Proposed Special Condition D-01 on "High Wall Mini-Suite"

Applicable to Airbus A380 and Boeing 777

Introductory note:

The following Special Condition has been classified as an important Special Condition and as such shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"*2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.*"

Statement of Issue

An applicant has submitted a project proposal to EASA for a new suite installation where the walls surrounding the passenger seat close out to the ceiling area and include a privacy screen that can be closed during flight creating an enclosure surrounding the seat. These suite walls surround an approved first class seat. The suite walls are mounted separately to airplane structure and do not interface with the seat. The suite walls surround the first class seat to provide additional privacy, comfort, convenience and provide the impression of exclusivity.

Previously, applicants have submitted project proposals to EASA for "mini-suite" installations where the seats were surrounded by partial height partitions. These mini-suite installations are certified according to special condition detailed in project specific CRIs.

However, suite designs with wall surrounds close out to the ceiling/bin area directly above the walls and with a privacy screen that can be closed during flight are considered novel features, not envisioned in applicable JAR/CS 25 rules such as 25.785(h), 25.813(e), 25.854, 25.857(b), etc. and therefore, in accordance with 21A.16B, Special Conditions are necessary to address the proposal.

NOTE: Security aspects beyond requirements in CS 25.795 as stated below are not addressed in this proposed Special Condition.

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- High Wall Mini-Suite -

Following the review of the design proposal and the existing CRIs for low wall partition mini-suites, EASA considers that the following Special Conditions are necessary to establish the required level of safety, in conjunction with the Interpretive Material and Means of Compliance, mentioned for information only.

1. Only single occupancy of the suite is allowed during taxi, takeoff and landing.
2. There must be two independent egress paths to allow sufficient access and egress to the suite.
   a. One egress path must be provided by a floor level entrance providing a 38 cm (15") wide passage

b. One egress path must be provided by a floor level entrance providing a 38 cm (15”) wide passage, or a non-floor level opening of not less than 48 cm (19”) wide by 66 cm (26”) high size.

3. If an egress path can be obstructed by a door, a screen or similar feature, then:

   a. the obstruction must be able to be removed with a maximum force of 113N (25 lbf),

   b. the obstruction feature must have no hold closed retention mechanism.

4. There must be one emergency passage feature that will ensure that occupants will not be trapped at any time in flight.

5. The suite must not provide the required evacuation path for any passenger other than for its single occupant.

6. Each suite occupant must be provided with supplemental oxygen system equivalent to that provided for the passenger cabin, however chemical oxygen generator installation must meet CS 25.795 at Amdt 16 amended as follows:

   (…)

   (d) Each chemical oxygen generator or its installation must be designed to be secure from deliberate manipulation by one of the following:

   (1) By providing effective resistance to tampering,

   (2) By providing an effective combination of resistance to tampering and active tamper-evident features,

   (3) By installation in a location or manner whereby any attempt to access the generator would be immediately obvious, or

   (4) By a combination of approaches specified in subparagraphs (d)(1), (d)(2) and (d)(3) of this paragraph.

7. A Cabin Crew must be responsible for a suite area comprising of no more than 6 suites when accomplishing the requirements of this Special Condition.

8. Each egress path obstruction must be removed during taxi, takeoff and landing. The Cabin Crew must be able to easily and readily ensure and check the obstruction removal.

9. The seat of the Cabin Crew responsible for a suite area must be located to provide a direct view of the egress path from each suite and of each main aisle adjacent to the suites.

10. The Cabin Crew must be able to determine the actions and demeanour of the occupants of the suite at any time throughout the flight without additional effort.

11. One egress path obstruction must remain open when the suite is unoccupied.

12. The Cabin Crew duties must be supported by appropriate placards, or other equivalent means, ensuring suite occupant awareness of the design and procedures required by this Special Condition.

13. A smoke or fire detection system is required to monitor each suite area, and must provide:

    a. a visual indication to the Flight Crew within one minute after the start of a fire,
    b. an aural warning in the suite area where detection has occurred, and a warning in the passenger cabin, which indicates the location of the event.

