt 25/13]

## CS 25.856 Thermal/acoustic insulation materials

ED Decision 2016/010/R

(See [AMC 25.856\(a\)](#))

- (a) Thermal/acoustic insulation material installed in the fuselage must meet the flame propagation test requirements of [Part VI](#) of Appendix F to CS-25, or other approved equivalent test requirements. This requirement does not apply to “small parts”, as defined in [Part I](#) of Appendix F to CS-25. (See [AMC 25.856\(a\)](#))
- (b) For aeroplanes with a passenger capacity of 20 or greater, thermal/acoustic insulation materials (including the means of fastening the materials to the fuselage) installed in the lower half of the aeroplane fuselage must meet the flame penetration resistance test requirements of [Part VII](#) of Appendix F to CS-25, or other approved equivalent test requirements. This requirement does not apply to thermal/acoustic insulation installations that the Agency finds would not contribute to fire penetration resistance. (See [AMC 25.856\(b\)](#))

[Amdt 25/6]

[Amdt 25/18]

### AMC 25.856(a) Thermal/acoustic insulation materials: Flame propagation resistance

ED Decision 2009/010/R

FAA Advisory Circular 25.856-1 Thermal/Acoustic Insulation Flame Propagation Test Method Details, dated 24/06/2005, is accepted by the Agency as providing acceptable means of compliance with [CS 25.856\(a\)](#) and [Part VI](#) of Appendix F to CS-25.

[Amdt 25/6]

### AMC 25.856(b) Thermal/acoustic insulation materials: Flame penetration (Burnthrough) resistance

ED Decision 2009/010/R

FAA Advisory Circular 25.856-2A Installation of Thermal/Acoustic Insulation for Burnthrough Protection, dated 29/07/2008, is accepted by the Agency as providing acceptable means of compliance with [CS 25.856\(b\)](#) and [Part VII](#) of Appendix F to CS-25.

[Amdt 25/6]

## CS 25.857 Cargo compartment classification

ED Decision 2009/017/R

(See [AMC 25.855](#) and [25.857](#))

- (a) *Class A.* A Class A cargo or baggage compartment is one in which –
  - (1) The presence of a fire would be easily discovered by a crew member while at his station; and
  - (2) Each part of the compartment is easily accessible in flight.

- (b) *Class B.* A Class B cargo or baggage compartment is one in which –
- (1) There is sufficient access in flight to enable a crewmember standing at any one access point and without stepping into the compartment, to extinguish a fire occurring in any part of the compartment using a hand fire extinguisher;
  - (2) When the access provisions are being used no hazardous quantity of smoke, flames or extinguishing agent will enter any compartment occupied by the crew or passengers; and
  - (3) There is a separate approved smoke detector or fire detector system to give warning to the pilot or flight engineer station.
- (c) *Class C.* A Class C cargo or baggage compartment is one not meeting the requirements for either a Class A or B compartment but in which–
- (1) There is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station;
  - (2) There is an approved built-in fire-extinguishing or suppression system controllable from the cockpit.
  - (3) There are means to exclude hazardous quantities of smoke, flames, or extinguishing agent, from any compartment occupied by the crew or passengers; and
  - (4) There are means to control ventilation and draughts within the compartment so that the extinguishing agent used can control any fire that may start within the compartment.
- (d) Reserved.
- (e) *Class E.* A Class E cargo compartment is one on aeroplanes used only for the carriage of cargo and in which –
- (1) Reserved.
  - (2) There is a separate approved smoke or fire detector system to give warning at the pilot or flight engineer station;
  - (3) There are means to shut off the ventilating airflow to, or within, the compartment, and the controls for these means are accessible to the flight crew in the crew compartment;
  - (4) There are means to exclude hazardous quantities of smoke, flames, or noxious gases, from the flight-crew compartment; and
  - (5) The required crew emergency exits are accessible under any cargo loading condition.
- (f) *Class F.* A Class F cargo or baggage compartment is one in which -
- (1) There is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station;
  - (2) There are means to extinguish or control a fire without requiring a crewmember to enter the compartment; and
  - (3) There are means to exclude hazardous quantities of smoke, flames, or extinguishing agent from any compartment occupied by the crew or passengers.

[Amdt 25/3]  
[Amdt 25/8]

## AMC 25.855 and 25.857 Cargo or baggage compartments

ED Decision 2020/024/R

### 1. PURPOSE

This Acceptable Means of Compliance (AMC) sets forth an acceptable means, but not the only means, of demonstrating compliance with the provisions of the airworthiness standards for Class B and Class F cargo compartments for large aeroplanes. This AMC provides a rational method for demonstrating that the requirements of the related paragraphs of CS-25 are met and that fires occurring in the compartments can be controlled to ensure that they do not present a hazard to the aeroplane or its occupants. Like all AMC material, this AMC is not, in itself, mandatory and does not constitute a requirement. Terms used in this AMC, such as "shall" and "must," are used only in the sense of ensuring applicability of this particular method of compliance when the acceptable method of compliance described herein is used.

