CS-25 AMENDMENT 13 — CHANGE INFORMATION

The Agency publishes amendments to Certification Specifications as consolidated documents. These documents are used for establishing the certification basis for applications made after the date of entry into force of the amendment.

Consequently, except for a note 'Amdt 25/13' under the amended paragraph, the consolidated text of CS-25 does not allow readers to see the detailed changes introduced by the new amendment. To allow readers to also see these detailed changes, this document has been created. The same format as for publication of Notices of Proposed Amendments has been used to show the changes:

1. text not affected by the new amendment remains the same: unchanged
2. deleted text is shown with a strike through: ~~deleted~~
3. new text is highlighted with grey shading: new
4. '...' indicates that remaining text is unchanged in front of or following the reflected amendment.

BOOK 1

SUBPART B — FLIGHT

Create a new CS 25.143(k) as follows:

CS 25.143 General

…

(k) Side stick controllers

In lieu of the maximum control forces provided in CS 25.143(d) for pitch and roll, and in lieu of specific pitch force requirements of CS 25.145(b) and CS 25.175(d), it must be shown that the temporary and maximum prolonged force levels for side stick controllers are suitable for all expected operating conditions and configurations, whether normal or non-normal.

It must be shown by flight tests that turbulence does not produce unsuitable pilot-in-the-loop control problems when considering precision path control/tasks.

Create a new CS 25.143(l) as follows:

CS 25.143 General

…

(l) Electronic flight control systems

For electronic flight control systems (EFCS) which embody a normal load factor limiting system and in the absence of aerodynamic limitation (lift capability at maximum angle of attack),

1) The positive limiting load factor must not be less than:
   i) 2.5 g with the EFCS functioning in its normal mode and with the high-lift devices retracted up to V_{MO}/M_{MO}. The positive limiting load factor may be gradually reduced down to 2.25 g above V_{MO}/M_{MO}.;
   ii) 2.0 g with the EFCS functioning in its normal mode and with the high-lift devices extended;
2) The negative limiting load factor must be equal to or more negative than:
   i) -1.0 g with the EFCS functioning in its normal mode and with the high-lift devices retracted;
   ii) 0 g with the EFCS functioning in its normal mode and with the high-lift devices extended.

Maximum reachable positive load factor wings level may be limited by flight control system characteristics or flight envelope protections (other than load factor limitation), provided that:

— the required values are readily achievable in turn, and

— wings level pitch up responsiveness is satisfactory.

Maximum reachable negative load factor may be limited by flight control system characteristics or flight envelope protections (other than load factor limitation), provided that:

— pitch down responsiveness is satisfactory, and

— from level flight, 0 g is readily achievable, or, at least, a trajectory change of 5 degrees per second is readily achievable at operational speeds (from V_{LS} to Max speed – 10 kt. V_{LS} is the lowest speed that the crew may fly with auto thrust or auto pilot engaged. Max speed – 10 kt is intended to cover typical margin from V_{MO}/M_{MO} to cruise speeds and typical margin from V_{FE} to standard speed in high-lift configurations.

Compliance demonstrations with the above requirements may be performed without ice accretion on the airframe.

…

SUBPART C — STRUCTURE

Amend CS 25.331(c) as follows:

CS 25.331 Symmetric manoeuvring conditions

…
(c)(1) …
(See AMC 25.331(c)(1))
(c)(2) …
(See AMC 25.331(c)(2))

Amend CS 25.333(b) as follows:

CS 25.333 Flight manoeuvring envelope

…

(b) *Manoeuvring envelope*

(See AMC 25.333(b))

Amend CS 25.335(b)(1) as follows:

CS 25.335 Design airspeeds

…
(b) Design dive speed, V_D. V_D must be selected so that V_C/M_C is not greater than 0.8 V_D/M_D, or so that the minimum speed margin between V_C/M_C and V_D/M_D is the greater of the following values:

(1)

(i) For aeroplanes not equipped with a high speed protection function: From an initial condition of stabilised flight at V_C/M_C, the aeroplane is upset, flown for 20 seconds along a flight path 7.5º below the initial path, and then pulled up at a load factor of 1.5 g (0.5 g acceleration increment). The speed increase occurring in this manoeuvre may be calculated if reliable or conservative aerodynamic data issued. Power as specified in CS 25.175(b)(1)(iv) is assumed until the pull up is initiated, at which time power reduction and the use of pilot controlled drag devices may be assumed;

(ii) For aeroplanes equipped with a high speed protection function: In lieu of subparagraph (b)(1)(i), the speed increase above V_C/M_C resulting from the greater of the following manoeuvres must be established:

(A) From an initial condition of stabilised flight at V_C/M_C, the aeroplane is upset so as to take up a new flight path 7.5° below the initial path. Control application, up to full authority, is made to try and maintain this new flight path. Twenty seconds after achieving the new flight path, manual recovery is made at a load factor of 1.5 g (0.5 g acceleration increment), or such greater load factor that is automatically applied by the system with the pilot's pitch control neutral. The speed increase occurring in this manoeuvre may be calculated if reliable or conservative aerodynamic data is used. Power as specified in CS 25.175(b)(1)(iv) is assumed until recovery is made, at which time power reduction and the use of pilot controlled drag devices may be assumed.

(B) From a speed below V_C/M_C, with power to maintain stabilised level flight at this speed, the aeroplane is upset so as to accelerate through

V_C/M_C at a flight path 15° below the initial path (or at the steepest nose down attitude that the system will permit with full control authority if less than 15°). Pilot controls may be in neutral position after reaching V_C/M_C and before recovery is initiated. Recovery may be initiated 3 seconds after operation of high speed, attitude, or other alerting system by application of a load factor of 1.5 g (0.5 g acceleration increment), or such greater load factor that is automatically applied by the system with the pilot's pitch control neutral. Power may be reduced simultaneously. All other means of decelerating the aeroplane, the use of which is authorised up to the highest speed reached in the manoeuvre, may be used. The interval between successive pilot actions must not be less than 1 second (See AMC 25.335(b)(1)(ii)).

…

Amend CS 25.349(a) as follows:

CS 25.349 Rolling conditions

…

(a) *Manoeuvring*. The following conditions, speeds, ~~and~~ aileron deflections and cockpit roll control motions (except as the deflections and the motions may be limited by pilot effort) must be considered in combination with an aeroplane load factor of zero and of two-thirds of the positive manoeuvring factor used in design. For aeroplanes equipped with electronic flight controls, where the motion of the control surfaces does not bear a direct relationship to the motion of the cockpit control devices, these conditions must be considered in combination with an aeroplane load factor ranging from zero to two thirds of the positive manoeuvring factor used in design. In determining the required or resulting aileron deflections, the torsional flexibility of the wing must be considered in accordance with CS 25.301(b):

(1) Conditions corresponding to steady rolling velocities must be investigated. In addition, conditions corresponding to maximum angular acceleration must be investigated for aeroplanes with engines or other weight concentrations outboard of the fuselage, and for aeroplanes equipped with electronic flight controls, where the motion of the control surfaces does not bear a direct relationship to the motion of the cockpit control devices. For the angular acceleration conditions, zero rolling velocity may be assumed in the absence of a rational time history investigation of the manoeuvre.

