DOCUMENT
GSM-G-CPL.022

DOCUMENT TITLE

GENERAL OPERATIONS, FLIGHT PLANNING AND PERFORMANCE

CHAPTER 14 –
CASA REGULATIONS AND ORDERS)

Version 1.0
January 2013

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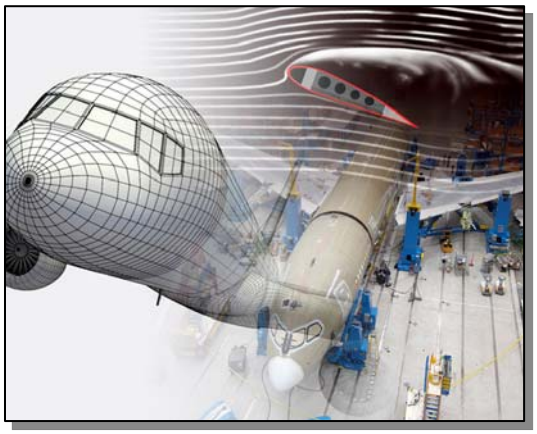
CASA REGULATIONS AND ORDERS

LEGAL CONTEXT



The aircraft designer aims to meet the operational demands planned for the aircraft by selecting sizes, shapes, power, materials and systems in combinations that will be capable of meeting expectations at affordable costs. This causes compromises, which mean choosing the least weight for the most strength and payload capacity using the most efficient power combinations.

Unchecked economic concerns could drive design and operational safety margins to low levels. Flying will always involve some hazards but it makes practical and economic sense to reduce the risks to levels acceptable to the travelling public, insurers and operators.

Safety regulations issued by authorities in various countries require minimum performance standards, which lock in basic parameters not only to control aircraft design, manufacture and certification but also their operations and the airfields in use. No aircraft can operate legally in circumstances where performance falls below these limits.

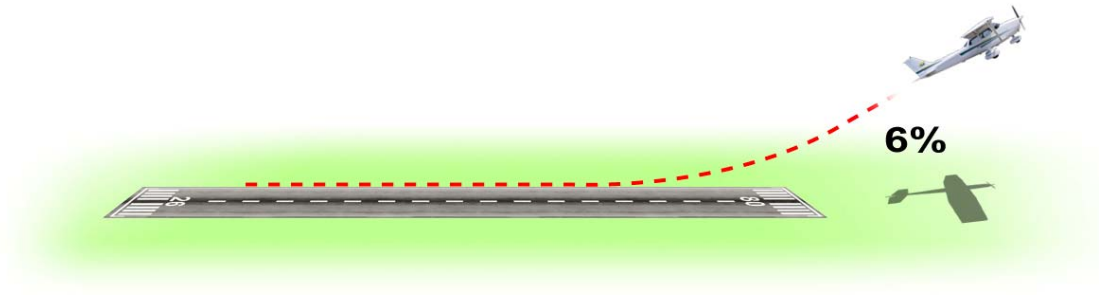
Regulations governing aircraft of 5700 kg (12500 lbs.) or less are similar to, but not as detailed as, those governing aircraft of a weight greater than 5700 kg. The heavier aircraft tend to be more complicated, fly faster, further, higher and carry more payload than lighter aircraft. Private and Regular Public Transport (RPT) operations have elements in common but the legal requirements for RPT are more stringent than for private use.

In Australia the Act of Federal Parliament governing Aviation enables Civil Aviation Regulations (CAR) and Civil Aviation Orders (CAO). There are also advisory publications and circulars. Notices to Airmen (NOTAMs) for example, contain current operational advice and may be issued daily. All these documents combine to set the legal context within which the pilot must operate, providing instructions, guidance and advice. The intention of the regulations is to ensure that if the performance parameters are met then the flight can be expected to proceed with a very high probability of reaching a safe conclusion. The most immediate documents used by pilots with regard to safety and performance are the Flight Manual and the Maintenance Release.

