



TECHNICAL GUIDANCE MATERIAL

for

MASS AND BALANCE

SUBJECT: TECHNICAL GUIDANCE MATERIAL FOR MASS AND BALANCE

EFFECTIVE DATE: 28 NOVEMBER 2025

1. APPLICABILITY

This guidance document has been developed for use by aircraft owners and operators and approved organisation's for SA-CAR Part 43 and SA-CAR Part 91

2. PURPOSE

Technical guidance material details the minimum requirements for information for mass and balance application.

3. REQUIREMENTS

This technical guidance material's intent is to guide the applicants and approval holders on how to comply with the requirements of SA-CAR Part 147 and SA-CAR Part 91

4. REFERENCE

- i. Part 91 and Part 43 of the Civil Aviation Regulations (CAR) of 2011 as amended.

5. LIST OF DEFINITIONS AND ABBREVIATIONS USED IN THIS DOCUMENT

5.1. Definitions

TERMINOLOGY	DESCRIPTION
Accept	Means the acknowledgement by SACAA that an item or plan should lead to compliance.
Aircraft	Means an aircraft as defined in the Act, including its engine, propellers, rotor, components, parts, equipment, instruments, accessories, and materials.
Applicant	Means the person/organization that is the legal entity on whose behalf the application was made.
Approve	Means to make formal acknowledgement that a product or document meets the regulations and requirements.

5.2. Abbreviations

ABBREVIATION	MEANING
DCA	Director of Civil Aviation
E: ASO	Executive: Aviation Safety Operations
SM: AW	Senior Manager: Airworthiness
M: ARI	Manager Aircraft Registration & Inspection
SACAA	South African Civil Aviation Authority
SACAR	South African Civil Aviation Regulations
AMO	Aircraft maintenance organization

6. GENERAL

6.1 BACKGROUND

- 6.1.1 The primary purpose of aircraft mass and balance control is safety.
- 6.1.2 A secondary purpose is to achieve the utmost in efficiency during operation of the aircraft. Improper loading reduces the efficiency of operating an aircraft and can be the cause of a failure to start or complete a flight.
- 6.1.3 The empty mass and corresponding centre of gravity of all civil aircraft is determined at the time of initial certification. The condition of the aircraft at the time of determining empty mass and centre of gravity should be one that is well defined and can be easily repeated. – Doc 9760
- 6.1.4 Annex 6, Part I, Chapter 5 and Part III, Section 2, Chapter 3 require that aeroplanes and helicopters be operated in accordance with a comprehensive and detailed code of performance in compliance with the applicable standards including mass limitations and centre of gravity limitations as specified in the aircraft flight manual.
- 6.1.5 To satisfy this requirement, operators are required to develop and maintain a mass and balance programme.

6.2 PERIODIC DETERMINATION OF MASS

- 6.2.1 Over a period of time and use, an aircraft will have a tendency to gain mass because of the accumulation of dirt, grease and oil in areas of the aircraft not readily accessible for washing and cleaning.
- 6.2.2 Other reasons include the repainting of aircraft, installation of new equipment and accomplishment of modifications and repairs.
- 6.2.3 The mass gained in any given period of time will depend on the function of the aircraft, its hours in flight, atmospheric conditions, the type of landing fields the aircraft operates from and their operating environment.
- 6.2.4 For this reason, periodic aircraft weighing is desirable and required in terms of –
- 6.2.5 SA-CAR 91.07.11 (2) - The owner or operator shall establish the mass and the centre of gravity of the aircraft by actual weighing prior to initial entry into operation and thereafter at intervals of five years.
- 6.2.6 SA-CAR 43.02.7(2) - Whenever alterations are made which could influence an aircraft's empty mass or its centre of gravity, the mass and balance data shall be amended.
- 6.2.7 The accumulated effects of modifications and repairs on the mass and balance of the aircraft shall be accounted for and properly documented by the owner or operator.
- 6.2.8 If the effect of modifications on the mass and balance is not accurately known, then the aircraft shall be weighed in accordance with the provisions of SA-CAR 91.07.11(2)
- 6.2.9 Further to the above provisions, if the SACAA or the operator is of the opinion that adequate mass control has not been exercised over an aircraft during the modification, the SACAA or the operator may require that a new empty mass and empty centre of gravity position should be determined

6.3 PROCEDURE TO ESTABLISH MASS: SA-CATS 43.02.7

- 6.3.1 Remove excessive dirt, grease, and moisture from the aircraft.
- 6.3.2 Place the aircraft in a level-flight attitude, as prescribed by the manufacturer.
- 6.3.3 Where practical, establish the mass inside a closed building to prevent mass-meter errors introduced by wind.