…

(5) For aeroplanes equipped with electronic flight controls, where the motion of the control surfaces does not bear a direct relationship to the motion of the cockpit control devices, in lieu of subparagraphs (a)(2), (a)(3), and (a)(4), the following apply:

(i) At V_A, movement of the cockpit roll control up to the limit is assumed. The position of the cockpit roll control must be maintained until a steady roll rate is achieved and then it must be returned suddenly to the neutral position.

(ii) At V_C, the cockpit roll control must be moved suddenly and maintained so as to achieve a roll rate not less than that obtained in subparagraph (a)(5)(i) of this paragraph. The return of cockpit control to neutral is initiated suddenly when steady roll rate is reached.

(iii) At V_D, the cockpit roll control must be moved suddenly and maintained so as to achieve a roll rate not less than one third of that obtained in subparagraph (a)(5)(i) of this paragraph.

The conditions specified in this subparagraph must be investigated without any corrective yaw control action (pilot or system induced) to maximise sideslip, and, as a separate condition, with corrective yaw control action (pilot or system induced) to reduce sideslip as far as possible. The first condition (without any corrective yaw control action) may be considered as a failure condition under CS 25.302.

(See AMC 25.349(a))

…

Amend CS 25.351 as follows:

CS 25.351 Yaw manoeuvre conditions

(see AMC 25.351)

Create a new CS 25.397 (d) as follows:

CS 25.397 Control system loads

…

(d) For aeroplanes equipped with side stick controls, designed for forces to be applied by one wrist and not by the arms, the limit pilot forces are as follows:

(1) For all components between and including the handle and its control stops:

PITCH		ROLL	
Nose up	890 N (200 lbf)	Nose left	445 N (100 lbf)
Nose down	890 N (200 lbf)	Nose right	445 N (100 lbf)

(2) For all other components of the side stick control assembly, but excluding the internal components of the electrical sensor assemblies, to avoid damage as a result of an in-flight jam:

PITCH		ROLL	
Nose up	556 N (125 lbf)	Nose left	222 N (50 lbf)
Nose down	556 N (125 lbf)	Nose right	222 N (50 lbf)

Amend CS 25.509 as follows:

CS 25.509 Towing loads

(See AMC 25.509)

…

SUBPART D — DESIGN AND CONSTRUCTION

Amend CS 25.745(d) as follows:

CS 25.745 Nose-wheel steering

…

(d) ~~The design of the attachment for towing the aeroplane on the ground must be such as to preclude damage to the steering system.~~

The nose-wheel steering system, towing attachment(s), and associated elements must be designed or protected by appropriate means such that during ground manoeuvring operations effected by means independent of the aeroplane:

(1) Damage affecting the safe operation of the nose-wheel steering system is precluded, or

(2) A flight crew alert is provided, before the start of taxiing, if damage may have occurred (see AMC 25.1322).

(See AMC 25.745(d))

Create a new CS 25.777(i) as follows:

CS 25.777 Cockpit controls

…

(i) Pitch and roll control forces and displacement sensitivity shall be compatible so that normal inputs on one control axis will not cause significant unintentional inputs on the other.

Amend CS 25.785(b) as follows:

CS 25.785 Seats, berths, safety belts and harnesses

…

(b) Each seat, berth, safety belt, harness, and adjacent part of the aeroplane at each station designated as occupiable during take-off and landing must be designed so that a person making proper use of these facilities will not suffer serious injury in an emergency landing as a result of the inertia forces specified in CS 25.561 and CS 25.562. However, berths intended only for the carriage of medical patients (e.g. stretchers) need not comply with the requirements of CS 25.562.

Amend CS 25.810(a)(1)(iv) as follows:

CS 25.810 Emergency egress assist means and escape routes

…

(a) …

(1) …

(iv) It must have the capability, in 46 km/hr (25-knot) winds directed from the most critical angle, simultaneously with any engine(s) running at ground idle, to deploy and, with the assistance of only one person, to remain usable after full deployment to evacuate occupants safely to the ground.

…

Amend CS 25.855(c) as follows:

CS 25.855 Cargo or baggage compartments

…

(c) …

(1) Ceiling and sidewall liner panels of Class C cargo or baggage compartments, and ceiling and sidewall liner panels in Class F cargo or baggage compartments, if installed to meet the requirements of subparagraph (b)(2) of this paragraph, must meet the test requirements of Part III of Appendix F or other approved equivalent methods.

(2) Cockpit voice and flight data recorder systems, windows and systems or equipment within, or in the vicinity of, Class E cargo compartments shown to be essential for continued safe flight and landing according to CS 25.1309 must be adequately protected against fire. If protective covers are used, they must meet the requirements of Appendix F, Part III.

SUBPART E — POWERPLANT

Amend CS 25.951, to correct an error made when amending CS 25.951(c) at CS-25 amendment 12, as follows:

CS 25.951 General

…

(c) Each fuel system must be capable of sustained operation throughout its flow and pressure range with fuel initially saturated with water at 26.7°C (80°F) and having 0.20 cm^3 ~~(0.75 cc)~~ of free water per ~~3.8~~ litre~~s~~ (0.75 cm^3 per US gallon) added and cooled to the most critical condition for icing likely to be encountered in operation.

…

Amend CS 25.1193(e)(3) as follows:

CS 25.1193 Cowling and nacelle skin

…

(e) Each aeroplane must -

…

(3) ~~Have fireproof skin in areas subject to flame if a fire starts in the engine power or accessory sections.~~ have cowlings and nacelles skins, in areas subject to flame if a fire starts in an engine fire zone, complying with the following:

(i) For in-flight operations, cowlings and nacelles skins must be fireproof in the complete concerned areas, and

(ii) For ground operations, cowlings and nacelles skins must be:

(a) Fireproof in the portions of the concerned areas where a skin burn through would affect critical areas of the aeroplane, and

(b) Fire-resistant or compliant with subparagraph (e)(1) of this paragraph in the remaining portions of the concerned areas.

(See AMC 25.1193(e))

SUBPART F — EQUIPMENT

Amend CS 25.1447 (c)(3) as follows:

CS 25.1447 Equipment standards for oxygen dispensing units

…

(c) …

(3)…

(See AMC 25.1447 (c)(3))

…

SUBPART G – OPERATING LIMITATIONS AND INFORMATION

Amend CS 25.1501 as follows:

CS 25.1501 General

(a) Each operating limitation specified in CS 25.1503 to 25.1533 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crew members and/or to the operator as appropriate, as prescribed in CS 25.1541 to ~~25.1587~~CS 25.1593.

