

Initial Airworthiness Special Condition

Crew Rest Compartments including Stowage Provision

Note

This document contains a number of amendments that will be incorporated into the final published version following consultation.

Warning

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SUBJECT : **Crew Rest Compartments including Stowage Provision**
REQUIREMENTS incl. Amdt. : **CS 25.561, 25.812, 25.831, 25.853, 25.854, 25.1439, CS25 Appendix S amdt. 26**
ASSOCIATED IM/MoC¹ : Yes / No
ADVISORY MATERIAL :

INTRODUCTORY NOTE:

The following Special Condition (SC) has been classified as important 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.) 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."

IDENTIFICATION OF ISSUE:

An applicant intend to certify an option to install Crew Rest Compartments (CRCs) into their VIP aircraft layouts of large aeroplanes referring to Special Conditions used in previous aircraft Type Certification programmes. Occupancy to these CRCs will be limited to crewmembers who are trained in the emergency procedures and in the use of emergency equipment and systems of the CRC.

The referred Special Condition D-04 Issue 4 on *"Crew Rest Compartment"* was released by EASA for public consultation in 2006 and the final version of the subject SC can be found under the following link:

<https://www.easa.europa.eu/sites/default/files/dfu/certification-docs-special-condition-Special-Condition-D-04.pdf>

Nevertheless, this CRC Special Condition limits the stowage to crew personal luggage. To further extend the flexibility of the installed compartment the applicant requested to include limited storage capabilities in the Crew Rest Compartment.

The aircraft design affected is configured as a VIP aircraft and fulfils the requirements outlined in CS 25 Appendix S. The aircraft is equipped with *"isolated compartments"*, such as e.g. a passenger bedroom. The general design of the crew rest compartment can also be understood to be equivalent to other *"isolated compartments"*. Anyway the CRC requires additional considerations due to its use which is addressed in the Crew Rest Compartment Special Condition.

¹ In case of SC, the associated Interpretative Material and/or Means of Compliance may be published for awareness only and they are not subject to public consultation.

Considering the approach of CS 25 Appendix S including the applicable requirements from CS 25 for the installation of stowage provisions into the crew rest compartment, the risk of the installation is controlled by these requirements in an equal consideration as used for passenger bedrooms. As CRCs have additional needs, specific elements must be taken into account for these stowage provisions which are covered within the amended Special Condition proposed below.

The applicable airworthiness regulations do not contain adequate or appropriate safety standards for these specific design features. Special conditions are thus required for the certification of a CRC.

Considering all the above, the following amended Special Condition is proposed. All changes compared to the previously published SC ref. D-04 Issue 4 are tracked and the current consultation applies to the revised / amended text only:

