A4.2. Aeroplane approved for flight in Appendix C icing conditions and freezing drizzle conditions of Appendix O but not approved for flight in freezing rain conditions of Appendix O.

a. AFM Limitations.

Intentional flight, including take-off and landing, into freezing rain conditions is prohibited. If freezing rain conditions are encountered, or if [insert cue description here], immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

b. AFM Operating Procedures (Normal Procedures Section).

Freezing rain conditions are severe icing conditions for this aeroplane. Intentional flight, including take-off and landing, into freezing rain conditions is prohibited. A flight delay or diversion to an alternate airport is required if these conditions exist at the departure or destination airports.

[insert cue description here] is one indication of severe icing for this aeroplane. If severe icing is encountered, immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

c. Flight Crew Operating Manual Operating Procedures.

Warning: Hazardous icing effects may result from environmental conditions outside of those for which this aeroplane is certified. Flight into unapproved icing conditions may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice might not be shed when using the ice protection systems, and may seriously degrade the performance and controllability of the aeroplane.

Operations in icing conditions, including freezing drizzle, were evaluated as part of the certification process for this aeroplane. Freezing rain conditions were not evaluated and are considered severe icing conditions for this aeroplane.

Intentional flight, including take-off and landing, into freezing rain conditions is prohibited. A flight delay or diversion to an alternate airport is required if these conditions exist at the departure or destination airports. [insert cue description here] is an indication of severe icing conditions that exceed those for which this aeroplane is certified. If severe icing is encountered, immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

A4.3 Aeroplane approved for flight in Appendix C and Appendix O icing conditions except for en route and holding flight phases in Appendix O icing conditions.

a. AFM Limitations.

Intentional holding or en route flight into freezing drizzle or freezing rain conditions is prohibited. If freezing drizzle or freezing rain conditions are encountered during a hold (in any aeroplane configuration) or in the en route phase of flight (climb, cruise, or descent with high lift devices and gear retracted), or if [insert cue description here], immediately request priority handling from air traffic control to facilitate a route or

altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

b. AFM Operating Procedures (Normal Procedures Section).

Freezing drizzle and freezing rain conditions encountered during a hold (in any aeroplane configuration) or in the en route phase of flight (climb, cruise, or descent with high lift devices and gear retracted) are severe icing conditions for this aeroplane. Intentional holding or en route flight into freezing drizzle or freezing rain conditions is prohibited.

[insert cue description here] is one indication of severe icing for this aeroplane. If severe icing is encountered, immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

c. Flight Crew Operating Manual Operating Procedures.

Warning: Hazardous icing effects may result from environmental conditions outside of those for which this aeroplane is certified. Flight into unapproved icing conditions may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or in ice forming aft of the protected surfaces. This ice might not be shed when using the ice protection systems, and may seriously degrade the performance and controllability of the aeroplane.

Operations in icing conditions were evaluated as part of the certification process for this aeroplane. En route (climb, cruise, and descent with high lift devices and gear retracted) and holding flight (in any aeroplane configuration) in freezing drizzle and freezing rain conditions were not evaluated and are considered severe icing conditions for this aeroplane.

Intentional holding or en route flight into freezing drizzle or freezing rain conditions is prohibited. [insert cue description here] is an indication of severe icing conditions that exceed those for which the aeroplane is certified. If severe icing is encountered, immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

A4.4 Aeroplane approved for flight in Appendix C icing conditions and a portion of Appendix O icing conditions.

a. AFM Limitations.

Intentional flight, including take-off and landing, into [insert pilot usable description here] conditions is prohibited. If [insert pilot usable description here] conditions are encountered, or if [insert cue description here], immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

b. AFM Operating Procedures (Normal Procedures Section).

[insert pilot usable description here] are severe icing conditions for this aeroplane. Intentional flight, including take-off and landing, into [insert pilot usable description here] conditions is prohibited. A flight delay or diversion to an alternate airport is required if these conditions exist at the departure or destination airports.

[insert cue description here] is one indication of severe icing for this aeroplane. If severe icing is encountered, immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Stay clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

c. Flight Crew Operating Manual Operating Procedures.

Warning: Hazardous icing effects may result from environmental conditions outside of those for which this aeroplane is certified. Flight into unapproved icing conditions may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed when using the ice protection systems, and may seriously degrade the performance and controllability of the aeroplane.