### 2. RELATED DOCUMENTS

#### a. Certification Specifications.

- CS 25.851 Fire extinguishers
- CS 25.855 Cargo or baggage compartments
- CS 25.857 Cargo compartment classification
- CS 25.858 Cargo compartment fire detection systems

#### b. FAA Advisory Circulars (AC).

The following FAA Advisory Circulars are accepted by the Agency as providing acceptable means of compliance with [CS 25.857](#):

AC 25-17A Change 1, Transport Airplane Cabin Interiors Crashworthiness Handbook (the relevant parts addressing the applicable FAR Part 25/CS-25 paragraphs)

AC 25-9A Smoke Detection, Penetration, and Evacuation Tests and Related Flight Manual Emergency Procedures,

AC 25-18 Transport Category Airplanes Modified for Cargo Service

AC 20-42D, Hand Fire Extinguishers for use in Aircraft

AC 25-22, Certification of Transport Airplane Mechanical Systems

FAA Order 8150.4, Certification of Cargo Containers with Self-Contained Temperature Control Systems (Active ULDs)

### 3. BACKGROUND

[CS 25.857\(b\)](#) and [25.857\(f\)](#) provide standards for certification of two classes of cargo compartments, Class B and Class F.

A Class B cargo compartment is configured in a manner that allows a crewmember to extinguish or control any fire likely to occur in the compartment using a hand fire extinguisher. While the person combating the fire must have access to the compartment, it must not be necessary for that person to physically enter the compartment to extinguish the fire (see [CS 25.857\(b\)\(1\)](#)). The contents of the compartment may be reached by hand or with the contents of a hand extinguisher while standing in the entry door.

A Class F cargo compartment is similar to a Class C compartment in that there are means to extinguish or control the fire without any requirement to enter the compartment.

Both Class B and Class F cargo compartments have fire or smoke detection systems to alert the crew to the presence of the fire.

#### 4. COMPARTMENT CLASSIFICATION

All cargo compartments must be properly classified in accordance with [CS 25.857](#) and meet the requirements of [CS 25.857](#) pertaining to the particular class involved (see CS 25.855 (a)).

In order to establish appropriate requirements for fire protection, a system for classification of cargo or baggage compartments was developed and adopted for large aeroplanes.

Classes A, B, and C were initially established; Classes D, E, and F were added later. Class D has been eliminated from the CS-25 specifications (by Amdt 3). The classification is based on the means by which a fire can be detected and the means available to control the fire.

- a. A Class A compartment (see [CS 25.857\(a\)](#)) is one that is located so close to the station of a crewmember that the crewmember would discover the presence of a fire immediately. In addition, each part of the compartment is easily accessible so that the crewmember could quickly extinguish a fire with a portable fire extinguisher. A Class A compartment is not required to have a liner.
- b. A Class B compartment (see [CS 25.857\(b\)](#)) is one that is more remote than a Class A compartment and must, therefore, incorporate a fire or smoke detection system to give warning at the pilot or flight engineer station. Because a fire would not be detected and extinguished as quickly as in a Class A compartment, a Class B compartment must have a liner in accordance with [CS 25.855\(b\)](#). In flight, a crewmember must have sufficient access to a Class B compartment to reach any part of the compartment by hand or with the contents of a hand extinguisher when standing at any one access point, without stepping into the compartment. There are means to ensure that, while the access provisions are being used, no hazardous quantity of smoke, flames, or extinguishing agent will enter areas occupied by the crew or passengers.
- c. A Class C compartment (see [CS 25.857\(c\)](#)) differs from a Class B compartment in that it is not required to be accessible in flight and must, therefore, have a built-in fire extinguishing system to suppress or control any fire. A Class C compartment must have a liner and a fire or smoke detection system in accordance with [CS 25.855\(b\)](#) and [CS 25.857\(c\)\(1\)](#). There must also be means to exclude hazardous quantities of extinguishant and products of combustion from occupied areas (see [CS 25.857\(c\)\(3\)](#)).
- d. A Class E compartment (see [CS 25.857\(e\)](#)) is found on an all-cargo aeroplane. Typically, a Class E compartment is the entire cabin of an all-cargo aeroplane; however, other compartments of such aeroplanes may be also classified as Class E compartments. Shutting off the ventilating airflow to or within the compartment controls a fire in a Class E compartment. A Class E compartment must have a liner (see [CS 25.855\(b\)](#)) and a fire or smoke detection system installed in accordance with [CS 25.857\(e\)\(2\)](#). It is not required to have a built-in fire suppression system.
- e. A Class F compartment (see [CS 25.857\(f\)](#)) is one in which there are means to control or extinguish a fire without requiring a crewmember to enter the compartment. Allowing access by a crewmember in the presence of a fire warning is not envisioned. Class F compartments that include a built-in fire extinguisher/suppression system or require the use of acceptable fire containment covers (FCCs) would meet these requirements. The Class F compartment must have a fire or smoke detection system installed in accordance with [CS 25.857\(f\)\(1\)](#). Unless there are other means of containing the fire and protecting critical systems and structure, a Class F compartment must have a liner meeting the