The Flight Manual is carried by every aircraft and contains information specific to that type and to that particular aircraft. The Maintenance Release is also kept with the aircraft and records the fact that maintenance has been carried out by an authorised body in accordance with an approved schedule and that the aircraft was airworthy at the time of issue. Before flight, the pilot in command inspects the aircraft and the release and signs to accept that the aircraft is airworthy. Flight times are also recorded and problems noted by the pilot in command so as to inform Maintenance and to warn the next pilot who is to fly that aircraft.

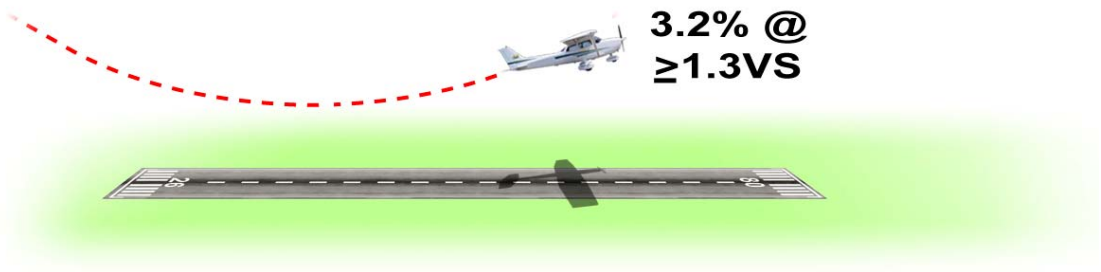
CLIMB WEIGHT LIMIT TAKE OFF (CAO 20.7.4)

In the take-off configuration with landing gear extended, an aeroplane must have the ability to achieve a climb gradient of 6% at take-off safety speed, without ground effect, and with all engines operating at take-off power.



CLIMB WEIGHT LIMIT LANDING *(IN THE EVENT OF A GO AROUND)*

In the landing configuration with all engines operating at take-off power an aeroplane must have the ability to climb at a gradient of 3.2% in standard atmospheric conditions at a speed not exceeding 1.3VS.



PERFORMANCE REQUIREMENTS (CAO 20.7.4)

CAO 20.7.4 details the performance requirements for aircraft of less than 5700 kg engaged in Private, Airwork and Charter operations.

In summary:

- Take Off Distance Required includes the ground run and lift-off to take-off safety speed at 50 ft., multiplied by:
  - 1.15 for aircraft weighing less than 2000 kg
  - 1.25 for aircraft weighing less than 3500 kg ;or
  - linear interpolation between 1.15 and 1.25 for those weights between
- Take-off Climb performance from lift-off to 50 ft shall be at a gradient of not less than 6%
- En-Route Climb performance for single engined aircraft shall be not less than a gradient of 4.5% at a speed of not less than 1.2 V_S up to 5000 ft. Multi-engined aircraft, after engine failure, shall maintain a gradient of not less than 1% and at a speed of not less than 1.2 V_S up to 5000 ft.
- Landing Climb performance shall be at a speed of not less than 1.3 V_S and at a missed approach gradient of not less than 3.2%.
- Landing Distance Required shall be from 50 ft above the threshold at a speed of not less than 1.3 V_S to a speed of 3 kts multiplied by:
  - (1.15 at weights up to 2000 kg and
  - (1.43 at weights above 4500 kg.
  - (Linear interpolation applies between those weights of 2000 to 4500 kg.
- These performance requirements are those achievable in ambient conditions at the relevant pressure height.
- The required distances must also take into account runway surface conditions and slope.

CASA, CIVIL AVIATION ORDERS, SECTION 20.7.4

Give information which must be applied to performance charts, below is an extract of Section 20.7.4 of the CAO :

Australian Government
Civil Aviation Safety Authority

CIVIL AVIATION ORDERS
PART 20

SECTION 20.7.4
Issue 4

AEROPLANE WEIGHT AND PERFORMANCE LIMITATIONS — AEROPLANES NOT ABOVE 5 700 KG — REGULAR PUBLIC TRANSPORT OPERATIONS (SINGLE-ENGINE AEROPLANES ONLY), CHARTER OPERATIONS, AERIAL WORK (EXCLUDING AGRICULTURAL) OPERATIONS AND PRIVATE OPERATIONS

SUBSECTIONS

2 APPLICATION

This section applies to aeroplanes having a maximum take-off weight not in excess of 5700 kg engaged in regular public transport operations (single-engine aeroplanes only), private operations, aerial work operations (excluding agricultural operations) and charter operations, unless CASA specifies that sections 20.7.1 or 20.7.2 are to be applied.