Operations in icing conditions were evaluated as part of the certification process for this aeroplane. [insert pilot usable description here] were not evaluated and are considered severe icing conditions for this aeroplane.

Intentional flight, including take-off and landing, into [insert pilot usable description here] is prohibited. A flight delay or diversion to an alternate airport is required if these conditions exist at the departure or destination airports. [insert cue description here] is an indication of severe icing conditions that exceed those for which this aeroplane is certified. If severe icing is encountered, immediately request priority handling from air traffic control to facilitate a route or altitude change to exit all icing conditions. Remain clear of all icing conditions for the remainder of the flight, including landing, unless it can be determined that ice accretions no longer remain on the airframe.

[Amdt 25/16]

Appendix 5 – Related Acceptable Means of Compliance (AMC) and FAA Advisory Circulars (AC)

ED Decision 2015/008/R

Acceptable Means of Compliance

The following AMCs are related to the guidance contained in this AMC:

AMC 25.1309, System Design and Analysis

AMC N°. 1 to CS 25.1329, Flight Guidance System

AMC N°. 2 to CS 25.1329, Flight testing of Flight Guidance Systems

AMC 25.1419, Ice Protection

AMC 25.1420, Supercooled large drop icing conditions

Advisory Circulars

The following FAA ACs are related to the guidance contained in this AMC.

AC 20-73A, Aircraft Ice Protection

[Amdt 25/16]

Appendix 6 – Acronyms and definitions

ED Decision 2015/008/R

AC	Advisory Circular
AFM	Aeroplane Flight Manual
ATTCS	Automatic Takeoff Thrust Control System
FAA	Federal Aviation Administration
ICTS	Ice-Contaminated Tailplane Stall.
LWC	Liquid Water Content
MED	Mean Effective Diameter
MVD	Median Volume Diameter
CL	Lift Coefficient
C_{LMAX}	Maximum Lift Coefficient
Trim	A flight condition in which the aerodynamic moment acting about the axis of interest is zero. In the absence of an external disturbance no control input is needed to maintain the flight condition.

[Amdt 25/16]

CS 25.23 Load distribution limits

ED Decision 2003/2/RM

(a) Ranges of weights and centres of gravity within which the aeroplane may be safely operated must be established. If a weight and centre of gravity combination is allowable only within certain load distribution limits (such as spanwise) that could be inadvertently exceeded, these limits and the corresponding weight and centre of gravity combinations must be established.

(b) The load distribution limits may not exceed –

(1) The selected limits;

(2) The limits at which the structure is proven; or

(3) The limits at which compliance with each applicable flight requirement of this Subpart is shown.

CS 25.25 Weight Limits

ED Decision 2003/2/RM

(a) *Maximum weights.* Maximum weights corresponding to the aeroplane operating conditions (such as ramp, ground taxi, take-off, en-route and landing) environmental conditions (such as altitude and temperature), and loading conditions (such as zero fuel weight, centre of gravity position and weight distribution) must be established so that they are not more than –

(1) The highest weight selected by the applicant for the particular conditions; or

(2) The highest weight at which compliance with each applicable structural loading and flight requirement is shown.

(3) The highest weight at which compliance is shown with the noise certification requirements.

(b) *Minimum weight.* The minimum weight (the lowest weight at which compliance with each applicable requirement of this CS-25 is shown) must be established so that it is not less than –

(1) The lowest weight selected by the applicant;

(2) The design minimum weight (the lowest weight at which compliance with each structural loading condition of this CS-25 is shown); or

(3) The lowest weight at which compliance with each applicable flight requirement is shown.

CS 25.27 Centre of gravity limits

ED Decision 2003/2/RM

The extreme forward and the extreme aft centre of gravity limitations must be established for each practicably separable operating condition. No such limit may lie beyond –

(a) The extremes selected by the applicant;

(b) The extremes within which the structure is proven; or

(c) The extremes within which compliance with each applicable flight requirement is shown.

CS 25.29 Empty weight and corresponding centre of gravity

ED Decision 2003/2/RM

(a) The empty weight and corresponding centre of gravity must be determined by weighing the aeroplane with –

(1) Fixed ballast;

(2) Unusable fuel determined under CS 25.959; and

(3) Full operating fluids, including –

(i) Oil;

(ii) Hydraulic fluid; and

(iii) Other fluids required for normal operation of aeroplane systems, except potable water, lavatory pre-charge water, and fluids intended for injection in the engine.