Special Condition

Crew Rest Compartments including Stowage Provision

- 1 CRC occupancy is not allowed during Taxi, Take off and Landing (TT&L) phases except for the Flight Crew Rest Compartments where Special Condition 21 applies. During flight, occupancy of the CRC is limited to the total number of bunks and / or seats that are installed in the compartment.
 - (a) There must be appropriate placards, inside and outside each entrance to the CRC to indicate:
 - 1) The maximum number of crewmembers allowed during flight and,
 - 2) That occupancy is restricted to operating crewmembers trained in the use of emergency equipment, emergency procedures and the systems of the CRC,
 - 3) That smoking is prohibited in the CRC,
 - 4) That the crew rest area is limited to the stowage of crew personal luggage and must not be used for the stowage of cargo or passenger baggage, **except for CS25 Appendix S compliant configurations where Special Condition 22 applies.**
 - (b) There must be at least one ashtray on the inside and outside of any entrance to the CRC.
 - (c) A limitation in the Airplane Flight Manual or other suitable means must be established to restrict occupancy to crewmembers and to specify the phases of flight occupancy that are allowed for each installed CRC.
 - (d) For each occupant permitted in the CRC, there must be an approved seat or berth that must be able to withstand the maximum flight loads when occupied.
- 2 For all doors installed, there must be a means to preclude anyone from being trapped inside the CRC. If a locking mechanism is installed, it must be capable of being unlocked from the outside without the aid of special tools. The lock must not prevent opening from the inside of the compartment at any time.
- 3 There must be at least two emergency evacuation routes, which could be used by each occupant of the CRC to rapidly evacuate to the passenger decks.
 - (a) The routes must be located with sufficient separation within the CRC, and between the evacuation routes, to minimize the possibility of an event, either inside or outside of the crew rest compartment, rendering both routes inoperative.
 - (b) The routes must be designed to minimize the possibility of blockage, which might result from fire (inside or outside the CRC), mechanical or structural failure, or persons standing below or against crew rest exits doors or hatches. If there is low headroom at or near the evacuation route, provisions must be made to prevent or to protect occupants (of the CRC) from head injury. The use of evacuation routes must not be dependent on any powered device. If a crew rest exit route is in an area where there are passenger seats, a maximum of five passengers may be displaced from their seats temporarily during the evacuation process of an incapacitated person(s). If the evacuation procedure involves the evacuee stepping on seats, the seats must not be damaged to the extent that they would not be acceptable for occupancy during an emergency landing.
 - (c) Emergency evacuation procedures, including the emergency evacuation of an incapacitated occupant from the CRC, must be established and demonstrated.
 - (d) There must be a limitation in the Airplane Flight Manual or other suitable means requiring that crewmembers be trained in the use of evacuation routes.
 - (e) There must be a means to prevent passengers on the passenger decks from entering the CRC in the event of an emergency, including an emergency evacuation, or when no flight attendant is present.

- (f) The means of opening CRC doors and hatches must be simple and obvious. In addition, the CRC doors and hatches must be able to be closed from outside.
- (g) It must be shown by actual demonstration that the maximum allowed number of CRC occupants can easily evacuate the CRC using the main access route. This demonstration must also be performed using the alternate evacuation route.

The secondary evacuation route is not required for CRC located at a passenger deck level and when:

- The CRC is a small room designed for only one occupant for short time duration, such as a changing area or lavatory or
 - It can be shown that no one can be trapped in the CRC due to fire (inside or outside the CRC), mechanical or structural failure.
- 4 The evacuation of an incapacitated person (representative of a ninety-fifth percentile male in size, at the corresponding weight) must be demonstrated for all evacuation routes. The number of crewmembers, which may provide assistance in the evacuation from inside, are limited by the available space. Additional assistance may be provided by up to three persons in the passenger compartment.
- 5 The following signs and placards must be provided in the CRC:
- (a) At least one exit sign, located near each crew rest door or hatch, meeting the requirements of JAR² 25.812(b)(1)(i),
 - (b) An appropriate placard located conspicuously on or near each crew rest emergency exit door or hatch that defines the location and the operating instructions for each evacuation route.
 - (c) Placards must be readable from a distance of 30 inches under emergency lighting conditions.
 - (d) The door or hatch handles and evacuation path operating instruction placards must be illuminated to at least 160 microlamberts under emergency lighting conditions.
- The above requirements may be subject to specific evaluation and possibly to a finding of equivalent level of safety.
- 6 There must be a means in the event of failure of the aircraft's main power system, or of the normal CRC lighting system, for emergency illumination to be automatically provided for the CRC.
- (a) This emergency illumination must be independent of the main lighting system.
 - (b) The sources of general cabin illumination may be common to both the emergency and the main lighting systems if the power supply to the emergency lighting system is independent of the power supply to the main lighting system.
 - (c) The illumination level must be sufficient for the occupants of the CRC to locate and transfer to the passenger cabin by means of each evacuation route.
 - (d) The illumination level must be sufficient, with the privacy curtains in the closed position, for each occupant of the crew rest to locate a deployed oxygen mask.
- 7 There must be means for two-way voice communications between crewmembers on the flight deck and occupants of the CRC. There must also be two-way communications between the occupants of the CRC and each flight attendant station required to have a public address system microphone per JAR 25.1423(g) in the passenger cabin. In addition, the public address system must include provisions to provide only the

² For all JAR paragraphs referred to in this Special Condition the corresponding JAR or CS 25 paragraph should be selected in accordance with the EASA certification basis applicable to the individual certification project.

relevant information to the crewmembers in the CRC (e.g., fire in flight, aircraft depressurization, etc.). That is, provisions must be provided so that occupants of the CRC will not be disturbed with normal, non-emergency announcements made to the passenger cabin.

