

PART VI

AIRCRAFT OPERATING AND PERFORMANCE LIMITATIONS

Applicability

105. This Part prescribes the operating and performance limitations for all civil aircraft.

Applicability

106. (1) An operator shall operate an aircraft in accordance with a comprehensive and detailed code of aircraft performance prescribed by the Authority in compliance with the applicable Regulations of this Part.

General requirements for aircraft operations

(2) An operator shall not operate an aircraft that—

(a) exceeds its designed performance limitations for any operation, as established by the Authority; or

(b) exceeds operating limitations contained in the Aircraft Flight Manual, or its equivalent.

(3) An aircraft shall be operated in compliance with the terms of its Certificate of Airworthiness and within the approved operating limitations contained in its flight manual.

(4) An operator shall not operate a helicopter to or from heliports in a congested hostile environment, unless he satisfies the requirements specified by the competent authority in which the heliport is situated, to enable the operation to be conducted in a manner that gives appropriate consideration for the risk associated with a power-unit failure.

(4A) In conditions where the safe continuation of flight is not ensured in the event of a critical power-unit failure, helicopter operations shall be conducted in a manner that gives appropriate consideration for achieving a safe forced landing.

(5) An unmanned free balloon shall be operated in such a manner as to minimize hazards to persons, property or other aircraft in accordance with conditions Schedule 4A and specified by the Authority.

Schedule 4A

Aircraft Performance Data

107. (1) An operator shall ensure that the aircraft performance data contained in the Aircraft Flight Manual, or other authorized source is used to determine compliance with the appropriate requirements of this Part.

Aircraft performance calculations

(2) When applying performance data, a person performing calculations shall account for the aircraft configuration, environmental conditions and the operation of any system or systems which may have an adverse effect on aircraft performance.

General Weight and Obstruction Clearance Limitations

General weight and obstruction clearance limitations

108. (1) An operator shall not take-off an aircraft without ensuring that the maximum allowable weight for flight does not exceed the maximum allowable take-off or landing weight or any applicable en-route aircraft performance or landing distance limitations considering the—

- (a) condition of the take-off and landing areas to be used;
- (b) gradient of runway to be used in respect of land planes;
- (c) pressure altitude;
- (d) ambient temperature;
- (e) current and forecast winds; and
- (f) any known conditions such as atmospheric and aircraft configuration, which may adversely affect aircraft performance.

(2) An operator shall not take-off an aircraft, assuming normal engine operations, which due to its weight is unable to safely clear all obstacles during all phases of flight, including all points along the intended en-route path or any planned diversions.

(3) An operator shall ensure that an aircraft is operated in compliance with its mass limitations and noise certificate limitations where applicable.

Applicability of regulations 110 to 118

Applicability of regulations 110 to 118

109. Regulations 110 to 118 prescribe aircraft performance and operating limitations for aircraft used in commercial air transport operations.

General Requirements for Aircraft Performance in Commercial Air Transport

General requirements for aircraft performance in commercial air transport

110. Where full compliance with the requirements of regulations 111 to 118 cannot be shown due to specific design characteristics such as seaplanes, airships, or supersonic aircraft, the operator shall apply approved performance standards that ensure a level of safety not less restrictive than those of relevant requirements of these Regulations.

Prohibitions on the use of single-engine aircraft

111. (1) An operator shall not operate a single-engine aircraft used for revenue passenger carrying operations unless such aircraft is continually operated in daylight, under Visual Flight Rules.

(2) An operator shall not operate a multi-engine aircraft used for revenue passengers carrying operations that is unable to comply with any of the performance limitations of regulations 114 through 118 unless that aircraft is continually operated—

- (a) in daylight;
- (b) under Visual Flight Rules; and
- (c) at a weight that will allow it to climb, with the critical engine inoperative, at least 50 feet a minute when operating at the minimum en-route altitude of the intended route or any planned diversion, or at 5,000 feet above mean sea level, whichever is higher.

(3) A multi-engine aircraft that is unable to comply with subregulation (2)(c), is for the purpose of these regulations, considered to be a single engine aircraft and shall comply with the requirements of subregulation (4).

(4) Except as provided in regulation 118A a single engine aircraft shall only be operated in conditions of weather and light and over such routes and diversions there from, that permit a safe forced landing to be executed in the event of engine failure.

Mass Limitations

112. (1) The mass of an aircraft at the start of take-off shall not exceed the mass at which take-off limitations are complied with, nor the mass at which en-route engine inoperative and landing limitations are complied with, allowing for expected reductions in mass as the flight proceeds and for any applicable jettisoning of fuel.

