(2) That equipment must include:

(i) Masks covering the eyes, nose, and mouth; or

(ii) Masks covering the nose and mouth, plus accessory equipment to protect the eyes; and

(3) That equipment must supply protective oxygen of 10 minutes duration per crew member at a pressure altitude of 2438 m (8000 ft) with a respiratory minute volume of 30 litres per minute BTPD.

CS 29.1457 Cockpit voice recorders

(a) Each cockpit voice recorder required by the applicable operating rules must be approved, and must be installed so that it will record the following:

(1) Voice communications transmitted from or received in the rotorcraft by radio.

(2) Voice communications of flight-crew members on the flight deck.

(3) Voice communications of flight-crew members on the flight deck, using the rotorcraft's inter-phone system.

(4) Voice or audio signals identifying navigation or approach aids introduced into a headset or speaker.

(5) Voice communications of flight-crew members using the passenger loudspeaker system, if there is such a system, and if the fourth channel is available in accordance with the requirements of sub-paragraph (c) (4)(ii).

(b) The recording requirements of sub-paragraph (a) (2) may be met:

(1) By installing a cockpit-mounted area microphone, located in the best position for recording voice communications originating at the first and second pilot stations and voice communications of other crew members on the flight deck when directed to those stations; or

(2) By installing a continually energised or voice-actuated lip microphone at the first and second pilot stations.

The microphone specified in this paragraph must be so located and, if necessary, the preamplifiers and filters of the recorder must be so adjusted or supplemented, that the recorded communications are intelligible when recorded under flight cockpit noise conditions and played back. The level of intelligibility must be approved by the Agency. Repeated aural or visual playback of the record may be used in evaluating intelligibility.

(c) Each cockpit voice recorder must be installed so that the part of the communication or audio signals specified in sub-paragraph (a) obtained from each of the following sources is recorded on a separate channel:

(1) For the first channel, from each microphone, headset, or speaker used at the first pilot station.

(2) For the second channel, from each microphone, headset, or speaker used at the second pilot station.

(3) For the third channel, from the cockpit-mounted area microphone, or the continually energised or voice-actuated lip microphones at the first and second pilot stations.

(4) For the fourth channel, from:

(i) Each microphone, headset, or speaker used at the stations for the third and fourth crew members; or

(ii) If the stations specified in sub-paragraph (c)(4)(i) are not required or if the signal at such a station is picked up by another channel, each microphone on the flight deck that is used with the passenger loudspeaker system if its signals are not picked up by another channel.

(iii) Each microphone on the flight deck that is used with the rotorcraft's loudspeaker system if its signals are not picked up by another channel.

(d) Each cockpit voice recorder must be installed so that:

(1) It receives its electric power from the bus that provides the maximum reliability for operation of the cockpit voice recorder without jeopardising service to essential or emergency loads:

(2) There is an automatic means to simultaneously stop the recorder and prevent each erasure feature from functioning, within 10 minutes after crash impact; and

(3) There is an aural or visual means for pre-flight checking of the recorder for proper operation.

(e) The record container must be located and mounted to minimise the probability of rupture of the container as a result of crash impact and consequent heat damage to the record from fire.

(f) If the cockpit voice recorder has a bulk erasure device, the installation must be designed to minimise the probability of inadvertent operation and actuation of the device during crash impact.

(g) Each recorder container must be either bright orange or bright yellow.

CS 29.1459 Flight recorder

(a) Each flight recorder required by the applicable operating rules must be installed so that:

(1) It is supplied with airspeed, altitude, and directional data obtained from sources that meet the accuracy requirements of CS 29.1323, 29.1325, and 29.1327, as applicable;

(2) The vertical acceleration sensor is rigidly attached, and located longitudinally within the approved centre of gravity limits of the rotorcraft;

(3) It receives its electrical power from the bus that provides the maximum reliability for operation of the flight recorder without jeopardising service to essential or emergency loads;

(4) There is an aural or visual means for pre-flight checking of the recorder for proper recording of data in the storage medium; and

(5) Except for recorders powered solely by the engine-driven electrical generator system, there is an automatic means to simultaneously stop a recorder that has a data erasure feature and prevent each erasure feature from functioning, within 10 minutes after any crash impact.

(b) Each non-ejectable recorder container must be located and mounted so as to minimise the probability of container rupture resulting from crash impact and subsequent damage to the record from fire.

(c) A correlation must be established between the flight recorder readings of airspeed, altitude, and heading and the corresponding readings (taking into account correction factors) of the first pilot's instruments. This correlation must cover the airspeed range over which the aircraft is to be operated, the range of altitude to which the aircraft is limited, and 360° of heading. Correlation may be established on the ground as appropriate.

(d) Each recorder container must:

(1) Be either bright orange or bright yellow;

(2) Have a reflective tape affixed to its external surface to facilitate its location under water; and

(3) Have an underwater locating device, when required by the applicable operating rules, on or adjacent to the container which is secured in such a manner that it is not likely to be separated during crash impact.

CS 29.1461 Equipment containing high energy rotors

(a) Equipment containing high energy rotors must meet sub-paragraphs (b), (c), or (d).

(b) High energy rotors contained in equipment must be able to withstand damage caused by malfunctions, vibration, abnormal speeds, and abnormal temperatures. In addition:

(1) Auxiliary rotor cases must be able to contain damage caused by the failure of high energy rotor blades; and

(2) Equipment control devices, systems, and instrumentation must reasonably ensure that no operating limitations affecting the integrity of high energy rotors will be exceeded in service.

(c) It must be shown by test that equipment containing high energy rotors can contain any failure of a high energy rotor that occurs at the highest speed obtainable with the normal speed control devices inoperative.

(d) Equipment containing high energy rotors must be located where rotor failure will neither endanger the occupants nor adversely affect continued safe flight.

SUBPART G – OPERATING LIMITATIONS AND INFORMATION

GENERAL

CS 29.1501 General

(a) Each operating limitation specified in CS 29.1503 to 29.1525 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 as prescribed in CS 29.1541 to 29.1589.

OPERATING LIMITATIONS

CS 29.1503 Airspeed limitations: general

(a) An operating speed range must be established.

(b) When airspeed limitations are a function of weight, weight distribution, altitude, rotor speed, power, or other factors, airspeed limitations corresponding with the critical combinations of these factors must be established.

CS 29.1505 Never-exceed speed

(a) The never-exceed speed, V_{NE}, must be established so that it is:

(1) Not less than 74 km/h (40 knots) (CAS); and

(2) Not more than the lesser of:

(i) 0.9 times the maximum forward speeds established under CS 29.309;

(ii) 0.9 times the maximum speed shown under CS 29.251 and 29.629; or

(iii) 0.9 times the maximum speed substantiated for advancing blade tip mach number effects under critical altitude conditions.

(b) V_{NE} may vary with altitude, rpm, temperature, and weight, if:

(1) No more than two of these variables (or no more than two instruments integrating more than one of these variables) are used at one time; and

(2) The ranges of these variables (or of the indications on instruments integrating more than one of these variables) are large enough to allow an operationally practical and safe variation of V_{NE}.

(c) For helicopters, a stabilised power-off V_{NE} denoted as V_{NE} (power-off) may be established at a speed less than V_{NE} established pursuant to sub-paragraph (a), if the following conditions are met:

(1) V_{NE} (power-off) is not less than a speed midway between the power-on V_{NE} and the speed used in meeting the requirements of:

(i) CS 29.67(a)(3) for Category A helicopters;

(ii) CS 29.65(a) for Category B helicopters, except multi-engine helicopters meeting the requirements of CS 29.67 (b); and

(iii) CS 29.67(b) for multi-engine Category B helicopters meeting the requirements of CS 29.67(b).

(2) V_{NE} (power-off) is:

(i) A constant airspeed;

(ii) A constant amount less than power-on V_{NE}; or

(iii) A constant airspeed for a portion of the altitude range for which certification is requested, and a constant amount less than power-on V_{NE} for the remainder of the altitude range.

CS 29.1509 Rotor speed

(a) *Maximum power-off (autorotation).* The maximum power-off rotor speed must be established so that it does not exceed 95% of the lesser of:

(1) The maximum design rpm determined under CS 29.309(b); and

(2) The maximum rpm shown during the type tests,

(b) *Minimum power-off.* The minimum power-off rotor speed must be established so that it is not less than 105% of the greater of:

(1) The minimum shown during the type tests; and

(2) The minimum determined by design substantiation.

(c) *Minimum power-on.* The minimum power-on rotor speed must be established so that it is:

(1) Not less than the greater of:

(i) The minimum shown during the type tests; and

(ii) The minimum determined by design substantiation; and

(2) Not more than a value determined under CS 29.33(a)(1) and (c)(l).

CS 29.1517 Limiting height-speed envelope

For Category A rotorcraft, if a range of heights exists at any speed, including zero, within which it is not possible to make a safe landing following power failure, the range of heights and its variation with forward speed must be established, together with any other pertinent information, such as the kind of landing surface.

CS 29.1519 Weight and centre of gravity

The weight and centre of gravity limitations determined under CS 29.25 and 29.27, respectively, must be established as operating limitations.

