This document was created to make public non-proprietary data contained in Special Conditions (including Deviations, Equivalent Safety Findings) that are part of the applicable Certification Basis as recorded in TCDS EASA.IM.A.620.

Content:

Disclaimer – This document is not exhaustive and it will be updated gradually.

D-01 (SC): Flight Instrument External Probes – Qualification in Icing Conditions	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1309, CS 25.1322, CS 25.1323(h), CS 25.1323(i), CS 25.1325(b), CS 25.1326, CS 25.1419, CS 25.1529
ADVISORY MATERIAL:	ETSO C16a & C54, AMC 25.1323(h), AMC 25.1323(i), AMC 25.1325(b), AMC 25.1093(b)(1), AMC 25.1419

Special Condition

Replace CS 25.1323(i), AMC 25.1323(i) and 25.1326 by SC 2 & 3 and respective AMC's

Flight Instrument External Probes Heating Systems

Each flight instrument external probes systems, including, but not necessarily limited to, pitot tubes, pitot-static tubes, static probes, angle of attack sensors, side slip vanes, and temperature probes, must be heated or have an equivalent means of preventing malfunction in the heavy rain conditions defined in table of this paragraph, in the icing conditions as defined in CS 25 Appendices C and in mixed phase / ice crystal conditions as defined in Appendix 1 of this Special Condition

Rain test conditions

Altitude Range		Liquid Water Content	Horizontal Extent		Droplet MVD
(ft)	(m)	(g/m^3)	(km)	(NM)	(µm)
0 to 10000	0 to 3000	1	100	50	500 to 2000
		6	5	3	
		15	1	0.5	

Flight Instrument External Probes heat alerting systems

If a flight instrument external probe heating system is installed, an alert must be provided to the flight crew when the flight instrument external probe heating system is not operating or not functioning normally. The alert must comply with the following requirements:

(a) The alert provided must conform to the Caution alert indications.

(b) The alert provided must be triggered if either of the following conditions exists:

(1) The flight instrument external probe heating system is switched 'off'.

(2) The flight instrument external probe heating system is switched 'on' and is not functioning normally.

(see AMC in Appendix 2 of this SC)

Appendix 1

Special Condition D-01
Mixed Phase and Ice Crystal Icing Envelope (Deep Convective Clouds)

References

1. THE ANALYSIS OF MEASUREMENTS OF FREE ICE AND ICE/WATER CONCENTRATIONS IN THE ATMOSPHERE OF THE EQUATORIAL ZONE, IAN I. MCNAUGHTON, B.SC., DIP. R.T.C., ROYAL AIRCRAFT ESTABLISHMENT (FARNBOROUGH) TECHNICAL NOTE NO: MECH. ENG. 283

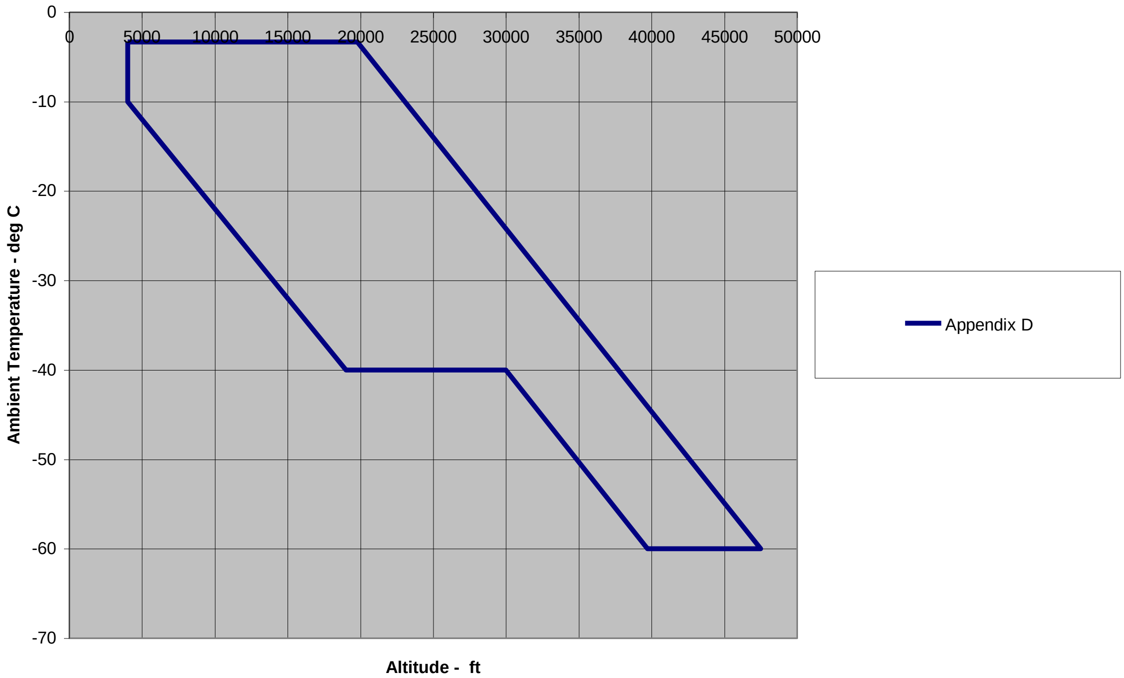
2. SNOW AND ICE PARTICLE SIZES AND MASS CONCENTRATIONS AT ALTITUDES UP TO 9 KM (30,000 FT), R. K. JECK, DOT/FAA/AR-97/66, AUGUST, 1998.

3. CLOUD MICROPHYSICAL MEASUREMENTS IN THUNDERSTORM OUTFLOW REGIONS DURING ALLIED/BAE 1997 FLIGHT TRIALS, STRAPP, J.W., P. CHOW, M. MALTBY, A.D. BEZER, A. KOROLEV, I. STOMBERG, AND J. HALLETT, *37TH AIAA AEROSPACE SCIENCES MEETING AND EXHIBIT*, JAN. 11-14, 1999, RENO, NV. AIAA 99-0498.

4. ARAC EHWG PROPOSED APPENDIX D TO 14 CFR PART 33

Ice crystal conditions associated with convective storm cloud formations exist within the CS 25 Appendix C Intermittent Maximum Icing envelope (including the extension to -40 deg C) and the Mil Standard 310 Hot Day envelope. This ice crystal icing envelope is depicted in the Figure D-1.

FAR 33 Appendix D Icing Envelope Limits



Disclaimer – This document is not exhaustive and it will be updated gradually.

Figure D-1 Convective Cloud Ice Crystal Envelope

Within the envelope, total water content (TWC) in gms/m3 have been assessed based upon the adiabatic lapse defined by the convective rise of 90% relative humidity air from sea level to higher altitudes and scaled by a factor of 0.65 to a standard cloud length of 17.4 nautical miles. TWC is displayed for this distance over a range of ambient temperature within the boundaries of the ice crystal envelope in Figure D-2.

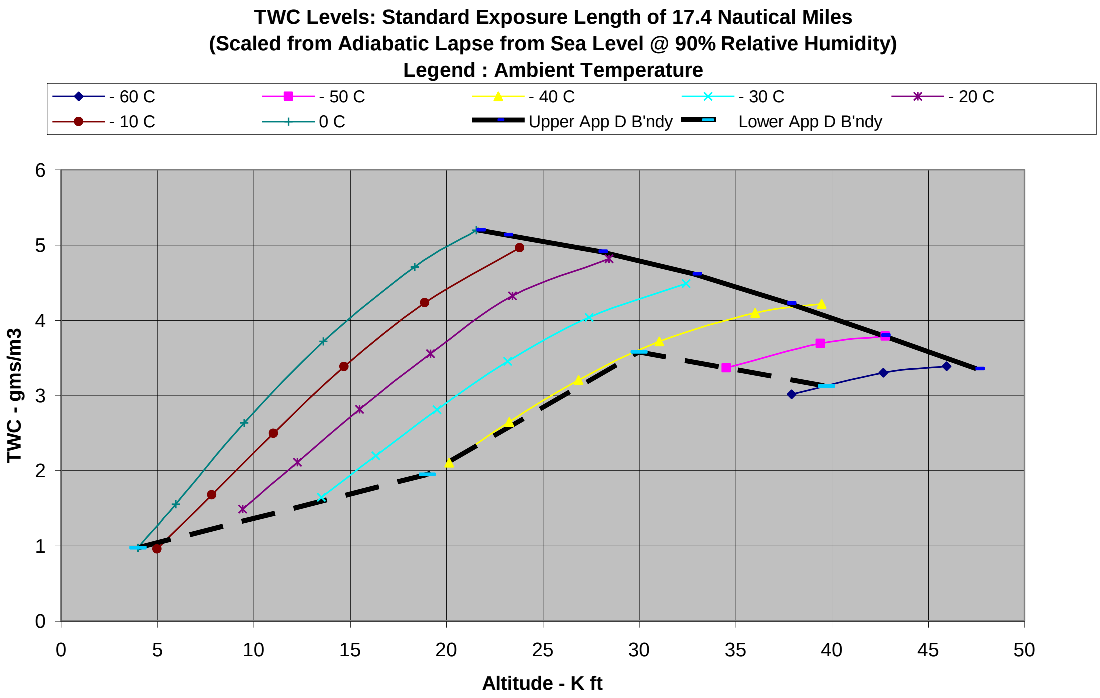


Figure D-2 Total Water Content

Ice crystal size median mass dimension (MMD) range is 50 - 200 microns (equivalent spherical size) based upon measurements near convective storm cores.

The TWC can be treated as completely glaciated except as noted in the Table D-1.

Temperature Range – deg C	Horizontal Cloud Length	LWC – gm/m3
0 to -20	</= 50 miles	</=1.0
0 to -20	Indefinite	</=0.5
< -20		0

Table D-1 Supercooled Liquid Portion of TWC

The TWC levels displayed in Figure D-2 represent TWC values for a standard exposure distance (horizontal cloud length) of 17.4 nautical miles that must be adjusted with length of icing exposure. The assessment from data measurements in References 1 supports the reduction factor with exposure length shown in Figure D-3.

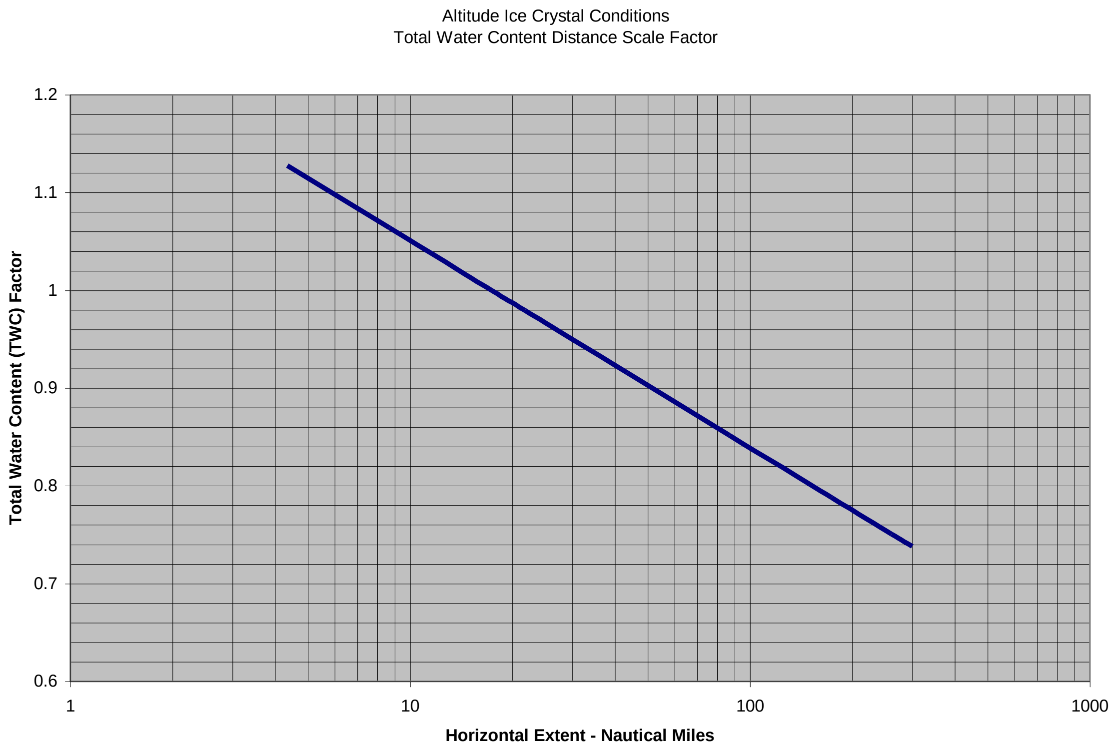


Figure D-3 Exposure Length Influence on TWC

Appendix 2

Acceptable Means of Compliance D-01
Flight Instrument External Probes – Qualification in Icing Conditions

1. Nomenclature

SAT: Static Air Temperature
LWC: Liquid Water Content
MVD: Mean Volume Diameter
IWC: Ice Water Content
IMMD: Ice Median Mass Dimension
L(i): "Liquid" supercooled water conditions
M(i): Mixed phase icing conditions, contain both supercooled water and ice crystals.
G(i): Glaciated conditions are icing conditions totally composed of ice crystals.
R(i): Rain conditions
SD: supercooled droplet
SLD: supercooled large drop
WC: water content

2. Test setup and Conditions to be testedWind Tunnels

If wind tunnel testing is proposed, all conditions must be appropriately corrected to respect the similarity relationship between actual and wind tunnel conditions (due to pressure and scale differences for example). It is the applicant responsibility to determine and justify the various derivations and corrections to be made to the upstream conditions in order to determine actual test conditions (local and scaled). When the tests are conducted in non-altitude conditions, the system power supply and the external aerodynamic and atmospheric conditions should be so modified as to represent the required altitude condition as closely as possible.

The Icing Wind tunnel calibration should have been verified, in accordance with SAE ARP 5905 with an established programme to maintain calibration of the facility Calibration records should be examined to ensure the local liquid water concentration at the location of the probe complies with values required in the test specification.

2.2. Test setup

The test setup installation in the wind tunnel must be shown to be equivalent to the installation on aircraft. In particular, the probe must be installed in such a way that the heat sink capacity of the mount is equal to or greater than the aircraft installation.

Surface temperature measurements could be made, during icing wind tunnel tests to verify thermal analyses and to allow extrapolation to conditions not reachable due to the wind tunnel limitations.

