

## AERONAUTICAL CIRCULAR CIVIL AVIATION AUTHORITY – MACAO, CHINA

**SUBJECT:** *Aircraft Loading Requirements*

**EFFECTIVE DATE:**

2 September 2019

**CANCELLATION:**

AC/OPS/030R00

**GENERAL:**

The President of Civil Aviation Authority – Macao, China, in exercise of his power under Paragraph 89 of the Air Navigation Regulation of Macao (ANRM) and Article 35 of the Statutes of Civil Aviation Authority, approved by the Decree-Law 10/91/M, established this AC.

### **1 Introduction**

- 1.1 ANRM Part V Paragraph 27 (1) specifies that the operator of a Macao registered aircraft shall not cause or permit it to be loaded or any load to be suspended wherefrom for a flight for the purpose of commercial air transport except under the supervision of a person whom he/she caused to be furnished with written instructions as to the distribution and securing of the load so as to ensure that the load may safely be carried on the flight, and any conditions subject to which the Certificate of airworthiness in force in respect of the aircraft was issued or rendered valid, being conditions relating to the loading of the aircraft, are complied with.
- 1.2 ANRM Part V Paragraph 27 (2) specifies that the instructions shall indicate the weight of the aircraft prepared for service, that is to say the aggregate of the basic weight (shown in the Weight schedule referred to in paragraph 16 of the ANRM) and the weight of such additional items in or on the aircraft as the operator thinks fit to include; and the instructions shall indicate the additional items included in the weight of the aircraft prepared for service, and shall show the position of the centre of gravity of the aircraft at that weight.
- 1.3 ANRM Part V Paragraph 27 (4) specifies that the person supervising the loading of the aircraft shall, before the commencement of any such flight, prepare and sign a load sheet in duplicate conforming to the requirements specified in ANRM Part V Paragraph 27 (6) and shall (unless he/she is the pilot-in-command of the aircraft) submit the load sheet for examination by the pilot-in-command of the aircraft who shall upon being satisfied

that the aircraft is loaded in the manner required by ANRM Part V Paragraph 27 (1), sign his/her name thereon.

- 1.4 The purpose of this Aeronautical Circular is to establish the requirements for aircraft loading.

## **2 Applicability**

This AC is applicable to operators of Macao registered aircraft flying for the purpose of commercial air transport.

## **3 Duties, Responsibilities and Training**

- 3.1 To eliminate the possibility of loading errors, the operator shall ensure that flight crew, cabin crew, ground handling agents and the loading teams (as applicable) are all aware of their duties and responsibilities within the operation that relates to the loading of the aircraft. The operator shall provide comprehensive documented information and instructions to support the stated duties and responsibilities.

- 3.2 Training of the appropriate personnel is required to ensure that instructions are properly understood and implemented. The importance of correct aircraft loading shall be highlighted. Training shall consist of initial and recurrent training to enable personnel to accomplish and maintain competency to fulfill their roles within the operation. A test to verify understanding shall be provided following training. Confirmation that the test has been completed satisfactorily is required. The training syllabus shall, as a minimum, include the following:

- (a) duties and responsibilities;
- (b) aircraft type and series familiarisation;
- (c) mass and balance planning;
- (d) loading;
- (e) restraint of load;
- (f) carriage of dangerous goods;
- (g) last minute change;
- (h) the completion and use of associated documentation; and
- (i) familiarisation with the operator's related Air Operator Certificate (AOC) requirements.

3.3 In addition, personnel shall be given an overview of the duties and responsibilities of everyone involved in the operation (whether employed by operator or agent) and particular emphasis placed on the interfaces between personnel, along with the delegation of duties and responsibilities at the interfaces. Personnel shall be clear not only of the scope and boundaries of their responsibilities, but also those with whom they interface during the loading operation; only with this understanding can they exercise vigilance for actions and responsibilities of others which may have been omitted. The operator shall consider providing sub-contractors with contact details of the appropriate accountable person so, if necessary, knowledge and support is readily available.