- 8 There must be a means for manual activation of an aural emergency alarm system, audible during normal and emergency conditions, to enable crewmembers on the flight deck and at each pair of required floor level emergency exits to alert occupants of the CRC of an emergency situation. Use of a public address or crew interphone system will be acceptable, provided an adequate means of differentiating between normal and emergency communications is incorporated. The system must be powered in flight, after the shutdown or failure of all engines and auxiliary power units (APU), for a period of at least ten minutes.
- 9 There must be a means, readily detectable by seated or standing occupants of the CRC, which indicates when seat belts should be fastened. Seat belt type restraints must be provided for berths and must be compatible for the sleeping attitude during cruise conditions. There must be a placard on each berth requiring that these restraints be fastened when occupied. If compliance with any of the other requirements of these special conditions is predicated on specific head location, there must be a placard identifying the head position.
- 10 Means must be provided to cover turbulence. If the seat backs do not provide a firm handhold, or if there is no seat installed, there must be a handgrip or rail to enable persons to steady themselves while in the CRC, in moderately rough air.
- 11 The following safety equipment must also be provided in the CRC:
 - (a) At least one approved hand-held fire extinguisher appropriate for the kinds of fires likely to occur,
 - (b) One Portable Protective Breathing Equipment (PBE) devices approved to European Technical Standard Order (ETSO)-C116 or equivalent and meeting JAR 25.1439, closed to each hand-held fire extinguisher
 - (c) One flashlight
- 12 A smoke or fire detection system (or systems) must be provided that monitors each occupiable area within the CRC, including those areas partitioned by curtains. Each system (or systems) 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 CRC, and
 - (c) A warning in the passenger decks. This warning must be readily detectable by a flight attendant, taking into consideration the positioning of flight attendants throughout the passenger compartment during various phases of flight.
- 13 A means to fight and suppress a fire when the CRC is not occupied must be provided. This means can either be a built-in extinguishing system or manual hand held bottle extinguishing system.
 - (a) The design shall be such that any fire within the compartment can be controlled without entering the compartment or the design of the access provisions must allow crewmembers equipped for fire fighting to have unrestricted access to the compartment.
 - (b) If a built-in fire extinguishing system is used in lieu of manual fire fighting, the system must have adequate capacity to suppress any fire occurring in the crew rest compartment, considering the fire threat, volume of the compartment, the ventilation rate and the minimum performance standards (MPS) that have been established for the agent being used. In addition it must be shown that a fire will be contained within a controlled volume meeting the requirements of Appendix F, Part III.