2.3. Local conditions

The Water Content (WC) values provided in this AMC or in the Appendix 1 are upstream values, independent of the aircraft installation. Local WC values (at the probe location) need to be derived from the upstream values according to the streamline behavior around the aircraft. Overconcentration of the WC at the probe location may occur due to the aerodynamic effects of the fuselage in particular.

Local conditions shall be determined based on many parameters which could include:

- **Aircraft specific**
  - A/C fuselage shape
  - Probe location on aircraft fuselage (X, Y, Z coordinates)
  - Aircraft speed and altitude (Climb, Cruise, Descent …)
- **Environmental Conditions specific**
  - Type (SD, SLD, Crystals, Rain)
  - Size (from 0 to 2000 micron)
  - Density
- **Probe specific:**
  - mast/strut length

Concerning the type and size of the particles, the local WC shall be computed considering the full distribution of the particles sizes that is actually present in the real atmosphere, even if the wind tunnel tests are then performed at a given single size (20 micron for supercooled droplets, 150 micron for ice crystals, 500 to 2000 micron for rain drops). The local conditions may also be affected by the “bouncing effect” and “shattering effect” for solid particles or the “splashing effects” for large liquid particles. As no model exists today to represent ice particles trajectories and these particular effects, an assessment based on the best available state of the art shall be made.

2.4. Operational Conditions

The conditions are to be tested at several Mach and Angle of Attack (AoA) values in order to cover the operational flight envelope of the aircraft. It is the applicant responsibility to select and justify, for each of the conditions listed in each Cloud Matrix below, the relevant operational conditions to be tested (Mach, AoA and Mode…).

It is expected that several operational conditions will be identified for each environmental conditions but exhaustive testing is not intended.

2.5. Power supply

The heating power supply used during the tests shall be the minimum value expected at the probe location on the aircraft. It is commonly accepted to test the probe at 10% below the nominal rated voltage.

2.6. Flight deck indication

When a flight instrument external probe heating system is installed, CS 25.1326 requires an alert to be provided to the flight crew when that flight instrument external probe heating system is not operating or not functioning normally.

All performances of the probe ice protection system, in particular the icing tests described in this AMC are expected to be demonstrated with equipment selected with heating power set to the minimum value triggering the flight deck indication.

2.7. Test article selection

To be delivered, an article has to meet an Acceptance Test Procedure (ATP) established by the equipment supplier. The ATP is a production test performed on each item to show it meets the performance specification. Both the performance of the ice protection system and the icing tests described hereafter are expected to be demonstrated with an equipment selected at the lowest value of the ATP with the respect to the acceptability of the heating performance. This can be accomplished by adjusting the test voltage, heating cycles and/or any other applicable parameters, to simulate the lowest performing probe. Note that this has to be applied in addition to the power supply reduction mentioned in paragraph 2.5 above.

2.8. Mode of Operation

The modes of operation of the probe are to be assessed in the two following tests. However, depending on the mode of operation of the heating systems, other intermediate modes may have to be tested (e.g. if heating power is varied as a function of the outside temperature, etc.)

Anti-icing test:

During this test, the icing protection of the probe (typically resistance heating) is assumed to be switched “on” prior exposure to icing conditions.

De-icing test:

During this test, the icing protection of the probe (typically resistance heating) must be “off” until 0.5 inch of ice has accumulated on the probe. For ice crystal tests in de-icing mode, since no accretion is usually observed, an agreed “Off” time duration should be agreed before the test. In the past a one-minute time duration without heating power has been accepted. This mode need not be tested if, in all operational scenarios (including all dispatch cases), the probe heating systems are activated automatically at aircraft power “On” and cannot be switched to manual operation later during the flight.

2.9. Supercooled Liquid (L) Conditions

The following proposed test points are intended to provide the most critical conditions of the complete CS-25 Appendix C icing envelope, however, a Critical Points Analysis (CPA) may be used to justify different values.

2.9.1 - Stabilized conditions

Test #	SAT (°C)	Altitude Range		LWC(*) (g/m3)	Duration (min)	MVD(*) (µm)
SL1	− 20	0 to 22,000 ft.	0 to 6,706 m	0.22 to 0.3	15	15 to 20
SL2	− 30	0 to 22,000 ft.	0 to 6,706 m	0.14 to 0.2	15	15 to 20
SL3	− 20	4,000 to 31,000 ft.	1,219 to 9,449m	1.7 to 1.9	5	15 to 20
SL4	− 30	4,000 to 31,000 ft.	1,219 to 9,449 m	1 to 1.1	5	15 to 20

Table 1: Stabilized Liquid icing test conditions
(*) Note:

The upstream LWC values of the table are based on CS-25 Appendix C and correspond to a droplet diameter of 20 µm or 15 µm. Considering that the local collection efficiency is function of the MVD and the probe location with respect to the boundary layer, and that the upstream LWC value is higher for an MVD of 15 µm as compared to 20 µm, the applicant shall establish the conditions leading to the highest local LWC at probe location and test accordingly.

It is acceptable to run the tests at the highest determined local LWC but using a droplet diameter of 20 µm since most of the wind tunnel are calibrated for that value.

2.9.2 - Cycling conditions

A separate test should be conducted at each temperature condition of Table 2 below, the test being made up of repetitions of either the cycle:

a) 28 km in the conditions of column (a) appropriate to the temperature, followed by 5 km in the conditions of column (b) appropriate to the temperature, for a duration of 30 minutes, or
b) 6 km in the conditions of column (a) appropriate to the temperature, followed by 5 km in the conditions of column (b) appropriate to the temperature, for a duration of 10 minutes.

Test #	SAT (°C)	Altitude Range		LWC (g/m³)		MVD (µm)
		(ft)	(m)	(a)	(b)	
SL6	− 10	17, 000	5,182	0.6	2.2	20
SL7	− 20	20, 000	6,096	0.3	1.7	
SL8	− 30	25, 000	7,620	0.2	1.0	

Table 2: Cycling Liquid icing test conditions

2.10. Supercooled Large Drop Liquid Conditions

Based on the design of the probe, the drop size may not be a significant factor to consider as compared to the other parameters and in particular the Liquid Water Content. The SLD LWC between 0.18 and 0.44 g/m3 are largely covered by the Appendix C continuous maximum LWC (between 0.2 and 0.8 g/m3) and the Appendix C intermittent maximum LWC (between 0.25 and 2.9 g/m3).

Testing SLD conditions may not be necessary if it can be shown that the Supercooled Liquid Conditions of Appendix C are more critical. If some doubt exists, the applicant shall propose a set of critical test points to cover adequately SLD conditions.

2.11. Mixed Phase (M) and Glaciated (G) Conditions

The applicant should propose a set of critical test points to cover adequately the Icing Environment as proposed in Appendix 1 of this CRI.

Testing should be performed at representative altitude as the effect of altitude on probe behaviour is not yet fully understood, unless demonstration can be made that application of scaling laws leads to conservative approach of testing.

The following considerations shall be taken into account.

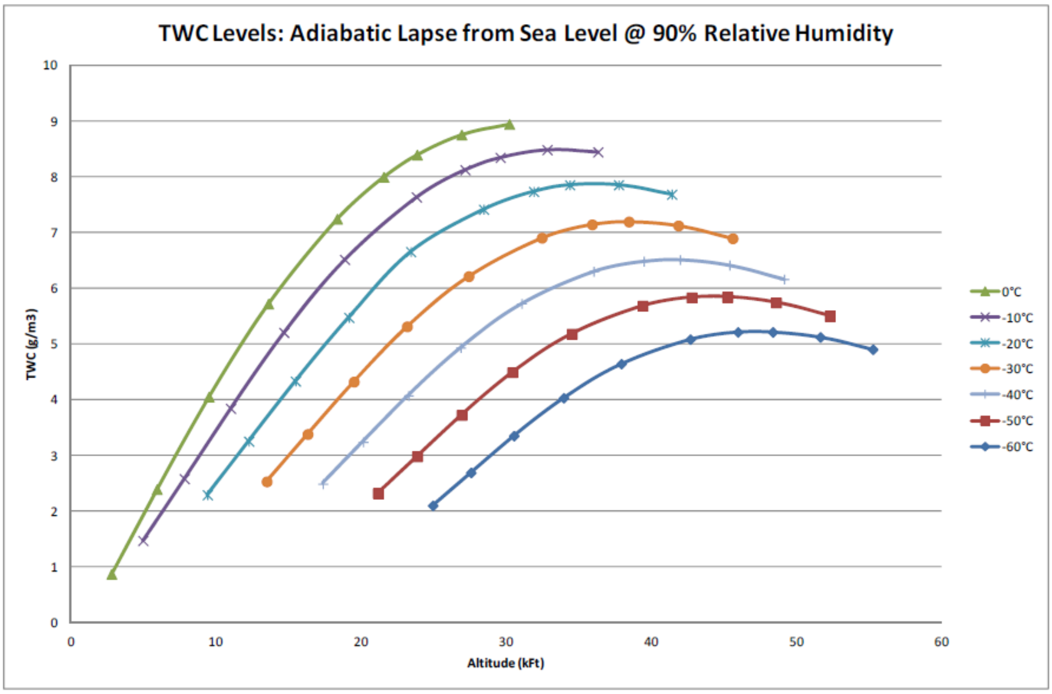
Glaciated Conditions

As indicated in the Appendix 1, the total water content (TWC) in g/m3 have been assessed based upon the adiabatic lapse defined by the convective rise of 90% relative humidity air from sea level to higher altitudes and scaled by a factor of 0.65 to a standard cloud length of 17.4 nautical miles (NM).

In service occurrences show that several Pitot icing events in Glaciated Conditions, above 30 000ft, are outside of the Appendix 1 domain in term of Altitude and outside air temperature. In that context, the Appendix 1, Figure 1 (Convective cloud ice crystal envelope) should be enlarged to encompass ISA +30°C conditions. Furthermore, a reported event occurred at a temperature of – 70 °C. Testing may not be possible at such a low temperature due to simulation tool limitations. However, the presence of Ice Crystals has been observed, and it is anticipated that an extrapolation of existing test data at higher temperature should allow assessing the predicted performance of the probe heating down to this minimum temperature.

In addition, based on several sources of information including the Eurocae WG 89, , the Agency is of the opinion that the standard cloud of 17.4 NM and the associated average TWC concentration values provided by appendix 1 may not provide the most conservative conditions for Flight Instrument External probes testing.

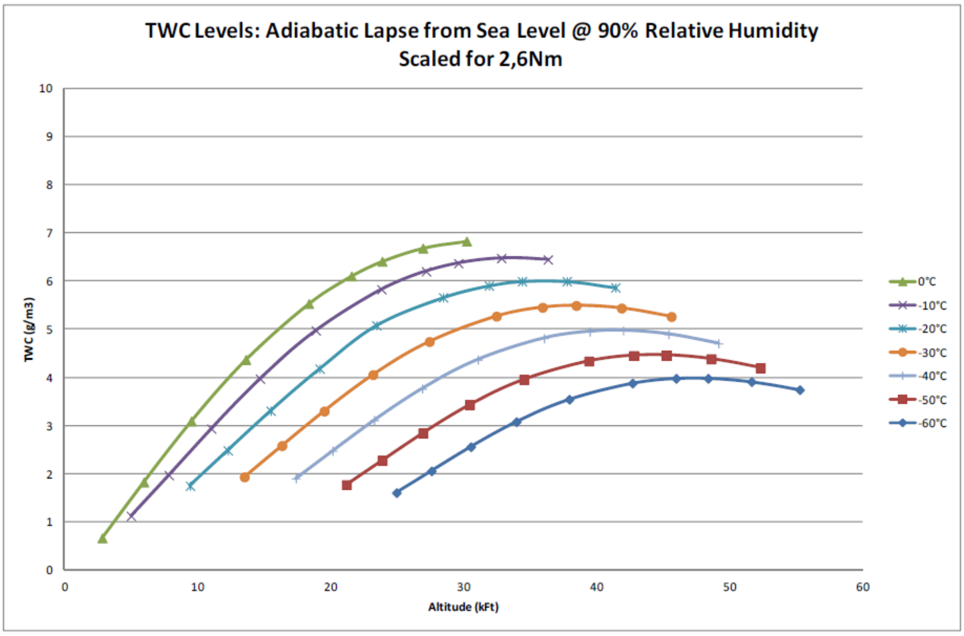
The “max” or “peak” TWC concentration values should be considered instead of the “17.4 NM” values provided by the Appendix 1. These max or peak values are available in FAA document DOT/FAA/AR-09/13. They correspond to the “17.4 NM” values multiplied by a factor of 1.538 (1/0.65). The “max” concentration values (TWC) are provided below:



Mixed Phase Conditions

In service occurrences show several Pitot icing events in Mixed phase conditions, between 20 000 & 30 000 ft, outside of the Appendix 1 domain in term of Altitude and outside air Temperature.
Based on several sources of information including the Eurocae WG-89 , the agency is of the opinion that the “2.6 NM” TWC concentration values should be considered instead of the “17.4 NM” values, as the CS 25 Appendix C Intermittent conditions provide data for a 2.6 NM cloud.

The “2.6 NM” values are given by the “17.4 NM” values scaled by the F factor for 2.6 NM clouds which is 1.175 and are provided below:



It is commonly recognised that below -40°C no liquid conditions exist anymore. Therefore testing in mixed phase conditions does not need to consider temperatures below -40°C.

Ice Particles

Several methods of generating ice particles are used in testing and produce a wide range of particle sizes. Some methods of generating ice particles results in irregular shapes which are difficult to quantify in terms of mean particle diameter. It is acceptable to specify ice particle sizes based on the available range of ice particle generation techniques in the MMD range of 50 to 200 µm as provided in Appendix 1. Higher values may be used if justified.

For mixed phase icing, the heat requirements are driven primarily by the quantity of ice collected in the probe rather than the size of the ice particles. Supercooled liquid droplet MVD size of 20 µm should be used.

Duration

For each condition a minimum of 2 minutes exposure time should be tested. This is the minimum time needed to reach a steady state and stabilised condition.

Total Air Temperature design consideration

It is recognised that due to the intrinsic function of the total air temperature probes it may not be possible to design the temperature sensor with sufficient heating capability to ensure both adequate protection across the complete icing environment of Appendix 1 and accurate temperature measurements. In this case it may be acceptable that the temperature probe is not fully protected over a portion of the Appendix 1 icing environment provided that the malfunction of the probe will not prevent continued safe flight and landing. System safety assessments must include common mode failure conditions. Mitigation for potential icing related failures at the aircraft level should be accomplished as required by the Air Data System and/or by the primary data consumers. Examples of mitigation methods include comparing air data from multiple sources and from sources of dissimilar technologies.