#### **4 Load Planning, Supervision and Loading**

- 4.1 All personnel responsible for load planning, supervision and loading shall receive appropriate instructions and training in the tasks allocated to them by the operator.
- 4.2 Aircraft mass and balance shall be carefully calculated and the load/trim sheets and loading instructions shall be prepared ensuring that the correct data is used and entered. When this duty has been delegated to sub-contractors, operators shall employ robust procedures to ensure that the mass and balance documentation and, in particular, the data is accurate and kept up to date. It is essential that the masses of all traffic loads are accurately established, either by weighing or the use of approved standard masses.
- 4.3 The person responsible for the preparation of the aircraft mass and balance shall give clear and comprehensive written or electronic instructions to the person responsible for the loading of the aircraft. The name of this person shall be stated on the document.
- 4.4 There shall be no doubt as to how the load is to be distributed within the aircraft. It is essential that the identification of the aircraft holds, bays and compartments is clearly marked. The configuration used shall be reflected on the mass and balance documentation.
- 4.5 If the operator chooses to utilise an electronic device for load planning, then the integrity and security of the equipment and programme shall be proven. A manual back-up shall be made available.
- 4.6 Those responsible for supervising the loading of the aircraft shall reconcile the distribution of the traffic load with the loading instructions. After checking that the load is properly restrained throughout the holds, bays and compartments, they shall then confirm by signature that the load and its distribution are in accordance with the mass and balance documentation. Those responsible shall take additional care when holds, bays, compartments and cabin areas are only partially filled with traffic load, which could have a significant effect on the aircraft balance condition.

*NOTE: Some cargo nets have strap fastenings which are simple to pull tight but difficult to release when fully tightened. This shall not be a reason for the loading teams not to tighten the straps fully.*

- 4.7 The pilot-in-command shall advise the cabin crew of any applicable seating restrictions. Passenger head counts and gender identification (when applicable) shall be conducted carefully in order to achieve accurate figures. Personnel shall remain vigilant identifying and actioning any deviation from standard passenger and baggage masses, if used.
- 4.8 Whilst final responsibility for accepting the load rests with the pilot-in-command, the operation shall contain robust procedures to enable the pilot-in-command to be satisfied that the information declared on the load/trim sheet is a true reflection of the aircraft's mass and balance condition. Communications shall be maintained between flight and ground crews, so that if last minute changes occur, sufficient time is available for amendments to be carried out correctly before the aircraft departs.
- 4.9 If any positions within the hold, bays or compartments are to be left void, then the operator shall establish a procedure to ensure that there is no movement of Unit Load Devices (ULD) or migration of bulk-type traffic loads.
- 4.10 If any damage to the aircraft's loading or restraining equipment is observed, this shall be reported to an appropriate person so the deficiency can be entered into the aircraft's technical log. If restraint equipment is inoperative, there may be restrictions on the operational limitations. The operator shall establish a programme of inspection to ensure the continued maintenance of the restraining equipment; this will also consider any applicable certified time expiry dates.
- 4.11 All personnel involved, from those who are tasked with preparation of documentation through to those who physically load the aircraft, have a responsibility to ensure that the aircraft is correctly loaded. If in any doubt, personnel shall be encouraged to ask questions or report any deviations from the planned load to an appropriate supervisor. It is imperative that the documentation given to the crew, before departure, provides an accurate reflection of the aircraft's mass and balance condition.

## 5 Loading Instructions

- 5.1 An operator shall provide appropriate instruction and guidance for flight crew, cabin crew, ground handling agents and loading teams, including agents at overseas aerodromes, regarding the mass and balance and loading of the aircraft. The instruction and guidance provided shall remain relative to the particular personnel involved in the loading operation.
- 5.2 Instruction, guidance and information for all types, marks and variants shall include a minimum of the following:
- (a) all operational limiting masses and Centre of Gravity (C of G);
  - (b) current APS (Aircraft Prepared for Service) mass and index data (all items and details of equipment used to modify basic to APS masses);
  - (c) clarification regarding units of measurements;