Required
mass
limitations
for
aeroplanes

(2) The mass of an aircraft at the start of take-off shall not exceed the maximum take-off mass specified in the flight manual taking into account the factors specified in regulation 108(1).

(3) The estimated mass of an aircraft for the expected time of landing at the aerodrome of intended landing and at any alternate aerodrome shall not exceed the maximum landing mass specified in the flight manual taking into account the factors specified in regulation 108(1).

(4) The mass of an aircraft at the start of take-off and the estimated mass for the expected time of landing at the aerodrome of intended landing and at any alternate aerodrome shall not exceed the relevant maximum mass at which compliance was demonstrated with the applicable noise certification standards, unless otherwise authorized by the Authority in respect of that aerodrome.

Aircraft Performance Calculations

113. (1) A national air operator shall not take-off an aircraft used in commercial air transport without ensuring that the applicable operating and performance limitations required for this regulation can be accurately computed based on the Aircraft Flight Manual, or other data source approved by the Authority.

Aircraft
performance
calculations

(2) An air operator calculating performance and operating limitations for an aircraft used in commercial air transport shall ensure that performance data used to determine compliance with these regulations can, during any phase of flight, accurately account for—

- (a) any reasonably expected adverse operating conditions that may affect aircraft performance;
- (b) one engine failure for aircraft having two engines, where applicable; and
- (c) two engine failure for aircraft having three or more engines, where applicable.

(3) When calculating the performance and limitation requirements of regulations 114 to 118, a person performing the calculation shall, for all engines operating and for inoperative engines, accurately account—

- (a) in all phases of flight for—
 - (i) the effect of fuel and oil consumption on aircraft weight;
 - (ii) the effect of fuel consumption on fuel reserves resulting from changes in flight paths, winds, and aircraft configuration;
 - (iii) the effect of fuel jettisoning on aircraft weight and fuel reserves, where applicable and approved;
 - (iv) the effect of any ice protection system, where weather conditions require its use;
 - (v) ambient temperatures and winds along intended route and any planned diversion; and
 - (vi) flight paths and minimum altitudes required to remain clear of obstacles; and
- (b) during take-off and landing for—
 - (i) the condition of the take-off runway or area to be used, including any contamination such as water, slush, snow and ice;
 - (ii) the gradient of runway to be used;
 - (iii) the runway length including clearways and stop-ways, where applicable;
 - (iv) pressure altitude at take-off and landing sites;

- (v) current ambient temperature and wind at take-off;
- (vi) forecast ambient temperatures and winds at each destination and planned alternate landing site;
- (vii) the ground handling characteristics, such as braking action, of the type of aircraft; and
- (viii) landing aid and terrain that may affect the take-off path, landing path, and landing roll.

(4) Obstacle data shall be provided by the air operator, for the development of procedures and calculations to ensure compliance with take-off and obstacle clearance limitations.

(5) An air operator shall take account of charting accuracy when complying with these Regulations.

(6) Where conditions are different from those on which the performance is based, compliance may be determined by interpolation or by computing the effects of changes in the specific variables, where the results of the interpolation or computations are substantially as accurate as the results of direct tests.

(7) In performing aircraft performance calculation under this regulation an air operator may correct take-off data based on still air by taking into account not more than fifty per cent of any reported headwind component and not less than one hundred and fifty per cent of any reported tailwind component.

Take-off Limitations

114. (1) An air operator shall take account of charting accuracy when assessing compliance with this regulation.

Commercial
air transport
operations
take-off
limitations

(2) An air operator shall ensure that an aeroplane shall be able, in the event of a critical power-unit failing at any point in the take-off, either to discontinue the take-off and stop within the accelerate-stop distance available or to continue the take-off and clear all obstacles along the flight path by an adequate margin until the aircraft is in a position to comply with the en-route one engine inoperative limitations.

(3) A national air operator shall ensure that an aeroplane is not allowed to take-off unless the following requirements are met when determining the maximum permitted take-off mass:

- (a) the take-off run shall not be greater than the length of the runway;
- (b) where the critical engine fails at any time after the aeroplane reaches V₁, to continue the take-off flight path and clear all obstacles either—

- (i) by a height of at least 35 feet vertically for turbine engine powered aeroplanes or 50 feet for reciprocating engine powered aeroplane; and
- (ii) by at least 60 metres horizontally within the aerodrome boundaries and by at least ninety meters horizontally after passing the boundaries, without banking more than fifteen degrees at any point on the take-off flight path;

(c) for a turbine engine powered aeroplane—

- (i) the take-off distance shall not exceed the length of the runway plus the length of any clearway, except that the length of any clearway included in the calculation shall not be greater than half the length of the runway; and
- (ii) the accelerate-stop distance shall not exceed the length of the runway, plus the length of any stop-way, at any time during take-off until reaching V1;

(d) the accelerate-stop distance shall not exceed the length of the runway at any time during take-off until reaching V1 for reciprocating engine powered aeroplane.