2.12. Rain (R)Conditions

Flight instrument external probes must be evaluated in the heavy rain conditions provided in table of the SC §2. A test temperature below 10°C is considered acceptable. Testing may be performed at a higher temperature if it can be demonstrated that the increase in evaporation rate due to the higher ambient temperature does not decrease the severity of the test.

2.13. Pass/fail criteria

The pass/fail criteria of a given test are as follows:

The output of the probe should quickly stabilize to the correct value after the start of an anti-icing test or once the icing protection is restored in a de-icing test. This value has to be agreed before the test between the applicant and Agency, and it must stay correct as long as the icing protection is maintained. The measurement is considered to be correct if any observed fluctuation, when assessed by the applicant has no effect at the aircraft level.

In addition, for pitot probes and especially during ice crystal or mixed phase conditions tests, it should be observed that the measured pressure is not ‘frozen’ (pressure signal without any noise, i.e. completely flat), which would indicate an internal blockage resulting in a captured pressure measurement.

After each test, any water accumulating in the probe connection line should be collected and assessed. The amount of water trapped in the probe (i.e. in the line conveying the air to the electronics) should not interfere with the output correctness when the probe is installed on the aeroplane.

3. Flight instrument external probes heating systems alert

If a flight instrument external probe heating system is installed, an alert must be provided to the flight crew when the flight instrument external probes heating system is not operating or not functioning normally.

It is expected that probe heating system failures are indicated to the flight crew if such failures have an impact on the performance of the heating system to the extent of having an “effect on operational capability or safety” (see CS 25.1309).

In accordance with CS 25.1309(c) and CS 25.1322(b), a Caution category of alert is required by CS 25.1326 for immediate crew awareness and subsequent crew action.

It should be assumed that icing conditions exist during the failure event. The decision to provide heating system failure indication should not be based on the numerical probability of the failure event. If the failure could potentially have hazardous or catastrophic consequences, then this failure must be indicated.

The reliability of the system performing the probe heating system failure detection and alerting should be consistent with the safety effect induced by the failure. Refer to AMC 25.1309, chapter 9(c) for more detailed guidance.

3. Further Guidance

Further guidance can be found in the following documents:

- BS 2G135 revised “Specification for Electrically-heated pitot and pitotstatic pressure heads
- AS8006 “Minimum performance standard for pitot and pitot-static tubes”
- AS 5562 “Ice an Rain Minimum Qualification Standards for Pitot and Pitot-static Probes”
- MIL-HDBK-310 “Global climatic data for developing Military products”

– END –

D-05 (SC): Control Surface Position Awareness / EFCS	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.671 & 25.672
ADVISORY MATERIAL:	AMC 25.671 and AMC 25.672, Aviation Rulemaking Advisory Committee (ARAC) Flight Control Harmonisation Working Group (FCHWG) Report 25.671 & 25.672 dated 17 May 2002

Special Condition

In addition to current CS 25.671 paragraph, the following conditions are applicable:

Modify CS 25.671(a) to read:

(a) Each control and control system must operate with the ease, smoothness and positiveness appropriate to its function. The flight control system shall be designed to continue to operate and must not hinder aeroplane recovery from any attitude.

Introduce new CS 25.671(e) and (f):

(e) The system design must ensure that the flight crew is made suitably aware whenever the primary control means nears the limit of control authority.

(f) If the design of the flight control system has multiple modes of operation, a means must be provided to indicate to the crew any mode that significantly changes or degrades the normal handling or operational characteristics of the aeroplane.

– END –

D-09 (SC): Airworthiness Standards for aircraft operations under snow both falling and blowing	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1093(b), CS 25J1093(b)
ADVISORY MATERIAL:	NPA 25E-341, AMC 25.1093 Amdt. 16

Special Condition

Modify CS 25.1093(b)(1) to read as follows :

(b) Turbine engines

(1) Each turbine engine must operate throughout the flight power range of the engine (including idling), without the accumulation of ice on the engine, inlet system components, or airframe components that would adversely affect engine operation or cause a serious loss of power or thrust

(i) Under the icing conditions specified in Appendix C.

(ii) In falling and blowing snow within the limitations established for the airplane for such operation.

– END –

D-18 (SC): Rudder Control Reversal Load Conditions	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.351, CS 25.671(a)
ADVISORY MATERIAL:	--

Special Condition

Rudder control reversal load conditions

The aeroplane must be designed for loads, considered as ultimate, resulting from the yaw manoeuvre conditions specified in paragraphs (a) through (e) of this requirement from the highest airspeed for which it is possible to achieve maximum rudder deflection at zero sideslip or VMC, whichever is greater, to V_C/M_C. These conditions are to be considered with the landing gear retracted and speed brakes (or spoilers when used as speed brakes) retracted. Flaps (or flaperons or any other aerodynamic devices when used as flaps) and slats extended configurations are also to be considered if they are used in en-route conditions. Unbalanced aerodynamic moments about the centre of gravity must be reacted in a rational or conservative manner considering the aeroplane inertia forces. In computing the loads on the aeroplane, the yawing velocity may be assumed to be zero.

(a) With the aeroplane in unaccelerated flight at zero yaw, it is assumed that the cockpit rudder control is displaced as specified in CS 25.351(a) and (b), with the exception that only 890 N (200 lbf) need be applied.

(b) With the aeroplane yawed to the overswing sideslip angle, it is assumed that the cockpit rudder control is suddenly displaced in the opposite direction to achieve the resulting rudder deflection, as limited by the control system or control surface stops, and as limited by the pilot force of 890 N (200 lbf).

(c) With the aeroplane yawed to the opposite overswing sideslip angle, it is assumed that the cockpit rudder control is suddenly displaced in the opposite direction to achieve the resulting rudder deflection, as limited by the control system or control surface stops, and as limited by the pilot force of 890 N (200 lbf).

(d) With the aeroplane yawed to the subsequent overswing sideslip angle, it is assumed that the cockpit rudder control is suddenly displaced in the opposite direction to achieve the resulting rudder deflection, as limited by the control system or control surface stops, and as limited by the pilot force of 890 N (200 lbf).

(e) With the aeroplane yawed to the opposite overswing sideslip angle, it is assumed that the cockpit rudder control is suddenly returned to neutral.

– END –

D-19 (SC): High Altitude Operation above 41.000 ft / High Cabin Heat Load	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.831, CS 25.841, CS 25.903, CS 25.1309
ADVISORY MATERIAL:	AMC 20-128A, AMC 25.1309, INT/POL/25/16

Special Condition

A - PRESSURE VESSEL INTEGRITY

For the damage tolerance evaluation, in addition to the damage sizes critical for residual strength, the damage sizes critical for depressurisation decay must be considered, taking also into account the (normal) unflawed pressurised cabin leakage rate. The resulting leakage rate must not result in the cabin altitude exceeding the cabin altitude time history shown in Figure 4.

B - VENTILATION

In lieu of the requirements of CS 25.831(a), the ventilation system must be designed to provide a sufficient amount of uncontaminated air to enable the crew members to perform their duties without undue discomfort and fatigue and to provide reasonable passenger comfort during normal operating conditions and also in the event of any probable failure of any system which could adversely affect the cabin ventilating air. For normal operations, crew members and passengers must be provided with at least 0·55 lb/min of fresh air per person or the equivalent in filtered, recirculated air based on the volume and composition at the corresponding cabin pressure altitude of not more than 8000 ft.

The supply of fresh air in the event of the loss of one source, should not be less than 0·4 lb/min per person for any period exceeding five minutes. However, reductions below this flow rate may be accepted provided that the compartment environment can be maintained at a level which is not hazardous to the occupant (text of the AMC 25.831(a) of CS 25).

C - AIR CONDITIONNING

In addition to the requirements of CS 25.831, paragraphs (b) through (e), the cabin cooling system must be designed to meet the following conditions during flight above 15 000 ft mean sea level (MSL):

1. After any probable failure, the cabin temperature-time history may not exceed the values shown in Figure 1.

2. After any improbable failure, the cabin temperature-time history may not exceed the values shown in Figure 2.

Other temperatures standards could be accepted by the EASA if they provide an equivalent level of safety.

D - PRESSURISATION

In addition to the requirements of CS 25.841, the following apply:

1. The pressurisation system, which includes for this purpose bleed air, air conditioning and pressure control systems, must prevent the cabin altitude from exceeding the cabin altitude-time history shown in Figure 3 after each of the following :

   a) Any probable double failure in the pressurisation system (CS 25.1309 may be applied).

   b) Any single failure in the pressurisation system combined with the occurrence of a leak produced by a complete loss of a door seal element, or a fuselage leak through an opening having an effective area 2.0 times the effective area which produces the maximum permissible fuselage leak rate approved for normal operation, whichever produces a more severe leak.

2. The cabin altitude-time history may not exceed that shown in Figure 4 after each of the following :

   a) The pressure vessel opening or duct failure resulting from probable damage (failure effect) while under maximum operating cabin pressure differential due to a tyre burst, loss of antennas or stall warning vanes, or any probable equipment failure (bleed air, pressure control, air conditioning, electrical source(s) ...) that affects pressurisation.

   b) Complete loss of thrust from engines.

3. In showing compliance with paragraph D.1 and D.2 of this special condition, it may be assumed that an emergency descent is made by an approved emergency procedure. A 17-seconds crew recognition and reaction time must be applied between cabin altitude warning and the initiation of emergency descent.

   For flight evaluation of the rapid descent, the test article must have the cabin volume representative of what is expected to be normal

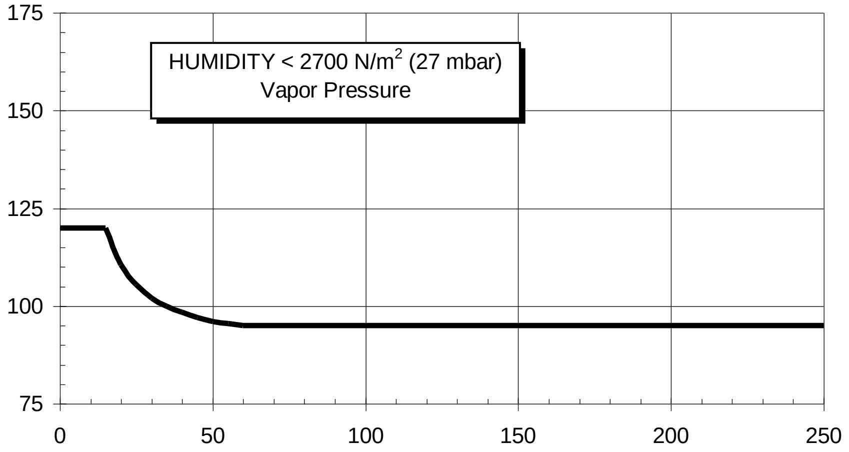
4. Engine rotor failures must be assessed according to the requirements of JAR 25.903(d)(1).

   In considering paragraph 8.d(2) of AMJ 20-128A, consideration must be given to the practicability and feasibility of minimising the depressurisation effects, assessing each aircraft configuration on a case-by-case basis, and taking into account the practices in the industry for each configuration.

E - OXYGEN SUPPLY

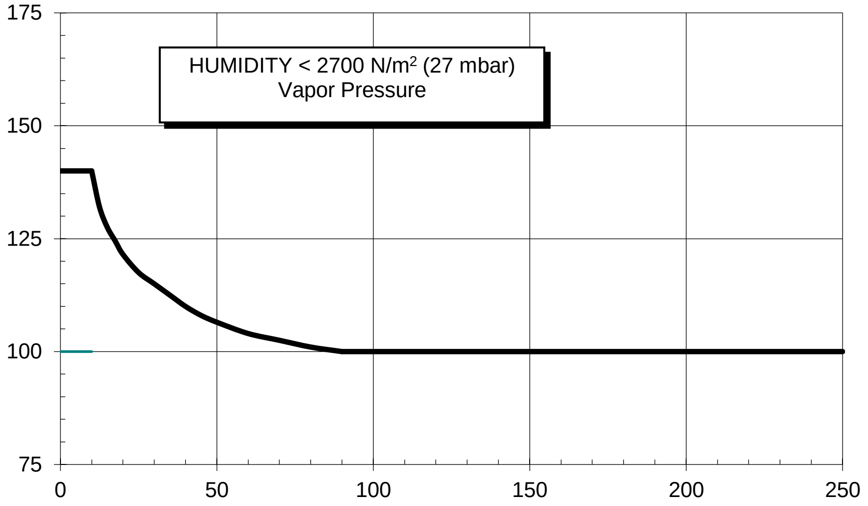
AFM procedure must be introduced to require that when operating at flight altitudes above flight level 410, one pilot at the controls of the airplane shall at all times wear and use an oxygen mask secured, sealed, and supplying oxygen. If certification for operation above 41,000 feet without equipment donned is intended, the applicant must substantiate that if a rapid depressurization occurs, the crew can recognize it and don equipment quickly enough to prevent unacceptable levels of hypoxia.

TEMPERATURE
(°F)



TIME - MINUTES
TIME - TEMPERATURE RELATIONSHIP
FIGURE 1

TEMPERATURE
(°F)



TIME - MINUTES
TIME - TEMPERATURE RELATIONSHIP
FIGURE 2

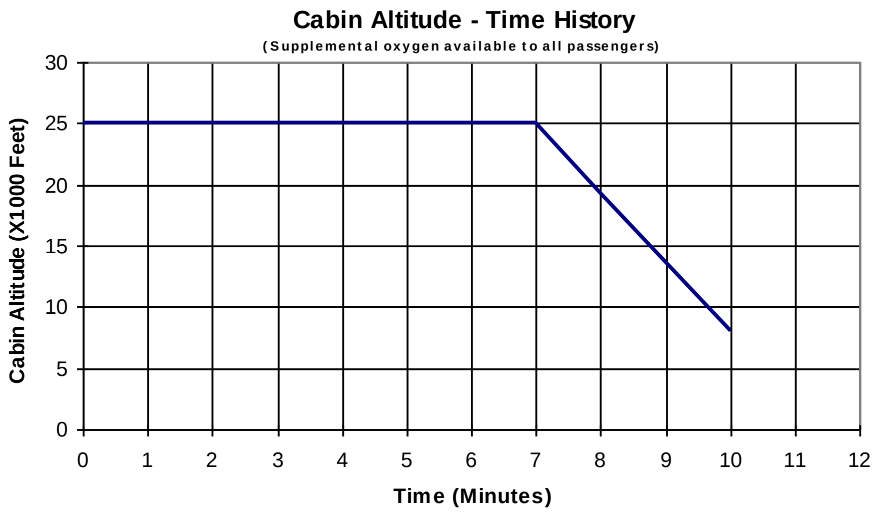


Figure 3

NOTE: For figure 3, time starts at the moment cabin altitude exceeds 8,000 feet during depressurization. If depressurization analysis shows that the cabin altitude limit of this curve is exceeded, the following alternate limitations apply: After depressurization, the maximum cabin altitude exceedence is limited to 30,000 feet. The maximum time the cabin altitude may exceed 25,000 feet is 2 minutes; time starting when the cabin altitude exceeds 25,000 feet and ending when it returns to 25,000 feet.