- (d) identification, configuration and maximum masses of aircraft cabins, holds, bays and compartments;
- (e) loading procedures (including ground stability and preferred distribution, if used);
- (f) examples of current documentation (content and completion);
- (g) limitation regarding floor loading (cumulative, running load and load spreading);
- (h) where applicable, the use of standard weights or any notional weights given in exemptions granted by the AACM;
- (i) last minute changes (limitations and procedures);
- (j) Unit Load Device (ULD) fitment, handling, loading, securing and serviceability guide;
- (k) the care and maintenance of ULD, these include cargo containers, nets and pallets, responsibilities for ensuring their fitness for use prior to loading and the procedure for directing damaged units to an approved organization for repair; Guidance shall be given to both loading and maintenance personnel on the division of duties in respect of their serviceability;
- (l) calculation, handling, loading, positioning and securing of bulk traffic load, flight spares, ballast, pallets or containers;
- (m) the types, use, strength, usable direction, spacing and stowage (as applicable) of all available restraint devices (including lashing points), loading spreading devices and equipment (if equipment becomes inoperative, details of imposed limits);
- (n) operation of Cargo Loading System or similar;
- (o) diagrams and dimensions of aircraft cabins and holds/bays/compartments to facilitate maximum allowable package sizes and the pre-planning of cargo distribution;
- (p) any applicable imposed seating restrictions and advising the aircraft pilot-in-command and cabin crew of these restrictions;
- (q) the operation of cabin, cargo and hold doors;
- (r) fuel (mass, balance and loading limitations);

- (s) carriage of dangerous goods;
- (t) regulating the carriage and stowage of baggage and cargo in passenger compartments, including instructions on the amount of hand baggage allowed and how it is to be stowed. Emergency exits, gangways and dinghy launching stations shall be kept clear during taxiing, take-off and landing;
- (u) checking that items of cargo or baggage allocated to particular compartments, bays or holds are distributed and restrained correctly. The person responsible for the trim of the aircraft shall give written instructions to the person responsible for loading the aircraft;
- (v) the effect of the maximum zero fuel weight, landing weight restrictions at planned destination, take off and climb performance requirements at the departure aerodrome and en route performance requirements on Regulated Take-Off Weight (RTOW);
- (w) where appropriate, limitations on loading for any non-standard flight;
- (x) instructions concerning the loading of stretchers, carriage of livestock or other unusual loads;
- (y) instructions on the use of passenger aircraft for the carriage of cargo;
- (z) where appropriate, instructions on the loading and securing of mail bags or similar cargo, including checking for leakage or spillage and consequential aircraft contamination; and
- (aa) a statement that a load/trim sheet cannot serve as a loading instruction and a trim slide rule does not dispense with the requirement to complete a load sheet.

5.3 Where traffic staff and handling agents are responsible for calculating the RTOW, operators shall ensure that they are provided with all relevant information and are competent.

## **6 Mass and Balance Documentation**

6.1 Mass and balance documentation shall be prepared before every flight to ensure that aircraft departs within all operational and C of G limits. The mass and balance documentation can be presented in a number of ways and is not limited to a single document; they can vary in type, from manual index and dropline versions to electronic produced printouts. If the operator chooses to utilise an electronic load/trim sheet, then the integrity and security of the equipment and programme shall be proven. The device shall be expected to provide the same data as the manual equivalent and a manual back-up shall be made available. There shall be no doubt as to the units of measurement used and they shall be stated on the mass and balance documentation.