CS 29.1521 Powerplant limitations

(a) *General*. The powerplant limitations prescribed in this paragraph must be established so that they do not exceed the corresponding limits for which the engines are type certificated.

(b) *Take-off operation.* The powerplant take-off operation must be limited by:

(1) The maximum rotational speed, which may not be greater than:

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable manifold pressure (for reciprocating engines);

(3) The maximum allowable turbine inlet or turbine outlet gas temperature (for turbine engines);

(4) The maximum allowable power or torque for each engine, considering the power input limitations of the transmission with all engines operating;

(5) The maximum allowable power or torque for each engine considering the power input limitations of the transmission with one engine inoperative;

(6) The time limit for the use of the power corresponding to the limitations established in sub-paragraphs (b)(1) to (5); and

(7) If the time limit established in sub-paragraph (b)(6) exceeds 2 minutes:

(i) The maximum allowable cylinder head or coolant outlet temperature (for reciprocating engines); and

(ii) The maximum allowable engine and transmission oil temperatures.

(c) *Continuous operation.* The continuous operation must be limited by:

(1) The maximum rotational speed, which may not be greater than:

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The minimum rotational speed shown under the rotor speed requirements in CS 29.1509(c);

(3) The maximum allowable manifold pressure (for reciprocating engines);

(4) The maximum allowable turbine inlet or turbine outlet gas temperature (for turbine engines);

(5) The maximum allowable power or torque for each engine, considering the power input limitations of the transmission with all engines operating;

(6) The maximum allowable power or torque for each engine, considering the power input limitations of the transmission with one engine inoperative; and

(7) The maximum allowable temperatures for:

(i) The cylinder head or coolant outlet (for reciprocating engines);

(ii) The engine oil; and

(iii) The transmission oil.

(d) *Fuel grade or designation.* The minimum fuel grade (for reciprocating engines) or fuel designation (for turbine engines) must be established so that it is not less than that required for the operation of the engines within the limitations in sub-paragraphs (b) and (c).

(e) *Ambient temperature.* Ambient temperature limitations (including limitations for winterization installations if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of CS 29.1041 to 29.1049 is shown.

(f) *Two and one-half minute OEI power operation.* Unless otherwise authorised, the use of 2½-minute OEI power must be limited to engine failure operation of multi-engine, turbine powered rotorcraft for not longer than 2½ minutes for any period in which that power is used. The use of 2½-minute OEI power must also be limited by:

(1) The maximum rotational speed, which may not be greater than:

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(g) *Thirty-minute OEI power operation.* Unless otherwise authorised, the use of 30-minute OEI power must be limited to multi-engine, turbine-powered rotorcraft for not longer than 30 minutes after failure of an engine. The use of 30-minute OEI power must also be limited by:

(1) The maximum rotational speed, which may not be greater than:

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(h) *Continuous OEI power operation.* Unless otherwise authorised, the use of continuous OEI power must be limited to multi-engine, turbine-powered rotorcraft for continued flight after failure of an engine. The use of continuous OEI power must also be limited by:

(1) The maximum rotational speed, which may not be greater than:

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests.

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(i) *Rated 30-second OEI power operation.* Rated 30-second OEI power is permitted only on multi-engine, turbine-powered rotorcraft also certificated for the use of rated 2-minute OEI power, and can only be used for continued operation of the remaining engine(s) after a failure or precautionary shutdown of an engine. It must be shown that following application of 30-second OEI power, any damage will be readily detectable by the applicable inspections and other related procedures furnished in accordance with paragraph A29.4 of Appendix A of CS–29. The use of 30-second OEI power must be limited to not more than 30 seconds for any period in which the power is used and by:

(1) The maximum rotational speed which may not be greater than:

(i) The maximum value determined by the rotor design: or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

(j) *Rated 2-minute OEI power operation.* Rated 2-minute OEI power is permitted only on multi-engine, turbine-powered rotorcraft, also certificated for the use of rated 30-second OEI power, and can only be used for continued operation of the remaining engine(s) after a failure or precautionary shutdown of an engine. It must be shown that following application of 2-minute OEI power, any damage will be readily detectable by the applicable inspections and other related procedures furnished in accordance with paragraph A29.4 of Appendix A of CS–29. The use of 2-minute OEI power must be limited to not more than 2 minutes for any period in which that power is used, and by:

(1) The maximum rotational speed, which may not be greater than:

(i) The maximum value determined by the rotor designs; or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

CS 29.1522 Auxiliary power unit limitations

If an auxiliary power unit that meets the requirements of CS–APU is installed in the rotorcraft, the limitations established for that auxiliary power unit including the categories of operation must be specified as operating limitations for the rotorcraft.

CS 29.1523 Minimum flight crew

The minimum flight crew must be established so that it is sufficient for safe operation, considering:

(a) The workload on individual crew members;

(b) The accessibility and ease of operation of necessary controls by the appropriate crew member; and

(c) The kinds of operation authorised under CS 29.1525.

CS 29.1525 Kinds of operation

The kinds of operations (such as VFR, IFR, day, night, or icing) for which the rotorcraft is approved are established by demonstrated compliance with the applicable certification requirements and by the installed equipment.

CS 29.1527 Maximum operating altitude

The maximum altitude up to which operation is allowed, as limited by flight, structural, powerplant, functional, or equipment characteristics, must be established.

CS 29.1529 Instructions for Continued Airworthiness

Instructions for continued airworthiness in accordance with Appendix A to CS–29 must be prepared.

MARKINGS AND PLACARDS

CS 29.1541 General

(a) The rotorcraft must contain:

(1) The markings and placards specified in CS 29.1545 to 29.1565; and

(2) Any additional information, instrument markings, and placards required for the safe operation of the rotorcraft if it has unusual design, operating or handling characteristics.

(b) Each marking and placard prescribed in sub-paragraph (a):

(1) Must be displayed in a conspicuous place; and

(2) May not be easily erased, disfigured, or obscured.

CS 29.1543 Instrument markings: general

For each instrument:

(a) When markings are on the cover glass of the instrument there must be means to maintain the correct alignment of the glass cover with the face of the dial; and

(b) Each arc and line must be wide enough, and located to be clearly visible to the pilot.

CS 29.1545 Airspeed indicator

(a) Each airspeed indicator must be marked as specified in sub-paragraph (b), with the marks located at the corresponding indicated airspeeds.

(b) The following markings must be made:

(1) A red radial line:

(i) For rotorcraft other than helicopters, at V_{NE}; and

(ii) For helicopters, at V_{NE} (power-on).

(2) A red, cross-hatched radial line at V_{NE} (power-off) for helicopters, if V_{NE} (power-off) is less than V_{NE} (power-on).

(3) For the caution range, a yellow arc.

(4) For the safe operating range, a green arc.

CS 29.1547 Magnetic direction indicator

(a) A placard meeting the requirements of this paragraph must be installed on or near the magnetic direction indicator.

(b) The placard must show the calibration of the instrument in level flight with the engines operating.

(c) The placard must state whether the calibration was made with radio receivers on or off.

(d) Each calibration reading must be in terms of magnetic heading in not more than 45° increments.

CS 29.1549 Powerplant instruments

For each required powerplant instrument, as appropriate to the type of instruments:

(a) Each maximum and, if applicable, minimum safe operating limit must be marked with a red radial or a red line;

(b) Each normal operating range must be marked with a green arc or green line, not extending beyond the maximum and minimum safe limits;

(c) Each take-off and precautionary range must be marked with a yellow arc or yellow line;

(d) Each engine or propeller range that is restricted because of excessive vibration stresses must be marked with red arcs or red lines; and

(e) Each OEI limit or approved operating range must be marked to be clearly differentiated from the markings of sub-paragraphs (a) to (d) except that no marking is normally required for the 30-second OEI limit.

CS 29.1551 Oil quantity indicator

Each oil quantity indicator must be marked with enough increments to indicate readily and accurately the quantity of oil.

CS 29.1553 Fuel quantity indicator

If the unusable fuel supply for any tank exceeds 3.8 litres (0.8 Imperial gallon/1 US gallon), or 5% of the tank capacity, whichever is greater, a red arc must be marked on its indicator extending from the calibrated zero reading to the lowest reading obtainable in level flight.

CS 29.1555 Control markings

(a) Each cockpit control, other than primary flight controls or control whose function is obvious, must be plainly marked as to its function and method of operation.

(b) For powerplant fuel controls:

(1) Each fuel tank selector valve control must be marked to indicate the position corresponding to each tank and to each existing cross feed position;

(2) If safe operation requires the use of any tanks in a specific sequence, that sequence must be marked on, or adjacent to, the selector for those tanks; and

(3) Each valve control for any engine of a multi-engine rotorcraft must be marked to indicate the position corresponding to each engine controlled.

(c) Usable fuel capacity must be marked as follows:

(1) For fuel systems having no selector controls, the usable fuel capacity of the system must be indicated at the fuel quantity indicator.

(2) For fuel systems having selector controls, the usable fuel capacity available at each selector control position must be indicated near the selector control.

(d) For accessory, auxiliary, and emergency controls:

(l) Each essential visual position indicator, such as those showing rotor pitch or landing gear position, must be marked so that each crew member can determine at any time the position of the unit to which it relates; and

(2) Each emergency control must be red and must be marked as to method of operation.