requirements of part III of Appendix F, or other approved equivalent methods (see CS 25.855(b)).

It is not envisaged that lower deck cargo compartments be approved as Class F cargo compartments. The Class F cargo compartment was introduced as a practicable and safe alternative to the previous practice of providing large Class B cargo compartments. These latter compartments were limited to the main deck for accessibility reasons. Lower deck cargo compartments in aircraft carrying passengers need to comply with the Class C cargo compartment requirements of [CS25.857\(c\)](#).

## 5. FIRE PROTECTION FEATURES

Based on the class of the compartment, fire protection features must be provided. The fire protection features must be shown to meet the standards established by the original type certification basis for the aeroplane or later CS-25 standards. These features may include liners, fire or smoke detection systems, hand fire extinguishers, and built-in fire suppression systems.

### a. Liners

The primary purpose of a liner is to prevent a fire originating in a cargo compartment from spreading to other parts of the aeroplane before it can be brought under control. For Class B compartments, it is assumed that the fire will be quickly extinguished. Therefore, the liner does not need to be qualified to the requirements of Part III of Appendix F. For Class F cargo compartments, the fire might have grown larger prior to being suppressed, and therefore, better protection is needed to prevent damage to surrounding systems and structure. However, the liner does not need to serve as the compartment seal. It should be noted, however, that the liner is frequently used to perform the secondary functions of containing discharged extinguishing agent and controlling the flow of oxygen into the compartment. If other means, such as compartment walls, are not capable of performing those functions, the liner must be sufficiently airtight to perform them.

The liner must have sufficient fire integrity to prevent flames from burning through the liner before the fire can be brought under control and the heat from the fire is sufficiently dissipated. As stated in Part III of Appendix F, in addition to the basic liner material, the term "liner" includes any design feature, such as a joint or fastener that would affect the capability of the liner to safely contain a fire.

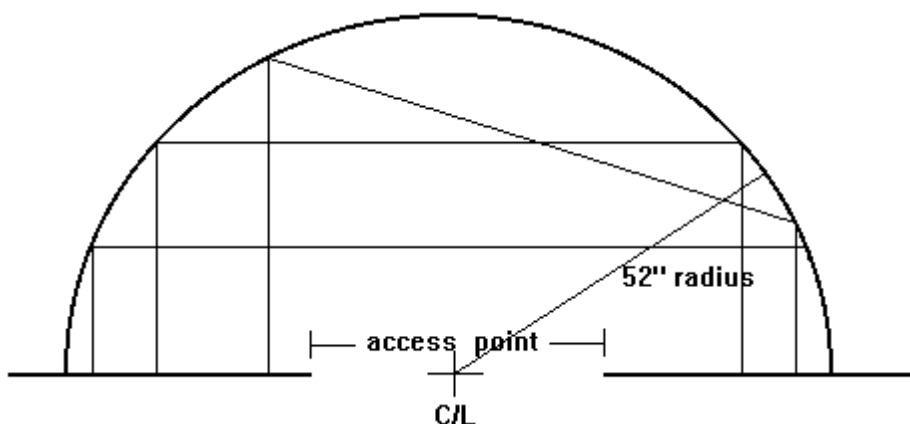
### b. Access

(1) Class B. Class B compartments must provide sufficient accessibility to enable a crewmember to reach any part of the compartment by hand or with the contents of a hand extinguisher without physically entering the compartment. This requirement, by its nature, tends to limit the size and shape of the compartment. Additionally, the access provisions should be sufficiently large to enable the crewmember to determine visually that a fire has been extinguished. Access is also a function of how the compartment is configured rather than just dimension and/or volume. In determining access, it would not be acceptable for there to be a need to pull baggage or cargo on to the floor of the passenger compartment to gain access to the seat of the fire. Such action may introduce a safety hazard to the passengers.