~~(c) Supplementary information must be made available to the operator of each aeroplane as prescribed in CS 25.1591.~~

Create a new CS 25.1593 as follows:

CS 25.1593 Exposure to volcanic cloud hazards
(See AMC 25.1593)

The susceptibility of aeroplane features to the effects of volcanic cloud hazards must be established.

SUBPART J — AUXILIARY POWER UNIT INSTALLATIONS

Amend CS 25J1193(e)(3) as follows:

CS 25J1193 APU compartment

…

(e) Each aeroplane must:

...

(3) ~~Have fireproof skin in areas subject to flame if a fire starts in the APU compartment.~~ Have APU compartment external skins, in areas subject to flame if a fire starts in an APU fire zone, complying with the following:

(i) For in-flight operations, APU compartment external skins must be fireproof in the complete concerned areas, and

(ii) For ground operations, APU compartment external skins must be :

(a) Fireproof in the portions of the concerned areas where a skin burn through would affect critical areas of the aeroplane, and

(b) Fire-resistant or compliant with subparagraph (e)(1) of this paragraph in the remaining portions of the concerned areas.

(See AMC 25.1193(e))

APPENDICES

Create a new Appendix Q as follows:

Appendix Q

Additional airworthiness requirements for approval of a Steep Approach Landing (SAL) capability

(SAL) 25.1 Applicability

This Appendix contains airworthiness requirements that enable an aeroplane to obtain approval for a steep approach landing capability using an approach path angle greater than or equal to 4.5° (a gradient of 7.9 %).

The requirements of this Appendix cover only CS-25 Subparts B and G and they apply in lieu of CS 25.121(d). They also apply in lieu of CS 25.125 if a reduced landing distance is sought, or if the landing procedure (speed, configuration, etc.) differs significantly from normal operation, or if the screen height is greater than 50 ft. Additional requirements may apply with respect to aeroplane systems or equipment or other relevant items such as autopilot, flight guidance, or GPWS. It is likely that the GPWS mode 1 (sink rate) envelope will need modification to prevent nuisance alerts. Also, the structural implications of the increased probability of high rates of descent at touchdown must be considered.

If a steep approach approval is required for flight in icing conditions, substantiation must be provided accordingly for the steep approach condition.

An applicant may choose to schedule information for an all-engines approach or for an approach with one engine inoperative. If an all-engines approach is scheduled, it is assumed that a diversion is required if an engine failure occurs prior to the decision to land.

(SAL) 25.2 Definitions

For the purposes of this Appendix:

— Steep Approach Landing: An approach to land made using a glide path angle greater than or equal to 4.5°, as selected by the applicant.

— Screen Height: The reference height above the runway surface from which the landing distance is measured. The screen height is a height selected by the applicant, at 50 ft or another value from 35 to 60 ft.

— $V_{REF(SAL)}$ is the calibrated airspeed selected by the applicant used during the stabilised approach at the selected approach path angle and maintained down to the screen height defined above. $V_{REF(SAL)}$ may not be less than 1.23 V_{SR}, V_{MCL}, or a speed that provides the manoeuvring capability specified in CS 25.143(h), whichever is greater and may be different from the V_{REF} used for standard approaches.

— $V_{REF(SAL)-1}$ is the calibrated airspeed selected by the applicant used during the stabilised one-engine-inoperative approach at the selected approach path angle and maintained down to the screen height defined above. $V_{REF(SAL)-1}$ may not be less than $V_{REF(SAL)}$.

(SAL) 25.3 Steep Approach Landing Distance (Applicable only if a reduced landing distance is sought, or if the landing procedure (speed, configuration, etc.) differs significantly from normal operation, or if the screen height is greater than 50 ft.)

(a) The steep approach landing distance is the horizontal distance necessary to land and to come to a complete stop from the landing screen height and must be determined (for standard temperatures, at each weight, altitude and wind within the operational limits established by the applicant for the aeroplane) as follows:

(1) The aeroplane must be in the all-engines-operating or one-engine-inoperative steep approach landing configuration, as applicable.

(2) A stabilised approach, with a calibrated airspeed of $V_{REF(SAL)}$ or $V_{REF(SAL)-1}$ as appropriate, and at the selected approach angle must be maintained down to the screen height.

(3) Changes in configuration, power or thrust, and speed must be made in accordance with the established procedures for service operation (see AMC 25.125(b)(3)).

(4) The landing must be made without excessive vertical acceleration, tendency to bounce, nose over or ground loop and with a vertical touchdown velocity not greater than 6 ft/sec.

(5) The landings may not require exceptional piloting skill or alertness.

(b) The landing distance must be determined on a level, smooth, dry, hard-surfaced runway (see AMC 25.125(c)). In addition,

(1) The pressures on the wheel braking systems may not exceed those specified by the brake manufacturer;
(2) The brakes may not be used so as to cause excessive wear of brakes or tyres (see AMC 25.125(c)(2)); and
(3) Means other than wheel brakes may be used if that means
(i) Is safe and reliable;
(ii) Is used so that consistent results can be expected in service; and
(iii) Is such that exceptional skill is not required to control the aeroplane.

(c) Reserved.

(d) Reserved.

(e) The landing distance data must include correction factors for not more than 50 % of the nominal wind components along the landing path opposite to the direction of landing, and not less than 150 % of the nominal wind components along the landing path in the direction of landing.

(f) If any device is used that depends on the operation of any engine, and if the landing distance would be noticeably increased when a landing is made with that engine assumed to fail during the final stages of an all-engines-operating steep approach, the steep approach landing distance must be determined with that engine inoperative unless the use of compensating means will result in a landing distance not more than that with each engine operating.

(SAL) 25.4 Climb: One-engine-inoperative

In a configuration corresponding to the normal all-engines-operating procedure in which V_{SR} for this configuration does not exceed 110 % of the V_{SR} for the related all-engines-operating steep approach landing configuration, the steady gradient of climb may not be less than 2.1 % for two-engined aeroplanes, 2.4 % for three-engined aeroplanes, and 2.7 % for four-engined aeroplanes, with:

(a) The critical engine inoperative, the remaining engines at the go-around power or thrust setting;
(b) The maximum landing weight;
(c) A climb speed of $V_{REF(SAL)}$; and
(d) The landing gear retracted.

(SAL) 25.5 Safe operational and flight characteristics

(a) It must be demonstrated that it is possible to complete a stabilised approach in calm air down to the commencement of the landing flare, followed by a touchdown and landing without displaying any hazardous characteristics for the following conditions (see AMC to Appendix Q, (SAL) 25.5):

(1) The selected approach path angle at $V_{REF(SAL)}$ or $V_{REF(SAL)-1}$ as appropriate;

(2) An approach path angle 2° steeper than the selected approach path angle, at $V_{REF(SAL)}$ or $V_{REF(SAL)-1}$ as appropriate; and

(3) The selected approach path angle at $V_{REF(SAL)}$ minus 5 knots or $V_{REF(SAL)-1}$ minus 5 knots as appropriate.