3 DEFINITIONS

3.1 In this section:

approved foreign flight manual, in relation to an aeroplane, means the flight manual approved by the relevant regulatory aviation authority of the country where the aeroplane is, or was, manufactured.

landing distance available means the distance specified by CASA as being the effective operational length available for use by aircraft for landing at Government and Licensed Aerodromes or the distance available for landing on an authorised landing or alighting area.

manufacturer's data manual, in relation to an aeroplane, means a publication (however described) produced by the manufacturer of the aeroplane as a guide for the flight crew in the operation of the aeroplane.

pressure height means the height registered on an altimeter with the sub-scale set to 1013.2 hPa.

Issue 4: 8 December 2004
Amdt No. 212

take-off safety speed means the speed specified on the aeroplane take-off chart being the minimum speed to which an aeroplane must be accelerated in establishing the take-off distance required.

take-off distance available means the distance specified by CASA as being the effective operational length available for use by aircraft for take-off at Government or Licensed Aerodromes or the distance available for take-off on an authorised landing or alighting area.

V_S is the symbol used to denote the minimum speed in a stall or the minimum steady flight speed in the aeroplane configuration in which V_S is being used.

4 TAKE-OFF WEIGHT LIMITATIONS

4.1 An aeroplane must not take off at a weight in excess of the least of the weights determined in accordance with subparagraphs (a) to (d):

(a) a weight at which the take-off distance required under subsection 6 for the pressure height, temperature, runway slope (if in excess of 1%) and wind component along the runway, is equal to or less than the take-off distance available in the direction of take-off. Approved declared conditions may be used instead of actual pressure height and temperature;

(b) a weight which will permit compliance with the take-off climb requirements specified in subsection 7 taking into account ambient temperature and pressure height. Approved declared temperature and pressure height may be used instead of ambient conditions;

(c) a weight which will permit compliance with the en-route climb requirements specified in subsection 8;

(d) a weight which, allowing for normal consumption of fuel and oil in flight and taking into account either the forecast temperature and pressure or approved declared conditions, will permit compliance with the landing distance limitations specified in subsection 10 related to the longest available landing length under conditions of zero wind.

5 LANDING WEIGHT LIMITATIONS

5.1 Except in an emergency, an aeroplane must not land at a weight in excess of the least of the weights determined in accordance with subparagraphs (a) and (b):

(a) a weight at which the landing distance required in accordance with subsection 10 for the pressure height, temperature, runway slope (if in excess of 1%), and wind component along the runway at the time of landing, is equal to or less than the landing distance available in the direction of landing. Approved declared conditions may be used instead of actual pressure height and temperature;

(b) a weight which will permit compliance with the landing climb requirements specified in subsection 9, taking into account the elevation of the aerodrome of landing instead of actual pressure height and temperature.

6 TAKE-OFF DISTANCE REQUIRED

6.1 Subject to paragraph 6.3, the take-off distance required is the distance to accelerate from a standing start with all engines operating and to achieve take-off safety speed at a height of 50 feet above the take-off surface, multiplied by the following factors:

(a) 1.15 for aeroplanes with maximum take-off weights of 2 000 kg or less;
(b) 1.25 for aeroplanes with maximum take-off weights of 3 500 kg or greater; or
(c) for aeroplanes with maximum take-off weights between 2 000 kg and 3 500 kg, a factor derived by linear interpolation between 1.15 and 1.25 according to the maximum take-off weight of the aeroplane.

6.2 For aeroplanes operated on land, take-off distances are to be determined for a level short dry grass surface. For aeroplanes operated on water, take-off distances are to be determined taking into account the maximum crosswind component and the most adverse water conditions for the aeroplane type.