(b) The condition of the aeroplane at the time of determining empty weight must be one that is well defined and can be easily repeated.

CS 25.31 Removable ballast

ED Decision 2003/2/RM

Removable ballast may be used in showing compliance with the flight requirements of this Subpart.

CS 25.33 Propeller speed and pitch limits

ED Decision 2003/2/RM

(a) The propeller speed and pitch must be limited to values that will ensure –

(1) Safe operation under normal operating conditions; and

(2)Compliance with the performance requirements in CS 25.101 to 25.125.

(b) There must be a propeller speed limiting means at the governor. It must limit the maximum possible governed engine speed to a value not exceeding the maximum allowable rpm.

(c) The means used to limit the low pitch position of the propeller blades must be set so that the engine does not exceed 103% of the maximum allowable engine rpm or 99% of an approved maximum overspeed, whichever is greater, with –

(1) The propeller blades at the low pitch limit and governor inoperative;

(2) The aeroplane stationary under standard atmospheric conditions with no wind; and

(3) The engines operating at the maximum take-off torque limit for turbopropeller engine-powered aeroplanes.

PERFORMANCE

CS 25.101 General

ED Decision 2016/010/R

(See AMC 25.101)

(a) Unless otherwise prescribed, aeroplanes must meet the applicable performance requirements of this Subpart for ambient atmospheric conditions and still air.

(b) The performance, as affected by engine power or thrust, must be based on the following relative humidities:

(1) 80%, at and below standard temperatures; and

(2) 34%, at and above standard temperatures plus 28°C (50°F).

Between these two temperatures, the relative humidity must vary linearly.

(c) The performance must correspond to the propulsive thrust available under the particular ambient atmospheric conditions, the particular flight condition, and the relative humidity specified in sub-paragraph (b) of this paragraph. The available propulsive thrust must correspond to engine power or thrust, not exceeding the approved power or thrust, less –

(1) Installation losses; and

(2) The power or equivalent thrust absorbed by the accessories and services appropriate to the particular ambient atmospheric conditions and the particular flight condition. (See AMCs No 1 and No 2 to CS 25.101(c).)

(d) Unless otherwise prescribed, the applicant must select the take-off, en-route, approach, and landing configuration for the aeroplane.

(e) The aeroplane configurations may vary with weight, altitude, and temperature, to the extent they are compatible with the operating procedures required by sub-paragraph (f) of this paragraph.

(f) Unless otherwise prescribed, in determining the accelerate-stop distances, take-off flight paths, take-off distances, and landing distances, changes in the aeroplane's configuration, speed, power, and thrust, must be made in accordance with procedures established by the applicant for operation in service.

(g) Procedures for the execution of balked landings and missed approaches associated with the conditions prescribed in CS 25.119 and 25.121(d) must be established. (See AMC 25.101(g))

(h) The procedures established under sub-paragraphs (f) and (g) of this paragraph must –

(1) Be able to be consistently executed in service by crews of average skill,

(2) Use methods or devices that are safe and reliable, and

(3) Include allowance for any time delays in the execution of the procedures, that may reasonably be expected in service. (See AMC 25.101(h)(3).)

(i) The accelerate-stop and landing distances prescribed in CS 25.109 and 25.125, respectively, must be determined with all the aeroplane wheel brake assemblies at the fully worn limit of their allowable wear range. (See AMC 25.101(i).)

[Amdt 25/2]
[Amdt 25/18]

AMC 25.101 General

ED Decision 2003/2/RM

The test aeroplane used in the determination of the scheduled performance should be in a condition which, as far as is reasonably possible, is representative of the average new production aeroplane. Where the test aeroplane differs from this standard (e.g. with regard to engine idle thrust settings, flap rigging, etc.) it will be necessary to correct the measured performance for any significant performance effects of such differences.