14. The design of the suites and the firefighting equipment location must allow crewmembers to conduct effective firefighting procedures.

15. The suite firefighting procedures must be conducted without causing a hazardous condition to passengers due to excess quantities of smoke and / or extinguishing agent accumulating and remaining in other occupied areas.

16. Large enclosed stowage compartments are not allowed within the suite.

17. Where a waste disposal receptacle is fitted, it must be equipped with an automatic fire extinguisher that meets the applicable lavatory waste disposal receptacle requirements.

Interpretative Material

1. IM to SC 2, 3, 4, 8, 10 & 11. This Special Condition allows obstruction to both suite egress paths. This is mitigated by the removal of egress path obstruction during taxi, takeoff and landing, the in-flight demeanour visibility, the opening of egress path obstruction when the suite is unoccupied, and the design of one emergency passage feature for in-flight use in the unlikely event of the two egress paths obstruction being jammed.
2. IM to SC 2 & 3. When the movement or removal of an egress path obstruction or emergency path feature involves electrical power, the required functions must be fulfilled, regardless of power failure condition, and:
   a. it should not be hazardous to occupants, using ARP 5526 guidance or equivalent.
   b. it should be protected from damage caused by blocking items, misalignment of the mechanism and minor deformation of the structure.
   c. It should prevent overheating of the components that could be an ignition source.
3. IM to SC 3 & 4. Certain features such as curtains may be considered as non-obstructing.
4. IM to SC 3a. If the obstruction feature itself is translating along the suite wall or removable, it must be movable or removable from inside or outside. If the obstruction feature itself is not translating along the suite wall or removable, it must be deployable in the direction of the suite occupant egress, i.e. outside of the suite.
5. IM to SC 3b. Certain features such as magnets or other non-mechanism type features may be considered as non-holding close, however the compliance to SC 3a must then be demonstrated with closing feature in place.
6. IM to SC 5. When all suite egress path obstructions are removed, the suite should not provide a required evacuation path for a passenger not coming out of the suite.
   a. No passage through the suite should be an evacuation path for passengers. Nevertheless, in the case of two adjacent suites, which are only separated by low furniture that may easily be climbed over, it is not necessary to provide means to forbid access to the adjacent suite. This however does not allow to count the adjacent suite access as one of the egress path required per SC 2.
   b. No access sharing design is acceptable; floor level entrance can only provide access to the specific suite.
7. IM to SC 6. The oxygen masks provided in the suites must be equivalent to that provided in the passenger cabin
   a. It must include an automatic drop down system with means by which the oxygen masks can be manually deployed from the flight deck.
   b. Simultaneously with mask drop, an aural warning and Illumination should be provided, sufficient for occupants to locate a deployed oxygen mask.
   c. It should be understood that the oxygen masks within the suites are assumed to be not available for the cabin attendant moving about the cabin, since suite obstructions may be closed in flight. As such, additional oxygen or oxygen indication in the suite area is likely necessary to meet the applicable 10% coverage requirement and applicable uniform distribution requirement.
   d. Relevant chemical oxygen generator guidance is provided in AMC 25.795 which is amended as follows:
      (…)
      Compliance with CS 25.795(d): see Appendix
8. IM to SC 7. The requirement of a maximum of 6 mini-suite per responsible Cabin Crew, and any specific Cabin Crew tasks per this Special Condition, do not necessarily translate into requirement of addition to the total number of Cabin Crew required for the entire aircraft. The number of Cabin Crew and location of Cabin Crew seats should consider the number of individual suites and suite areas, and the design and installation features within those suites.
9. IM to SC 7 & 9. More than one attendant may be used to meet the direct view requirements of one given suite area.
10. IM to SC 8. For emergency evacuation situations, the suite area must maintain the applicable minimum dimension requirements for main aisles, cross aisles and passageways.
    a. Only temporary encroachment into these applicable minimum dimension requirements is allowed during the removal of an egress path obstruction.
    b. Installation of the suite must not introduce any additional obstacles or diversions to evacuating passengers, even from other parts of the cabin.
11. IM to SC 8 & 14. The suite and area design should ensure that:
    a. Obstruction features deploying out of the suite should never encroach in the deployment path of any other cabin feature.
    b. The installation of the suites should not create a path to the exit that is difficult to traverse in an emergency such as multiple ‘zig zags’ along the aisle or multiple sharp aisle transitions.