- 6.2 Where a 'loading plan' method is used, the basic assumptions upon which the plan is formulated shall be given and shall specify C of G limits more stringent than those permissible under the C of A. It shall also be stated that loading in accordance with the 'plan' ensures that the laden C of G always falls within the restricted limits. If this is done, a simple statement should be included on the load sheet that the laden C of G is between the operator's more stringent limits is acceptable.
- 6.3 Copies of the mass and balance documentation shall be retained on the flight deck and on the ground until the aircraft has arrived at destination. On completion of the flight, the operator shall preserve the flight deck copy for a minimum period of six months.
- 6.4 The mass and balance documentation shall contain a minimum of:
- (a) aircraft and flight identification;
  - (b) the departure and destination airfields;
  - (c) the name of the pilot-in-command;
  - (d) Zero Fuel Mass (ZFM), Take Off Mass (TOM) and Loading Mass (LM) and the corresponding C of G;
  - (e) the identity of the person supervising the loading of the aircraft;
  - (f) APS mass and reference;
  - (g) the breakdown and distribution of all traffic load;
  - (h) indication as to whether actual, standard, or approved notional mass of passengers and their baggages have been used;
  - (i) the take-off and trip fuel;
  - (j) the mass of other consumables (water methanol, drinking water); and
  - (k) flight spares/tools, Aircraft on the Ground (AOG) spares, spare hydraulic and de-icing fluid (as applicable).
- 6.5 The person supervising the loading of the aircraft shall confirm by signature that the load and its distribution are in accordance with the mass and balance documentation given to the pilot-in-command. The pilot-in-command shall indicate his/her acceptance by signature. Where a signature by hand is impracticable or the operator desires to arrange the verification by electronic means, the mass and balance documentation shall be deemed as signed by the relevant person provided the utilisation of an electronic means for verification has been accepted by the AACM. The operator shall ensure that:

- (a) the use of such electronic means is protected by unique personal credential (i.e. Password, PIN) with appropriate security;
  - (b) clear indication on the relevant documentation in such a way that it is evident, to anyone having a need for that information, who has signed the documentation;
  - (c) the computer system logs information to indicate when and where the unique personal credential has been entered; and
  - (d) all personnel concerned are made aware of the conditions associated with the electronic means and these are documented in the Operations Manual.
- 6.6 Special attention shall be paid to the wording of the loading certificate to ensure compliance with the individual operator's own requirements and standards. It may be possible for the pilot-in-command of a smaller type of aircraft to check whether the aircraft has been loaded in accordance with the mass and balance documentation, whereas the pilot-in-command of a larger type aircraft may have to delegate this duty.
- 6.7 The APS form shall account for all items of the laden weight. Although they may not always be specified individually, the following are examples of items to be included:
- (a) aircraft crew and baggage;
  - (b) passenger seats, children's cots, cabin floor covering, removable bulkheads;
  - (c) navigation bag or aircraft library and navigation equipment;
  - (d) emergency equipment, including dinghies, all lifejackets/flotation cots, survival packs, blankets, pillows;
  - (e) galley equipment including urns, hot cups;
  - (f) all catering and bar stores including carriage containers;
  - (g) load spreading devices, lashing, ballast;
  - (h) aircraft spares;
  - (i) toilet water; and
  - (j) all items of removable equipment carried.

The APS form used shall be referred to on the load sheet.



## **7 Helicopter Loading**

7.1 Helicopter operators shall provide loading instructions suited to the capabilities, limitations and operation of a helicopter. In preparing these instructions operators shall remember that in many cases they will have to be read and implemented by personnel with little or no aviation experience, such as oil rig crews and contractors' staff. The instructions shall be clear, concise and avoid the use of aviation jargon.

## **8 Last Minute Change**

8.1 An operator shall specify procedures for last minute changes to the load to ensure that:

- (a) any last minute change after the completion of the mass and balance documentation is brought to the attention of the pilot-in-command and entered in the flight planning documents containing the mass and balance documentation;
- (b) the maximum last minute change allowed in passenger numbers or hold load is specified; and
- (c) new mass and balance documentation is prepared if this maximum number is exceeded.

## **9 Ad-hoc/Charter Flight**

9.1 Whilst the majority of operations are conducted between regular destinations, many operators undertake ad-hoc/charter flights and extra vigilance shall be exercised with these types of operation. The destination airfields may not be familiar with the operators' procedures and requirements, or in some cases the aircraft type. The computer generated mass and balance documentation may not be available, so manual versions shall be supplied for use.

9.2 At diversion airfields the flight crew may need to control and supervise the handling and loading of the aircraft more carefully than usually expected under normal operations.

## **10 Operator's Quality System**

10.1 The operator shall ensure that audit schedules of their quality system include the oversight of mass and balance and aircraft loading. These audits shall establish compliance with current regulatory requirements and the operator's own requirements and procedures. Aircraft loading falls within several audit categories and may include related sub-contractor activities.

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