(e) For rotorcraft incorporating retractable landing gear, the maximum landing gear operating speed must be displayed in clear view of the pilot.

CS 29.1557 Miscellaneous markings and placards

(a) *Baggage and cargo compartments, and ballast location.* Each baggage and cargo compartment, and each ballast location must

have a placard stating any limitations on contents, including weight, that are necessary under the loading requirements.

(b) *Seats*. If the maximum allowable weight to be carried in a seat is less than 77 kg (170 pounds), a placard stating the lesser weight must be permanently attached to the seat structure.

(c) *Fuel and oil filler openings.* The following apply:

(1) Fuel filler openings must be marked at or near the filler cover with:

(i) The word 'fuel';

(ii) For reciprocating engine powered rotorcraft, the minimum fuel grade;

(iii) For turbine-engine-powered rotorcraft, the permissible fuel designations, except that if impractical, this information may be included in the rotorcraft flight manual, and the fuel filler may be marked with an appropriate reference to the flight manual; and

(iv) For pressure fueling systems, the maximum permissible fueling supply pressure and the maximum permissible defueling pressure.

(2) Oil filler openings must be marked at or near the filler cover with the word 'oil'.

(d) *Emergency exit placards.* Each placard and operating control for each emergency exit must differ in colour from the surrounding fuselage surface as prescribed in CS 29.811(f)(2). A placard must be near each emergency exit control and must clearly indicate the location of that exit and its method of operation.

CS 29.1559 Limitations placard

There must be a placard in clear view of the pilot that specifies the kinds of operations (VFR, IFR, day, night or icing) for which the rotorcraft is approved.

CS 29.1561 Safety equipment

(a) Each safety equipment control to be operated by the crew in emergency, such as controls for automatic liferaft releases, must be plainly marked as to its method of operation.

(b) Each location, such as a locker or compartment, that carries any fire extinguishing, signalling, or other life saving equipment, must be so marked.

(c) Stowage provisions for required emergency equipment must be conspicuously marked to identify the contents and facilitate removal of the equipment.

(d) Each liferaft must have obviously marked operating instructions.

(e) Approved survival equipment must be marked for identification and method of operation.

CS 29.1565 Tail rotor

Each tail rotor must be marked so that its disc is conspicuous under normal daylight ground conditions.

ROTORCRAFT FLIGHT MANUAL

CS 29.1581 General

(a) *Furnishing information.* A Rotorcraft Flight Manual must be furnished with each rotorcraft, and it must contain the following:

(1) Information required by CS 29.1583 to 29.1589.

(2) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) *Approved information.* Each part of the manual listed in CS 29.1583 to 29.1589 that is appropriate to the rotorcraft, must be furnished, verified, and approved, and must be segregated, identified, and clearly distinguished from each unapproved part of that manual.

(c) Reserved.

(d) *Table of contents.* Each Rotorcraft Flight Manual must include a table of contents if the complexity of the manual indicates a need for it.

CS 29.1583 Operating limitations

(a) *Airspeed and rotor limitations.* Information necessary for the marking of airspeed and rotor limitations on or near their respective indicators must be furnished. The significance of each limitation and of the colour coding must be explained.

(b) *Powerplant limitations.* The following information must be furnished:

(1) Limitations required by CS 29.1521.

(2) Explanation of the limitations, when appropriate.

(3) Information necessary for marking the instruments required by CS 29.1549 to 29.1553.

(c) *Weight and loading distribution.* The weight and centre of gravity limits required by CS 29.25 and CS 29.27, respectively, must be furnished. If the variety of possible loading conditions warrants, instructions must be included to allow ready observance of the limitations.

(d) *Flight crew.* When a flight crew of more than one is required, the number and functions of the minimum flight crew determined under CS 29.1523 must be furnished.

(e) *Kinds of operation.* Each kind of operation for which the rotorcraft and its equipment installations are approved must be listed.

(f) *Limiting heights.* Enough information must be furnished to allow compliance with CS 29.1517.

(g) *Maximum allowable wind.* For Category A rotorcraft, the maximum allowable wind for safe operation near the ground must be furnished.

(h) *Altitude*. The altitude established under CS 29.1527 and an explanation of the limiting factors must be furnished.

(i) *Ambient temperature.* Maximum and minimum ambient temperature limitations must be furnished.

CS 29.1585 Operating procedures

(a) The parts of the manual containing operating procedures must have information concerning any normal and emergency procedures, and other information necessary for safe operation, including the applicable procedures, such as those involving minimum speeds, to be followed if an engine fails.

(b) For multi-engine rotorcraft, information identifying each operating condition in which the fuel system independence prescribed in CS 29.953 is necessary for safety must be furnished, together with instructions for placing the fuel system in a configuration used to show compliance with that paragraph.

(c) For helicopters for which a V_{NE} (power-off) is established under CS 29.1505 (c), information must be furnished to explain the V_{NE} (power-off) and the procedures for reducing airspeed to not more than the V_{NE} (power-off) following failure of all engines.

(d) For each rotorcraft showing compliance with CS 29.1353 (c) (6) (ii) or (c) (6) (iii), the operating procedures for disconnecting the battery from its charging source must be furnished.

(e) If the unusable fuel supply in any tank exceeds 5% of the tank capacity, or 3.8 litres (0.8 Imperial gallon/1 US gallon), whichever is greater, information must be furnished which indicates that when the fuel quantity indicator reads ‘zero’ in level flight, any fuel remaining in the fuel tank cannot be used safely in flight.

(f) Information on the total quantity of usable fuel for each fuel tank must be furnished.

(g) For Category B rotorcraft, the airspeeds and corresponding rotor speeds for minimum rate of descent and best glide angle as prescribed in CS 29.71 must be provided.

CS 29.1587 Performance information

Flight manual performance information which exceeds any operating limitation may be shown only to the extent necessary for presentation clarity or to determine the effects of approved optional equipment or procedures. When data beyond operating limits are shown, the limits must be clearly indicated. The following must be provided:

(a) *Category A.* For each Category A rotorcraft, the rotorcraft flight manual must contain a summary of the performance data, including data necessary for the application of any applicable operating rule, together with descriptions of the conditions, such as airspeeds, under which this data was determined, and must contain:

(1) The indicated airspeeds corresponding with those determined for take-off and the procedures to be followed if the critical engine fails during take-off;

(2) The airspeed calibrations;

(3) The techniques, associated airspeeds, and rates of descent for autorotative landings;

(4) The rejected take-off distance determined under CS 29.62 and the take-off distance determined under CS 29.61;

(5) The landing data determined under CS 29.81 and 29.85;

(6) The steady gradient of climb for each weight, altitude, and temperature for which take-off data are to be scheduled, along the take-off

path determined in the flight conditions required in CS 29.67(a)(1) and (a)(2):

(i) In the flight conditions required in CS 29.67(a)(1) between the end of the take-off distance and the point at which the rotorcraft is 61 m (200 ft) above the take-off surface (or 61 m (200 ft) above the lowest point of the take-off profile for elevated heliports).

(ii) In the flight conditions required in CS 29.67(a)(2) between the points at which the rotorcraft is 61 m (200 ft) and 305 m (1000 ft) above the take-off surface (or 61 m (200 ft) and 305 m (1000 ft) above the lowest point of the take-off profile for elevated heliports).

(7) Hover per- formance determined under CS 29.49 and the maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground effect and out-of-ground effect in winds of not less than 31 km/h (17 knots) from all azimuths. This data must be clearly referenced to the appropriate hover charts.

(b) *Category B.* For each Category B rotorcraft, the Rotorcraft Flight Manual must contain:

(1) The take-off distance and the climbout speed together with the pertinent information defining the flight path with respect to autorotative landing if an engine fails, including the calculated effects of altitude and temperature;

(2) The steady rates of climb and hovering ceiling, together with the corresponding airspeeds and other pertinent information, including the calculated effects of altitude and temperature;

(3) The landing distance, appropriate airspeed and type of landing surface, together with any pertinent information that might affect this distance, including the effects of weight, altitude and temperature;

(4) The maximum safe wind for operation near the ground;

(5) The airspeed calibrations;

(6) The height-speed envelope except for rotorcraft incorporating this as an operating limitation;

(7) Glide distance as a function of altitude when autorotating at the speeds and conditions for minimum rate of descent and best glide angle, as determined in CS 29.71;

(8) Hover performance determined under CS 29.49 and the maximum safe wind demonstrated under the ambient conditions for data presented. In addition, the maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground effect and out-of-ground effect in winds of not less than 31 km/h (17 knots) from all azimuths. This data must be clearly referenced to the appropriate hover charts; and

(9) Any additional performance data necessary for the application of any applicable operating rule.

[Amdt. No.: 29/1, Amdt No.: 29/2]

CS 29.1589 Loading information

There must be loading instructions for each possible loading condition between the maximum and minimum weights determined under CS 29.25 that can result in a centre of gravity beyond any extreme prescribed in CS 29.27, assuming any probable occupant weights.