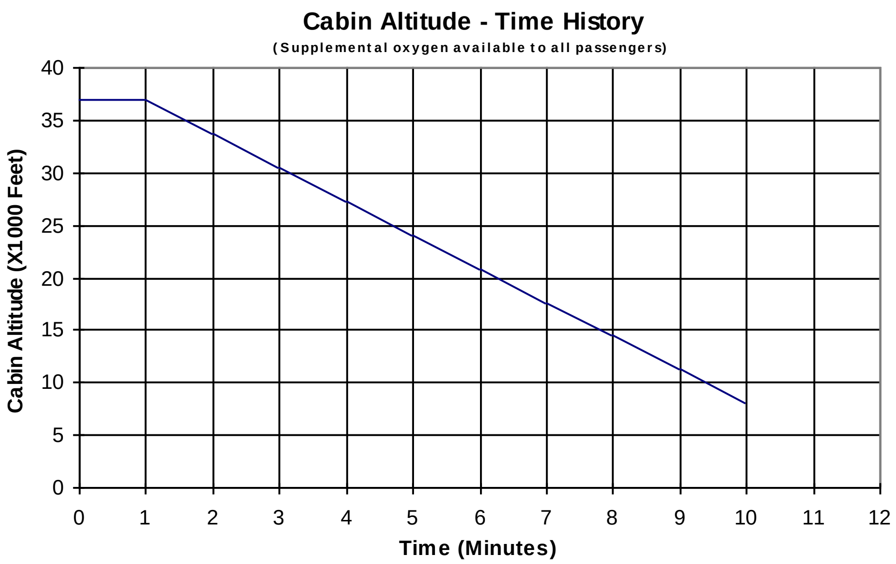


Figure 4

NOTE: For figure 4, time starts at the moment cabin altitude exceeds 8,000 feet during depressurization. If depressurization analysis shows that the cabin altitude limit of this curve is exceeded, the following alternate limitations apply: After depressurization, the maximum cabin altitude exceedence is limited to 40,000 feet. The maximum time the cabin altitude may exceed 25,000 feet is 2 minutes; time starting when the cabin altitude exceeds 25,000 feet and ending when it returns to 25,000 feet.

– END –

D-27 (SC): Side-Facing Seats – Installation of Airbag Systems	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.785(b), 25.562
ADVISORY MATERIAL:	FAA PS-ANM-25-03-R1

Special Condition

See sections **"The Special Conditions"** in FAA Special Condition 25-721-SC attached, complemented with the following additional conditions:

a) The following clarification is provided to special condition n.7 and is considered part of this special condition: *When making a compliance finding for condition number 7 there are two requirements to consider. The first being that an airbag deployment must not cause injury to anyone who may be positioned close to the structure-mounted airbag (e.g., seated in an adjacent seat, or standing adjacent to the airbag installation or the subject seat). Cases where a structure-mounted airbag is inadvertently deployed near a seated occupant or an empty seat must be considered. The second is potential injuries that could impede rapid egress of the airplane. The applicant must demonstrate that an inadvertent deployment that could cause injury to a standing or sitting person is improbable. Compliance for these requirements may be shown by company provided static test deployment of the airbag system and a qualitative evaluation of potential injuries to the occupants by review of head accelerometer data and video data of head, neck and upper torso motion.*

b) Evaluation of the deployment of the airbag must take into account the deflection or deformation of the installation during the crash pulse. If installed in a monument used for stowage, this should include the possible range of loading conditions. The effects of any loads imposed by the airbag deployment on the positioning of the airbag should also be included in the evaluation. The HIC test may be performed with the airbag deploying from a rigid test fixture provided that the above factors and the occupant size considerations in paragraph 4) are taken into account. A rational analysis supported by static deployment tests would be acceptable.

$Q_j = (T_j)(P_j)$

Where:

T_j = Average time spent in failure condition j (in hours)

P_j = Probability of occurrence of failure mode j (per hour)

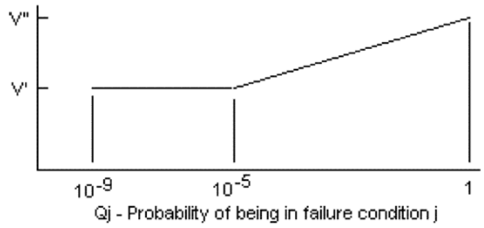
Note: If P_j is greater than 10^{-3} per flight hour then a 1.5 factor of safety must be applied to all limit load conditions specified in Subpart C.

iii. For residual strength substantiation, the airplane must be able to withstand two thirds of the ultimate loads defined in paragraph (6)(b)(ii) of the special condition. For pressurized cabins, these loads must be combined with the normal operating differential pressure.

iv. If the loads induced by the failure condition have a significant effect on fatigue or damage tolerance then their effects must be taken into account.

v. Freedom from aeroelastic instability must be shown up to a speed determined from Figure 3. Flutter clearance speeds V′ and V″ may be based on the speed limitation specified for the remainder of the flight using the margins defined by § 25.629(b).

Figure 3
Clearance speed



V′ = Clearance speed as defined by § 25.629(b)(2).

V″ = Clearance speed as defined by § 25.629(b)(1).

Qj = (Tj)(Pj) where:

Tj = Average time spent in failure condition j (in hours)

Pj = Probability of occurrence of failure mode j (per hour)

Note: If Pj is greater than 10^{-3} per flight hour, then the flutter clearance speed must not be less than V″.

vi. Freedom from aeroelastic instability must also be shown up to V′ in Figure 3 above, for any probable system failure condition combined with any damage required or selected for investigation by § 25.571(b).

c. Consideration of certain failure conditions may be required by other sections of 14 CFR part 25 regardless of calculated system reliability. Where analysis shows the probability of these failure conditions to be less than 10^{-9} per flight hour, criteria other than those specified in this paragraph may be used for structural substantiation to show continued safe flight and landing.

7. Failure indications. For system failure detection and indication, the following apply:

a. The system must be checked for failure conditions, not extremely improbable, that degrade the structural capability below the level required by part 25 or significantly reduce the reliability of the remaining system. As far as reasonably practicable, the flight crew must be made aware of these failures before flight. Certain elements of the control system, such as mechanical and hydraulic components, may use special periodic inspections, and electronic components may use daily checks, in lieu of detection and indication systems to achieve the objective of this requirement. These certification maintenance requirements must be limited to components that are not readily detectable by normal detection and indication systems and where service history shows that inspections will provide an adequate level of safety.

b. The existence of any failure condition, not extremely improbable, during flight that could significantly affect the structural capability of the airplane and for which the associated reduction in airworthiness can be minimized by suitable flight limitations, must be signaled to the flight crew. For example, failure conditions that result in a factor of safety between the airplane strength and the loads of 14 CFR part 25, subpart C, below 1.25, or flutter margins below V″, must be signaled to the crew during flight.

8. Dispatch with known failure conditions. If the airplane is to be dispatched in a known system failure condition that affects structural performance, or affects the reliability of the remaining system to maintain structural performance, then the provisions of this special condition must be met, including the provisions of paragraph (5) for the dispatched condition, and paragraph (6) for subsequent failures. Expected operational limitations may be taken into account in establishing Pj as the probability of failure occurrence for determining the safety margin in Figure 1. Flight limitations and expected operational limitations may be taken into account in establishing Qj as the combined probability of being in the dispatched failure condition and the subsequent failure condition for the safety margins in Figures 2 and 3. These limitations must be such that the probability of being in this combined failure state and then subsequently encountering limit load conditions is extremely improbable. No reduction in these safety margins is allowed if the subsequent system failure rate is greater than 10^{-3} per flight hour.

Issued in Des Moines, Washington.

Victor Wicklund,

Manager, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service.

[FR Doc. 2018–07277 Filed 4–9–18; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA–2018–0247; Special Conditions No. 25–721–SC]

Special Conditions: Textron Aviation Inc. Model 700 Series Airplanes; Side-Facing Seats—Installation of Airbag Systems

AGENCY: Federal Aviation Administration (FAA), DOT.

Federal Register / Vol. 83, No. 69 / Tuesday, April 10, 2018 / Rules and Regulations 15305

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Textron Aviation Inc. (Textron), Model 700 series airplanes that feature an inflatable airbag system on multiple-place and single-place side-facing seats (*i.e.,* seats positioned in the airplane with the occupant facing 90 degrees to the direction of airplane travel). The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: This action is effective on Textron Aviation Inc. on April 10, 2018. Send comments on or before May 25, 2018.

ADDRESSES: Send comments identified by Docket No. FAA–2018–0247 using any of the following methods:

- *Federal eRegulations Portal:* Go to *http://www.regulations.gov/*and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M–30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE, Room W12–140, West Building Ground Floor, Washington, DC 20590–0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

Privacy: The FAA will post all comments it receives, without change, to *http://www.regulations.gov/,* including any personal information the commenter provides. Using the search function of the docket website, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477–19478).

Docket: Background documents or comments received may be read at *http://www.regulations.gov/* at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Alan Sinclair, FAA, Airframe and Cabin Safety Section, AIR–675, Transport Standards Branch, Aircraft Certification Service, 2200 South 216th St., Des Moines, Washington 98198–6547, telephone 206–231–3215, email *Alan.Sinclair@faa.gov.*

SUPPLEMENTARY INFORMATION: The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions is unnecessary because the substance of these special conditions has been published in the **Federal Register** for public comment in several prior instances with no substantive comments received. The FAA therefore has determined that prior public notice and comment are unnecessary, and finds that, for the same reason, good cause exists for making these special conditions effective upon publication in the **Federal Register**.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On November 20, 2014, Textron applied for a type certificate for the Textron Model 700 series airplanes. The Textron Model 700 series airplanes are low-wing, executive jet airplanes with seating provisions for 2 crewmembers and up to 12 passengers. These airplanes will have a maximum takeoff weight of 38,514 lbs.

Textron's proposed passenger seating arrangement(s) include a baseline 9-place and an optional 8-place and 10-place configuration. The baseline configuration includes a forward right hand belted single-place side-facing seat. An optional 10-place seat configuration includes a left hand, aft-belted, three-place side-facing couch. The multiple-place and single-place side-facing seats can be occupied for taxi, takeoff, and landing, and incorporate an inflatable airbag occupant protection system integrated into the side-facing seats. The FAA determined that inflatable airbag systems are a novel or unusual design feature and the existing airworthiness regulations do not provide adequate or appropriate safety standards.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.17, Textron must show that the Textron Model 700 series airplanes meet the applicable provisions of part 25, as amended by Amendments 25–1 through 25–141.

If the Administrator finds that the applicable airworthiness regulations (*i.e.,* 14 CFR part 25) do not contain adequate or appropriate safety standards for the Textron Model 700 series airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Textron Model 700 series airplanes must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34 and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Textron Model 700 series airplanes will incorporate the following novel or unusual design feature:

An inflatable airbag system on multiple-place and single-place side-facing seats installed in Textron Model 700 series airplanes, in order to reduce the potential for both head and leg injury in the event of an accident.

Discussion

Side-facing seats are considered a novel design for transport category airplanes that include §§ 25.562 and 25.785 at Amendment 25–64 in their certification basis, and were not considered when those airworthiness standards were issued. The FAA has determined that the existing regulations do not provide adequate or appropriate safety standards for occupants of side-facing seats. To provide a level of safety

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that is equivalent to that afforded to occupants of forward- and aft-facing seats, additional airworthiness standards in the form of special conditions are necessary.

On June 16, 1988, 14 CFR part 25 was amended by Amendment 25–64 to revise the emergency-landing conditions that must be considered in the design of transport category airplanes. Amendment 25–64 revised the static-load conditions in § 25.561, and added a new § 25.562 that required dynamic testing for all seats approved for occupancy during takeoff and landing. The intent of Amendment 25–64 was to provide an improved level of safety for occupants on transport category airplanes. However, because most seating on transport category airplanes is forward-facing, the pass/fail criteria developed in Amendment 25–64 focused primarily on these seats. For some time, the FAA granted exemptions for the multiple-place side-facing-seat installations because the existing test methods and acceptance criteria did not produce a level of safety equivalent to the level of safety provided for forward- and aft-facing seats. These exemptions were subject to many conditions that reflected the injury-evaluation criteria and mitigation strategies available at the time of the exemption issuance.

The FAA also issued special conditions to address single-place side-facing seats based on the data available at the time the FAA issued those special conditions. Continuing concerns regarding the safety of side-facing seats prompted the FAA to conduct research to develop an acceptable method of compliance with §§ 25.562 and 25.785(b) for side-facing seat installations. That research has identified injury considerations and evaluation criteria in addition to those previously used to approve side-facing seats (see published report DOT/FAA/AR–09/41, July 2011).

One particular concern that was identified during the FAA's research program, but not addressed in the previous special conditions, was the significant leg injuries that can occur to occupants of both single- and multiple-place side-facing seats. Because this type of injury does not occur on forward- and aft-facing seats, the FAA determined that, to achieve the level of safety envisioned in Amendment 25–64, additional requirements would be needed as compared to previously issued special conditions. Nonetheless, the research has now allowed the development of a single set of special conditions that is applicable to all fully side-facing seats.

On November 5, 2012, the FAA released Policy Statement PS–ANM–25–03–R1, "Technical Criteria for Approving Side-Facing Seats," to update existing FAA certification policy on §§ 25.562 and 25.785(a) at Amendment 25–64 for single- and multiple-place side-facing seats. This policy addresses both the technical criteria for approving side-facing seats and the implementation of those criteria. The FAA methodology detailed in Policy Statement PS–ANM–25–03–R1 was used to establish a new set of proposed special conditions that incorporated conditions for exemptions developed prior to the policy and included in these new special conditions, others that reflect current research findings specifically for neck and leg protection. We have frequently issued these new special conditions for airbag systems in the shoulder belts. While the Textron design integrate the airbag systems into the side-facing seats that deploy from a different location then the shoulder belts, the airbag will inflate at the same locations as those in the shoulder belts. Therefore, the FAA is using the same special conditions as for airbag systems in shoulder belts for this Textron design as the airbag system functions the same.