12. IM to SC 8. The removal of the obstruction is expected to be performed prior to taxi and prior to landing; it is to be maintained for the whole duration of taxi, takeoff and landing.
13. IM to SC 8. The removal of an egress path obstruction must provide the full restoration of the egress path by removal of the obstruction feature itself or any other acceptable equivalent Means.
14. IM to SC 8. The Cabin Crew ability to easily and readily check that an egress path obstruction is removed is not a direct view requirement, and therefore does not need to be fulfilled by Cabin Crew seating at their station.
15. IM to SC 8, 10. Suite lighting should be provided to ensure the demeanour, entrance and obstruction removal system visibility of this Special Condition under all lighting conditions.
    a. Suite entrance illumination must be provided meeting the applicable cabin general illumination requirements.
    b. All egress path obstruction removal systems should be well illuminated even in conditions of occupant crowding around the egress path.
    c. Suite emergency lighting must meet the applicable emergency lighting requirements.
    d. This does not apply to SC 9 and SC 11
16. IM to SC 10. The occupant demeanour visibility may exclude brief periods (such as for changing), if restricted to a limited area and appropriately controlled by procedure. Alternatively, a brief temporary period without visibility into each suite is acceptable provided that no action is required to restore visibility.
17. IM to SC 10. During abnormal situation, e.g. depressurization, severe turbulence, etc., the Cabin Crew check of the actions and demeanour of the occupants of the suites must be delayed until it is deemed safe to do so.
18. IM to SC10 It is not considered as additional effort for the Cabin Crew to utilize a passive viewing feature for demeanour check that requires a Cabin Crew to move their body towards the suite and turn their head to see within the suite, without involving an activation of the viewing system.
19. IM to SC 11. The opening of an egress path obstruction required when the suite is unoccupied is relevant to flight phases outside taxi, takeoff and landing. The intent is to restore a fire protection capability similar to the reminder of the cabin (i.e. not as in a lavatory). An egress path is considered open if it creates a usable access path.
20. IM to SC 12. In addition to the placards, to provide appropriate occupant awareness, the aircraft or suite installation must include an aural emergency alarm system meeting the applicable public address requirements.
21. IM to SC 13. The smoke detection aural warning must be readily detectable by at least one Cabin Crew, taking into consideration the Cabin Crew positioning throughout the passenger cabin during various phases of flight.
22. IM to SC 14. The design of the suites must allow crewmembers equipped for firefighting to have unrestricted access to the compartment.
23. IM to SC 14. The firefighting equipment must meet applicable “readily accessibility” requirements to enable a crewmember to initiate timely and effective firefighting considering the suite area configuration.
24. IM to SC 14. The firefighting procedures include methods to search the suite compartment for fire source. If the firefighting procedures methods to search the suite are not different than current cabin procedures used by the airline, then no further updates to the procedures are necessary.
25. IM to SC 14. The installation of electrical power supply capable to be used by the occupants must meet applicable fire risk requirements.
26. IM to SC 16. Enclosed stowage compartment impacts the smoke detection capability. The intent is to avoid sealed compartment with insufficient smoke evacuation into the suite. The crewmembers’ ability to effectively reach any part of the compartment with the contents of a hand fire extinguisher should also be considered. Without further justification, a compartment is not considered large if smaller than 1.6 m3 (57 cubic feet).