CS–29 BOOK 1

APPENDICES

Appendix A Instructions For Continued Airworthiness

A29.1 General

(a) This appendix specifies requirements for the preparation of instructions for continued airworthiness as required by CS 29.1529.

(b) The instructions for continued airworthiness for each rotorcraft must include the instructions for continued airworthiness for each engine and rotor (hereinafter designated 'products'), for each appliance required by any applicable CS or operating rule, and any required information relating to the interface of those appliances and products with the rotorcraft. If instructions for continued airworthiness are not supplied by the manufacturer of an appliance or product installed in the rotorcraft, the instructions for continued airworthiness for the rotorcraft must include the information essential to the continued airworthiness of the rotorcraft.

A29.2 Format

(a) The instructions for continued airworthiness must be in the form of a manual or manuals as appropriate for the quantity of data to be provided.

(b) The format of the manual or manuals must provide for a practical arrangement.

A29.3 Content

The contents of the manual or manuals must be prepared in a language acceptable to the Agency. The instructions for continued airworthiness must contain the following manuals or sections, as appropriate, and information:

(a) *Rotorcraft maintenance manual or section.*

(1) Introduction information that includes an explanation of the rotorcraft's features and data to the extent necessary for maintenance or preventive maintenance.

(2) A description of the rotorcraft and its systems and installations including its engines, rotors, and appliances.

(3) Basic control and operation information describing how the rotorcraft components and systems are controlled and how they operate, including any special procedures and limitations that apply.

(4) Servicing information that covers details regarding servicing points, capacities of tanks, reservoirs, types of fluids to be used, pressures applicable to the various systems, location of access panels for inspection and servicing, locations of lubrication points, the lubricants to be used, equipment required for servicing, tow instructions and limitations, mooring, jacking, and levelling information.

(b) *Maintenance Instructions.*

(1) Scheduling information for each part of the rotorcraft and its engines, auxiliary power units, rotors, accessories, instruments, and equipment that provides the recommended periods at which they should be cleaned, inspected, adjusted, tested, and lubricated, and the degree of inspection, the applicable wear tolerances, and work recommended at these periods. However, it is allowed to refer to an accessory, instrument, or equipment manufacturer as the source of this information if it is shown that the item has an exceptionally high degree of complexity requiring specialised maintenance techniques, test equipment, or expertise. The recommended overhaul periods and necessary cross references to the airworthiness limitations section of the manual must also be included. In addition, an inspection program that includes the frequency and extent of the inspections necessary to provide for the continued airworthiness of the rotorcraft must be included.

(2) Trouble-shooting information describing probable malfunctions, how to recognise those malfunctions, and the remedial action for those malfunctions.

(3) Information describing the order and method of removing and replacing products and parts with any necessary precautions to be taken.

(4) Other general procedural instructions including procedures for system testing during ground running, symmetry checks, weighing and determining the centre of gravity, lifting and shoring, and storage limitations.

(c) Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided.

(d) Details for the application of special inspection techniques including radiographic and

ultrasonic testing where such processes are specified.

(e) Information needed to apply protective treatments to the structure after inspection.

(f) All data relative to structural fasteners such as identification, discard recommendations, and torque values.

(g) A list of special tools needed.

[Amdt 29/2]

A29.4 Airworthiness Limitations Section

the instructions for continued airworthiness must contain a section titled airworthiness limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure approved under CS 29.571. If the instructions for continued airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads – 'The airworthiness limitations section is approved and variations must also be approved'.

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Appendix B

Airworthiness Criteria For Helicopter Instrument Flight

I. *General*. A large helicopter may not be type certificated for operation under the instrument flight rules (IFR) unless it meets the design and installation requirements contained in this appendix.

II. *Definitions*

(a) V_{YI} means instrument climb speed, utilised instead of V_Y for compliance with the climb requirements for instrument flight.

(b) V_{NEI} means instrument flight never-exceed speed, utilised instead of V_{NE} for compliance with maximum limit speed requirements for instrument flight.

(c) V_{MINI} means instrument flight minimum speed, utilised in complying with minimum limit speed requirements for instrument flight.

III. *Trim*. It must be possible to trim the cyclic, collective, and directional control forces to zero at all approved IFR airspeeds, power settings, and configurations appropriate to the type.

IV. *Static longitudinal stability*

(a) *General*. The helicopter must possess positive static longitudinal control force stability at critical combinations of weight and centre of gravity at the conditions specified in sub-paragraphs IV (b) to (f) of this appendix. The stick force must vary with speed so that any substantial speed change results in a stick force clearly perceptible to the pilot. The airspeed must return to within 10% of the trim speed when the control force is slowly released for each trim condition specified in sub-paragraphs IV (b) to (f) of this appendix.

(b) *Climb*. Stability must be shown in climb throughout the speed range 37 km/h (20 knots) either side of trim with:

(1) The helicopter trimmed at V_{YI} ;

(2) Landing gear retracted (if retractable); and

(3) Power required for limit climb rate (at least 5.1 m/s (1000 fpm)) at V_{YI} or maximum continuous power, whichever is less.

(c) *Cruise*. Stability must be shown throughout the speed range from 0.7 to 1.1 V_H or V_{NEI}, whichever is lower, not to exceed ±37 km/h (± 20 knots) from trim with:

(1) The helicopter trimmed and power adjusted for level flight at 0.9 V_H or 0.9 V_{NEI}, whichever is lower; and

(2) Landing gear retracted (if retractable).

(d) *Slow cruise.* Stability must be shown throughout the speed range from 0.9 V_{MINI} to 1.3 V_{MINI} or 37 km/h (20 knots) above trim speed, whichever is greater, with:

(1) The helicopter trimmed and power adjusted for level flight at 1.1 V_{MINI}; and

(2) Landing gear retracted (if retractable).

(e) *Descent*. Stability must be shown throughout the speed range 37 km/h (20 knots) either side of trim with:

(1) The helicopter trimmed at 0.8 V_H or 0.8 V_{NEI} (or 0.8 V_{LE} for the landing gear extended case), whichever is lower;

(2) Power required for 5.1 m/s (l000 fpm) descent at trim speed; and

(3) Landing gear extended and retracted, if applicable.

(f) *Approach*. Stability must be shown throughout the speed range from 0.7 times the minimum recommended approach speed to 37 km/h (20 knots) above the maximum recommended approach speed with:

(1) The helicopter trimmed at the recommended approach speed or speeds;

(2) Landing gear extended and retracted, if applicable; and

(3) Power required to maintain a 3° glide path and power required to maintain the steepest approach gradient for which approval is requested.

V. *Static lateral-directional stability*

(a) Static directional stability must be positive throughout the approved ranges of airspeed, power, and vertical speed. In straight and steady sideslips up to ±10° from trim, directional control position must increase without discontinuity with the angle of sideslip, except for a small range of sideslip angles around trim. At greater angles up to the maximum sideslip angle appropriate to the type, increased directional control position must produce increased angle of sideslip. It must be possible to

maintain balanced flight without exceptional pilot skill or alertness.

[Amdt. No.: 29/1]

(b) During sideslips up to ± 10° from trim throughout the approved ranges of airspeed, power, and vertical speed there must be no negative dihedral stability perceptible to the pilot through lateral control motion or force. Longitudinal cyclic movement with sideslip must not be excessive.

VI. *Dynamic stability*

(a) Any oscillation having a period of less than 5 seconds must damp to ½ amplitude in not more than one cycle.

(b) Any oscillation having a period of 5 seconds or more but less than 10 seconds must damp to ½ amplitude in not more than two cycles.

(c) Any oscillation having a period of 10 seconds or more but less than 20 seconds must be damped.

(d) Any oscillation having a period of 20 seconds or more may not achieve double amplitude in less than 20 seconds.

(e) Any aperiodic response may not achieve double amplitude in less than 9 seconds.

VII. *Stability augmentation system (SAS)*

(a) If a SAS is used, the reliability of the SAS must be related to the effects of its failure. Any SAS failure condition that would prevent continued safe flight and landing must be extremely improbable. It must be shown that, for any failure condition of the SAS which is not shown to be extremely improbable:

(1) The helicopter is safely controllable when the failure or malfunction occurs at any speed or altitude within the approved IFR operating limitations; and

(2) The overall flight characteristics of the helicopter allow for prolonged instrument flight without undue pilot effort. Additional unrelated probable failures affecting the control system must be considered. In addition:

(i) The controllability and manoeuvrability requirements in Subpart B of CS-29 must be met throughout a practical flight envelope;

(ii) The flight control, trim, and dynamic stability characteristics must not be impaired below a level needed to allow continued safe flight and landing;

(iii) For Category A helicopters, the dynamic stability requirements of Subpart B of CS-29 must also be met throughout a practical flight envelope; and

(iv) The static longitudinal and static directional stability requirements of Subpart B of CS-29 must be met throughout a practical flight envelope.

(b) The SAS must be designed so that it cannot create a hazardous deviation in flight path or produce hazardous loads on the helicopter during normal operation or in the event of malfunction or failure, assuming corrective action begins within an appropriate period of time. Where multiple systems are installed, subsequent malfunction conditions must be considered in sequence unless their occurrence is shown to be improbable.