(b) For conditions (1), (2), and (3):

(i) The demonstration must be conducted at the most critical weight and centre of gravity, either with all-engines-operating or with the critical engine inoperative, as appropriate;

(ii) The rate of descent must be reduced to 3 feet per second or less before touchdown;

(iii) Below a height of 200 ft no action shall be taken to increase power or thrust apart from those small changes which are necessary to maintain an accurate approach;

(iv) No nose depression by use of longitudinal control shall be made after initiating the flare other than those small changes necessary to maintain a continuous and consistent flare flight path; and

(v) The flare, touchdown and landing may not require exceptional piloting skill or alertness.

(c) For conditions (1) and (3), the flare must not be initiated above the screen height.

(d) For condition (2), it must be possible to achieve an approach path angle 2° steeper than the selected approach path angle in all configurations which exist down to the initiation of the flare, which must not occur above 150 % of the screen height. The flare technique used must be substantially unchanged from that recommended for use at the selected approach path angle.

(e) All-engines-operating steep approach.

It must be demonstrated that the aeroplane can safely transition from the all-engines-operating steep landing approach to the one-engine-inoperative approach climb configuration with one engine having been made inoperative for the following conditions:

(1) The selected steep approach angle;

(2) An approach speed of $V_{REF(SAL)}$;

(3) The most critical weight and centre of gravity; and

(4) For propeller-powered aeroplanes, the propeller of the inoperative engine shall be at the position it automatically assumes following an engine failure at high power.

(f) In addition, for propeller-powered aeroplanes, it must be demonstrated that controllability is maintained following an engine failure at approach power and with the propeller at the position it automatically assumes.

(g) The height loss during the manoeuvre required by subparagraph (SAL) 25.5(e) must be determined.

(h) It must be demonstrated that the aeroplane is safely controllable during a landing with one engine having been made inoperative during the final stages of an all-engines-operating steep approach for the following conditions:

(1) The selected steep approach angle;

(2) An approach speed of $V_{REF(SAL)}$;

(3) The most critical weight and centre of gravity; and

(4) For propeller-powered aeroplanes, the propeller of the inoperative engine shall be at the position it automatically assumes following an engine failure at approach power.

(i) One-engine-inoperative steep approach.

It must be demonstrated that the aeroplane can safely transition from the one-engine-inoperative steep landing approach to the approach climb configuration for the following conditions:

(1) The selected steep approach angle;

(2) An approach speed of $V_{REF(SAL)-1}$;

(3) The most critical weight and centre of gravity; and

(4) For propeller-powered aeroplanes the propeller of the inoperative engine may be feathered.

(SAL) 25.6 Aeroplane Flight Manual

For steep approach landing, the AFM shall include the following:

(a) The steep approach landing distance determined in accordance with paragraph (SAL) 25.3 of this Appendix for the selected screen height and aeroplane configuration. The landing distance data may additionally include correction factors for runway slope and temperature other than standard, within the operational limits of the aeroplane, and may provide the required landing field length including the appropriate factors for operational variations prescribed in the relevant operating regulation.

(b) The more limiting of the landing weight, altitude and temperature (WAT) limits derived in accordance with:

(1) CS 25.119, and

(2) The one-engine-inoperative approach climb requirement of paragraph (SAL) 25.4 of this Appendix.

(c) Appropriate limitations and detailed normal, non-normal, and emergency procedures. Where an aeroplane is not approved for deliberate one-engine-inoperative steep approach landings, this limitation shall be stated.

(d) A statement that the presentation of the steep approach limitations, procedures, and performance reflects the capability of the aeroplane to perform steep approach landings but that it does not constitute operational approval.

(e) A statement of headwind and crosswind limitations if they are different from those for non-steep approaches. The tailwind limitation is 5 knots unless test evidence shows that more than 5 knots is acceptable.

(f) The reference steep approach glide slope angle and the screen height used for determination of the landing distance.

(g) The height loss during a go-around from the all-engines-operating steep landing approach to the approach climb configuration with one engine made inoperative, determined in accordance with (SAL) 25.5(g).

BOOK 2

AMC — SUBPART B

Amend AMC 25.21(g) as follows:

AMC 25.21(g) Performance and handling characteristics in icing conditions contained in Appendix C to CS-25

…

4.7 …

h. Installed thrust. This includes operation of ice protection systems when establishing acceptable power or thrust setting procedures, control, stability, lapse rates, rotor speed margins, temperature margins, ~~Automatic Reserve Power (ARP)~~ Automatic Take-Off Thrust Control System (ATTCS) operation, and power or thrust lever angle functions.

…

Create a new AMC 25.101(g) as follows:

AMC 25.101(g)
Go-around

In showing compliance with CS 25.101(g), it should be shown at the landing weight, altitude and temperature (WAT) limit, by test or calculation, that a safe go-around can be made from the minimum decision height with:

- the critical engine inoperative and, where applicable, the propeller feathered,
- a configuration and a speed initially set for landing and then in accordance with the go-around procedures, using actual time delays and, except for movements of the primary flying controls, not less than 1 second between successive crew actions,
- the power available,
- the landing gear selection to the 'up' position being made after a steady positive rate of climb is achieved.

It should be noted that for Category 3 operation, the system will ensure the aircraft is over the runway, so any go-around will be safe with the aircraft rolling on the runway during the manoeuvre. Hence, AMC 25.101 (g) is only relevant to or necessary for decision heights down to Category 2 operations.

AMC — SUBPART C

Create a new AMC 25.331(c)(1) as follows:

AMC 25.331(c)(1)
Maximum pitch control displacement at V_A

The physical limitations of the aircraft from the cockpit pitch control device to the control surface deflection, such as control stops position, maximum power and displacement rate of the servo controls, and control law limiters, may be taken into account.

Create a new AMC 25.331(c)(2) as follows:

AMC 25.331(c)(2)
Checked manoeuvre between V_A and V_D

The physical limitations of the aircraft from the cockpit pitch control device to the control surface deflection, such as control stops position, maximum power and displacement rate of the servo controls, and control law limiters, may be taken into account.

For aeroplanes equipped with electronic flight controls, where the motion of the control surfaces does not bear a direct relationship to the motion of the cockpit control devices, the circular frequency of the movement of the cockpit control 'ω' shall be varied by a reasonable amount to establish the effect of the input period and amplitude on the resulting aeroplane loads. This variation is intended to verify that there is no large and rapid increase in aeroplane loads.

Create a new AMC 25.333(b) as follows:

AMC 25.333(b)
Manoeuvring envelope

For the calculation of structural design speeds, the stalling speeds V_{s0} and V_{s1} should be taken to be the 1-g stalling speeds in the appropriate flap configuration. This structural interpretation of stalling speed should be used in connection with the paragraphs CS 25.333 (b), CS 25.335, CS 25.335(c)(d)(e), CS 25.479(a), and CS 25.481(a)(1).

Create a new AMC 25.335(b)(1)(ii) as follows:

AMC 25.335(b)(1)(ii)
Design Dive Speed — High speed protection function

In any failure condition affecting the high speed protection function, the conditions as defined in CS 25.335(b)(1)(ii) still remain applicable.