(4) In determining the length of the runway available for an aircraft, account shall be taken of the loss, where any, of runway length due to alignment of the aeroplane prior to take-off.

(5) An air operator operating a helicopter in performance class 1 shall ensure that the helicopter is able, in the event of the critical power-unit failure being recognized –

- (a) at or before the take-off decision point, to discontinue the takeoff and stop within the rejected take-off area available; or
- (b) at or after the take-off decision point, to continue the take-off, clearing all obstacles along the flight path by an adequate margin until the helicopter is in a position to comply with the requirements of regulation 116(5).

(6) An air operator operating a helicopter in performance class 2 shall ensure that the helicopter is able, in the event of the failure of the critical power-unit –

- (a) at any time before reaching defined point after take-off, to achieve a safe forced landing; or
- (b) at any time after reaching defined point after take-off, to continue the take-off clearing all obstacles along the flight path by an adequate margin until the helicopter is in a position to comply with the requirements of regulation 116(5).

(7) An air operator operating a helicopter in performance class 3 shall ensure that the helicopter is able, in the event of the failure of the critical power-unit at any point of the flight path, to achieve a safe forced landing.

En-Route Limitations with all Engines Operating

115. A national air operator shall not take-off a reciprocating engine powered aeroplane used in commercial air transport operations at a weight that does not allow a rate of climb of at least 6.9 V_{so} , with all engines operating, at an altitude of at least 1,000 feet above all terrain and obstructions within ten miles of each side of the intended track.

En-route limitations with all engines operating

En-Route Limitations with One Engine In-operative

116. (1) A national air operator shall not take-off an aeroplane used in commercial air transport operations having two engines unless such aeroplane can, in the event of a power failure at the most critical point along the route or planned diversion there from, continue the flight to a suitable aerodrome where a landing can be made within the landing limitations and without flying below the minimum flight altitude at any point, while allowing—

En-route limitations where one engine is inoperative

(a) for a reciprocating engine powered aeroplane—

- (i) at least a rate of climb of 0.079—(0.106/number of engines installed) V_{so2} (when V_{so} is expressed in knots) at an altitude of per 1,000 feet above all terrain and obstructions within 5 statute miles, on each side of the intended track; and
- (ii) a positive slope at an altitude of at least 1,500 feet above the aerodrome where the aircraft is assumed to land;

(b) for a turbine engine powered transport category aeroplane—

- (i) a positive slope at an altitude of at least 1,000 feet above all terrain and obstructions within 9.3 kilometres, on each side of the intended track;
- (ii) net flight path from cruising altitude to the intended landing aerodrome that allows at least 2,000 feet clearance above all terrain and obstructions within 5 statute miles, on each side of the intended track; and
- (iii) a positive slope at an altitude of at least 1,500 feet above the aerodrome where the aircraft is assumed to land.

(2) The climb rate specified in subregulation (1)(a)(i) may be amended to 0.026 $V_{so 2}$ for large transport category aircraft issued a type certificate prior to the year 1953.

(3) The 5 statute miles clearance margin stated in subregulation (1)(a), shall be increased to 10 statute miles where navigational accuracy does not meet the ninety-five per cent containment level.

(4) An air operator shall not take-off a helicopter used in commercial air transport operations having two engines, unless that helicopter can, in the event of the critical engine failing and any point in the en route phase, continue the flight to the destination or alternate landing site without flying below the minimum flight altitude at any point and clearing all obstacles in the approach path by a safe margin.

(5) An air operator operating a helicopter in performance Class 1 shall ensure that the helicopter is able, in the event of the failure of the critical power-unit at any point in the *en route* phase, to continue the flight to a site and meet the requirements of regulation 118(7) or (8), without flying below the appropriate minimum flight altitude at any point.

(6) An air operator operating a helicopter in performance Class 3 shall ensure that the helicopter is able, -

- (a) with all power-units operating, to continue along its intended route or planned diversions without flying at any point below the appropriate minimum flight altitude; or
- (b) in the event of the failure of a power-unit at any point in the *en route* phase, to achieve a safe forced landing.