In Policy Statement PS–ANM–25–03–R1, conditions 1 and 2 are applicable to all side-facing seat installations, whereas conditions 3 through 16 represent additional requirements applicable to side-facing seats equipped with an airbag system in the shoulder belt. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Applicability

As discussed above, these special conditions are applicable to the Textron Model 700 series airplanes Should Textron apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on one model of airplane. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

Authority Citation

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis.

In addition to the requirements of §§ 25.562 and 25.785, the following special condition numbers 1 and 2 are part of the type certification basis of the Textron Model 700 series airplanes with side-facing seat installations. For seat places equipped with airbag systems, additional special condition numbers 3 through 16 are part of the type certification basis.

1. Additional requirements applicable to tests or rational analysis conducted to show compliance with §§ 25.562 and 25.785 for side-facing seats:

a. The longitudinal test(s) conducted in accordance with § 25.562(b)(2) to show compliance with the seat-strength requirements of § 25.562(c)(7) and (8), and these special conditions must have an ES–2re anthropomorphic test dummy (ATD) (49 CFR part 572, subpart U) or equivalent, or a Hybrid-II ATD (49 CFR part 572, subpart B, as specified in § 25.562) or equivalent, occupying each seat position and including all items contactable by the occupant (*e.g.,* armrest, interior wall, or furnishing) if those items are necessary to restrain the occupant. If included, the floor representation and contactable items must be located such that their relative position, with respect to the center of the nearest seat place, is the same at the start of the test as before floor misalignment is applied. For example, if floor misalignment rotates the centerline of the seat place nearest the contactable item 8 degrees clockwise about the airplane x-axis, then the item and floor representations must be rotated by 8 degrees clockwise also to maintain the same relative position to the seat place, as shown in Figure 1. Each ATD's relative position to the seat after application of floor misalignment must be the same as before misalignment is applied. To ensure proper loading of the seat by the occupants, the ATD pelvis must remain supported by the seat pan, and the restraint system must remain on the pelvis and shoulder of the ATD until rebound begins. No injury-criteria evaluation is necessary for tests conducted only to assess seat-strength requirements.

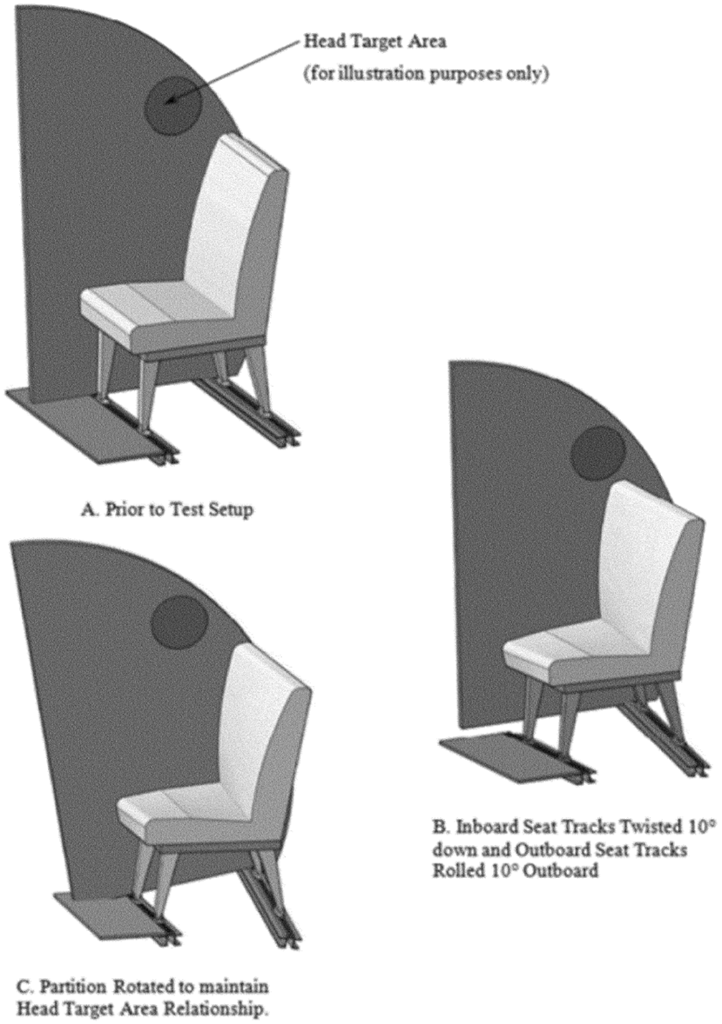

Figure 1: Head Target Areas Relative to Seat Position

b. The longitudinal test(s) conducted in accordance with § 25.562(b)(2), to show compliance with the injury assessments required by § 25.562(c) and these special conditions, may be conducted separately from the test(s) to show structural integrity. In this case, structural-assessment tests must be conducted as specified in paragraph 1a, above, and the injury-assessment test must be conducted without yaw or floor misalignment. Injury assessments may be accomplished by testing with ES–2re ATD (49 CFR part 572, subpart U) or equivalent at all places. Alternatively, these assessments may be accomplished by multiple tests that use an ES–2re at the seat place being evaluated, and a Hybrid-II ATD (49 CFR part 572, subpart B, as specified in § 25.562) or equivalent used in all seat places forward of the one being assessed, to evaluate occupant interaction. In this case, seat places aft of the one being assessed may be unoccupied. If a seat installation includes adjacent items that are contactable by the occupant, the injury potential of that contact must be assessed. To make this assessment, tests may be conducted that include the actual item, located and attached in a representative fashion. Alternatively, the injury potential may be assessed by a combination of tests with items having the same geometry as the actual item, but having stiffness characteristics that would create the worst case for injury (injuries due to both contact with the item and lack of support from the item).

c. If a seat is installed aft of structure (*e.g.,* an interior wall or furnishing) that does not have a homogeneous surface contactable by the occupant, additional analysis and/or test(s) may be required to demonstrate that the injury criteria are met for the area which an occupant could contact. For example, different yaw angles could result in different injury considerations and may require additional analysis or separate test(s) to evaluate.

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d. To accommodate a range of occupant heights (5th percentile female to 95th percentile male), the surface of items contactable by the occupant must be homogenous 7.3 inches (185 mm) above and 7.9 inches (200 mm) below the point (center of area) that is contacted by the 50th percentile male size ATD's head during the longitudinal test(s) conducted in accordance with paragraphs 1a, 1b, and 1c, of these special conditions. Otherwise, additional head-injury criteria (HIC) assessment tests may be necessary. Any surface (inflatable or otherwise) that provides support for the occupant of any seat place must provide that support in a consistent manner regardless of occupant stature. For example, if an inflatable shoulder belt is used to mitigate injury risk, then it must be demonstrated by inspection to bear against the range of occupants in a similar manner before and after inflation. Likewise, the means of limiting lower-leg flail must be demonstrated by inspection to provide protection for the range of occupants in a similar manner.

e. For longitudinal test(s) conducted in accordance with § 25.562(b)(2) and these special conditions, the ATDs must be positioned, clothed, and have lateral instrumentation configured as follows:

i. *ATD positioning:*

(1) Lower the ATD vertically into the seat while simultaneously (see Figure 2 for illustration):

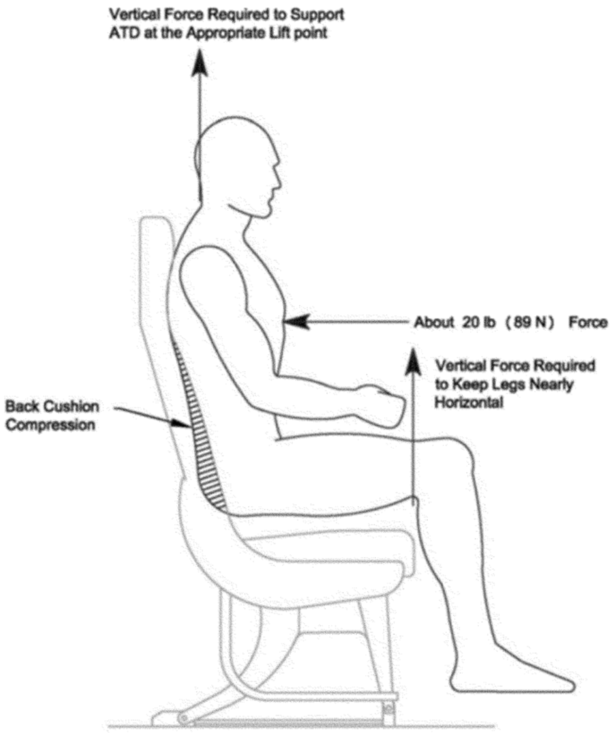

Figure 2: ATD Positioning

(a) Aligning the midsagittal plane (a vertical plane through the midline of the body; dividing the body into right and left halves) with approximately the middle of the seat place.

(b) Applying a horizontal x-axis direction (in the ATD coordinate system) force of about 20 lbs. (89 N) to the torso at approximately the intersection of the midsagittal plane and the bottom rib of the ES–2re or lower sternum of the Hybrid-II at the midsagittal plane, to compress the seat back cushion.

(c) Keeping the upper legs nearly horizontal by supporting them just behind the knees.

(2) Once all lifting devices have been removed from the ATD:

Rock it slightly to settle it in the seat.

(a) Separate the knees by about 4 inches (100 mm).

(b) Set the ES–2re's head at approximately the midpoint of the available range of z-axis rotation (to align the head and torso midsagittal planes).

(c) Position the ES–2re's arms at the joint's mechanical detent that puts them at approximately a 40 degree angle with respect to the torso. Position the Hybrid-II ATD hands on top of its upper legs.

(d) Position the feet such that the centerlines of the lower legs are approximately parallel to a lateral vertical plane (in the aircraft coordinate system).

ii. *ATD clothing:* Clothe each ATD in form-fitting, mid-calf-length (minimum) pants and shoes (size 11E) weighing about 2.5 lbs. (1.1 Kg) total. The color of the clothing should be in contrast to the color of the restraint system. The ES–2re jacket is sufficient for torso clothing, although a form-fitting shirt may be used in addition if desired.

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iii. *ES–2re ATD lateral instrumentation:* The rib-module linear slides are directional, *i.e.,* deflection occurs in either a positive or negative ATD y-axis direction. The modules must be installed such that the moving end of the rib module is toward the front of the aircraft. The three abdominal-force sensors must be installed such that they are on the side of the ATD toward the front of the aircraft.

f. The combined horizontal/vertical test, required by § 25.562(b)(1) and these special conditions, must be conducted with a Hybrid II ATD (49 CFR part 572, subpart B, as specified in § 25.562), or equivalent, occupying each seat position.

g. Restraint systems:

i. If inflatable restraint systems are used, they must be active during all dynamic tests conducted to show compliance with § 25.562.

ii. The design and installation of seat-belt buckles must prevent unbuckling due to applied inertial forces or impact of the hands/arms of the occupant during an emergency landing.

2. Additional performance measures applicable to tests and rational analysis conducted to show compliance with §§ 25.562 and 25.785 for side-facing seats:

a. *Body-to-body contact:* Contact between the head, pelvis, torso, or shoulder area of one ATD with the adjacent-seated ATD's head, pelvis, torso, or shoulder area is not allowed. Contact during rebound is allowed.

b. *Thoracic:* The deflection of any of the ES–2re ATD upper, middle, and lower ribs must not exceed 1.73 inches (44 mm). Data must be processed as defined in Federal Motor Vehicle Safety Standards (FMVSS) 571.214.

c. *Abdominal:* The sum of the measured ES–2re ATD front, middle, and rear abdominal forces must not exceed 562 lbs. (2,500 N). Data must be processed as defined in FMVSS 571.214.

d. *Pelvic:* The pubic symphysis force measured by the ES–2re ATD must not exceed 1,350 lbs. (6,000 N). Data must be processed as defined in FMVSS 571.214.

e. *Leg:* Axial rotation of the upper-leg (femur) must be limited to 35 degrees in either direction from the nominal seated position.

f. *Neck:*

As measured by the ES–2re ATD and filtered at CFC 600 as defined in SAE J211:

i. The upper-neck tension force at the occipital condyle (O.C.) location must be less than 405 lbs. (1,800 N).

ii. The upper-neck compression force at the O.C. location must be less than 405 lbs. (1,800 N).

iii. The upper-neck bending torque about the ATD x-axis at the O.C. location must be less than 1,018 in lbs. (115 Nm).

iv. The upper-neck resultant shear force at the O.C. location must be less than 186 lbs. (825 N).

g. *Occupant (ES–2re ATD) retention:* The pelvic restraint must remain on the ES–2re ATD's pelvis during the impact and rebound phases of the test. The upper-torso restraint straps (if present) must remain on the ATD's shoulder during the impact.

h. *Occupant (ES–2re ATD) support:*

i. *Pelvis excursion:* The load-bearing portion of the bottom of the ATD pelvis must not translate beyond the edges of its seat's bottom seat-cushion supporting structure.

ii. *Upper-torso support:* The lateral flexion of the ATD torso must not exceed 40 degrees from the normal upright position during the impact.

3. For seats with an airbag system, show that the airbag system will deploy and provide protection under crash conditions where it is necessary to prevent serious injury. The means of protection must take into consideration a range of stature from a 2-year-old child to 95th percentile male. The airbag system must provide a consistent approach to energy absorption throughout that range of occupants. When the seat systems include airbag systems, the systems must be included in each of the certification tests as they would be installed in the airplane. In addition, the following situations must be considered:

a. The seat occupant is holding an infant.

b. The seat occupant is a pregnant woman.

4. The airbag systems must provide adequate protection for each occupant regardless of the number of occupants of the seat assembly, considering that unoccupied seats may have an active airbag system.

5. The design must prevent the airbag systems from being incorrectly installed, such that the airbag systems would not properly deploy. Alternatively, it must be shown that such deployment is not hazardous to the occupant and will provide the required injury protection.

6. It must be shown that the airbag system is not susceptible to inadvertent deployment as a result of wear and tear, or inertial loads resulting from in-flight or ground maneuvers (including gusts and hard landings), and other operating and environment conditions (vibrations, moisture, etc.) likely to occur in service.

7. Deployment of the airbag system must not introduce injury mechanisms to the seated occupant or result in injuries that could impede rapid egress. This assessment should include an occupant whose belt is loosely fastened.

