

Advisory Circular

CARRIAGE OF CARGO IN THE PASSENGER CABIN

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GENERAL

Advisory Circulars (ACs) are issued by the Director-General of Civil Aviation (DGCA) from time to time to provide practical guidance or certainty in respect of the statutory requirements for aviation safety. ACs contain information about standards, practices and procedures acceptable to CAAS. An AC may be used, in accordance with section 3C of the Air Navigation Act (Cap. 6) (ANA), to demonstrate compliance with a statutory requirement. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.

PURPOSE

This AC provides guidance to demonstrate compliance with, and information related to, the carriage and stowage of cargo in the aircraft passenger cabin.

APPLICABILITY

This AC is applicable for an AOC holder operating in accordance with ANR-121.

RELATED REGULATIONS

This AC relates specifically to regulations 9, 67, 68, 69, and 70 of ANR-121.

RELATED ADVISORY CIRCULARS

- AC 21-1 Approval Requirements for Modifications and Repairs
- AC 121-4-1 Guidance on Mass and Balance for ANR-121 Operations

CANCELLATION

Revision 2 of this AC supersedes revision 1 dated 9 October 2020. In this revision 2, guidance in sections 3, 5, 6 and 8 of this AC have been updated.

EFFECTIVE DATE

Revision 2 of this AC is effective from 23 December 2021.

OTHER REFERENCES

- CAAC Operation Safety Bulletin No. OSB-2020-01
- EASA Guidelines Document TE.RPRO.00065-003 Issue 5.1 – Transport of Cargo in Passenger Compartment – Exemptions under Article 71(1) of Regulation 2018/1139 (The Basic Regulation)
- FAA Exemption No. 18561B, Regulatory Docket No. FAA-2020-0429
- FAA Exemption No. 18584A, Regulatory Docket No. FAA-2020-0492
- FAA SAFO 20008 – Transporting Cargo on Transport-Category Airplanes Configured to Carry Passengers
- Transport Canada Document – Civil Aviation Safety Alert No. 2020-04 Issue 4 – Transport of Cargo in Passenger Compartment
- US Code of Federal Regulations – 14 CFR 121.285 Carriage of Cargo in Passenger Compartments
- ICAO Doc 9284, Technical Instructions for the Safe Transport of Dangerous Goods by Air (TI)

1 INTRODUCTION

- 1.1 This AC provides guidance on the carriage and stowage of cargo in the aircraft passenger cabin in exceptional circumstances, to increase cargo carriage capacity beyond the capacity of the lower cargo compartments. For clarity, this scenario excludes the carriage of passengers.
- 1.2 The guidance in this AC may not cover all possible scenarios. As such, the AOC holder may need to refer to additional guidance, or adapt from existing guidance, to ensure aircraft airworthiness and safety of operations for different scenarios.
- 1.3 The AOC holder must demonstrate to CAAS that there exists an exceptional circumstance to support its request to carry and stow cargo in the aircraft passenger cabin.
- 1.4 The following regulations in ANR-121 specify the requirements relevant to the carriage of cargo:
 - Regulation 9 requires the AOC holder to establish procedures on the stowage of cargo.
 - Regulation 67 requires the AOC holder to ensure that the aircraft is only loaded under the supervision of a qualified person and in accordance with the loading instructions.
 - Regulation 68 requires the AOC holder to ensure that the load sheet enables the pilot-in-command to determine the load of an aeroplane and its distribution are such that all operational limitations of the aeroplane are not exceeded. It also requires the AOC holder to ensure that the load sheet contains the required information and to establish procedures and limitations for dealing with last minute changes to the load.
 - Regulation 69 requires the AOC holder to establish the actual mass of goods, and checked baggage, to be carried on board and through one of the acceptable means as prescribed.
 - Regulation 70 requires the AOC holder to establish loading procedures and specify them in the Operations Manual.

2 CARRIAGE AND STOWAGE OF CARGO IN THE CABIN

- 2.1 For the safe operation of cargo in the cabin, the AOC holder must ensure that there is proper management to address changes to the aircraft weight and balance, and possible in-flight emergencies such as cargo dislodge, spillages and smoke and fire.
- 2.2 Modifications may be made to the aircraft for the carriage of cargo in the passenger cabin. For modifications that are classified as “major”, as defined in the Singapore Airworthiness Requirements (SAR) Part 21, the AOC holder will require a Supplemental Type Certificate unless the modification data is acceptable under SAR 21.117 through a mutual recognition agreement or arrangement such as an approved Service Bulletin issued by the holder of an FAA or EASA type certificate.
- 2.3 The AOC holder will need to develop and implement a policy for the carriage of cargo in the cabin, which must address at least the considerations in sections 3 to 7 below.