"To reach any part of the compartment" means that the crewmember should be able to open the door or hatch and, standing in the opening, reach by hand anywhere in the compartment where cargo or baggage can be located. The

extension of the crewmember's reach through the use of fire extinguisher wands, etc., should not be considered in determining reach.

Based on the estimated reach of a 95 percentile male, the outline of any compartment, viewed from above, should fit within a vertical cylinder of radius 132 cm (52 inches) measured from the centreline of the access door or hatch (see Figure 1). This dimension assumes the above male can reach a one foot square box located anywhere within the compartment. Access by a smaller crewmember to reach the same area within the compartment could require that the crewmember move laterally within the access door or hatch opening, while not physically entering the compartment.



**Figure 1**

*Example of possible cargo compartment shapes within 132 cm (52 inches) reach from access point centreline.*

- (2) Class F. In the case of a Class F compartment, a means should be provided to control or extinguish a fire without a crewmember entering the compartment.

One means is to design the compartment to Class C requirements but not include a built-in fire suppression system. One suppression method might be to utilize a plumbing and nozzle distribution system within the compartment that would provide acceptable suppression capability throughout the volume of the compartment. The source for such a system could be hand fire extinguishers, which interface with the distribution system through a suitable interface nozzle. This reduces the complexity and costs associated with a built-in suppression system and could be suitable for smaller compartments. For certification purposes, the extinguishing agent concentration should be measured in flight, following aeroplane flight manual (AFM) procedures, and the length of protection time afforded by the system should be recorded. This time of protection should be used to establish AFM limitations for cargo or baggage compartment fire protection times. The operator, for route planning, could then use these times. For Halon 1301 fire extinguishing agent, a minimum five percent concentration by volume at all points in the compartment is considered adequate for initial knock-down of a fire, and a three percent concentration by volume at all points in the compartment is considered the minimum for controlling a fire after it is knocked down. This option requires the use of a liner as stated in [CS 25.855\(b\)](#).

Another means of providing fire protection in a Class F compartment might be the use of cargo containers or fire containment covers (FCCs) shown to be capable of

containing a fire. Some FCCs have already been developed and are typically constructed of woven fibreglass-based materials that will pass the oil burner test requirements of Part III of Appendix F.

This is in line with the revised [CS 25.855](#) which for a Class F cargo or baggage compartment not using FCCs requires a ceiling and sidewall liner constructed of materials that meet the requirements of Part III of Appendix F and be separated from the aeroplane structure (except for attachments), while the floor panels must comply with Part I of Appendix F.

Similarly, if FCCs are proposed as a means of compliance for the new Class F compartment, it is likely that in order to meet the intent they must also meet these standards (i.e. Part III of Appendix F for the sides and top and Part I of Appendix F for the bottom). However, based on full scale qualification testing there is evidence that alternative materials, not fully in compliance with Part III of Appendix F, might also be acceptable for FCC side and top portions, as long as they are successfully tested and meet the intent of the rule.

It is recommended that the Agency be contacted for concurrence when FCC or Container qualification is envisaged in order to address the relevant test method.

Unless evidence can be presented to support a different design, if FCCs are used as a means of compliance, they should completely surround all cargo, including underneath the cargo, except for obviously non-flammable items, such as metal stock, machinery, and non flammable fluids without flammable packaging. Because the fire is controlled or extinguished within the isolated compartment, but is separated from the actual cargo compartment boundaries, the cargo compartment liner requirements of [CS 25.855\(c\)](#) would not apply. However, the effects of the heat generated by the contained/covered fire should be evaluated to ensure that adjacent systems and structure are not adversely affected. For certification purposes, test data with the actual design configuration and possible fire sources would have to be provided. The temperature and heat load time history measurements at various locations above, around and below the FCC are needed to ensure the continued safe function of adjacent systems and structure. The time history data should be used to establish the length of protection time afforded by the system and subsequent AFM limitations for cargo or baggage compartment fire protection times. The operator would then use these times for route planning purposes.

Class F cargo compartment designs which rely on fire containment, e.g. fire hardened containers/pallets and/or FCCs (placed over palletised loads or non-fire hardened containers) should be considered in regards to the possibility of incorrect usage.

All practicable means to prevent the carriage of cargo in standard containers or pallets (if special pallets are required) and/or the omission of FCCs should be incorporated. Means may include, but not be limited to, physical features at the container/pallet to cargo compartment floor interface or operational procedures such as requiring aircraft crew verification of cargo loading before every flight or a suitable detection system that would warn the crew in the event a non authorized cargo configuration has been loaded.