8. It must be shown that inadvertent deployment of the airbag system during the most critical part of the flight, will either meet the requirement of § 25.1309(b) or not cause a hazard to the airplane or its occupants.

9. It must be shown that the airbag system will not impede rapid egress of occupants 10 seconds after airbag deployment.

10. The airbag systems must be protected from lightning and high-intensity radiated fields (HIRF). The threats to the airplane specified in existing regulations regarding lightning, § 25.1316, and HIRF, § 25.1317, are incorporated by reference for the purpose of measuring lightning and HIRF protection.

11. The airbag system must function properly after loss of normal aircraft electrical power, and after a transverse separation of the fuselage at the most critical location. A separation at the location of the airbag systems does not have to be considered.

12. It must be shown that the airbag system will not release hazardous quantities of gas or particulate matter into the cabin.

13. The airbag system installations must be protected from the effects of fire such that no hazard to occupants will result.

14. A means must be available for a crew member to verify the integrity of the airbag activation system prior to each flight or it must be demonstrated to reliably operate between inspection intervals. The FAA considers that the loss of the airbag system deployment function alone (*i.e.,* independent of the conditional event that requires the airbag system deployment) is a major-failure condition.

15. The inflatable material may not have an average burn rate of greater than 2.5 inches/minute when tested using the horizontal flammability test defined in part 25, appendix F, part I, paragraph (b)(5).

16. The airbag system, once deployed, must not adversely affect the emergency lighting system (*e.g.,* block floor proximity lights to the extent that the lights no longer meet their intended function).

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Issued in Des Moines, Washington.

Victor Wicklund,

Manager, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service.

[FR Doc. 2018–07278 Filed 4–9–18; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2017–1120; Product Identifier 2017–CE–030–AD; Amendment 39–19244; AD 2018–07–13]

RIN 2120–AA64

Airworthiness Directives; Textron Aviation Inc. Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for certain Textron Aviation Inc. Models 510, 680, and 680A airplanes equipped with certain part number brake assemblies. This AD was prompted by a report that brake pad wear indicator pins were set incorrectly, which could lead to brake pad wear beyond the acceptable limits without indication. This AD requires inspection of the brake pad wear indicator pins and replacement of the brake assembly if any pin is set incorrectly. We are issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective May 15, 2018.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of May 15, 2018.

ADDRESSES: For service information identified in this final rule, contact Textron Aviation Inc., One Cessna Boulevard, P.O. Box 7704, Wichita, Kansas 67277; phone: 316–517–6215; email: *citationpubs@txtav.com;* internet: *https://support.cessna.com/custsupt/csupport/newlogin.jsp;* or UTC Aerospace Systems, Goodrich Corporation, 101 Waco Street, P.O. Box 340, Troy, Ohio 45373; phone: 937–339–3811; email: *awb.techpubs@utas.utc.com;* internet: *https://www.customers.utcaerospacesystems.com/.* You may view this service information at the FAA, Policy and Innovation Division, 901 Locust, Kansas City, Missouri 64106. For information on the availability of this material at the FAA, call (816) 329–4148. It is also available on the internet at *http://www.regulations.gov* by searching for and locating Docket No. FAA–2017–1120.

Examining the AD Docket

You may examine the AD docket on the internet at *http://www.regulations.gov* by searching for and locating Docket No. FAA–2017–1120; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the regulatory evaluation, any comments received, and other information. The address for Docket Operations (phone: 800–647–5527) is U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: CONTACT ONE OF THE FOLLOWING:

- *For the Model 510:* David Enns, Aerospace Engineer, Wichita ACO Branch, FAA, 1801 Airport Road, Room 100, Wichita, Kansas 67209; phone: 316–946–4147; fax: 913–946–4107; email: *david.enns@faa.gov;* or
- *For the Models 680 and 680A:* Adam Hein, Aerospace Engineer, Wichita ACO Branch, FAA, 1801 Airport Road, Room 100, Wichita, Kansas 67209; phone: 316–946–4116; fax: 316–946–4107; email: *adam.hein@faa.gov.*

SUPPLEMENTARY INFORMATION:

Discussion

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain Textron Aviation Inc. (Textron) Models 510, 680, and 680A airplanes equipped with brake assemblies, part numbers (P/Ns) 2–1706–1 and 2–1675–1, with certain serial numbers. The NPRM published in the **Federal Register** on December 11, 2017 (82 FR 58140). The NPRM was prompted by a report that brake pad wear indicator pins were set incorrectly, which could lead to brake pad wear beyond the acceptable limits without indication. Brakes overhauled by UTC may have wear indicator pins set longer than specified. UTC discovered this condition during their inspection of incoming brakes. This condition, if not corrected, could result in brake pad wear beyond the acceptable limits without indication and consequent loss of braking ability, which could lead to a runway excursion. We are issuing this AD to address the unsafe condition on these products.

Comments

We gave the public the opportunity to participate in developing this final rule. The following presents the comments received on the NPRM and the FAA's response to each comment.

Request Clarification for FAA-Approved Replacement Instructions

Mark Mitcheson of NetJets Aviation requested specifics on "FAA-approved replacement instructions approved specifically for this AD." We infer he wants clarification of the intent of this statement.

We agree that the language quoted by the commenter and used in the NPRM was confusing. We intended to direct those responsible for complying with the requirements of the AD to the type certificate holder, in this case Textron Aviation Inc., to obtain the replacement instructions (*i.e.,* maintenance manuals) specific to the applicable airplane models affected by this AD.

We modified in this AD the language quoted by the commenter to more accurately reflect our intent.

Request Parts Installation Prohibition

Mark Mitcheson requested whether the AD should prohibit the installation of the affected parts.

We partially agree. We agree operators should avoid installing the affected part because parts that do not meet type design could introduce the unsafe condition onto the airplane. However, we disagree with adding a specific requirement to the AD prohibiting the installation of the affected part. This AD requires inspection of the installed affected parts, and, if an affected part is installed, the airplane will immediately be subject to the requirements of this AD.

Conclusion

We reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this final rule with the change described previously and minor editorial changes. We have determined that these changes:

- Are consistent with the intent that was proposed in the NPRM for addressing the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM.

We also determined that these changes will not increase the economic burden on any operator or increase the scope of this final rule.

– END –

D-33 (SC): Occupant Protection for Side-Facing Seat Installed Forward of Aft-Facing Seat	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25. 25.561, 25.562, 25.785, 25.1301 amdt. 15
ADVISORY MATERIAL:	--

Special Condition

See sections **"The Special Conditions"** in FAA Special Condition 25-724-SC attached.

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(iii) The FDIC has notified you, in connection with its review of a capital restoration plan required under section 38 of the Federal Deposit Insurance Act or subpart H of part 324 of this chapter or otherwise, that a notice is required under §§ 390.360 through 390.368; or

* * * * *

§§ 390.450 through 390.455 [Removed and Reserved]

■ 56. Remove and reserve §§ 390.450 through 390.455.

■ 57. Section 390.457 is amended by revising paragraphs (a)(1)(i)(A) and (a)(1)(ii) to read as follows:

§ 390.457 Procedures for reclassifying a State savings association based on criteria other than capital.

(a) * * *

(1) * * *

(i) * * *

(A) Pursuant to § 324.403(d) of this chapter, the FDIC may reclassify a well capitalized State savings association as adequately capitalized or subject an adequately capitalized or undercapitalized institution to the supervisory actions applicable to the next lower capital category if:

(*1*) The FDIC determines that the State savings association is in unsafe or unsound condition; or

(*2*) The FDIC deems the State savings association to be engaged in an unsafe or unsound practice and not to have corrected the deficiency.

* * * * *

(ii) *Prior notice to institution*. Prior to taking action pursuant to § 324.403(d) of this chapter, the FDIC shall issue and serve on the State savings association a written notice of the FDIC's intention to reclassify the State savings association.

* * * * *

Subpart Z—[Removed and Reserved]

■ 58. Remove and reserve subpart Z.

Dated at Washington, DC, on March 20, 2018.

By order of the Board of Directors.

Federal Deposit Insurance Corporation.

Valerie Best,

Assistant Executive Secretary.

[FR Doc. 2018–06881 Filed 4–23–18; 8:45 am]

BILLING CODE 6714–01–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA–2017–0637; Special Conditions No. 25–724–SC]

Special Conditions: Textron Aviation Inc. Model 700 Airplane; Occupant Protection for Side-Facing Seats Installed Forward of Aft-Facing Seats

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Textron Aviation Inc. (Textron) Model 700 airplane. This airplane will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is side-facing seats installed forward of aft-facing seats. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: This action is effective on Textron on April 24, 2018. Send your comments by June 8, 2018.

ADDRESSES: Send comments identified by docket number FAA–2017–0637 using any of the following methods:

- *Federal eRegulations Portal:* Go to *http://www.regulations.gov/* and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M–30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE, Room W12–140, West Building Ground Floor, Washington, DC, 20590–0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

Privacy: The FAA will post all comments it receives, without change, to *http://www.regulations.gov/*, including any personal information the commenter provides. Using the search function of the docket website, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477–19478).

Docket: Background documents or comments received may be read at *http://www.regulations.gov/* at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Alan Sinclair, FAA, Airframe and Cabin Safety Section, AIR–675, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service, 1601 Lind Avenue SW, Renton, Washington 98057–3356; telephone 425–227–2195; facsimile 425–227–1320.

SUPPLEMENTARY INFORMATION: The substance of these special conditions has been published in the **Federal Register** for public comment in several prior instances with no substantive comments received. The FAA therefore finds it unnecessary to delay the effective date and finds that good cause exists for making these special conditions effective upon publication in the **Federal Register**.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On November 20, 2014, Textron applied for a type certificate for their new Model 700 airplane. The Model 700 airplane is a turbofan-powered executive-jet airplane with seating for two crewmembers and 12 passengers. This airplane will have a maximum takeoff weight of 38,514 pounds.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.17, Textron must show that the Model 700 airplane meets the applicable provisions of 14 CFR part 25, as amended by

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Amendments 25–1 through 25–139, 25–141, and 25–143.

If the Administrator finds that the applicable airworthiness regulations (*i.e.*, 14 CFR part 25) do not contain adequate or appropriate safety standards for the Textron Model 700 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model 700 airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Textron Model 700 will incorporate the following novel or unusual design feature: Side-facing seats installed forward of aft-facing seats.

Discussion

Many of the Textron Model 700 interior configurations include a multiple-place side-facing seat installed just forward of an aft-facing seat. There is the possibility of interaction between the aft-facing seat and the occupant in the aft-most seating position on the multiple-place side-facing seat. Textron is proposing to install a structural armrest aft of the multiple-place side-facing seat and forward of the aft-facing seat. See Figure 1.

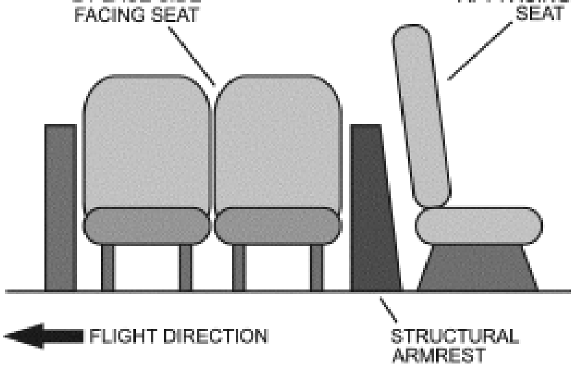

Figure 1: Seat Installation

Dynamic seat testing is required of all applicants who plan to install side-facing and oblique-angled seats in passenger airplanes. The intent of dynamic seat testing is to evaluate airplane seats, restraints, and related interior systems to demonstrate their structural strength and their ability to protect an occupant from serious injuries in a survivable crash. The current regulations in §§ 25.561, 25.562, and 25.785 address occupant injury protection for forward and aft-facing seats.

The FAA will issue special conditions separately to address the additional occupant-injury protection concerns raised for side-facing seats. However, the aft occupant of the side-facing seat (see Figure 1 in these special conditions) may interact with the aft-facing seat, a scenario that the regulations do not specifically address.

The aft-facing seat back could deform during the dynamic-test event, and could contact the occupant in the aft side-facing seat. The point that the seat back contacts the occupant could be in an area of the body that has no defined, acceptable, injury-evaluation method, such as the shoulder. This type of contact is addressed in these side-facing-seat special conditions, which prohibit body-to-body contact.

The applicant proposed installing a structural armrest between the side-facing seat and the aft-facing seat to help prevent contact between the aft-facing seat and the aft occupant of the side-facing seat. This contact would be likely to occur if the structural armrest failed to perform as intended in an emergency landing. Therefore, the purpose of these special conditions is to define the specific structural requirements of the proposed structural armrest, and the additional requirements necessary to protect the seated occupant from both the side-facing seat and the adjacent aft-facing seat.

The applicant is likely to have to conduct two or more 16g forward structural tests with the combination of the side-facing seat, structural armrest, and aft-facing seat to account for all critical cases.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Applicability

As discussed above, these special conditions are applicable to the Textron Model 700 airplane. Should Textron apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only a certain novel or unusual design feature on one

Disclaimer – This document is not exhaustive and it will be updated gradually.

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model of airplane. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Textron Model 700 airplanes with a structural armrest installed between a side-facing seat, located forward of aft-facing seats, and the aft-facing seats.

1. The applicant must propose a certification strategy for the structural armrest. This strategy must address the structural integrity of the structural armrest and occupant protection after a survivable crash. The strategy must define how the applicant will ensure that the installation, when permanently deformed due to the application of static, dynamic, and interaction (with aft-facing seat) loads, and while complying with the applicable §§ 25.561 and 25.562 requirements, meets the following conditions:

a. The proposed structural armrest must not contact the occupant in the aft-most seating position of the side-facing seat, such that the armrest imparts any load, other than incidental and non-injurious contact, with the seat occupant.

b. The backrest of the aft-facing seat must not touch the occupant in the aft-most seating position of the side-facing seat.

c. The proposed structural armrest must not impose loads to the side-facing seat structure, and;

d. The seat back of the aft-facing seat must not, as a result of contact with the structural armrest, result in damage or permanent deformation of the seat back that could be injurious to the occupant of the aft-facing seat.