Means of Compliance

1. MOC for SC 2 & 4. Each unobstructed egress path and emergency passage feature must be demonstrated to be usable for the range of occupant, from a 5th percentile female through a 95th percentile male.
2. MOC for SC 3 & 4. The substantiation of non-obstructing aspect of features such as curtains must include a demonstration of the ability to walk through without help of hands and without significant effort and without significant delay, and must include insurance of open configuration at taxi, takeoff and landing through appropriate design, Cabin Crew procedure and placard.
3. MOC for SC 4. The emergency passage feature must be demonstrated considering the specific cabin layout of the suite area. The demonstration must include showing that the feature can be easily manipulated and does not impede egress.
4. MOC for SC 4. The emergency passage feature requirement may be complied with by design of a frangible, a movable feature, a removable feature, or a permanently open area. The emergency passage feature must be functionally independent of the obstruction removal, since its use is anticipated when the obstruction removal is jammed.
    a. A frangible feature is one that it is easily broken by the occupant of the suite. It can be a subpart or subsystem of the egress path obstruction or independent of the egress paths.
    b. A movable feature is a panel that is stowed within the suite structure (e.g. a sliding panel) and is easily operated by the occupant.
    c. A removable feature is a panel that is easily removed and remotely stowed by the Cabin Crew without the use of tools.
    d. A permanently open area can be an opening within an egress path obstruction, or independent of the egress paths. The opening must be without obstruction, or fitted with non-obstructing feature demonstrated by the ability to go through without additional help of hands, and without significant effort and without significant delay.
5. MOC for SC 7. The number of Cabin Crew and location of Cabin Crew seats shall be agreed with the Authority.
6. MOC for SC 8. If the removal of egress path obstruction with full restoration of the egress path is accomplished by the removal of the obstruction feature itself, the following conditions should be satisfied.
    a. It must be easily performed by the cabin attendant without the use of tools.
    b. The stowage for the removable egress path obstruction feature must fit the obstruction feature size and comply with applicable stowage compartment requirements.
    c. Training and operating instruction materials regarding the stowage location (for a removable egress path obstruction feature) should be provided to the operator for incorporation into their cabin crew operational manuals.
7. MOC for SC 8. If the removal of egress path obstruction with full restoration of the egress path is to be accomplished by hold open retention of the movable obstruction, the following conditions should be satisfied.
    a. For each egress path obstruction, there must be two independent hold open retention mechanisms (latches).
    b. At least one egress path obstruction must have a locking feature for at least one hold open retention mechanism.
    c. Each hold open retention mechanism must be substantiated to applicable static load requirements related to emergency landing conditions, using applicable load safety factor requirements.
    d. Each hold open retention mechanisms must not retain in a direction opposite to the direction of the emergency landing loads, otherwise the hold open retention mechanisms must be demonstrated to meet the static load requirements with 30% additional load factor.
    e. The gap between the fully open movable egress path obstruction feature and the latched hold open retention mechanism must be minimized to avoid appreciable inertial dynamic loads.
    f. One hold open retention mechanism must not be able to be disengaged by the seated, belted occupant of the suite.
8. MOC for SC 8. The Cabin Crew ability to easily and readily check that an egress path obstruction is removed can be substantiated by the obvious removal of the obstruction feature or the latching of the hold open retention mechanism, or other equivalent Means such as a Cabin Crew station deactivation switch of a powered obstruction closing mechanism.
9. MOC for SC 8. If the obstruction feature itself is deployable outside of the suite, it must be demonstrated that it does not impede egress.
10. MOC for SC 8, 9, 10, 11. Training and operating instruction materials must be provided to the operator for incorporation into their Cabin Crew training programs and associated operational manuals as follows
    a. Information regarding the proper configuration of the egress paths for taxi, takeoff and landing.

b. Information regarding abnormal situation, e.g. depressurization, severe turbulence, etc.
c. Information regarding firefighting in the suite.