AMC No. 1 to CS 25.101(c) Extrapolation of Performance with Weight

ED Decision 2003/2/RM

The variation of take-off, climb and landing performance with weight may be extrapolated without conservatism to a weight greater, by up to 10%, than the maximum weight tested and to a weight lower, by up to 10%, than the lowest weight tested. These ranges may not be applicable if there are significant discontinuities, or unusual variations, in the scheduling of the relevant speeds with weight, in the weight ranges covered by extrapolation.

AMC No. 2 to CS 25.101(c) General

ED Decision 2003/2/RM

1 GENERAL - CS 25.101

1.1 Explanation - Propulsion System Behaviour. CS 25.101(c) requires that aeroplane "performance must correspond to the propulsive thrust available under the particular ambient atmospheric conditions, the particular flight condition, . . ." The propulsion system's (i.e., turbine engines and propellers, where appropriate) installed performance characteristics are primarily a function of engine power setting, airspeed, propeller efficiency (where applicable), altitude, and ambient temperature. The effects of each of these variables must be determined in order to establish the thrust available for aeroplane performance calculations.

1.2 Procedures.

1.2.1 The intent is to develop a model of propulsion system performance that covers the approved flight envelope. Furthermore, it should be shown that the combination of the propulsion system performance model and the aeroplane performance model are validated by the takeoff performance test data, climb performance tests, and tests used to determine aeroplane drag. Installed propulsion system performance characteristics may be established via the following tests and analyses:

a. Steady-state engine power setting vs. thrust (or power) testing. Engines should be equipped with adequate instrumentation to allow the determination of thrust (or power). Data should be acquired in order to validate the model, including propeller installed thrust, if applicable, over the range of power settings, altitudes, temperatures, and airspeeds for which approval is sought. Although it is not possible to definitively list or foresee all of the types of instrumentation that might be considered adequate for determining thrust (or power) output, two examples used in past certification programmes are: (1) engine pressure rakes, with engines calibrated in a ground test cell, and (2) fan speed, with engines calibrated in

a ground test cell and the calibration data validated by the use of a flying test bed. In any case, the applicant should substantiate the adequacy of the instrumentation to be used for determining the thrust (or power) output.

b. Lapse rate takeoff testing to characterise the behaviour of power setting, rotor speeds, propeller effects (i.e., torque, RPM, and blade angle), or gas temperature as a function of time, thermal state, or airspeed, as appropriate. These tests should include the operation of an Automatic Takeoff Thrust Control System (ATTCS), if applicable, and should cover the range of power settings for which approval is sought.

   i. Data for higher altitude power settings may be acquired via overboost (i.e., operating at a higher than normal power setting for the conditions) with the consent of the engine and propeller (when applicable) manufacturer(s). When considering the use of overboost on turbopropeller propulsion system installations to simulate higher altitude and ambient temperature range conditions, the capability to achieve an appropriate simulation should be evaluated based on the engine and propeller control system(s) and aircraft performance and structural considerations. Engine (gearbox) torque, rotor speed, or gas temperature limits, including protection devices to prohibit or limit exceedences, may prevent the required amount of overboost needed for performance at the maximum airport altitude sought for approval. Overboost may be considered as increased torque, reduced propeller speed, or a combination of both in order to achieve the appropriate blade angle for the higher altitude and ambient temperature range simulation. Consideration for extrapolations will depend on the applicant's substantiation of the proper turbopropeller propulsion system simulated test conditions.

   ii. Lapse rate characteristics should be validated by takeoff demonstrations at the maximum airport altitude for which takeoff approval is being sought. Alternatively, if overboost (see paragraph (i) above) is used to simulate the thrust setting parameters of the maximum airport altitude for which takeoff approval is sought, the takeoff demonstrations of lapse rate characteristics can be performed at an airport altitude up to 915 m (3,000 feet) lower than the maximum airport altitude.

c. Thrust calculation substantiation. Installed thrust should be calculated via a mathematical model of the propulsion system, or other appropriate means, adjusted as necessary to match the measured inflight performance characteristics of the installed propulsion system. The propulsion system mathematical model should define the relationship of thrust to the power setting parameter over the range of power setting, airspeed, altitude, and temperature for which approval is sought. For turbojet aeroplanes, the propulsion system mathematical model should be substantiated by ground tests in which thrust is directly measured via a calibrated load cell or equivalent means. For turbopropeller aeroplanes, the engine power measurements should be substantiated by a calibrated dynamometer or equivalent means, the engine jet thrust should be established by an