En-Route Limitations with Two Engines Inoperative

117. (1) A national air operator shall not take-off an aeroplane used in commercial air transport operations having three or more engines at such a weight where there is no suitable landing aerodrome within ninety minutes at any point along the intended route with all engines operating at cruising power, unless that aircraft can, in the event of simultaneous power failure of two critical engines at the most critical point along that route, continue to a suitable landing aerodrome while allowing—

- (a) for a turbine engine powered aeroplane—
 - (i) a net flight path considering the ambient temperatures anticipated along the track clearing vertically, by at least 2,000 feet, all terrain and obstructions within 5 statute miles on each side of the intended track;
 - (ii) a positive slope at 1,500 feet above the aerodrome of intended landing; and
 - (iii) enough fuel to continue to the aerodrome of intended landing, to arrive at an altitude of at least 1,500 feet directly over the aerodrome and thereafter to fly for 15 minutes at cruise power;

En-route
limitations
where two
engines of an
aeroplane are
inoperative

(b) for a reciprocating engine powered aeroplane—

- (i) a rate of climb at 0.013 V_{so} 2 feet per minute, at an altitude of 1,000 feet above the highest ground or obstruction within 10 miles on each side of the intended track, or at an altitude of 5,000 feet, whichever is higher; and
- (ii) enough fuel to continue to the aerodrome of intended landing and to arrive at an altitude of at least 300 m directly over that aerodrome.

(2) A national air operator shall ensure that in computing the fuel required to continue to the aerodrome of intended landing under subregulation (1)(a) the consumption of fuel and oil after engine failure is the same as the consumption that is allowed for in the net flight path data in the Aircraft Flight Manual.

(3) Where the two engines of the reciprocating aeroplane are predicted to fail at an altitude above the prescribed minimum altitude, compliance with the prescribed rate of climb need not be shown during the descent from the cruising altitude to the prescribed minimum altitude, where those requirements can be met once the prescribed minimum altitude is reached, and assuming descent to be along a net flight path and the rate of descent to be 0.013 V_{so} 2 greater than the rate in the approved performance data.

(4) Where the jettisoning of fuel is authorized or planned, the weight of the aeroplane at the point where the two engines fail is considered to be not less than that which would include enough fuel to proceed to an aerodrome and to arrive at an altitude of at least 1,000 feet directly over that aerodrome.

(5) A national air operator shall not take-off a Performance Class 1 helicopter or Performance Class 2 helicopter used in commercial air transport operations having three or more engines, unless that helicopter can, in the event of two critical engines failing simultaneously at any point in the en route phase of flight, continue the flight to a suitable landing site.

Aircraft Landing Performance Limitations

118. (1) Before commencing an approach to land, a pilot in command shall satisfy himself that, according to the information available to him, the weather at the aerodrome and the condition of the runway intended to be used, do not prevent a safe approach, landing or missed approach, having regard to the aircraft performance information contained in the Operations Manual.

Aircraft
landing
limitations

(2) A national air operator shall not take-off an aeroplane used in commercial air transport operation unless its weight on arrival at either the intended destination aerodrome or any planned alternate aerodrome would allow a full stop landing from a point 50 feet above the intersection of the obstruction clearance plane and the runway, and within—

(a) for a turbine engine powered aeroplane, sixty per cent of the effective length of each runway;

(b) for reciprocating engine powered aeroplane, seventy per cent of the effective length of each runway.

(3) For the purpose of determining the allowable landing weight at the destination aerodrome, an operator determining the landing limit shall ensure that—

(a) the aeroplane is landed on the most favourable runway and in the most favourable direction, in still air; or

(b) the aeroplane is landed on the most suitable runway considering the probable wind speed and direction, runway conditions, the ground handling characteristics of the aircraft, and considering other conditions such as landing aids, terrain and expected variations in the approach and landing techniques, where such allowance has not been made in the scheduling of performance data.

(4) Where the runway at the landing destination is reported or forecast to be wet or slippery, the landing distance available shall be at least one hundred and fifteen per cent of the required landing distance unless, based on a showing of actual operating landing techniques on wet or slippery runways, a shorter landing distance, but not less than that required by subregulation (2), has been approved for a specific type and model aeroplane and this information is included in the Aeroplane Flight Manual.

(5) A turbine powered transport category aeroplane that would be prohibited from taking off from its destination aerodrome because it could not meet the requirements of subregulation (2)(a) for mass landing for such destination aerodrome, may take-off from the departure aerodrome where an alternate aerodrome is specified that meets all the requirements of subregulation (2).

(6) An air operator shall not take-off a helicopter used in commercial air transport unless, with all engines operating on arrival at the intended destination landing site or any planned alternate landing, it can clear all obstacles on the approach path and can land and stop within the landing distance available.