11. MOC for SC 9. The Means of Compliance to demonstrate compliance to this Special Condition requirement of Cabin Crew direct view of the suite area may be one of the following alternatives: a, b, c or d as defined below. Airplane level (and remaining zone) direct view requirements apply to the remainder of the cabin and exclude the suite cabin area. Note that for alternatives c and d, mirrors may be proposed, however the visibility should then be enhanced beyond the minimum requirements outlined in c or d. Also in c or d alternatives, the Means of Compliance of alternative b should still be used for any criteria, which is not deemed specific to the suite situation, i.e. Cabin Crew head movement.
    a. The Means of Compliance outlined in FAA AC 25.785-1B.
    b. The Means of Compliance used for the applicable direct view requirements of the passenger cabin, approved prior the installation of the suite.
    c. The length of each main aisle adjacent to the suite must be visible at least to the point of the entrance area of the last suite enclosure. An aisle is considered visible if at least 50% of the width of the aisle is visible.
    d. At least 80% of the suite entrances must be visible. An entrance is considered visible, if a person standing in the aisle at the suite entrance is observable, considering a body depth of 12".
12. MOC for SC 10. The effectiveness of the occupant actions and demeanor viewing must be demonstrated for the range of occupant and the range of Cabin Crew, from a 5^{th} percentile female through a 95^{th} percentile male, considering all possible lighting conditions and location of the suite occupant.
13. MOC for SC 11. The usable access of the opening of one egress path obstruction, required when the suite is unoccupied, can be demonstrated by analysis of the usability demonstration of the related unobstructed egress path.
14. MOC for SC 12. Placards to support Cabin Crew duties must ensure that suite occupants are made aware of the following:
    a. both egress paths and the emergency passage feature,
    b. method of operation of each egress path obstruction and the emergency passage feature,
    c. that each egress path obstruction need be removed for taxi, takeoff and landing,
    d. that at least one egress path obstruction should be left open when the suite is unoccupied.
15. MOC for SC 14. The time for a crewmember on the passenger deck to react to the fire alarm, to don the fire-fighting equipment and to gain access to the suite compartment must not exceed the time for the compartment to become smoke-filled, making it difficult to locate the fire source.
16. MOC for SC 14. Training and procedures must be demonstrated by test, however if the design is such that it is readily apparent by a cabin attendant stepping into the suite where the fire source is located, then firefighting training and procedures need not to be demonstrated by test.
17. MOC for SC 15. The prevention of hazardous condition due to accumulation of excess quantities of smoke and/or extinguishing agent caused by firefighting must be demonstrated for areas outside the suites.

Appendix to Proposed Special Condition D-01 on "High Wall Mini-Suite":

Compliance with CS 25.795 (d)

(a) Acceptable means of determining if a COG or its installation is designed to be secure

Several criteria may be used for determining if a COG installation is secure or has a security vulnerability. COG installations with a security vulnerability must include design features to prevent potential misuse of the COG. Figure 1, *Criteria for Assessing an Installation*, includes assessment criteria that can be used for determining if a COG installation has a security vulnerability. Table 1 includes guidance to assist in answering the questions in Figure 1. For installations identified as having security vulnerabilities, such as those for which the answers to the assessment statements in Figure 1 result in the answer to question number 4 being yes, the design should be changed. Alternatively, the COG can be replaced with an acceptable oxygen source that is not a security threat.