3 PREPARING THE AIRCRAFT

- 3.1 The AOC holder should provide for a sufficient quantity of portable emergency equipment such as fire extinguishers and Protective Breathing Equipment (PBE), after considering the cargo size, cargo type, persons on board and type of operation (e.g., EDTO). Fire extinguishers and other life-saving equipment should be stowed in accessible locations and marked accordingly. Nonetheless, the following fire extinguishers should be made available in the main deck:
- Two Underwriters Laboratories (UL)2A (2.5 gallon) rated water portable fire extinguishers,
 - At least two fire extinguishers with a minimum UL4A-80B:C rated extinguishers or equivalent, and
 - The quantity and type of fire extinguishers identified as necessary in the AOC holder's risk assessment.
- 3.2 All smoke and fire detectors shall be maintained as per the applicable Instructions for Continued Airworthiness (ICA) or Component Maintenance Manual (CMM) if modification has been carried out to install such equipment.
- 3.3 Supplemental oxygen systems in the passenger compartment where cargo is stowed should either be deactivated or removed.
- 3.4 Articles under the air operator's property that are classified as dangerous goods (such as portable devices containing lithium batteries) and that are required to be carried in the passenger compartment for the normal operation of the aircraft or to meet relevant airworthiness requirements may be allowed, subject to CAAS' approval, and should be protected or repositioned away from areas stowed with cargo so that they do not pose as an additional fire risk.
- 3.5 The air conditioning and pressurisation system should be set taking into account the location of crew and cargo on board, and any emergency procedure that utilises the systems.
- 3.6 To prevent overheating of passenger compartment systems, non-flight essential systems, such as in-flight entertainment systems, seat power systems, unused galley ovens and chiller should be switched off.
- 3.7 Markings or placards should be used to indicate the maximum allowable stowage mass at a given location within the passenger cabin and identify areas that cargo should not be stowed.

4 PREPARING THE CREW

- 4.1 There should be sufficient crew members on board whose duties include fire detection and firefighting in the cabin. Additionally, sufficient and appropriate safety equipment must be provided for each crew.
- 4.2 The procedures for crew should include increased vigilance at areas where cargo is carried to ensure that there is no smoke and any potential fire hazard as fire suppression systems are not present in the cabin. When developing these procedures, consideration should also be given to the management of crew's safety whilst they are conducting the inflight checks on cargo. These should include rapid accessibility to emergency equipment.

- 4.3 Proper handling or management of cargo fire, spillage, and leakage should be established through procedures. Procedures should be developed for the crew to identify areas that are permitted for stowage of cargo, and to verify that cargo are secured properly in the cabin and restraints are used correctly as part of their ground duties, including handling of in-flight loosened cargo.
- 4.4 Crew should be seated at suitable seat locations to maintain visibility of stowed cargo. Crew should not be seated in the same seat row as cargo secured on seats, and there should be at least one empty row of seats between the crew and any seat stowed with cargo.

5 PREPARING THE CARGO

- 5.1 Cargo designated for loading in the passenger compartment should be adequately packaged to withstand the conditions (including changes to cabin air pressure and vibration) encountered in air transport and the normal handling of cargo by ground staff.
- 5.2 The mass of the cargo packages should be within the maximum allowable mass of its intended stowage location¹ and the cargo dimensions should permit stowage without exceeding the confines of that location. In addition, the shape of the cargo packages should not impede the effectiveness of restraint devices needed to secure the cargo at its intended stowage location.
- 5.3 Cargo intended for loading in the passenger compartment should be inspected to verify their mass, dimension and volume is suitable for loading at the various pre-identified cargo stowage locations in the passenger compartment to prevent any damage to the aircraft's cabin equipment and interior.
- 5.4 Cargo intended to be stowed on passenger seats should not exceed 22.5 kg (50 lbs) per seat place or 50 kg (110 lbs) in a single package per triple seat. The dimensions of the cargo should not exceed the width of the seat and the height of its seatback. Other cargo mass may be substantiated through analysis showing that the moment on the seat generated during emergency landing conditions is lesser than the original seat manufacturer moment generated for the certified seat for passenger carriage.
- 5.5 Cargo may only be stowed under seats that have a restraint bar system. Each cargo package to be stowed under a seat should not exceed 9 kg (20 lbs) and should fit fully underneath the seat.
- 5.6 Cargo secured to the floor of the passenger compartment where seats have been removed should not exceed the height of those seats that were removed.
- 5.7 The volume of each cargo cluster secured to the floor of the passenger compartment where seats have been removed should not exceed 3.54m³ (125 ft³). Additionally, the cargo mass for a given location should not exceed the area and linear load limitation of the floor in the passenger compartment.