2. In addition, the applicant must:

a. Test, to the emergency-landing conditions listed in § 25.562, the structural armrest and the aft-facing seat together, as a system, with pitch and roll of the seat track to ensure that the armrest continues to protect the occupant of the side-facing seat.

b. Conduct 16g forward structural tests with the combination of the side-facing seat, structural armrest, and the aft-facing seat, accounting for all critical cases. For these tests, the applicant should account for all structural requirements and post-test conditions. Anthropomorphic test dummies are required as part of § 25.562 structural testing.

c. Apply to the seat track the worst-case floor deformation that:

i. Produces the maximum load into the structural armrest for armrests that are integrally a part of any seat structure. This maximum load includes the load caused by the floor deformation and the load from the aft-facing seat back.

ii. Allows the aft-facing seat back the most forward dynamic deformation in the area of the side-facing seat's aft occupant. No contact between the aft-facing seat and the side-facing seat aft occupant is acceptable.

Issued in Renton, Washington, on April 17, 2018.

Paul Siegmund,

Acting Manager, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service.

[FR Doc. 2018–08556 Filed 4–23–18; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2018–0314; Product Identifier 2018–NE–11–AD; Amendment 39–19255; AD 2018–08–02]

RIN 2120–AA64

Airworthiness Directives; Rolls-Royce plc Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; request for comments.

SUMMARY: We are adopting a new airworthiness directive (AD) for all Rolls-Royce plc (RR) Trent 1000–A2, Trent 1000–AE2, Trent 1000–C2, Trent 1000–CE2, Trent 1000–D2, Trent 1000–E2, Trent 1000–G2, Trent 1000–H2, Trent 1000–J2, Trent 1000–K2, and Trent 1000–L2 turbofan engines. This AD requires initial and repetitive inspections of the intermediate-pressure compressor (IPC) stage 1 rotor blades, IPC stage 2 rotor blades, and IPC shaft stage 2 dovetail posts, and removing any cracked parts from service. This AD was prompted by IPC blade separations resulting in engine failures. We are issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective April 24, 2018.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of April 24, 2018.

We must receive comments on this AD by June 8, 2018.

ADDRESSES: You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- *Federal eRulemaking Portal:* Go to *http://www.regulations.gov*. Follow the instructions for submitting comments.
- *Fax:* 202–493–2251.
- *Mail:* U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.
- *Hand Delivery:* U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For service information identified in this final rule, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, England, DE24 8BJ; phone: 011–44–1332–242424; fax: 011–44–1332–249936; email: *corporate.care@rolls-royce.com*. Internet: *https://customers.rolls-royce.com/public/rollsroycecare*. You may view this service information at the FAA, Engine & Propeller Standards Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call 781–238–7759. It is also available on the internet at *http://www.regulations.gov* by searching for and locating Docket No. FAA–2018–0314.

Examining the AD Docket

You may examine the AD docket on the internet at *http://www.regulations.gov* by searching for and locating Docket No. FAA–2018–0314; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the mandatory continuing airworthiness information (MCAI), the regulatory evaluation, any comments received, and other information. The street address for Docket Operations (phone: 800–647–5527) is listed above. Comments will be available in the AD docket shortly after receipt.

FOR FURTHER INFORMATION CONTACT: Kevin M. Clark, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781–238–7088; fax: 781–238–7199; email: *kevin.m.clark@faa.gov*.

– END –

D-34 (SC): Pilot compartment view – Hydrophobic coatings in lieu of windshield wipers	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.603, CS 25.773(a), CS 25.773(b)(1), CS 25.773(b)(2), CS 25.1301, CS 25.1309, CS 25.1523, CS 25.1529 amdt. 15
ADVISORY MATERIAL:	--

Special Condition

1. CS 25.773(b)(1) is replaced by the following:

   "The airplane must have a means to maintain a clear portion of the windshield, during precipitation conditions, enough for both pilots to have a sufficiently extensive view along the ground or flight path in normal, taxi and flight attitudes of the airplane. This means must be designed to function, without continuous attention on the part of the crew, in -"

2. CS 25.773(b)(1)(i) is replaced by the following:

   "Conditions from light misting precipitation to heavy rain at speeds from fully stopped in still air, to 1.5 VSR1 with lift and drag devices retracted; and"

3. All the reference in the regulation to CS 25.773 (b)(1) & (b)(1)(i) should be intended as amended above.

– END –

E-05 (SC): Water / Ice in Fuel	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.951(c), CS 25J951(c)
ADVISORY MATERIAL:	--

Special Condition

The applicant shall establish that:

1) The free water (or ice) remains evenly dispersed in the fuel under all operating conditions, or

2) The applicant must establish the threat(s) (quantity of ice, temperature) that can be released. The complete fuel system (including the engine) must be shown to be tolerant to such sudden release of ice, without significant adverse effect(s) on the powerplant system.

– END –

E-09 (SC): Engine Cowling Retention	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1193
ADVISORY MATERIAL:	--

Special Condition

The following requirements 25.1193(e)(4) and 25.1193 (f) shall be considered in addition to the existing CS.25.1193 requirement:

(e) Each aeroplane must--

(…)

(4) Be designed and constructed to minimize any inflight opening or loss of engine cowling which could prevent continued safe flight and landing.

(f) The retention system for each removable or openable cowling must—

(1) Keep the cowling closed and secured under the operational loads identified in paragraph (a) of CS 25.1193 requirement following each of these specific conditions:

Improper fastening of any single latching, locking, or other retention device, or the failure of single latch or hinge

(2) Have readily accessible means of closing and securing the cowling that do not require excessive force or manual dexterity; and

(3) Have a reliable means for effectively verifying that the cowling is secured prior to each departure.

Note 1: all dispatch configuration (MMEL and CDL) shall be considered for showing compliance with this Special condition.

Note 2: typically, for turbofan, the cowling addressed under this Special Condition are fan cowling; thrust reverser cowls have shown a satisfactory in-service experience and are not intended to be addressed under the requirements of this Special Condition.

– END –

SC-E25.904-01 (SC): Use of Automatic Power Reserve (APR) for Go-Around Performance Credit	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.20; 25.904 Appendix I
ADVISORY MATERIAL:	--

Special Condition

See sections **"The Special Conditions"** in FAA Special Condition 25-700-SC attached.

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must always be possible to reduce angle of attack by conventional use of the controls. The pilot must retain good lateral and directional control, by conventional use of the controls, throughout the maneuver.

6. Atmospheric Disturbances

Operation of the high incidence protection system must not adversely affect aircraft control during expected levels of atmospheric disturbances, nor impede the application of recovery procedures in case of wind-shear. This must be demonstrated in non-icing and icing conditions.

7. Proof of Compliance

In addition to the requirements of § 25.21, the following requirement applies:

(b) The flying qualities must be evaluated at the most unfavorable center-of-gravity position.

8. Sections 25.145(a), 25.145(b)(6), and 25.1323(d)

The following requirements apply:

- For § 25.145(a), add "V_{min}" in lieu of "stall identification."
- For § 25.145(b)(6), and "V_{min}" in lieu of "V_{SW}."
- For § 25.1323(d), add "From 1.23 V_{SR} to V_{min} . . .," in lieu of, "1.23 V_{SR} to the speed at which stall warning begins . . .," and, ". . . speeds below V_{min} . . ." in lieu of, ". . . speeds below stall warning."

Special Conditions Part II

Credit for Robust Envelope Protection in Icing Conditions

The following special conditions are in lieu of the specified paragraphs of §§ 25.103, 25.105, 25.107, 25.121, 25.123, 25.125, 25.143, and 25.207.

1. Define the stall speed as provided in these special conditions, Part I, in lieu of § 25.103.

2. In lieu of § 25.105(a)(2)(i), the following requirement applies:

(i) The V_2 speed scheduled in non-icing conditions does not provide the maneuvering capability specified in § 25.143(h) for the takeoff configuration, or

3. In lieu of § 25.107(c) and (g), the following requirements apply, with additional sections (c′) and (g′):

Takeoff speeds:

(c) In non-icing conditions V_2, in terms of calibrated airspeed, must be selected by the applicant to provide at least the gradient of climb required by § 25.121(b) but may not be less than—

(1) V_{2MIN};

(2) V_R plus the speed increment attained (in accordance with § 25.111(c)(2)) before reaching a height of 35 feet above the takeoff surface; and

(3) A speed that provides the maneuvering capability specified in § 25.143(h).

(c′) In icing conditions with the "takeoff ice" accretion defined in part 25, appendix C, V_2 may not be less than—

(1) The V_2 speed determined in non-icing conditions; and

(2) A speed that provides the maneuvering capability specified in § 25.143(h).

(g) In non-icing conditions, V_{FTO}, in terms of calibrated airspeed, must be selected by the applicant to provide at least the gradient of climb required by § 25.121(c), but may not be less than—

(1) 1.18 V_{SR}; and

(2) A speed that provides the maneuvering capability specified in § 25.143(h).

(g′) In icing conditions with the "final takeoff ice" accretion defined in part 25, appendix C, V_{FTO}, may not be less than—

(1) The V_{FTO} speed determined in non-icing conditions.

(2) A speed that provides the maneuvering capability specified in § 25.143(h).

4. In lieu of §§ 25.121(b)(2)(ii)(A), 25.121(c)(2)(ii)(A), and 25.121(d)(2)(ii), the following requirements apply:

In lieu of § 25.121(b)(2)(ii)(A):

(A) The V_2 speed scheduled in non-icing conditions does not provide the maneuvering capability specified in § 25.143(h) for the takeoff configuration; or

In lieu of § 25.121(c)(2)(ii)(A):

(A) The V_{FTO} speed scheduled in non-icing conditions does not provide the maneuvering capability specified in § 25.143(h) for the en-route configuration; or

In lieu of § 25.121(d)(2)(ii):

(d)(2) The requirements of subparagraph (d)(1) of this paragraph must be met: (ii) In icing conditions with the approach ice accretion defined in appendix C, in a configuration corresponding to the normal all-engines-operating procedure in which $V_{min}1g$ for this configuration does not exceed 110% of the $V_{min}1g$ for the related all-engines-operating landing configuration in icing, with a climb speed established with normal landing procedures, but not more than 1.4 V_{SR} (V_{SR} determined in non-icing conditions).

5. In lieu of § 25.123(b)(2)(i), the following requirements apply:

(i) The minimum en-route speed scheduled in non-icing conditions does not provide the maneuvering capability specified in § 25.143(h) for the en-route configuration, or

6. In lieu of §§ 25.125(b)(2)(ii)(B) and 25.125(b)(2)(ii)(C), the following requirements apply:

(B) A speed that provides the maneuvering capability specified in § 25.143(h) with the landing ice accretion defined in part 25, appendix C.

(C) 1.17 $V_{min}1g$.

7. In lieu of § 25.143(j)(1), the following requirement applies:

(1) The airplane is controllable in a pull-up maneuver up to 1.5 g load factor or lower if limited by angle of attack protection; and

8. In lieu of § 25.207, *Stall warning*, to read as the requirements defined in these special conditions Part I, Section 4.

Issued in Renton, Washington, on July 31, 2017.

Victor Wicklund,

Manager, Transport Standards Branch, Aircraft Certification Service.

[FR Doc. 2017–17072 Filed 8–11–17; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA–2017–0484; Special Conditions No. 25–700–SC]

Special Conditions: Textron Aviation Inc. Model 700 Airplanes; Use of Automatic Power Reserve for Go-Around Performance Credit

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Textron Aviation Inc. (Textron) Model 700 airplane. This airplane will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is an Automatic Takeoff Thrust Control System (ATTCS), referred to as an Automatic Power Reserve (APR), to set the performance level for approach-climb operation after an engine failure. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: This action is effective on Textron on August 14, 2017. Send your comments by September 28, 2017.

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ADDRESSES: Send comments identified by docket number FAA–2017–0484 using any of the following methods:

- *Federal eRegulations Portal:* Go to *http://www.regulations.gov/*and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M–30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE., Room W12–140, West Building Ground Floor, Washington, DC, 20590–0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

Privacy: The FAA will post all comments it receives, without change, to *http://www.regulations.gov/,* including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477–19478).

Docket: Background documents or comments received may be read at *http://www.regulations.gov/* at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Joe Jacobsen, FAA, Airplane and Flightcrew Interface, ANM–111, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057–3356; telephone 425–227–2011; facsimile 425–227–1320.

SUPPLEMENTARY INFORMATION: The substance of these special conditions has been subject to the notice and comment period in several prior instances and has been derived without substantive change from those previously issued. It is unlikely that prior public comment would result in a significant change from the substance contained herein. Therefore, because a delay would significantly affect the certification of the airplane, the FAA has determined that prior public notice and comment are unnecessary and impracticable.

In addition, since the substance of these special conditions has been subject to the public comment process in several prior instances with no substantive comments received, the FAA finds it unnecessary to delay the effective date and finds that good cause exists for adopting these special conditions upon publication in the **Federal Register**.

The FAA is requesting comments to allow interested persons to submit views that may not have been submitted in response to the prior opportunities for comment described above.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On November 20, 2014, Textron applied for a type certificate for their new Model 700 airplane. The Model 700 airplane is a turbofan-powered executive-jet airplane with seating for two crewmembers and 12 passengers. This airplane will have a maximum takeoff weight of 38,514 pounds.

Type Certification Basis

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Textron must show that the Model 700 airplane meets the applicable provisions of part 25, as amended by Amendments 25–1 through 25–139, 25–141, and 25–143.

If the Administrator finds that the applicable airworthiness regulations (*i.e.,* 14 CFR part 25) do not contain adequate or appropriate safety standards for the Textron Model 700 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model 700 airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Model 700 airplane will incorporate the following novel or unusual design feature: An Automatic Takeoff Thrust Control System, referred to as an Automatic Power Reserve, to set the performance level for approach-climb operation after an engine failure.

Discussion

Textron proposes using the ATTCS function of the Model 700 airplane during go-around and requests approach-climb performance credit for the use of the additional power. The Model 700 powerplant control system comprises a Full Authority Digital Electronic Control (FADEC) for the AS907–2–1S engine. The control system includes an ATTCS feature, referred to as Maximum Takeoff Thrust (MTO), and in the airplane flight manual (AFM), Automatic Power Reserve.