It implies that a specific value, which may be different from the V_D/M_D value in normal configuration, has to be associated with this failure condition for the definition of loads related to V_D/M_D as well as for the justification to CS 25.629. However, the strength and speed margin required will depend on the probability of this failure condition, according to the criteria of CS 25.302.

Alternatively, the operating speed V_{MO}/M_{MO} may be reduced to a value that maintains a speed margin between V_{MO}/M_{MO} and V_D/M_D that is consistent with showing compliance with CS 25.335(b)(1)(ii) without the benefit of the high speed protection system, provided that:

(a) Any failure of the high speed protection system that would affect the design dive speed determination is shown to be Remote;

(b) Failures of the system must be announced to the pilots, and:

(c) Aeroplane flight manual instructions should be provided that reduce the maximum operating speeds, V_{MO}/M_{MO}.

Create a new AMC 25.349(a) as follows:

AMC 25.349(a)
Rolling conditions

The physical limitations of the aircraft from the cockpit roll control device to the control surface deflection, such as control stops position, maximum power and displacement rate of the servo controls, and control law limiters, may be taken into account.

Create a new AMC 25.351 as follows:

AMC 25.351
Yaw manoeuvre conditions

The physical limitations of the aircraft from the cockpit yaw control device to the control surface deflection, such as control stops position, maximum power and displacement rate of the servo controls, and control law limiters, may be taken into account.

Create a new AMC 25.509 as follows:

AMC 25.509
Towbarless towing

(a) General

Towbarless towing vehicles are generally considered as ground equipment and are as such not subject to direct approval by the (aircraft) certifying agencies. However, these vehicles should be qualified in accordance with the applicable SAE ARP documents. It should be ensured that the nose landing gear and supporting structure is not being overloaded (by static and dynamic (including fatigue) loads) during towbarless towing operations with these vehicles. This should be ensured by the aircraft manufacturer, either by specific investigations as described in subparagraphs (b) and (c) below, or alternatively, by publishing aircraft load limitations in a towbarless towing vehicle assessment document, to allow towbarless towing vehicle manufacturers to demonstrate their vehicles will not overload the aircraft.

(b) Limit static load cases

For the limit static load cases, the investigation may be conducted by rational analysis supported by test evidence. The investigation should take into account the influence on the towing loads of the tractive force of the towing vehicle including consideration of its weight and pavement roughness.

Furthermore, the investigation should include, but may not be limited to, the following towbarless towing operation scenarios:

(1) Pushback towing: Moving a fully loaded aircraft (up to Maximum Ramp Weight (MRW)) from the parking position to the taxiway. Movement includes: pushback with turn, a stop, and short tow forward to align aircraft and nose wheels. Engines may or may not be operating. Aeroplane movement is similar to a conventional pushback operation with a towbar.

(2) Maintenance towing: The movement of an aeroplane for maintenance/remote

parking purposes (e.g. from the gate to a maintenance hangar). Aircraft is typically unloaded with minimal fuel load.

(3) Dispatch (operational) towing: Towing a revenue aircraft (loaded with passengers, fuel, and cargo up to Maximum Ramp Weight (MRW) from the terminal gate/remote parking area to a location near the active runway. The movement may cover several kilometres with speeds according to SAE ARP 5283 technical standards, with several starts, stops, and turns. It replaces typical taxiing operations prior to take-off.

Operations that are explicitly prohibited need not to be addressed.

(c) Fatigue evaluation

Fatigue evaluation of the impact of towbarless towing on the airframe should be conducted under the provision of CS 25.571 and CS 25.1529.

Specifically, the contribution of the towbarless towing operational loads to the fatigue load spectra for the nose landing gear and its support structure needs to be evaluated. The impact of the towbarless towing on the certified life limits of the landing gear and supporting structure needs to be determined.

The fatigue spectra used in the evaluation should consist of typical service loads encountered during towbarless towing operations, which cover the loading scenarios noted above for static considerations. Furthermore, the spectra should be based on measured statistical data derived from simulated service operation or from applicable industry studies.

(d) Other considerations

Specific combinations of towbarless towing vehicle(s) and aircraft that have been assessed as described above and have been found to be acceptable, along with any applicable towing instructions and/or limitations should be specified in the Instructions for Continued Airworthiness as described in Appendix H, paragraph H25.3(a)(4) and in the Aeroplane Flight Manual as specified in AMC 25.745(d).

Aircraft braking, while the aircraft is under tow, may result in loads exceeding the aircraft's design load and may result in structural damage and/or nose gear collapse. For these reasons, the aircraft manufacturer should ensure that the appropriate information is provided in the Aeroplane Maintenance Manual and in the Aeroplane Flight Manual to preclude aircraft braking during normal towbarless towing. Appropriate information should also be provided in the Instructions for Continued Airworthiness to inspect the affected structure should aircraft braking occur, for example in an emergency situation.

AMC — SUBPART D

Create a new AMC 25.745(d) as follows:

AMC 25.745(d)
Nose-wheel steering

CS 25.745(d) provides for the two following options:

1. A 'no damage' situation exists, because damage is precluded.

2. Damage can occur, but indication to the flight crew is provided.

(a) General consideration to CS 25.745(d)(1) and (2)

Some damage may occur during ground manoeuvring activities that can be considered acceptable and judged to be normal wear and tear. It is not intended that such damage needs necessarily to be precluded or that it should initiate a flight crew alert.

(b) To comply with CS 25.745(d)(1) the following applies:

The aeroplane may be designed in such a way that under all ground manoeuvring operations by any towing means, no damage affecting the steering system can occur.

Examples are:

- The steering system is designed sufficiently strong to resist any applied towing input.
- The steering system is designed to allow 360 degrees rotation.
- The steering system is disconnected either automatically or by operational procedure.
- The steering system is protected by shear sections installed on the nose landing gear.

(c) To comply with CS 25.745(d)(2), the following applies:

When protection is afforded by the flight crew alerting system, the damage detection means should be independent of the availability of aeroplane power supplies and should be active during ground manoeuvring operations effected by means independent of the aeroplane. If damage may have occurred, a latched signal should be provided to the flight crew alerting system.

(d) Alternative Acceptable Means of Compliance to CS 25.745(d)(1) and (2):

In the case where the aeroplane design does not comply with CS 25.745(d)(1) and (d)(2), the following apply:

(1) The Aeroplane Flight Manual, in the Section Limitations, should include a statement that 'Towbarless towing is prohibited', or

(2) The Aeroplane Flight Manual, in the Section Limitations, should include a statement that:

'Towbarless towing is prohibited unless the towbarless towing operations are performed in compliance with the appropriate operational regulation using towbarless towing vehicles that are designed and operated to preclude damage to the aeroplane nose wheel steering system, or which provide a reliable and unmistakable warning when damage to the steering system has occurred.