Figure 1: Criteria for assessing an installation

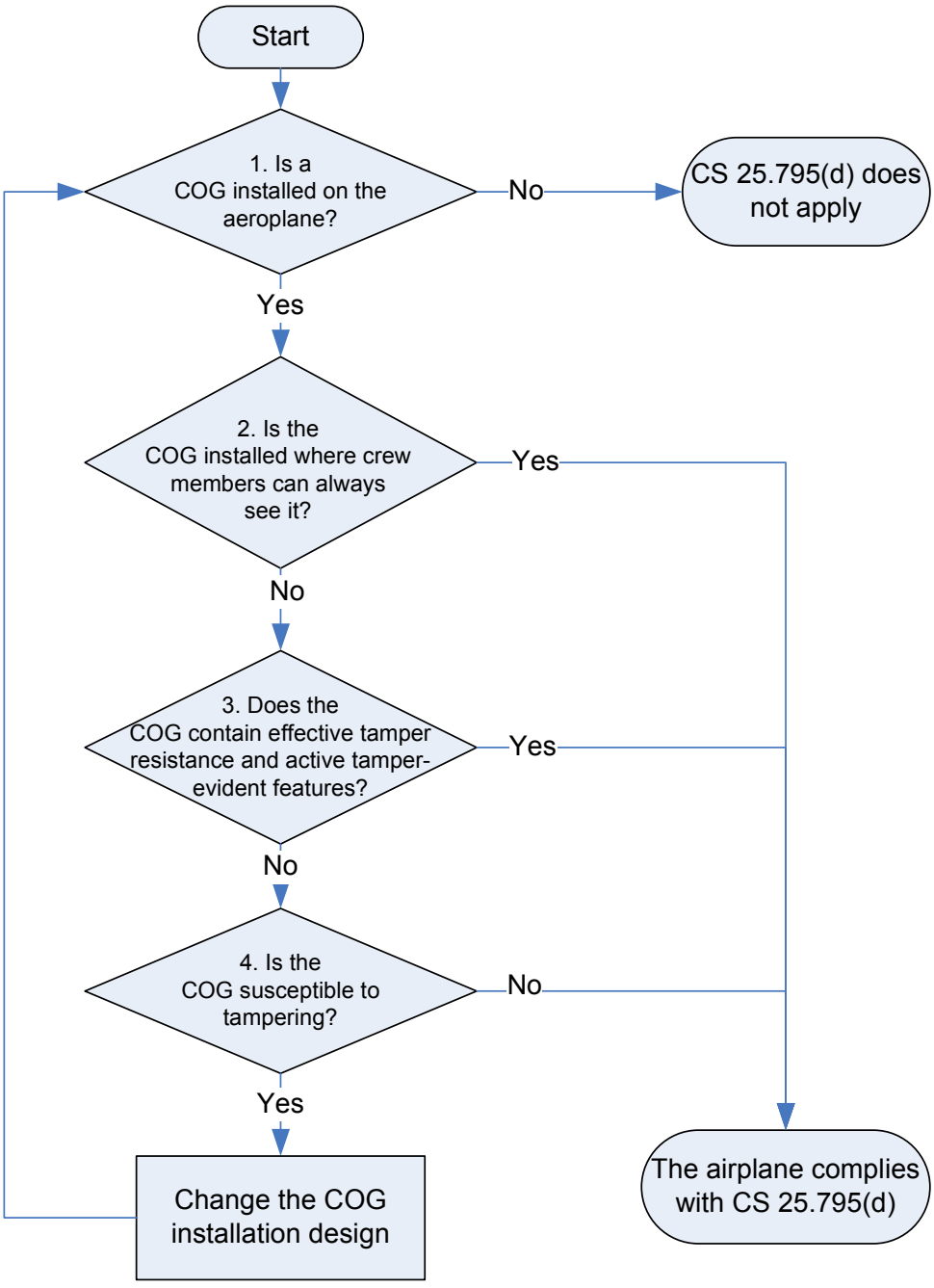

Table 1: Assessment statement analysis

Question number	Notes and questions to assist with the assessment statement analysis
1.	Review the instructions for continued airworthiness. Review the drawing system. Inspect the aeroplane's configuration.
2.	Can crew members observe the COG installation? Check the area where the COG is installed. Isolated areas such as galleys, lavatories, crew rests, enclosed occupied compartments, and lower lobe lavatory complexes are potential areas of concern and require further evaluation. Are crew members close to the COG installation during their normal duties? Are there physical barriers between the crew members and the area being evaluated? Is there significant distance between the crew members and the area being observed? How accessible is the COG? Is the COG installation surrounded by curtains? Curtained areas are also considered potential areas of concern and may require further evaluation.
3.	Are there locks on doors/access panels to prevent access? Are there tamper-resistant fasteners on panels? Are alarms or some other active alerting tamper indication method part of the installation's design?
4.	Check if the COG can be compromised in place. Assess the vulnerability of the adjacent materials to contain the compromised device. Assess the ability of the compartment to contain the event. Check if the COG can be removed.