- 6.3.4 Use only approved mass meters as prescribed in sub-regulation SA-CAR 43.02.7(4).
- 6.3.5 Use mass meters in accordance with their manufacturer's instructions. The mass meters must be positioned at the stations called out by the aircraft's manufacturer. These points shall be clearly indicated in the mass and balance report and be in accordance with the aircraft manufacturer's specifications.
- 6.3.6 Obtain the necessary publications (i.e. maintenance manual, flight manual, etc.) before commencing with the procedures.
- 6.3.7 Ensure that the aircraft conforms to the definition of its "empty mass" configuration: engine coolant, unusable fuel, total oil, total hydraulic fluid, any fixed ballast, and all items of fixed equipment as per its approved equipment list. Any extra items must be removed before computation.
- 6.3.8 Comply with the requirements of Regulation 43.02.3 in respect of the manner in which maintenance must be carried out.

6.4 RECORD OF MASS AND BALANCE

- 6.4.1 The mass and balance record system should include procedures that allow the air operator to update and maintain a current and continuous record of the mass and CG of the aircraft they operate. The records should reflect changes in mass and balance and list all modifications affecting the mass or balance of the aircraft.
- 6.4.2 The mass and balance report shall include at least the following information:
 - a. Aircraft nationality and registration letters, make, model and serial number.
 - b. Date on which mass was determined and centre of gravity computed.
 - c. Datum point used.
 - d. The necessary calculations made.
 - e. Reference number of applicable publications used.
 - f. The signature and license or approval number of the person who was responsible for establishing the mass and the computing of the centre of gravity.
 - g. A copy of the mass and balance report must be submitted to the SACAA and a CA 43-C-08 certificate shall be issued by the Authority.

Note 1: Compliance with paragraph 7(g) can be accomplished by lodging an application using the form CA 91-28 accompanied by payment of the fee prescribed in SACAA Part 187 and the mass and balance report attached.

Note 2: An aircraft's empty mass shall be established by means of computation or by means of a mass meter by an appropriately approved AMO or a person acceptable to the Director.

6.5 AIRCRAFT DOCUMENTATION

- 6.5.1 The person who was responsible for establishing the mass and the computing of the centre of gravity of the aircraft shall make an appropriate entry in the airframe logbook of the aircraft concerned. The date of the entry shall coincide with the date appearing on the mass and balance report.
- 6.5.2 The person referred to in subparagraph (a) shall ensure that the approved equipment list is available, certified and up to date, and that the new mass and balance data is entered in the appropriate documentation of the aircraft concerned.
- 6.5.3 If an approved equipment list is not available for the aircraft, such a list shall be compiled and submitted to the Director for approval.

6.6 LOADING DATA

- 6.6.1 The loading schedule should be kept with the aircraft, forming a part of the aircraft flight manual. It should include instructions on the proper load distribution such as filling of fuel tanks and oil tanks, passenger movement, distribution of cargo, etc. A check should be made to determine if the schedule will allow computation of separate loading conditions when the aircraft is to be loaded in other than the specified conditions shown in the loading schedule.

- 6.6.2 Information on which to base records of mass and balance changes to the aircraft may be obtained from the pertinent aircraft specifications, aircraft flight manual and the aircraft mass and balance report. Operators should maintain records of all known mass and centre of gravity changes which occur after the aircraft mass has been determined.
- 6.6.3 A mass and centre of gravity schedule should be provided for each aircraft. Each schedule should be identified by the aircraft designation, nationality, and registration marks. The date of issue of the schedule should be given and the schedule should be signed by an approved representative of the organization. A statement should be included indicating that the schedule supersedes all earlier issues.

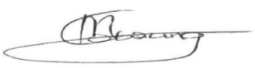
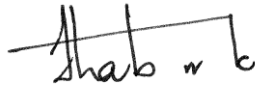
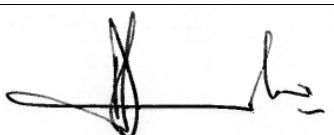
6.7 PREPARATION AND APPROVED OF LOADING DATA

- 6.7.1 Loading data prepared in accordance with the provisions of this sub-section should be acceptable to the SACAA. Where the applicable flight manual pages are used as the load data sheet and to specify any required loading system, the completed pages should be submitted to the SACAA for incorporation in the aircraft flight manual.
- 6.7.2 The operator is responsible for the preparation of a load data sheet for each aircraft based on the empty mass and empty centre of gravity position.
- 6.7.3 The operator is responsible for the preparation of a loading system for each aircraft based on the empty mass and empty centre of gravity position, unless it can be shown that the aircraft cannot be loaded so that its centre of gravity falls outside the approved range.

6.8 ENQUIRIES

All Mass and Balance related enquiries may be forwarded to the Airworthiness Department.

7. AUTHORISATION

DEVELOPED BY:		
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