Towbarless towing vehicles that are specifically accepted for this type of aeroplane are listed in the *[appropriate maintenance documentation]*provided by the aeroplane manufacturer.'

‘Appropriate maintenance documentation’ means Instructions for Continued Airworthiness as described in Appendix H, paragraph H25.3(a)(4) of CS-25.

(3) The acceptance by the aeroplane manufacturer of the applicable towbarless towing vehicles and its reliability of the oversteer protection and/or indication system as referred to in subparagraph ((d)(2)) above should be based on the following:

(i) The aeroplane Nose Wheel Steering Failure Analysis should include the effects of possible damage caused by towbarless towing operations.

(ii) If the Nose Wheel Steering Failure Analysis shows that damage to the steering system by the use of towbarless towing may result in a Failure Condition that can be classified as Hazardous or Catastrophic (refer to CS 25.1309), the acceptance of a towing vehicle oversteer protection and/or indication system should be based on an aeroplane safety analysis, encompassing the reliability of that vehicle system in order to meet the aeroplane safety objectives.

(iii) If the Nose Wheel Steering Failure Analysis shows that damage to the steering system by the use of towbarless towing may result in a Failure Condition that can be classified as Major or less severe, the aeroplane manufacturer can accept the design of the towing vehicle oversteer indication and/or protection system based on a ‘Declaration of Compliance’, issued by the towbarless towing vehicle manufacturer. This declaration will state that the vehicle design complies with the applicable standards (SAE ARPs, Aeroplane Towing Assessment Criteria Document) and that it is designed and built under ISO 9001 quality standards or equivalent.

Such a declaration must be made regarding all Towbarless Towing Vehicles to be used for ground manoeuvring of CS-25 certificated aeroplanes.

AMC — SUBPART E

Create a new AMC 25.1193 (e) as follows:

AMC 25.1193(e)
Engine cowling and nacelle skin, APU compartment external skin

(a) PURPOSE

This AMC provides guidance for showing compliance with the certification specifications relating to fire withstanding capability of engine cowlings and nacelles skins, and APU compartment external skins, in areas subject to flame if a fire starts in an engine or APU fire zone, in consideration of potential hazard levels associated to operating conditions (flight/ground).

(b) RELATED CERTIFICATION SPECIFICATIONS

CS 25.1193(e), CS 25J1193(e)

(c) APPLICABILITY

This AMC is applicable to engine cowlings and nacelles, and APU compartment external skins (fixed and/or removable).

(d) BACKGROUND

CS 25.1193(e) and CS 25J1193(e) previously required the engine cowlings/nacelle skins and APU compartment external skins to be fireproof if a fire starts in the engine power or accessory sections or in the APU compartment. During past Type certification projects, it has been found that having non-fireproof engine cowlings/nacelle skins in some locations under some operating conditions do not adversely affect safety. Consequently, in practice, not all cowlings/skins 'subject to flame if a fire starts in the engine power or accessory sections' have been required to be fireproof under all operating conditions and, for instance, some portions were approved as fire-resistant only for ground operating conditions. As it represented a rule relaxation, such non-fireproof cowlings/skins were formally found to be 'equivalently safe' to comply with the rule. Over time, however, these equivalent safety findings became inherent within traditionally accepted design practices. Certification Review Item (CRI) released to cover the relaxation included also interpretations for zone definitions and operating conditions to be considered for fireproofness or fire-resistance compliance demonstration.

(e) FIRE WITHSTANDING REQUIREMENTS, OPERATING CONDITIONS AND POTENTIAL HAZARDS

(1) General

The required level of ability to withstand the effects of fire varies with the potential hazard level associated with different flight and ground operating conditions, as follows.

(2) Flight Conditions

For the purpose of CS 25.1193(e) and CS 25J1193(e), flight conditions are defined as aeroplane operation from airspeed above minimum V1 until minimum touchdown speed in approved normal or abnormal operations. Cowling and skin in areas subject to flame if a fire starts in an engine or APU fire zone must be demonstrated to be fireproof.

For demonstrating the fireproof capabilities of the cowling/skin, the following apply:

(i) Credit from the external airflow on the cowling/skin can be considered.

(ii) The airflow levels and the engine/APU powers should be consistent with the operating conditions. These parameters should be examined and the most critical ones should be determined.

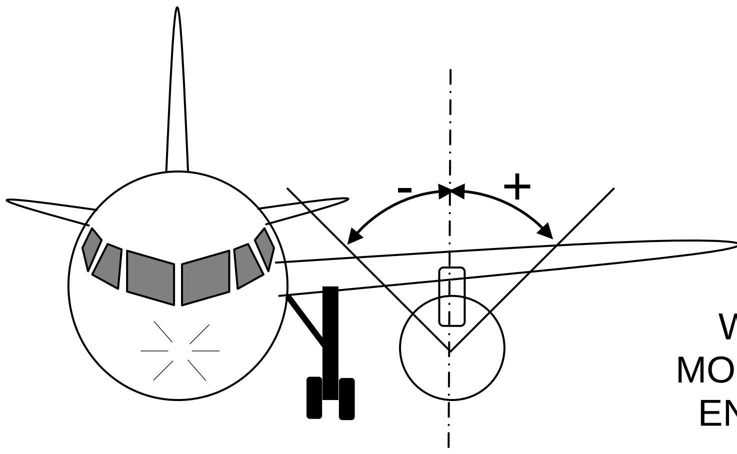
(iii) The engine/APU should be considered to be operative for the first 5 minutes, and during the remaining 10 minutes under windmilling conditions for engine and stopped conditions for the APU.

(3) Ground conditions

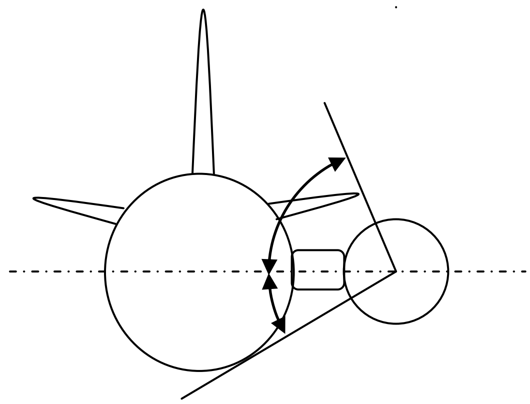
For the purpose of CS 25.1193(e) and CS 25J1193(e), ground conditions are defined as aircraft operation not covered by the flight conditions provided in subparagraph (e)(2) of this AMC. It includes static, taxiing, take-off roll, and landing roll.

(i) *Areas where fireproof skins are required* — The portion of cowling and skin in areas subject to flames if a fire starts in an engine or APU fire zone, and located so that not containing the effects of the fire could result in serious hazards to the aircraft, injuries to crew, passengers or ground personnel, must be fireproof under all conditions. Serious hazards include, but are not limited to, events such as fuel tank explosion, hazardous spread of fire to flammable fluid sources outside the fire zone, fuselage penetration and flight control surface damages.