6.3 Where there is an approved foreign flight manual or a manufacturer's data manual for an aeroplane that sets out the take-off distance required for that aeroplane, then that aeroplane must be operated so as to comply with either the requirements set out in paragraphs 6.1 and 6.2 or the requirements relating to take-off distance set out in either of those manuals.

Note: The data contained in some manufacturers' data manuals is unfactored and makes no allowance for degraded aircraft performance. Where there is a considerable difference between the data in a manufacturer's data manual and the data in the flight manual for the aeroplane then the manufacturer's data should be treated with caution.

7 TAKE-OFF CLIMB PERFORMANCE

7.1 In the take-off configuration with landing gear extended, an aeroplane must have the ability to achieve a climb gradient of 6% at take-off safety speed, without ground effect, and with all engines operating at take-off power.

8 EN-ROUTE CLIMB PERFORMANCE

8.1 Multi-engined aeroplanes engaged in charter operations under the Instrument Flight Rules or aerial work operations under the Instrument Flight Rules must have the ability to climb with a critical engine inoperative at a gradient of 1% at all heights up to 5 000 feet in the standard atmosphere in the following configuration:

(a) propeller of inoperative engine stopped;
(b) undercarriage (if retractable) and flaps retracted;

(c) remaining engine(s) operating at maximum continuous power;
(d) airspeed not less than 1.2 V_S.

8.2 Multi-engined aeroplanes (other than those specified in paragraph 8.1) must have the ability to maintain height at all heights up to 5 000 feet in the standard atmosphere in the configuration specified in subparagraphs 8.1 (a), (b), (c) and (d).

8.3 Single-engined aeroplanes must have the ability to climb at a gradient of 4.5% at an airspeed not less than 1.2V_S at all heights up to 5 000 feet in standard atmospheric conditions with the engine operating at maximum continuous power, undercarriage (if retractable) and flaps retracted.

9 LANDING CLIMB PERFORMANCE

9.1 In the landing configuration with all engines operating at take-off power an aeroplane must have the ability to climb at a gradient of 3.2% in standard atmospheric conditions at a speed not exceeding 1.3V_S.

10 LANDING DISTANCE REQUIRED

10.1 Subject to paragraphs 10.3 and 10.4, an aeroplane must not land unless the landing distance available is equal to or greater than the distance required to bring the aeroplane to a complete stop or, in the case of aeroplanes operated on water, to a speed of 3 knots, following an approach to land at a speed not less than 1.3V_S maintained to within 50 feet of the landing surface. This distance is to be measured from the point where the aeroplane first reaches a height of 50 feet above the landing surface and must be multiplied by the following factors:
(a) 1.15 for aeroplanes with maximum take-off weights of 2 000 kg or less;
(b) 1.43 for aeroplanes with maximum take-off weights of 4 500 kg or greater;
(c) for aeroplanes with maximum take-off weights between 2 000 kg and 4500 kg, a factor derived by linear interpolation between 1.15 and 1.43 according to the maximum take-off weight of the aeroplane.

10.2 For aeroplanes operated on land, landing distances are to be determined for a level short dry grass surface. For aeroplanes operated on water, landing distances are to be determined on flat broken water.

10.3 Subject to paragraph 10.4, where there is an approved foreign flight manual or a manufacturer's data manual for an aeroplane that sets out the landing distance required for that aeroplane, then that aeroplane must be operated so as to comply with the requirements set out in paragraphs 10.1 and 10.2 or the requirements relating to landing distance set out in either of those manuals.

Note: The data contained in some manufacturers' data manuals is unfactored and makes no allowance for degraded aircraft performance. Where there is a considerable difference between the data in a manufacturer's data manual and the data in the flight manual for the aeroplane then the manufacturer's data should be treated with caution.

10.4 This subsection does not apply in the case of an emergency.

12 AEROPLANE CONFIGURATION AND PROCEDURES

12.1 An operator of a multi-engined aeroplane engaged in charter operations or aerial work operations, and an operator of a single-engine aeroplane engaged in RPT operations under the Instrument Flight Rules, must include in his or her operations manual the procedures to be followed by the pilot in the event of an engine failure.