¹ A stowage location refers to a passenger seat, the floor of the passenger compartment, an overhead compartment or a storage bin designated for stowing cargo in the passenger compartment.

- 5.8 Dangerous goods² prepared for transport as cargo (including those meeting the excepted quantity provisions of the ICAO TI) or in air mail should not be carried in the passenger compartment since the fire detection and suppression systems in this compartment are not designed for the carriage of such goods. AOC holders should establish procedures and systemic safeguards to ensure that cargo or air mail containing dangerous goods are not loaded into the passenger compartment. Unless special arrangements have been made with postal operators to ensure that air mail articles do not contain dangerous goods, it has to be assumed that such air mail may contain dangerous goods.
- 5.9 Dangerous goods cargo and air mail may still be transported in the aircraft cargo compartments of AOC holders authorised to transport dangerous goods according to Regulation 14(2) of ANR-121.
- 5.10 When passengers are not transported on an aircraft, consignments of dangerous goods prepared for transport on cargo aircraft only (CAO), as established in the ICAO TI, may be transported on the aircraft, but only in the cargo compartments of the aircraft. Prior to transporting CAO dangerous goods on its aircraft, AOC holders should assess the safety risks of transporting such goods. Additional training/briefing should be provided to crew members, so that they are aware of the increase in net quantity limits of transporting CAO dangerous goods. The training and briefing should include:
- the safety risks and consequences of increasing the quantity of dangerous goods transported in the cargo compartments; and
 - any changes in the emergency procedures and the emergency equipment that may be carried on board to mitigate safety risks of transporting such dangerous goods.
- 5.11 Whenever CAO dangerous goods are carried in the cargo compartments, crew members, AOC holder's employees in an official capacity, inspectors of CAAS on official duty and persons accompanying cargo may be transported on the aircraft. Relevant information (e.g., those affecting emergency procedures) should be included in briefings to all aircraft occupants.
- 5.12 Cargo, including all restraint devices³, should be weighed and its actual mass communicated to the staff responsible for load planning.
- 5.13 When planning cargo loads in the passenger compartment, the sequence of loading/unloading of cargo into/from various locations of the aircraft should be specified in order to avoid hazards related to imbalance of the aircraft during such activities.
- 5.14 The actual mass of cargo and restraint devices in each seat/cargo zone and the total actual mass of all cargo and restraint devices in the passenger compartment should be accounted for and documented on the load sheet.
- 5.15 Cargo designated for loading in the passenger compartment should be clearly communicated to the staff responsible for loading the aircraft using a Loading Instruction Report (LIR). The LIR should specify the identification and quantity of cargo

² According to ICAO Technical Instructions, "Dangerous Goods" is defined as Articles or substances which are capable of posing a hazard to health, safety, property or the environment and which are shown in the list of dangerous goods in these Instructions, or which are classified according to these Instructions.

³ Restraint devices may include but are not limited to cargo nets, straps, ropes, studs and seat belts.

to be stowed at each location, the actual mass of cargo planned for stowing in each seat zone and maximum allowable cargo mass permitted in each seat zone.

6 LOADING AND STOWING CARGO IN THE CABIN

- 6.1 The loading and unloading of cargo in the passenger compartment should be carried out in accordance with the established sequence and the instructions in the LIR, taking into account any changes made to it.
- 6.2 Cargo may not be stowed in stowage compartments (including stowage compartments with internal dividers) containing fire extinguishers, portable oxygen bottles, PBE, or equipment containing lithium batteries. Safeguards should be put in place to ensure this condition is met.
- 6.3 Care should be taken to ensure that aircraft ground stability is maintained at all times during loading and unloading operations.
- 6.4 Checks should be put in place to verify that cargo stowed in the cabin are adequately restrained and tied down and are to be in compliance with the procedures established in the AOC holder's operations manual and the aircraft manufacturer's manual.
- 6.5 Cargo restraint devices used should be certified to meet airworthiness design standards where available. Accepted standards are stated in SAR-21 Subpart I. For example, cargo nets and cargo straps should meet the TSO-C90 and TSO-C172 design standards respectively, or their equivalents. The load limitations of the cargo restraint devices should be adhered to. Cargo restraint devices used should not obstruct spaces and passageways that may be used by the crew for inspections, firefighting and emergency evacuation.
- 6.6 Cargo stowed on the floor where seats are removed, should be restrained and secured to the cabin floor seat tracks, such that it can accommodate the ground, flight, turbulence, take-off, landing and emergency landing conditions per 14 CFR 25.561 or CS 25.561, as applicable.
- 6.7 Cargo stowed onto seats must be secured to the seat primary structure (such as the seat beams and seat legs), or directly to the cabin floor seat tracks in accordance with the applicable load limitations of each component including the cargo restraint means, such that it can accommodate the ground, flight, turbulence, take-off, landing and emergency landing conditions per 14 CFR 25.561 or CS 25.561, whichever is applicable.
- 6.8 Prior to loading cargo at any location, all cargo packages are to be inspected to verify that there are no markings or labels that would suggest that its contents may contain hidden dangerous goods. Packaging of the cargo should be in a good condition and its contents are not exposed or leaking. Since dangerous goods contained in air mail cannot be identified by markings, labels or through documentation when offered for transport by air, the AOC holder should make special arrangements with designated postal operators (reference paragraph 5.8) if it intends to transport air mail that do not contain dangerous goods in the passenger compartment, to ensure that dangerous goods are not inadvertently carried.
- 6.9 For twin-aisle aircraft in which the seats are not removed, an empty seat row must be provided to allow crossing from one aisle to the other. The empty seat row should be,