- (c) The fire fighting procedures must describe the methods to search the crew rests for fire sources(s). Training and procedures must be demonstrated by test and documented in the suitable manuals.
- (d) 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 crew rest compartment must not exceed the time for the compartment to become smoke-filled, making it difficult to locate the fire source.
- (e) The in-flight accessibility of large enclosed stowage compartments and the subsequent impact on the crewmembers' ability to effectively reach any part of the compartment with the contents of a hand fire extinguisher may require additional fire protection considerations similar to those required for inaccessible compartments such as Class C cargo compartments.
- 14 There must be a means provided to exclude hazardous quantities of smoke or extinguishing agent originating in the CRC from entering any other occupiable compartment.
- (a) Small quantities of smoke may penetrate from the crew rest compartment into other occupied areas during the one-minute smoke detection time.
- (b) When built in fire extinguishing systems are used, there must be a provision in the fire fighting procedures to ensure that all door(s) and hatch(es) at the crew rest compartment emergency exits are closed after evacuation of the crew rest and during fire fighting.
- (c) Smoke entering any occupiable compartment when access to the CRC is open must dissipate within five minutes after the access to the CRC is closed.
- (d) In the case of a CRC immediately adjacent to and on the same deck as passenger seated areas the smoke penetration requirements of (a) to (c) above do not apply. However, it must be demonstrated that the complete fire detection and fire fighting procedure can be conducted effectively without causing a hazard to passengers due to excess quantities of smoke and / or extinguishant accumulating and remaining in occupied areas.
- 15 When a CRC is installed or enclosed as a removable module in part of a cargo compartment or located directly adjacent to a cargo compartment without an intervening cargo compartment wall, the following applies:
- (a) Any wall of the module (container) forming part of the boundary of the reduced cargo compartment, subject to direct flame impingement from a fire in the cargo compartment and including any interface item between the module (container) and the airplane structure or systems, must meet the applicable requirements of JAR 25.855.
- (b) Means must be provided so that the fire protection level of the cargo compartment meets the applicable requirements of JAR 25.855, JAR 25.857 and JAR 25.858 when the module (container) is not installed.
- (c) Use of the emergency evacuation route must not require occupants of the CRC to enter the cargo compartment in order to return to the passenger compartment.
- 16 There must be a supplemental oxygen system equivalent to that provided for passenger decks for each seat and berth in the CRC (automatic drop down system with means by which the oxygen masks can be manually deployed from the flight deck). The system must provide an aural and visual warning to warn the occupants of the CRC to don oxygen masks in the event of decompression. The warning must activate before the cabin pressure altitude exceeds 15,000 feet. The aural warning must sound continuously for a minimum of five minutes or until a reset push button in the CRC is pressed. Procedures for crew rest occupants in the event of decompression must be established. These procedures must be transmitted to the operator for incorporation into their training programs and appropriate operational manuals.

17 The following requirements apply to CRC that are divided into several sections by the installation of curtains or partitions:

- (a) To compensate for sleeping occupants, there must be an aural alert that can be heard in each section of the CRC that accompanies automatic presentation of supplemental oxygen masks. A visual indicator that occupants must don an oxygen mask is required in each section where seats or berths are not installed. A minimum of two supplemental oxygen masks are required for each seat or berth.
- (b) A placard is required adjacent to each curtain that visually divides or separates, for privacy purposes, the CRC into small sections. The placard must require that the curtain(s) remains open when the private section it creates is unoccupied.
- (c) For each section of the CRC created by the installation of a curtain, the following requirements of these special conditions must be met with the curtain open or closed:
 - 1) No smoking placard (Special Condition No. 1),
 - 2) Emergency illumination (Special Condition No. 6),
 - 3) Emergency alarm system (Special Condition No. 8),
 - 4) Seat belt fasten signal or return to seat signal as applicable (Special Condition No. 9), and
 - 5) The smoke or fire detection system (Special Condition No. 12).
- (d) CRC visually divided to the extent that evacuation could be affected must have exit signs that direct occupants to the primary evacuation route. The exit signs must be provided in each separate section of the CRC, except for curtained bunks, and must meet the requirements of JAR 25.812(b)(1)(i).
- (e) For sections within an CRC that are created by the installation of a partition with a door separating the sections, the following requirements of these special conditions must be met with the door open or closed:
 - 1) There must be a secondary evacuation route from each section to the passenger decks, or alternatively, it must be shown that any door between the sections has been designed to preclude anyone from being trapped inside the compartment. Removal of an incapacitated occupant from within this area must be considered. A secondary evacuation route from a small room designed for only one occupant for short time duration, such as a changing area or lavatory, is not required. However, removal of an incapacitated occupant from within a small room, such as a changing area or lavatory, must be considered.
 - 2) Any door between the sections must be shown to be openable when crowded against.
 - 3) There may be no more than one door between any seat or berth and the primary emergency exit.
 - 4) There must be exit signs in each section meeting the requirements of JAR 25.812(b)(1)(i) that direct occupants to the primary stairway outlet. For single bed or small compartments reduced sizes might be acceptable.
 - 5) Special Conditions No. 1 (no smoking placards), No. 6 (emergency illumination), No. 8 (emergency alarm system), No. 9 (fasten seat belt signal or return to seat signal as applicable) and No. 12 (smoke or fire detection system) must be met with the door open or closed.
 - 6) Special Conditions No. 7 (two-way voice communication) and No. 11 (emergency fire fighting and protective equipment) must be met independently for each separate

