Proposed Special Condition on "Crew Rest Compartments"

Applicable to Airbus A350-941

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

Airbus offers as an option the possibility to install Crew Rest Compartments (CRC) of different types and at different locations on the A350 Family : The Flight Crew Rest Compartment (FCRC) being occupied by flight crew members and the Cabin Crew Rest Compartment (CCRC) being occupied by cabin crew members.
Both types of CRC are installed in the overhead area with access from the main deck. Occupancy 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 applicable airworthiness regulations do not contain adequate or appropriate safety standards for these design features. Special conditions are thus required for the certification of a CRC. Certification experience from previous projects has been used in order to update some of the standards defined in the A350 CRC Special Condition.

Compared to similar Special Conditions used in previous aircraft Type Certification programmes (e.g. A380 Special Condition D-04, consulted 20 February 2006), the new or modified text introduced for the A350 Special Condition is highlighted in yellow below. For convenience the full Special Condition text is presented for this public consultation. However, only the highlighted parts are the subject of this public consultation and request for comments.

Airbus A350-941 - Special Condition D-04

- Crew Rest Compartments -

1. CRC occupancy is not allowed during Taxi, Take-off and Landing (TT&L) phases. During flight, occupancy of the CRC is limited to the total number of bunks and / or seats that are installed in the compartment. In addition, the maximum occupancy in the overhead crew rest compartment may be limited as necessary to provide the required level of safety.
   (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.

(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 and hatches 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 a key or other tool. 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.

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 CS 25.812(b)(1)(i).
   However, in the case of Flight Crew Rest Compartments limited to four occupants or fewer, the Agency agrees that internal electrical illumination of the sign is not required provided Airbus can demonstrate that the emergency lighting system providing general lighting in the compartment sufficiently highlights an exit sign meeting all other requirements of CS 25.812(b)(1)(i).

   (b) An appropriate placard located conspicuously on or near each crew rest emergency exit door or hatch to identify its location and the operating instructions.

   (c) Placards must be readable from a distance of 30 inches under emergency lighting conditions.

   (d) The door or hatch handles and 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 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.

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 CS 25.1423(g) in the passenger cabin. In addition, the public address system must include provisions to provide only the 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 and certain to wake a sleeping occupant, 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 all seats and berths in the CRC and in the latter case 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 this or any of the other requirements of these special conditions is based 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) device approved to European Technical Standard Order (ETSO)-C116 or equivalent and meeting CS 25.1439, close to each hand-held fire extinguisher. If only one hand-held fire extinguisher is installed in the compartment, two PBE devices must be provided.

    (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. Flight tests must be conducted to show compliance with this requirement. 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 that would be certain to wake a sleeping occupant, 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 in the CRC 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 firefighting to have unrestricted access to the compartment.

    (b) If a built-in fire extinguishing system is used in lieu of manual firefighting, 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 firefighting 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 firefighting 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 material used to construct each enclosed stowage compartment up to 25 ft^3 must at least be fire resistant (45° Bunsen burner test according App. F, Part I (a)(2)(ii)) and must meet the flammability standards for interior components specified in § 25.853. For bigger compartments design standards must be agreed with the Agency.

14. There must be a means provided to exclude hazardous quantities of smoke or extinguishing agent originating in the CRC from entering any other compartment occupied by crewmembers or passengers. This means must include the time periods during the evacuation of the overhead crew rest compartment and, if applicable, when accessing the overhead crew rest compartment to manually fight a fire. Flight tests must be conducted to show compliance with this requirement.

(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 firefighting 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 firefighting.

(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) It must be demonstrated that the complete fire detection and firefighting 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. There must be a supplemental oxygen system within the crew rest compartment as follows:

(a) There must be at least one mask for each seat, and berth in the crew rest compartment.

(b) If a destination area (such as a changing area) is provided in the overhead crew rest compartment, then there must be an oxygen mask readily available for each occupant that can reasonably be expected to be in the destination area (with the maximum number of required masks within the destination area being limited to the placarded maximum occupancy of the crew rest).

(c) There must also be an oxygen mask readily accessible to each occupant that can reasonably be expected to be either transitioning from the main cabin into the crew rest compartment, transitioning within the crew rest compartment, or transitioning from the crew rest compartment to the main cabin.

(d) The system must provide an aural (that would be certain to wake a sleeping occupant) and visual alert to warn the occupants of the overhead crew rest compartment to don oxygen masks in the event of decompression. The aural and visual alerts must activate concurrently with the deployment of the oxygen masks in the passenger cabin. To compensate for sleeping occupants, the aural alert must be heard in each section of the overhead crew rest compartment and must sound continuously for a minimum of five minutes or until a reset switch within the overhead crew rest compartment is activated. A visual alert that informs occupants that they must don an oxygen mask must be visible in each section.

(e) There must also be a means by which the oxygen masks can be manually deployed from the flight deck.

(f) 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.

(g) The supplemental oxygen system for the crew rest shall meet the same CS-25 requirements as the supplemental oxygen system for the passenger cabin occupants except for the 10 percent additional masks required by CS 25.1447(c)(1).

(h) The illumination level of the normal overhead crew rest compartment lighting system must automatically be sufficient for each occupant of the compartment to locate a deployed oxygen mask.

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

(a) 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.

(b) 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) Visibility of the No smoking placards (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), unless it is agreed by the Agency that only short term occupancy is possible (e.g. a changing area with room for only one standing person and possessing no seat or feature useable as a seat), and

(5) The smoke or fire detection system (Special Condition No. 12).

(6) The oxygen system (Special Condition No. 15).

(c) A 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 CS 25.812(b)(1)(i).

(d) 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 (i.e. any locking mechanism must be capable of being unlocked from either side without the aid of a key or other tool). 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 CS 25.812(b)(1)(i) that direct occupants to the primary 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), No. 12 (smoke or fire detection system) and No. 15 (oxygen 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.

17. Materials, Seat cushions and mattresses must comply with the requirements of CS 25.853(a)(c).

18. Where a waste disposal receptacle is fitted, it must be equipped with an automatic fire extinguisher that meets the performance requirements of CS 25.854(b).