[Amdt. No.: 29/1]

VIII. *Equipment, systems, and installation.* The basic equipment and installation must comply with Subpart F of CS–29 with the following exceptions and additions:

(a) *Flight and navigation instruments*

(1) A magnetic gyro-stabilised direction indicator instead of the gyroscopic direction indicator required by CS 29.1303 (h); and

(2) A standby attitude indicator which meets the requirements of CS 29.1303 (g) (1) to (7), instead of a rate-of-turn indicator required by CS 29.1303(g). If standby batteries are provided, they may be charged from the aircraft electrical system if adequate isolation is incorporated. The system must be designed so that the standby batteries may not be used for engine starting.

(b) *Miscellaneous requirements*

(1) Instrument systems and other systems essential for IFR flight that could be adversely affected by icing must be provided with adequate ice protection whether or not the rotorcraft is certificated for operation in icing conditions.

(2) There must be means in the generating system to automatically de-energise and disconnect from the main bus any power source developing hazardous overvoltage.

(3) Each required flight instrument using a power supply (electric, vacuum etc.) must have a visual means integral with the

instrument to indicate the adequacy of the power being supplied.

(4) When multiple systems performing like functions are required, each system must be grouped, routed, and spaced so that physical separation between systems is provided to ensure that a single malfunction will not adversely affect more than one system.

(5) For systems that operate the required flight instruments at each pilot's station:

(i) Only the required flight instruments for the first pilot may be connected to that operating system;

(ii) Additional instruments, systems, or equipment may not be connected to an operating system for a second pilot unless provisions are made to ensure the continued normal functioning of the required instruments in the event of any malfunction of the additional instruments, systems, or equipment which is not shown to be extremely improbable;

(iii) The equipment, systems, and installations must be designed so that one display of the information essential to the safety of flight which is provided by the instruments will remain available to a pilot, without additional crew member action, after any single failure or combination of failures that is not shown to be extremely improbable; and

(iv) For single-pilot configure-ations, instruments which require a static source must be provided with a means of selecting an alternate source and that source must be calibrated.

(6) In determining compliance with the requirements of CS 29.1351 (d) (2), the supply of electrical power to all systems necessary for flight under IFR must be included in the evaluation.

(c) *Thunderstorm lights.* In addition to the instrument lights required by CS 29.1381 (a), thunderstorm lights which provide high intensity white flood lighting to the basic flight instruments must be provided. The thunderstorm lights must be installed to meet the requirements of CS 29.1381(b).

IX. *Rotorcraft flight manual.* A rotorcraft flight manual or rotorcraft flight manual IFR Supplement must be provided and must contain –

(a) *Limitations*. The approved IFR flight envelope, the IFR flightcrew composition, the revised kinds of operation, and the steepest IFR precision approach gradient for which the helicopter is approved;

(b) *Procedures*. Required information for proper operation of IFR systems and the recommended procedures in the event of stability augmentation or electrical system failures; and

(c) *Performance*. If V_{YI} differs from V_Y, climb performance at V_{YI} and with maximum continuous power throughout the ranges of weight, altitude, and temperature for which approval is requested.

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Appendix C

Icing Certification

(a) *Continuous maximum icing.* The maximum continuous intensity of atmospheric icing conditions (continuous maximum icing) is defined by the variables of the cloud liquid water content, the mean effective diameter of the cloud droplets, the ambient air temperature, and the interrelationship of these three variables as shown in figure 1 of this appendix. The limiting icing envelope in terms of altitude and temperature is given in figure 2 of this appendix. The interrelationship of cloud liquid water content with drop diameter and altitude is determined from figures 1 and 2. The cloud liquid water content for continuous maximum icing conditions of a horizontal extent, other than 32.2 km (17.4 nautical miles), is determined by the value of liquid water content of figure 1, multiplied by the appropriate factor from figure 3 of this appendix.

(b) *Intermittent maximum icing.* The intermittent maximum intensity of atmospheric icing conditions (intermittent maximum icing) is defined by the variables of the cloud liquid water content, the mean effective diameter of the cloud droplets, the ambient air temperature, and the interrelationship of these three variables as shown in figure 4 of this appendix. The limiting icing envelope in terms of altitude and temperature is given in figure 5 of this appendix. The interrelationship of cloud liquid water content with drop diameter and altitude is determined from figures 4 and 5. The cloud liquid water content for intermittent maximum icing conditions of a horizontal extent, other than 4.8 km (2.6 nautical miles), is determined by the value of cloud liquid water content of figure 4 multiplied by the appropriate factor in figure 6 of this appendix.

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Appendix C (continued)

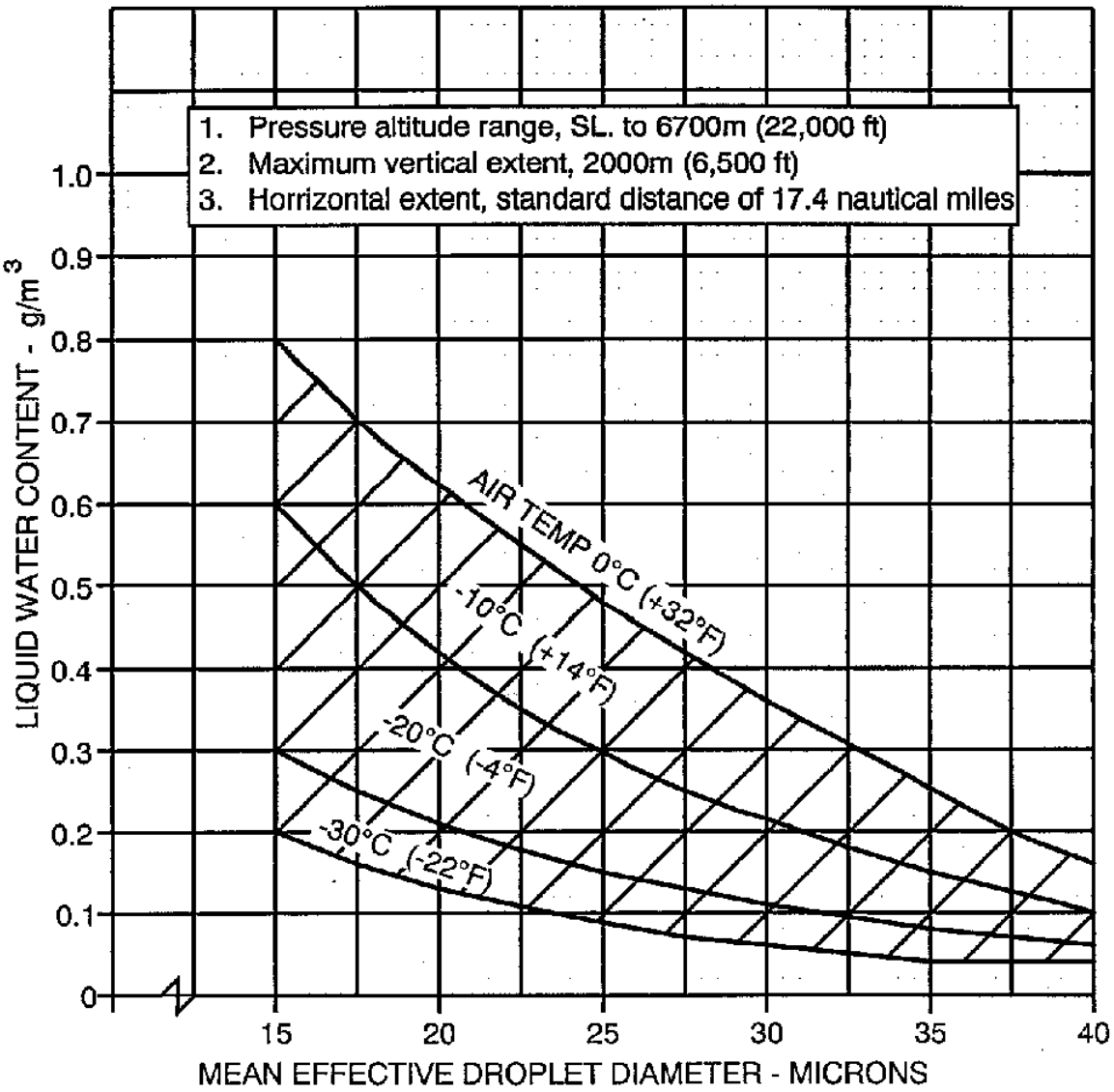

FIGURE 1

CONTINUOUS MAXIMUM (STRATIFORM CLOUDS)
ATMOSPHERIC ICING CONDITIONS
LIQUID WATER CONTENT VS MEAN EFFECTIVE
DROP DIAMETER

Source of data – NACA TN No. 1855, Class III - M, Continuous Maximum.