section except for lavatories or other small areas that are not intended to be occupied for extended periods of time.

- 18 Materials, Seat cushions and mattresses must comply with the relevant requirements of JAR 25.853.
- 19 The addition of a lavatory within the CRC would require the lavatory to meet the same requirements as those for a lavatory installed on the passenger decks except that JAR 25.854 (a) is replaced by the Special Condition No. 12 for smoke detection.
- 20 Where a waste disposal receptacle is fitted, it must be equipped with an automatic fire extinguisher that meets the performance requirements of JAR 25.854(b).
- 21 The following additional requirements apply to Flight Crew Rest Compartments (FCRC) that may be occupied during Taxi, Take off and Landing (TT&L):
- (a) During TT&L, occupancy of the FCRC is limited to the total number of installed seats approved to the flight / ground load conditions and emergency landing conditions.
Doors installed across emergency egress routes must have a means to latch them in the open position. The latching means must be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in JAR 25.561(b).
 - (b) Doors or hatches that separate the FCRC compartment from a passenger deck must not adversely affect evacuation of occupants (slowing evacuation by encroaching into aisles, for example) or cause injury to those occupants during opening or while open.
 - (c) A placard must be displayed in a conspicuous place on the crew rest entrance door and any other door(s) installed across emergency egress routes of the crew rest, that requires these doors to be latched open during TT&L when the crew rest is occupied.
 - (d) An assessment must be done on design features affecting access to the evacuation routes. The design features that should be considered include, but are not limited to, seat deformations in accordance with 25.561(d) and 25.562(c)(8), seat back break over, the elimination of rigid structure that reduces access from one part of the compartment to another, the elimination of items that are known to be the cause of potential hazards, supplemental restraint devices to retain items of mass that could hinder evacuation if broken loose and load path isolation between components that contain the evacuation routes.
 - (e) There must be a limitation in the Airplane Flight Manual or other suitable means requiring that crewmembers be trained in the use of evacuation routes. This training must instruct them to ensure that the crew rest (i.e., seats, doors, etc.) is in its proper TT&L configuration. The limitation must furthermore restrict occupancy to flight crewmembers who the pilot in command has determined are able to rapidly use the evacuation routes. Placards inside and outside the FCRC must be provided accordingly.
- Note: The Cabin Crew Rest Compartments (CCRC) shall not be occupied for Taxi, Tack off and Landing.

- 22 The following additional requirements apply to Crew Rest Compartments with a stowage provision installed:
- (a) The stowage provision must meet the requirements outlined in CS25.787 and CS25 Appendix S.
 - (b) The overall stowage volume over the entire compartment must not exceed 50 Cubic feet.
 - (c) Adequate limitations for the storage of luggage must be established and marked accordingly. These limitations must be part of the briefing to occupants using this stowage provision.
 - (d) When considering the storage of a limited amount of passenger luggage it must be ensured that no access to the luggage is granted during crew rest periods.

- (e) The fire / smoke detection system mentioned in Special Condition 12 must also be capable to detect a fire within the stowage provision within one minute after the start of a fire considering the most critical loading condition.
- (f) If the stowage provision is designed as a convertible provision which might be removed / installed, an adequate maintenance task for the configuration changes must be provided in the Instructions for Continued Airworthiness (ICA).