(A) *Pod-mounted engines:* The portion of the nacelle/cowling skin, which is required to be fireproof on ground, varies by installation. A design is considered acceptable when it is demonstrated that the fireproof area protects the pylon strut and other portions of the aircraft considered to be put at a serious hazard risk if a burn through occurs. Factors to consider within the analysis and to use when substantiating the design are: the engine location — wing or aft fuselage mounted, the coupling distance of the nacelle to the wing, the airflow characteristics, the fluid migration scheme and the fire plume patterns. After the initial analysis, similarity demonstration and in-service experience may be used as appropriate. Analyses have demonstrated that the typical area of concern ranges from 90° (± 45°) to 180° (± 90°) and is centred on the pylon centre line. This area may increase or decrease depending on the analysis results. For example, most wing mounted engines not closely coupled to the wing have been found acceptable with a ± 45° protection while more closely coupled installations and those with other unique design features have required ± 90° protection. The symmetry of the protection may also vary. Wing mounted engines usually have symmetrical protection while aft mounted engines may have non-symmetrical protection in order to cover more of the inboard area.



WING MOUNTED ENGINE



AFT MOUNTED ENGINE

(B) *Turbo-propellers, APUs and other non-pod-mounted engines*: Due to the wide variations in installation configurations, each installation should be evaluated to determine if not containing the effects of a fire would cause a serious hazard such as the examples above. If so, the affected area of the fire zone skin should be fireproof.

(C) *For the purpose of the demonstration*:

— No credit from external airflow on the cowling/skin should be considered in conjunction with the assumption that the aircraft may be static.

— The engine/APU should be considered to be operative for the first 5 minutes and stopped for the remaining 10 minutes.

— Engine/APU operation — Requirements for ability of cowling/skin in areas subject to flames if a fire starts in an engine or APU fire zone to withstand the effects of fire in ground operating conditions apply with either the engine operating or not operating, whichever is the more critical. The Engine/APU operating conditions shall be justified by the applicant.

(ii) *Other areas*: For the remaining portions of cowling/skin in areas subject to flames, if a fire starts in an engine or APU fire zone, the degree of fire resistance can be lower than 'fireproof' due to less serious or less probable hazard to the aircraft, crew, passengers and ground personnel under the critical operating conditions. Any burn through of the APU compartment external skin should consider hazards associated with combustion product and possible outgassing and re-ingestion of toxic air into cabin air system.

(A) Fire-resistant cowlings/skins provide adequate fire protection for those areas as they provide sufficient time to stop the aeroplane and evacuate it.

(B) A lower than 'fire-resistant' degree of fire protection may be considered; the following conditions should then be analysed and submitted to the Agency for approval:

- Cowling/skin should have the ability to withstand fire at least equivalent to the ability of a 1 mm (0.040 inch) aluminium sheet in the worst aircraft and engine/APU ground conditions anticipated;
- Applicants must substantiate that this lower fire protection level will not lead to hazardous effects including but not limited to:
  - Upon burn through of the lower than 'fire-resistant' area, both the fire-resistant and/or fire-proof areas shall not have their fire withstanding capability affected,
  - Liberation of parts that would affect the aeroplane evacuation procedure or reduce the efficiency of fire protection means,
  - Reduction in flammable fluid drainage capability such that fire severity would be increased (magnitude, residual presence, propagation to surrounding area),
  - Reduction in aeroplane evacuation capability due to proximity to evacuation paths or due to the visibility of the fire hindering the ability of the passengers to evacuate the aeroplane in a rapid and orderly manner,

    Note: There is some hazard involving aeroplane evacuation even in the absence of burn through due to such concerns as smoke and flaming liquids exiting from openings. Burn through of nacelle skin should not significantly increase these hazards.
  - Reduction in fire detection capability such that the flight crew would not be aware of the fire, especially in a situation involving taxiing prior to take-off,
  - Reduction in fire extinguishing capability which could cause or aggravate one of the potential hazards listed above.
  - Flammable fluid and/or fire spreading on the aeroplane evacuation path

(f) SPECIFIC CONFIGURATION CONSIDERATIONS

(1) *Multiple skin layers*: For some specific fire zones, a fire originating in that zone will have to pass through several layers of cowling or skin before burning through the external skin. This may be the case, for example, for the core zone of some turbofan installations. In such cases, credit may be taken for multiple layers, having regard to the location of the fire source and the likely direction of propagation from that location, providing burn through of the inner layer does

not produce other hazardous effects and it does not invalidate other certification specifications such as fire extinguishing capability. The corresponding compliance substantiation should take into account particular geometrical configuration with respect to the risk of flame propagation, as well as critical systems or structures.

(2) *Inlet skins*: For external inlet skins, which enclose fire zones, the guidance provided above for multiple skin layers applies. Inlet ducts should meet CS 25.1103/CS 25J1103 specifications.

(3) *Openings*: The following considerations are applicable to openings in a fire zone skin whether the openings are of fixed size, variable or controllable size, or normally closed, such as access or inspection doors, or pressure relief doors.

(i) Openings should be located such that flame exiting the opening would not enter any other region where it could cause a hazard in flight or a serious hazard on the ground as per subparagraph (e)(3). Exception is made for covered openings which meet the same criteria for ability to withstand the effects of fire as the surrounding cowl skin, and which are not expected to become open under fire conditions. Since pressure relief doors may open during some fire conditions, they should be located such that flames exiting the door will not cause a hazard. However, doors that will remain closed during most fire conditions, or will tend to re-close following initial opening, have traditionally been assumed to be closed for the purposes of evaluating fire detection and extinguishing.

(ii) Openings should have the same ability to withstand the effects of fire as the adjacent skin with respect to becoming enlarged under fire conditions. Some enlargement, such as burning away of louvers or doublers surrounding the opening or gapping of covered openings, is acceptable provided that the hazard is not significantly increased by a reduction in fire extinguishing or detection capability, increased airflow causing increase in fire size or intensity, or increase in probability of a hazardous spread of fire to other regions.

(4) *Hinges, Fittings and Latches*: These attaching means maintaining the nacelle/cowlings between them or to the aircraft/engine/APU structure may need to have a greater ability to withstand the effect of fire than the surrounding skin. Loss of attaching means may create more severe hazards such as cowling liberation in comparison to a skin burn through. The applicant must justify the required level of fire withstanding capability by test and/or analysis.

(5) *Seals* : Where seals are used part of the external engine nacelle/cowling or APU compartment boundaries, they should at least comply with the same fire integrity standard as the surrounding cowling/skin.

(g) COMPLIANCE DEMONSTRATION

Compliance should be substantiated per CS 25.1207. Substantiation involving airflow patterns may include analytical methods such as Computational Fluid Dynamics, test methods or other flow visualisation methods or a combination of these methods. Fire testing should be accomplished according to the guidance of ISO 2685 with considerations of applications of representative conditions (airflow, loads, vibrations) and establishment of appropriate pass/fail criteria (burn through, elongation, dislocation).