Appendix C (continued)

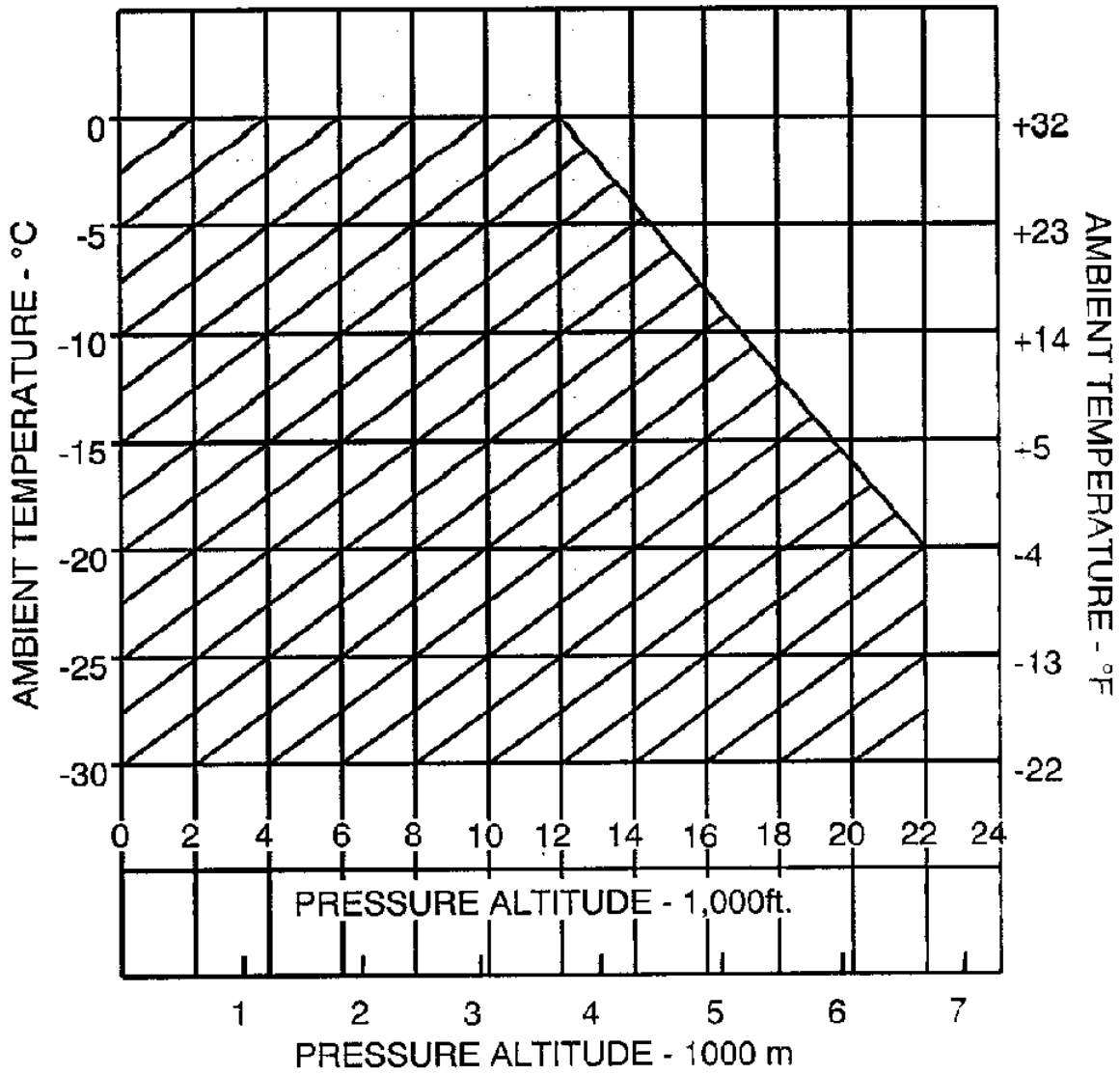

FIGURE 2

CONTINUOUS MAXIMUM (STRATIFORM CLOUDS)
ATMOSPHERIC ICING CONDITIONS
AMBIENT TEMPERATURE VS PRESSURE ALTITUDE

Source of data – NACA TN No. 2569.

Appendix C (continued)

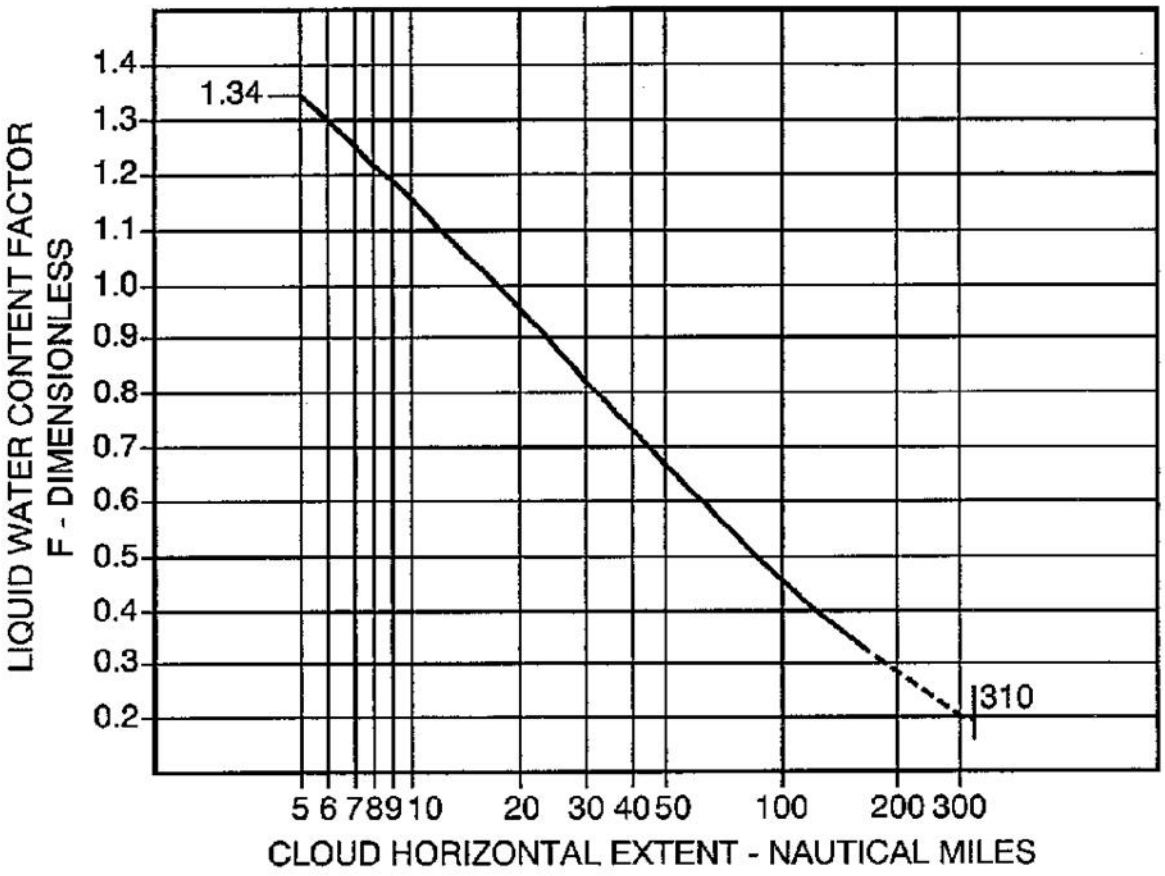

FIGURE 3

**CONTINUOUS MAXIMUM (STRATIFORM CLOUDS)
ATMOSPHERIC ICING CONDITIONS
LIQUID WATER CONTENT FACTOR VS CLOUD
HORIZONTAL DISTANCE**

Source of data – NACA TN No. 2738.

Appendix C (continued)