(7) An air operator operating a helicopter in performance Class 1 shall ensure that the helicopter is able, in the event of the failure of the critical power-unit being recognized –

(a) at any point during the approach and landing phase, before the landing decision point, after clearing all obstacles in the approach path –

(i) land and stop within the landing distance available; or

(ii) perform a balked landing and clear all obstacles in the flight path by an adequate margin equivalent to that specified in regulation 114(5); or

(b) after the landing decision point, to stop and land within the landing distance available

(8) An air operator operating a helicopter in performance Class 2 shall ensure that the helicopter is able, in the event of the failure of the critical power-unit being recognized –

(a) at any point during the approach and landing phase, before the landing decision point, after clearing all obstacles in the approach path to –

(i) land and stop within the landing distance available;

(ii) perform a balked landing and clear all obstacles in the flight path by an adequate margin equivalent to that specified in regulation 114(5); or

(b) after the landing decision point, to achieve a safe forced landing.

(8A) An air operator operating a helicopter in performance Class 3 shall ensure that the helicopter is able, in the event of the failure of the critical power-unit at any point in the approach and landing phase of flight, to achieve a safe forced landing.

(9) In this regulation the term “obstruction clearance plane” means a plane sloping upward from the runway at a slope of 1:20 to the horizontal, and tangent to or clearing all obstructions within a specified area surrounding the runway as shown in a profile view of that area. In the plan view, the centreline of the specified area coincides with the centreline of the runway, beginning at the point where the obstruction clearance plane intersects the centreline of the runway and proceeding to a point at least 1,500 feet from the beginning point. Thereafter, the centreline coincides with the take-off path over the ground for the runway, in the case of take-offs, or with the instrument approach counterpart, for landings, or where the applicable one of these paths has not been established, it proceeds consistent with turns of at least 4,000 foot radius until a point is reached beyond which the obstruction clearance plane clears all obstructions. This area extends laterally 200 feet on each side of the centreline at the point where the obstruction clearance plane intersects the runway and continues at this width to the end of the runway; then it increases uniformly to 500 feet on each side of the centreline at a point 1,500 feet from the intersection of the obstruction clearance plane with the runway; thereafter, it extends laterally 500 feet on each side of the centreline.

Director General
to recommend
Authority
approved single
engine turbine-
powered
aeroplane
operations

118A. (1) The Director General may recommend that the Authority approve operations by a single engine turbine-powered aeroplane at night or in Instrument Meteorological Conditions in commercial air transport operations, where the Director General is satisfied that the airworthiness certification of the aeroplane is appropriate and that the overall level of safety required under the Act and Regulations made thereunder is satisfied by—

- (a) the reliability of the turbine engine;
- (b) the air operator’s maintenance procedures, operating practices, flight dispatch procedures and crew training programmes; and
- (c) the equipment and other requirements as provided in Schedule 6.

(2) An air operator shall not operate a single engine turbine powered aeroplane—

- (a) at night or in Instrument Meteorological Conditions unless the aeroplane has an engine trend monitoring system;
- (b) for which the individual Certificate of Airworthiness is first issued on or after 1st January, 2005 at night or in Instrument Meteorological Conditions unless such aeroplane has an automatic engine trend monitoring system.”.

***“Additional Requirements for Operations of Helicopters
in Performance Class 3 in Instrument Meteorological Conditions,
Except Special Visual Flight Rules Flight***

Additional
requirements
for operations
of helicopters
in performance
Class 3 in
Instrument
Meteorological
Conditions,
except special
Visual Flight
Rules Flight

118B. (1) An air operator shall ensure that a helicopter operating in performance Class 3, in instrument meteorological conditions is only conducted over a surface environment acceptable to the competent authority of the State over which the operations are performed.

(2) The Director General may recommend that the Authority approve operations by a helicopter in Performance Class 3, in Instrument Meteorological Conditions in commercial air transport operations, where the Director General is satisfied that the airworthiness requirements for the helicopter is appropriate for flight under instrument flight rules and that the overall level of safety required under the Act and Regulations made thereunder is satisfied by –

- (a) the reliability of the engines;
- (b) the operator’s maintenance procedures, operating practices and crew training programme; and
- (c) equipment and other requirements provided in accordance with Schedule 6A.

(3) An air operator shall not operate a helicopter in performance Class 3, in Instrument Meteorological Condition unless the helicopter has a programme for engine trend monitoring.

(4) The programme for engine trend monitoring referred to in subregulation (3) shall utilize the recommended instruments, systems and operational and maintenance procedures of the manufacturer of the engine and helicopter, to monitor the engines.

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