(b) Installation of tamper-resistant features

Tamper-resistant design features can be used, in whole or in part, to make a COG installation secure. There are different types of tamper-resistant design features, and their functionality largely depends on the installation. The principal benefit of tamper-resistance is to delay exploitation of the COG as a weapon. However, it is not likely that an existing COG installation that can be accessed from within the lavatory could be modified with tamper-resistant design features sufficient to prevent a successful attack. This is because typical measures of tamper-resistance, such as special tools and fasteners, could likely be overcome given enough time. These measures are normally used as one of several layers of security. Thus, the reliance on such measures is only one element of the security system.

(1) A tamper-resistant installation employs multiple elements, which may include:

(i) the COG's location;

(ii) the method of mounting;

(iii) physical protection (through shielding or mechanical isolation of key components); and

(iv) internal design.

(2) Eliminating access to the COG is the most straightforward way to make the COG tamper-resistant. Typically, this can be done by placing the COG in a location where significant disassembly of the cabin interior would be required to gain access. For example, the COG for a lavatory could be located so that the entire lavatory module would have to be removed to access the COG. However, the installer should also consider the ramifications on maintenance when this approach is used.

(c) Installation of tamper-evident features

(1) For COGs that can be accessed from isolated compartments, such as lavatories, some form of active tamper-evidence (for example, an alert) would be needed in addition to the installation of tamper-resistant features. This is necessary so that the time to intervene and stop the attack is less than the time required to carry out the attack. In this case, passive tamper-evident features, such as a tamper-evident seal, are not effective because they provide an after-the-fact notification of tampering. The effectiveness of a tamper-evident system depends on intervention; it cannot be assumed that the alarm by itself would inhibit the attack.

(2) Once an alert is activated indicating that the COG is being tampered with, actions by crew members and other available, authorised responders are necessary to prevent catastrophic damage to the aeroplane. Therefore, there is a critical relationship between the tamper-evidence system and the training and capability of the crew to respond. To be most effective, crew training should be accomplished prior to the alarm feature being deployed into the fleet. The time needed to successfully respond to the alarm may be several minutes and depends on several factors. The time available to respond to a threat and intervention times are functions of not only the design features but also of many complex and human factor-dependent variables that are difficult to define. These variables include but are not limited to the individual capabilities and numbers of flight attendants/authorised responders relative to the terrorists/accomplices, as well as the extensiveness of the training received.

(3) In order to be effective, the alerting system must itself be resistant to tampering. Otherwise, the entire concept of using the early notification to crew could be nullified and the COG accessed without impediment.

(d) System safety considerations

The applicant should consult AMC 25.1309 for guidance on compliance with CS 25.1309.

(e) Hazard classification. Failure of tamper-resistant or tamper-evident features should be considered major.

(f) System performance when installed

A tamper-evidence system installed for compliance with CS 25.795(d) is intended to notify crew members that someone is trying to gain access to a COG. The system should provide aural and visual warnings to immediately notify crew members so that they can provide direct response in a timely manner. For example, visual indication should be provided so that crew members can identify which COG location is being tampered with while performing their normal duties. Aural alerts should be distinct from other alerts and clearly audible to the crew members expected to respond to the alert. If an alert is provided to the flight crew, the alert should be presented in accordance with CS 25.1322.

5. Areas that are immediately obvious

For COG installations located where any attempt to access would be immediately obvious, additional safety measures are not required. Immediately obvious areas include the main passenger cabin and other areas where occupants are always present. While some measure of tamper-resistance is encouraged for these locations, none is required to meet CS 25.795(d). Private compartments (such as a lavatory) or visually divided sections of larger cabin areas are assessed independently. The ‘immediately obvious’ criterion applies to the specific location of each COG installation, not simply the general area in which it is located. In addition, the installation should be evaluated under all conditions that may exist during a flight. So, for example, if tampering would be immediately obvious except when a curtain is pulled to

provide privacy, the installation should be evaluated based on the curtain being arranged in a way that most conceals the installation. As with tamper-evident designs, crews should be made aware that tampering with any COG is a safety risk, and any necessary information should be incorporated into training programmes.