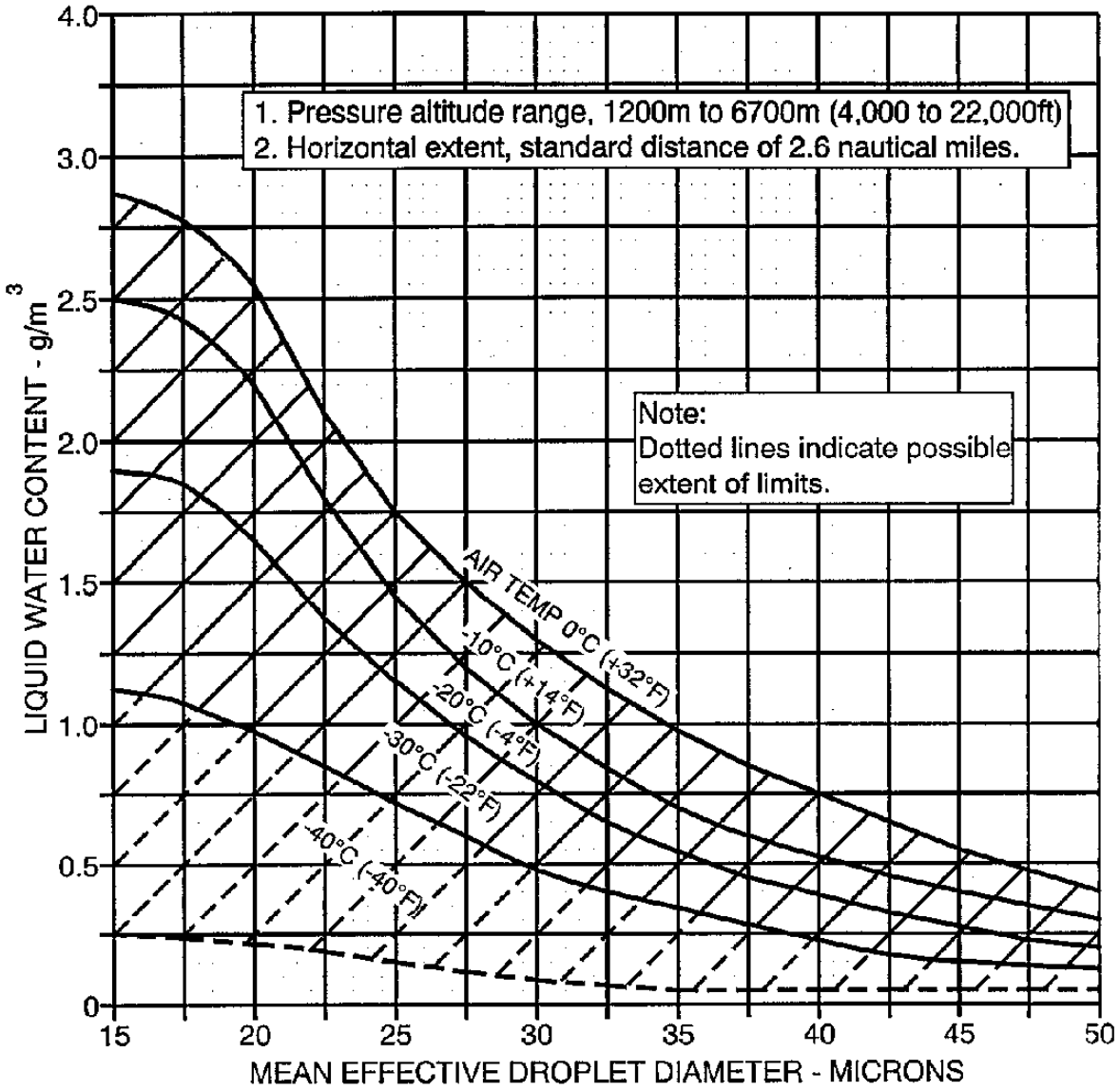

FIGURE 4

**INTERMITTENT MAXIMUM (CUMULIFORM CLOUDS)
ATMOSPHERIC ICING CONDITIONS
LIQUID WATER CONTENT VS MEAN EFFECTIVE DROP DIAMETER**

Source of data – NACA TN No. 1855, Class II - M, Intermittent Maximum.

Appendix C (continued)

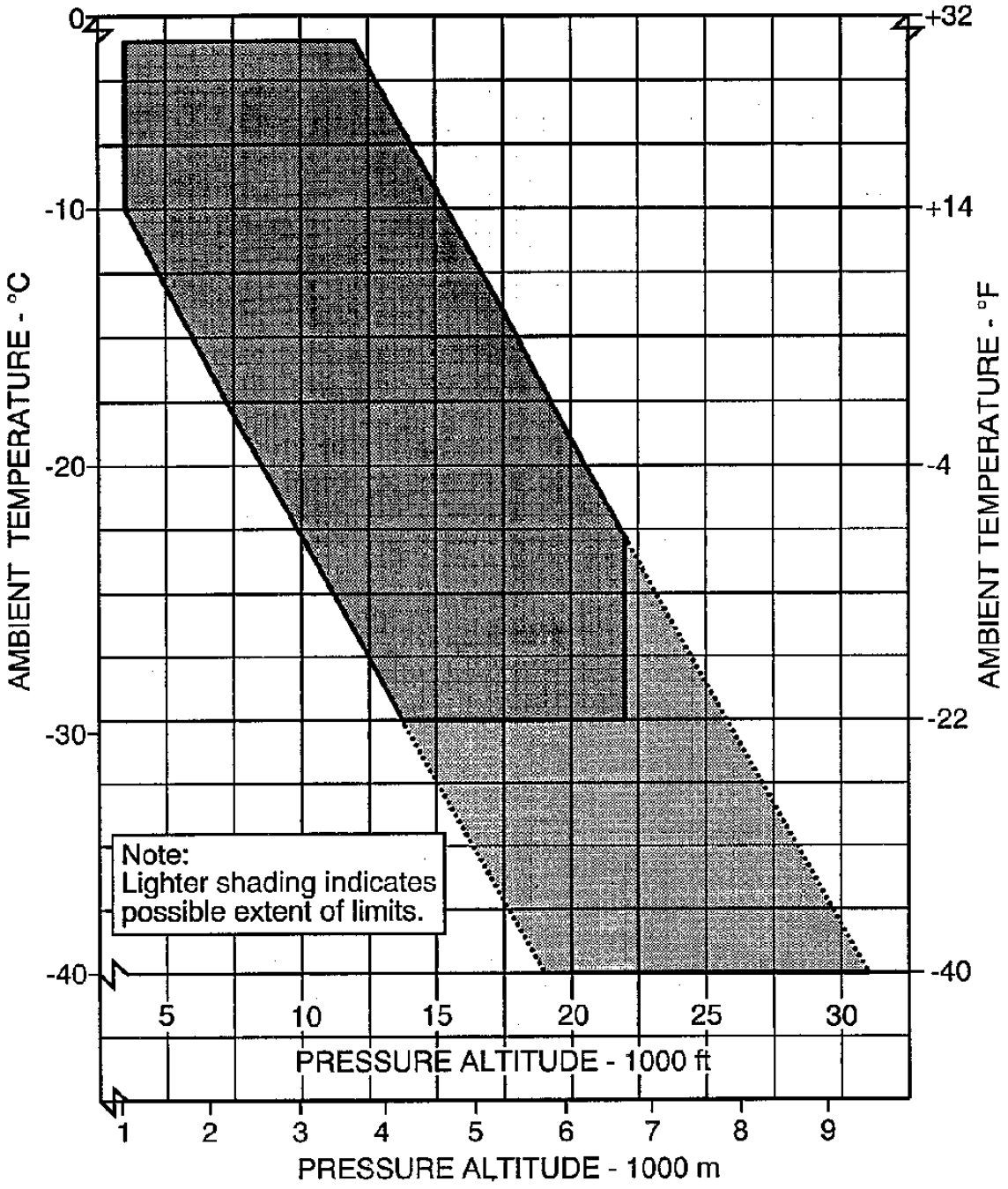

FIGURE 5

INTERMITTENT MAXIMUM
(CUMULIFORM CLOUDS)
ATMOSPHERIC ICING CONDITIONS
AMBIENT TEMPERATURE VS PRESSURE ALTITUDE

Source of data – NACA TN No. 2569.

Appendix C (continued)

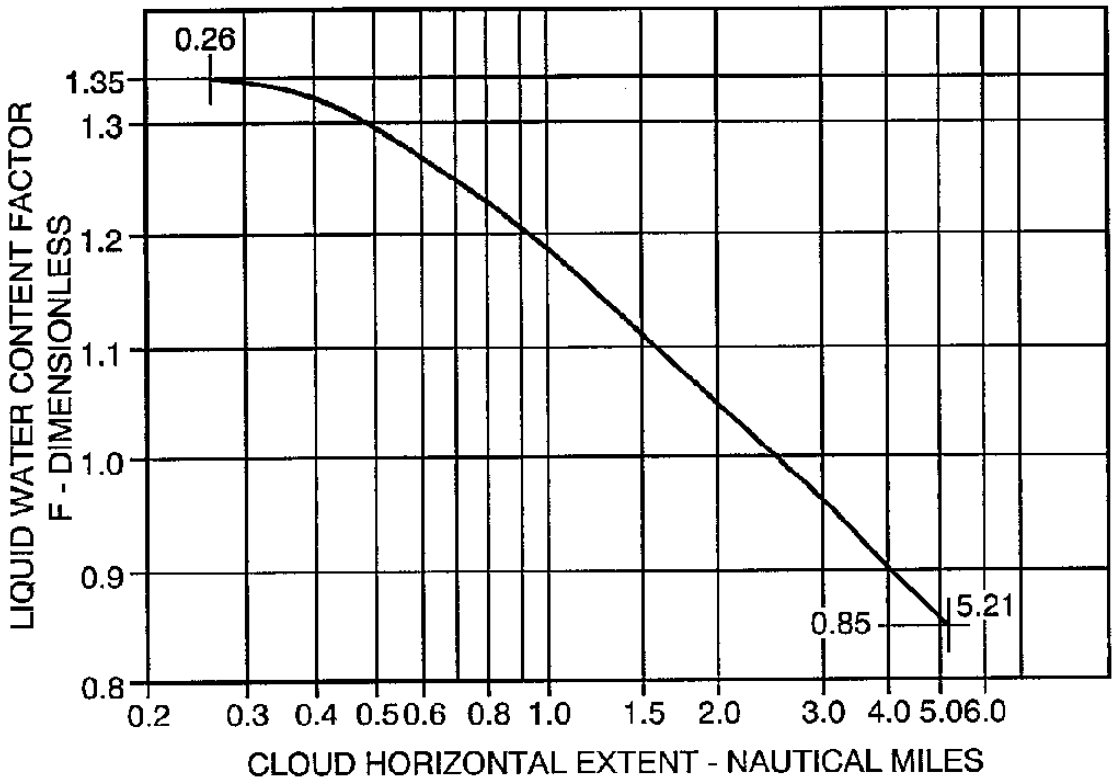

FIGURE 6

**INTERMITTENT MAXIMUM (CUMULIFORM CLOUDS)
ATMOSPHERIC ICING CONDITIONS
VARIATION OF LIQUID WATER CONTENT FACTOR WITH
CLOUD HORIZONTAL EXTENT**

Source of data – NACA TN No. 2738.