as much as possible, at equal distances from the cross-aisles required by 14 CFR 25.813 or CS 25.813, whichever is applicable.

- 6.10 Cargo stowed under seats should be strapped securely to the seat primary structure such as the seat leg(s) and/or seat beam(s).
- 6.11 Cargo net deformation due to cargo weight under emergency landing, flight and ground loads should be considered when evaluating cargo placement, access and emergency evacuation requirements.
- 6.12 The placement of cargo should allow the crew to have sufficient access to inspect the cabin and respond to incidents of smoke or fire.
- 6.13 Cargo should not be stowed at the emergency exit rows, aisles and/or at any locations that would obstruct access to the emergency exits or to access any emergency equipment in the passenger compartment. Regardless of the aircraft's certified seating capacity, the remaining aisle width after stowage of cargo on seats must not be less than the minimum aisle width specified in the applicable 14 CFR 25.815 or CS 25.815 for the criteria of an aeroplane with a seating capacity of 10 or fewer passengers. For cargo secured to the floor, the longitudinal aisle width should be at least 51 cm (20") and lateral aisle width fore and aft of each cargo volume should be at least 38 cm (15"), to ensure adequate access for cargo inspection and firefighting activities.
- 6.14 Cargo should not be placed near the cabin depressurization relief vents, to avoid risk of cabin floor collapse in the event of rapid cabin depressurisation during flight.
- 6.15 Cargo stowed in enclosed stowage areas should not prevent latched doors from being closed securely.
- 6.16 The cargo should not be stowed in such a manner that could obstruct any view of the passenger information signs or the required emergency evacuation signs/escape lighting.

7 TRAINING OF PERSONNEL

- 7.1 The AOC holder should ensure that appropriate training is provided to the relevant personnel, and to both local and overseas handling agents, to enable them to understand regulatory requirements, policy and procedures, responsibilities and duties as well as limitations related to the carriage of cargo in the passenger cabin.
- 7.2 All crew assigned for cabin management roles or duties should be trained on safety emergency procedures, use of emergency equipment and standard operating procedures for all phases of flight.

8 APPROVALS REQUIRED

- 8.1 The AOC holder shall seek CAAS' approval for carriage of cargo, including dangerous goods, in cabin prior to commencing operations. In seeking the approval, the AOC holder must submit a detailed risk assessment to identify hazards, evaluate and mitigate correlated risks related to the carriage of cargo, including dangerous goods that are necessary for airworthiness purposes. The AOC holder must also include in the submission supporting documents from the aircraft manufacturer that provides for the carriage of cargo in the cabin.

- 8.2 Additionally, the risk assessment should also include a gap analysis of current procedures and the AOC holder should develop required procedures accordingly and must ensure that the responsibilities of crew in the cabin are clearly defined.
- 8.3 The AOC holder should identify considerations in addition to the ones in sections 3 to 7 that are required for the carriage of cargo in the cabin and establish procedures for such operations in its operations manual and aircraft maintenance manuals.
- 8.4 The AOC holder will need to seek CAAS' approval for any amendment made to the operations manual, Minimum Equipment List, training programmes or checklists prior to commencing operations.

9 RETURN TO PASSENGER SERVICE

- 9.1 Before the aircraft is returned to passenger service, the AOC holder should ensure that a thorough check of all cabin systems, equipment and fittings is performed by Maintenance personnel, as part of the verification that the aircraft is restored back to the configuration certified for passenger service.