AMC — SUBPART F

Create a new AMC 25.1447(c)(3) as follows:

AMC 25.1447(c)(3)
Equipment standards for oxygen dispensing units

If oxygen outlets are not provided in a dedicated area, called here 'remote area', the applicant should demonstrate that oxygen dispensing outlets are within 'five feet/five seconds' reach of the remote area(s) and should show that no visual obstruction exists between the potential oxygen users and the outlets, such as curtains or partitions, unless another method of indication (e.g. a light) is provided in the remote area.

AMC — SUBPART G

Create a new AMC 25.1593 as follows:

AMC 25.1593
Exposure to volcanic cloud hazards

The aim of CS 25.1593 is to support operators by identifying and assessing airworthiness hazards associated with operations in contaminated airspace. Providing such data to operators will enable those hazards to be properly managed as part of an established management system.

Acceptable means of establishing the susceptibility of aeroplane features to the effects of volcanic clouds should include a combination of experience, studies, analysis, and/or testing of parts or sub-assemblies.

Information necessary for safe operation should be contained in the unapproved part of the flight manual, or other appropriate manual, and should be readily usable by operators in preparing a safety risk assessment as part of their overall management system.

A volcanic cloud comprises volcanic ash together with gases and other chemicals. Although the primary hazard is volcanic ash, other elements of the volcanic cloud may also be undesirable to operate through, and their effect on airworthiness should be assessed.

In determining the susceptibility of aeroplane features to the effects of volcanic clouds and the necessary information to operators, the following points should be considered:

(1) Identify the features of the aeroplane that are susceptible to airworthiness effects from volcanic clouds. These may include, but are not limited to, the following:

a. The malfunction or failure of one or more engines, leading not only to reduction or complete loss of thrust but also to failures of electrical, pneumatic, and hydraulic systems;

b. Blockage of pitot and static sensors, resulting in unreliable airspeed indications and erroneous warnings;

c. Windscreen abrasion, resulting in windscreens being rendered partially or completely opaque;

d. Fuel contamination;

e. Volcanic ash and/or toxic chemical contamination of cabin air-conditioning packs, possibly leading to loss of cabin pressurisation or noxious fumes in the cockpit and/or cabin;

f. Erosion, blockage, or malfunction of external and internal aeroplane components;

g. Volcanic cloud static discharge, leading to prolonged loss of communications; and

h. Reduced cooling efficiency of electronic components, leading to a wide range of aeroplane system failures.

(2) The nature and severity of effects.

(3) Details of any device or system installed on the aeroplane that can detect the presence of volcanic cloud hazards (e.g. volcanic ash (particulate) sensors or volcanic gas sensors).

(4) The effect of volcanic ash on operations to/from contaminated aerodromes. In particular, deposits of volcanic ash on a runway can lead to degraded braking performance, most significantly if the ash is wet.

(5) The related pre-flight, in-flight and post-flight precautions to be observed by the operator including any necessary amendments to Aircraft Operating Manuals, Aircraft Maintenance Manuals, Master Minimum Equipment List/Dispatch Deviation, or equivalents required to support the operator. Pre-flight precautions should include clearly defined procedures for the removal of any volcanic ash found on parked aeroplanes.

(6) The recommended continuing airworthiness inspections associated with operations in volcanic cloud contaminated airspace and to/from volcanic ash-contaminated aerodromes; this may take the form of Instructions for Continued Airworthiness or other advice.

AMC — APPENDICES

Create a new AMC to Appendix Q as follows:

AMC to Appendix Q

(SAL) 25.5 Safe operational and flight characteristics

(a) For the approach demonstrations required by (SAL) 25.5(a), due account should be taken of:

(1) The systems' aspects of the power/thrust levers being at idle (e.g. arming of ground lift dump);

(2) The most adverse flight idle power/thrust (e.g. effects of engine bleeds or FADEC idle power/thrust control); and

(3) The effects on controllability from the use of auxiliary drag devices such as flight spoilers (e.g. increased stall warning and stall speeds, loss of manoeuvrability).

(b) For the flare, touchdown and landing demonstrations required by (SAL) 25.5(a), there should not be any occurrence of:

(1) Stall warning;

(2) Tail strike; or

(3) Any other characteristic that would interfere with the completion of the landing (e.g. automatic thrust increase).

(c) For the go-around demonstrations required by (SAL) 25.5(e) and (i), due account should be taken of time delays associated with automatic or manual retraction of auxiliary drag devices.

GENERAL
ACCEPTABLE MEANS OF COMPLIANCE — AMC

Amend AMC 25-13 as follows:

5 *Reduced Thrust:* (Acceptable Means of Compliance)

…

a. The reduced take-off thrust setting –

…

(4) Is at least 60~~75~~% of the maximum take-off thrust (no derate) ~~or derated take-off thrust if such is the performance basis, for the existing ambient conditions,~~ for the existing ambient conditions, with no further reduction below 60~~75~~% resulting from ~~ARP~~ Automatic Take-off Thrust Control System (ATTCS) credit. Consequently the amount of reduced thrust permitted is reduced when combined with the use of derated thrust so that the overall thrust reduction remains at least 60 % of the maximum take-off thrust. For reduced thrust operations, compliance with the applicable performance and handling requirements should be demonstrated as thoroughly as for an approved take-off rating.

…

(6) Enables compliance with CS-25 Appendix I in the event of an engine failure during take-off, for aeroplanes equipped with an ~~Automatic Reserve Performance system~~ ATTCS.

…

b. Relevant speeds (VEF, VMC, VR, and V2) used for reduced thrust take-offs are not less than those which will comply with the required airworthiness controllability criteria when using the take-off thrust (or derated take-off thrust, if such is the performance basis) for the ambient conditions, including the effects of an ~~Automatic Reserve Performance (ARP) system~~ ATTCS. It should be noted, as stated in paragraph c. below, that in determining the take-off weight limits, credit can be given for an operable ~~ARP system~~ ATTCS.

c. The aeroplane complies with all applicable performance requirements, including the criteria in paragraphs a. and b. above, within the range of approved take-off weights, with the operating engines at the thrust available for the reduced thrust setting selected for take-off. However, the thrust settings used to show compliance with the take-off flight path requirements of CS 25.115 and the final take-off climb performance requirements of CS 25.121(c) should not be greater than that established by the initial thrust setting. In determining the take-off weight limits, credit can be given for an operable ~~ARP system~~ ATTCS.

…

e. A periodic take-off demonstration is conducted using the aeroplane's take-off thrust setting without ~~ARP~~ ATTCS, if fitted, and the event is logged in the aeroplane's permanent records. An approved engine maintenance procedure or an approved engine condition monitoring programme may be used to extend the time interval between take-off demonstrations.

f. The AFM states, as a limitation, that take-offs utilising reduced take-off thrust settings –

…

(4) Are authorised for aeroplanes equipped with an ~~ARP System~~ ATTCS, whether operating or not.

…