Appendix D

Criteria for demonstration of emergency evacuation procedures under CS 29.803

(a) The demonstration must be conducted either during the dark of the night or during daylight with the dark of night simulated. If the demonstration is conducted indoors during daylight hours, it must be conducted inside a darkened hangar having doors and windows covered. In addition, the doors and windows of the rotorcraft must be covered if the hangar illumination exceeds that of a moonless night. Illumination on the floor or ground may be used, but it must be kept low and shielded against shining into the rotorcraft's windows or doors.

(b) The rotorcraft must be in a normal attitude with landing gear extended.

(c) Safety equipment such as mats or inverted liferafts may be placed on the floor or ground to protect participants. No other equipment that is not part of the rotorcraft's emergency evacuation equipment may be used to aid the participants in reaching the ground.

(d) Except as provided in paragraph (a), only the rotorcraft's emergency lighting system may provide illumination.

(e) All emergency equipment required for the planned operation of the rotorcraft must be installed.

(f) Each external door and exit and each internal door or curtain must be in the take-off configuration.

(g) Each crewmember must be seated in the normally assigned seat for take-off and must remain in that seat until receiving the signal for commencement of the demonstration. For compliance with this paragraph, each crewmember must be:

(1) A member of a regularly scheduled line crew; or

(2) A person having knowledge of the operation of exits and emergency equipment.

(h) A representative passenger load of persons in normal health must be used as follows:

(1) At least 25% must be over 50 years of age, with at least 40% of these being females.

(2) The remaining 75% or less, must be 50 years of age or younger, with at least 30% of these being females.

(3) Three life-size dolls, not included as part of the total passenger load, must be carried by passengers to simulate live infants 2 years old or younger, except for a total passenger load of fewer than 44 but more than 19, one doll must be carried. A doll is not required for a 19 or fewer passenger load.

(4) Crewmembers, mechanics, and training personnel who maintain or operate the rotorcraft in the normal course of their duties may not be used as passengers.

(i) No passenger may be assigned a specific seat except as the Agency may require. Except as required by paragraph (g), no employee of the applicant may be seated next to an emergency exit, except as allowed by the Agency.

(j) Seat belts and shoulder harnesses (as required) must be fastened.

(k) Before the start of the demonstration, approximately one-half of the total average amount of carry-on baggage, blankets, pillows and other similar articles must be distributed at several locations in the aisles and emergency exit access ways to create minor obstructions.

(l) No prior indication may be given to any crewmember or passenger of the particular exits to be used in the demonstration.

(m) There must not be any practising, rehearsing or description of the demonstration for the participants nor may any participant have taken part in this type of demonstration within the preceding 6 months.

(n) A pre-take-off passenger briefing may be given. The passengers may also be advised to follow directions of crewmembers, but not be instructed on the procedures to be followed in the demonstration.

(o) If safety equipment, as allowed by paragraph (c), is provided, either all passenger and cockpit windows must be blacked out or all emergency exits must have safety equipment to prevent disclosure of the available emergency exits.

(p) Not more than 50% of the emergency exits in the sides of the fuselage of a rotorcraft that meet all of the requirements applicable to the required emergency exits for that rotorcraft may be used for demonstration. Exits that are not to be used for the demonstration must have the exit handle deactivated or must be indicated by red lights, red tape, or other acceptable means placed outside the exits to indicate fire or other reasons why they are unusable. The exits to be used must be representative of all the emergency exits on the rotorcraft and must be designated subject to approval by the Agency. If installed, at least one floor level exit (Type I; CS 29.807(a)(l)) must be used as required by CS 29.807(c).

(q) All evacuees must leave the rotorcraft by a means provided as part of the rotorcraft's equipment.

(r) Approved procedures must be fully utilised during the demonstration.

(s) The evacuation time period is completed when the last occupant has evacuated the rotorcraft and is on the ground.

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EASA Certification Specifications
for
Large Rotorcraft

CS-29
Book 2

Acceptable Means of Compliance

CS–29 BOOK 2

ACCEPTABLE MEANS OF COMPLIANCE

AMC 29 General

1. The AMC to CS–29 consists of FAA AC 29-2C Change 2 dated 25 April 2006 with the changes/additions given in this BOOK 2 of CS–29.

[Amdt 29/2]

2. The primary reference for each of these AMCs is the CS–29 paragraph. Where there is an appropriate paragraph in FAA AC 29-2C Change 2 dated 25 April 2006 this is added as a secondary reference.

[Amdt 29/2]

AMC 29.351
Yaw manoeuvre conditions

1. Introduction

This AMC provides further guidance and acceptable means of compliance to supplement FAA AC 29-2C Change 2 (AC 29.351b. § 29.351 (Amendment 29-40) YAWING CONDITIONS), to meet the Agency's interpretation of CS 29.351. As such it should be used in conjunction with the FAA AC but take precedence over it, where stipulated, in the showing of compliance.

Specifically, this AMC addresses two areas where the FAA AC has been deemed by the Agency as being unclear or at variance to the Agency's interpretation. These areas are as follows:

a. Aerodynamic Loads

The certification specification CS 29.351 provides a minimum safety standard for the design of rotorcraft structural components that are subjected in flight to critical loads combinations of anti-torque system thrust (e.g. tail rotor), inertia and aerodynamics. A typical example of these structural components is the tailboom.

However, compliance with this standard according to FAA AC 29-2c Change 2 may not necessarily be adequate for the design of rotorcraft structural components that are principally subjected in flight to significant aerodynamic loads (e.g. vertical empennage, fins, cowlings and doors).

For these components and their supporting structure, suitable design criteria should be developed by the Applicant and agreed with the Agency.

In lieu of acceptable design criteria developed by the applicant, a suitable combination of sideslip angle and airspeed for the design of rotorcraft components subjected to aerodynamic loads may be obtained from a simulation of the yaw manoeuvre of CS 29.351, starting from the initial directional control input specified in CS 29.351(b)(1) and (c)(1), until the rotorcraft reaches the maximum overswing sideslip angle resulting from its motion around the yaw axis.

b. Interaction of System and Structure

Maximum displacement of the directional control, except as limited by pilot effort (CS 29.397(a)), is required for the conditions cited in the certification specification. In the load evaluation credit may be taken for consideration of the effects of control system limiting devices.

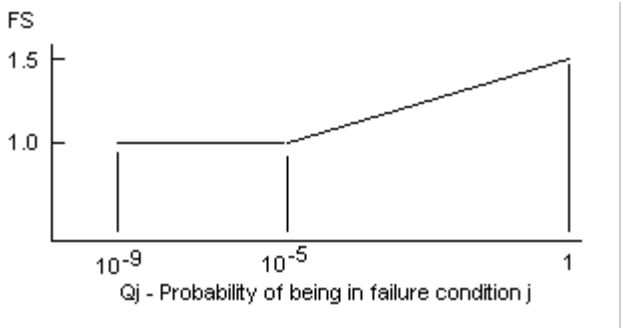
However, the probability of failure or malfunction of these system(s) should also be considered and if it is shown not to be extremely improbable then further load conditions with the system in the failed state should be evaluated. This evaluation may include Flight Manual Limitations, if failure of the system is reliably indicated to the crew.

A yaw limiting device is a typical example of a system whose failed condition should be investigated in the assessment of the loads requested by CS 29.351.

An acceptable methodology to investigate the effects of all system failures not shown to be extremely improbable on the loading conditions of CS 29.351 is as follows:

i) With the system in the failed state and considering any appropriate reconfiguration and flight limitations, it should be shown that the rotorcraft structure can withstand without failure the loading conditions of CS 29.351, when the manoeuvre is performed in accordance with the provisions of the this AMC.

ii) The factor of safety to apply to the above specified loading conditions to comply with CS 29.305 is defined in the figure below.



$Qj = (Tj)(Pj)$

where:
Tj = Average flight time spent with a failed limiting system j (in hours)
Pj = Probability of occurrence of failure of control limiting system j (per hour)

Note: If Pj is greater than $1x10^{-3}$ per flight hour then a 1.5 factor of safety should be applied to all limit load conditions evaluated for the system failure under consideration.

[Amdt 29/2]

AMC MG4
Full Authority Digital Electronic Controls (FADEC)

Note: Certification procedures identified in MG4 refer specifically to the FAA regulatory system. For guidance on EASA procedures, reference should be made to Commission Regulation (EC) No 1702/2003 (as amended) (Part-21), AMC-20 (and specifically AMC 20-1 and 20-3) and to EASA internal working procedures, all of which are available on EASA's web site: http://www.easa.europa.eu/

[Amdt 29/2]