Section 25.904 and part 25, appendix I, limit the application of performance credit for ATTCS to takeoff only. Because the airworthiness regulations do not contain appropriate safety standards for approach-climb performance using ATTCS, special conditions are required to ensure a level of safety equivalent to that established in the regulations.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Applicability

As discussed above, these special conditions are applicable to the Textron Model 700 airplane. Should Textron apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on one model of airplane. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

The Textron Model 700 airplane must comply with the requirements of 14 CFR 25.904, and appendix I, and the following requirements for the go-around phase of flight:

1. Definitions

a. Takeoff/go-around (TOGA): Throttle lever in takeoff or go-around position.

b. Automatic Takeoff Thrust Control System: The ATTCS in Model 700 airplanes is defined as the entire automatic system available during takeoff and in go-around mode, including all devices, both mechanical and electrical, that sense engine failure, transmit signals, actuate fuel controls or power levers (or increase engine power by other means on operating engines to achieve scheduled thrust or power increase), and furnish cockpit information on system operation.

c. Critical time interval:

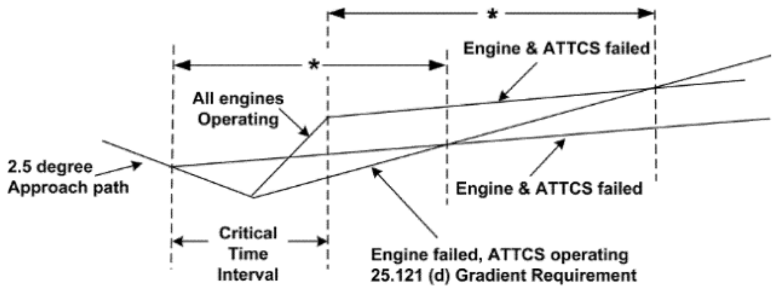
(1) When conducting an approach for landing using ATTCS, the critical time interval is defined as follows:

(i) The critical time interval begins at a point on a 2.5-degree approach glide path from which, assuming a simultaneous engine and ATTCS failure, the resulting approach-climb flight path intersects a flight path originating at a later point on the same approach path that corresponds to the part 25 one-engine-inoperative approach-climb gradient. The period of time from the point of simultaneous engine and ATTCS failure, to the intersection of these flight paths, must be no shorter than the time interval used in evaluating the critical time interval for takeoff, beginning from the point of simultaneous engine and ATTCS failure and ending upon reaching a height of 400 feet.

(ii) The critical time interval ends at the point on a minimum performance, all-engines-operating go-around flight path from which, assuming a simultaneous engine and ATTCS failure, the resulting minimum approach-climb flight path intersects a flight path corresponding to the part 25 minimum one-engine-inoperative approach-climb gradient. The all-engines-operating go-around flight path, and the part 25 one-engine-inoperative approach-climb gradient flight path, originate from a common point on a 2.5-degree approach path. The period of time from the point of simultaneous engine and ATTCS failure, to the intersection of these flight paths, must be no shorter than the time interval used in evaluating the critical time interval for the takeoff, beginning from the point of simultaneous engine and ATTCS failure and ending upon reaching a height of 400 feet.

(2) The critical time interval must be determined at the altitude resulting in the longest critical time interval for which one-engine-inoperative approach-climb performance data are presented in the airplane flight manual.

(3) The critical time interval is illustrated in the following figure:



*** The engine and ATTCS failed time interval must be no shorter than the time interval from the point of simultaneous engine and ATTCS failure to a height of 400 feet used to comply with I25.2(b) for ATTCS use during takeoff.**

2. Performance and system reliability requirements: The applicant must comply with the performance and ATTCS reliability requirements as follows:

a. An ATTCS failure or a combination of failures in the ATTCS during the critical time interval:

(1) Must not prevent the insertion of the maximum approved go-around thrust or power, or must be shown to be a remote event.

(2) Must not result in a significant loss or reduction in thrust or power, or must be shown to be an extremely improbable event.

b. The concurrent existence of an ATTCS failure and an engine failure during the critical time interval must be shown to be extremely improbable.

c. All applicable performance requirements of part 25 must be met with an engine failure occurring at the most critical point during go-around with the ATTCS functioning.

d. The probability analysis must include consideration of ATTCS failure occurring after the time at which the flightcrew last verifies that the ATTCS is in a condition to operate until the beginning of the critical time interval.

e. The propulsive thrust obtained from the operating engine, after failure of the critical engine during a go-around used to show compliance with the one-engine-inoperative climb requirements of § 25.121(d), may not be greater than the lesser of:

(1) The actual propulsive thrust resulting from the initial setting of power or thrust controls with the ATTCS functioning, or

(2) 111 percent of the propulsive thrust resulting from the initial setting of power or thrust controls with the ATTCS failing to reset thrust or power, and without any action by the flightcrew to reset thrust or power.

3. Thrust setting

a. The initial go-around thrust setting on each engine at the beginning of the go-around phase may not be less than any of the following:

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(1) That required to permit normal operation of all safety-related systems and equipment dependent upon engine thrust or power lever position; or

(2) That are shown to be free of hazardous engine-response characteristics, and not to result in any unsafe airplane operating or handling characteristics when thrust or power is advanced from the initial go-around position to the maximum approved power setting.

b. For approval to use an ATTCS for go-arounds, the thrust-setting procedure must be the same for go-arounds initiated with all engines operating as for go-around initiated with one engine inoperative.

4. Powerplant controls

a. In addition to the requirements of § 25.1141, no single failure or malfunction, or probable combination thereof, of the ATTCS, including associated systems, may cause the failure of any powerplant function necessary for safety.

b. The ATTCS must be designed to:

(1) Apply thrust or power to the operating engine(s), following any one-engine failure during a go-around, to achieve the maximum approved go-around thrust without exceeding the engine operating limits;

(2) Permit manual decrease or increase in thrust or power up to the maximum go-around thrust approved for the airplane, under the existing conditions, through the use of the power lever. For airplanes equipped with limiters that automatically prevent the engine operating limits from being exceeded under existing ambient conditions, other means may be used to increase the thrust in the event of an ATTCS failure, provided that the means:

(i) Is located on or forward of the power levers;

(ii) Is easily identified and operated under all operating conditions by a single action of either pilot with the hand that is normally used to actuate the power levers; and

(iii) Meets the requirements of § 25.777(a), (b), and (c).

(3) Provide a means to verify to the flightcrew, before beginning an approach for landing, that the ATTCS is in a condition to operate (unless it can be demonstrated that an ATTCS failure, combined with an engine failure during an entire flight, is extremely improbable); and

(4) Provide a means for the flightcrew to deactivate the automatic function. This means must be designed to prevent inadvertent deactivation.

5. Powerplant instruments: In addition to the requirements of § 25.1305:

a. A means must be provided to indicate when the ATTCS is in the OFF or FAILED condition; and

b. If the inherent flight characteristics of the airplane do not provide adequate warning that an engine has failed, a warning system that is independent of the ATTCS must be provided to give the pilot a clear warning of any engine failure during a go-around.

Issued in Renton, Washington, on August 8, 2017.

Victor Wicklund,

Manager, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service.

[FR Doc. 2017–17073 Filed 8–11–17; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Docket No. FAA–2017–0222; Airspace Docket No. 17–AWP–8]

Amendment of Class D and E Airspace; Hilo, HI

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule, technical amendment, correction.

SUMMARY: This action corrects a final rule, technical amendment published in the **Federal Register** on June 22, 2017, that amends Class E airspace designated as an extension at Hilo International, General Lyman Field, Hilo, HI. The airport name is corrected to Hilo International Airport, Hilo, HI, removing ‘‘General Lyman Field’’ from the airport name to match the FAA's aeronautical database. This technical amendment also corrects the airport name in Class D, Class E surface area airspace, and Class E airspace extending upward from 700 feet above the surface.

DATES: Effective 0901 UTC, August 17, 2017. The Director of the Federal Register approves this incorporation by reference action under Title 1, Code of Federal Regulations, Part 51, subject to the annual revision of FAA Order 7400.11 and publication of conforming amendments.

FOR FURTHER INFORMATION CONTACT: Robert LaPlante, Federal Aviation Administration, Operations Support Group, Western Service Center, 1601 Lind Avenue SW., Renton, WA 98057; telephone (425) 203–4566.

SUPPLEMENTARY INFORMATION:

History

The FAA published a final rule, technical amendment in the **Federal Register** (82 FR 28404, June 22, 2017) Docket No. FAA–2017–0222, amending Class E Airspace designated as an extension, removing the Notice to Airmen (NOTAM) part-time status at Hilo International, General Lyman Field, Hilo, HI. Subsequent to publication, the FAA found the airport name was incorrect and is now corrected from Hilo International, General Lyman Field, to Hilo International Airport.

In making the airport name change in Class E airspace designated as an extension, the FAA realized that the airport name change for Hilo International Airport also affects Class D airspace, Class E surface area airspace, and Class E airspace extending upward from 700 feet above the surface. This technical amendment correction includes amending the above airspace areas by removing General Lyman Field from the airport name, and does not affect the boundaries or operating requirements of the airport in the associated airspace.

Authority: 49 U.S.C. 106(f), 106(g); 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

Correction to Final Rule

■ Accordingly, pursuant to the authority delegated to me, in the **Federal Register** of June 22, 2017 (82 FR 28404) FR Doc. 2017–13048, Amendment of Class E Airspace; Hilo HI, is corrected as follows:

§ 71.1 [Amended]

Paragraph 5000 Class D Airspace.

* * * * *

AWP HI D Hilo, HI [Amended]

Hilo International Airport, HI
(Lat. 19°43′13″ N., long. 155°02′55″ W.)

That airspace extending upward from the surface to and including 2,500 feet MSL within a 4.3-mile radius of Hilo International Airport. This Class D airspace area is effective during the specific dates and times established in advance by a Notice to Airmen. The effective date and time will thereafter be continuously published in the Pacific Chart Supplement.

Paragraph 6002 Class E Airspace Areas Designated as a Surface Area.

* * * * *

AWP HI E2 Hilo, HI [Amended]

Hilo International, HI
(Lat. 19°43′13″ N., long. 155°02′55″ W.)

That airspace extending upward from the surface within a 4.3-mile radius of Hilo International Airport. This Class E airspace area is effective during the specific dates and

– END –

F-09 (SC): Flight Recorders including Data Link Recording	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1301, 25.1457, 25.1459
ADVISORY MATERIAL:	AMCs associated to the requirements listed above, EUROCAE ED-112, EUROCAE ED-93, FAA AC 20-160

Special Condition

The flight recorder (Cockpit Voice Recorder or Flight Data Recorder) shall record:

(a) Data link communications related to air traffic services (ATS Communications*) to and from the aeroplane.

(b) All messages whereby the flight path of the aircraft is authorized, directed or controlled, and which are relayed over a digital data link rather than by voice communication.

(c) The minimum recording duration shall be equal to the duration of the Cockpit Voice Recorder, and the recorded data shall be time correlated to the recorded cockpit audio.

(d) To enable an aircraft operator to meet the intent of European Commission Regulation (EU) No 965/2012, Annex IV, Part CAT, Subpart D, Section 1, CAT.IDE.A.195, information shall be provided explaining how the recorded data can be converted back to the format of the original data link messages in order to determine an accurate sequence of events for the aircraft and the cockpit operation

* ATS communications (ATSC) are defined by ICAO as communications related to air traffic services including air traffic control, aeronautical and meteorological information, position reporting and services related to safety and regularity of flight.

– END –

F-12 (SC): Security Protection of Aircraft Systems and Networks	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1309
ADVISORY MATERIAL:	EUROCAE ED-202 and the associated AMC

Special Condition

a) The applicant shall ensure security protection of the systems and networks of the aircraft from any remote or local access by unauthorized sources if corruption of these systems and networks (including hardware, software, data) by an inadvertent or intentional attack would impair safety, and

b) The applicant shall ensure that the security threats to the aircraft, including those possibly caused by maintenance activity or by any unprotected connecting equipment/devices inside or outside the A/C, are identified, assessed and risk mitigation strategies are implemented to protect the aircraft systems from all adverse impacts on safety, and

c) Appropriate procedures shall be established to ensure that the approved security protection of the aircraft's systems and networks is maintained following future changes to the Type Certificated design.

– END –

F-20 (SC): Rechargeable Lithium battery installations	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.601, 25.863, 25.1353
ADVISORY MATERIAL:	--

Special Condition

In lieu of the requirements of CS 25.1353(c) the following applies:

(a) Lithium batteries and battery installations must be designed and installed as follows:

(1) Safe cell temperatures and pressures must be maintained during any probable charging or discharging condition, or during any failure of the charging or battery monitoring system not shown to be extremely remote. The Li battery installation must be designed to preclude explosion in the event of those failures.

(2) Li batteries must be designed to preclude the occurrence of self-sustaining, uncontrolled increases in temperature or pressure.

(3) No explosive or toxic gasses emitted by any Li battery in normal operation or as the result of any failure of the battery charging or monitoring system, or battery installation not shown to be extremely remote, may accumulate in hazardous quantities within the aeroplane.

(4) Li battery installations must meet the requirements of CS 25.863(a) through (d).

(5) No corrosive fluids or gasses that may escape from any Li battery may damage surrounding aeroplane structures or adjacent essential equipment.

(6) Each Li battery installation must have provisions to prevent any hazardous effect on structure or essential systems that may be caused by the maximum amount of heat the battery can generate during a short circuit of the battery or of its individual cells.

(7) Li battery installations must have a system to control the charging rate of the battery automatically so as to prevent battery overheating or overcharging, and,

(i) A battery temperature sensing and over-temperature warning system with a means for automatically disconnecting the battery from its charging source in the event of an over-temperature condition or,

(ii) A battery failure sensing and warning system with a means for automatically disconnecting the battery from its charging source in the event of battery failure.

(8) Any Li battery installation whose function is required for safe operation of the aeroplane, must incorporate a monitoring and warning feature that will provide an indication to the appropriate flight crewmembers, whenever the capacity and SOC of the batteries have fallen below levels considered acceptable for dispatch of the aeroplane.

(9) The Instructions for Continued Airworthiness must contain maintenance procedures for Lithium-ion batteries in spares storage to prevent the replacement of batteries whose function is required for safe operation of the aeroplane, with batteries that have experienced degraded charge retention ability or other damage due to prolonged storage at low SOC.

(b) Compliance with the requirements of this Special Condition must be shown by test or, with the concurrence of EASA, by analysis.

Minimum Operational Performance Standards (MOPS) for Rechargeable Lithium Batteries DO-311A is an acceptable means of compliance with these requirements.

Alternative Means of Compliance can be proposed by the applicant to show compliance with the SC's included in this CRI and agreed by EASA in a case by case basis."

– END –

F-24 (SC): Non-rechargeable Lithium Battery Installations	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.601, 25.863, 25.869, 25.1301, 25.1309, 25.1353(c), 25.1529, 25.1360 (b)
ADVISORY MATERIAL:	--

Special Condition

In lieu of the requirements of CS 25.1353(c) (1) through (c)(4), non-rechargeable Lithium batteries and battery installations must comply with the following special conditions:

1. Be designed so that safe cell temperatures and pressures are maintained under all foreseeable operating conditions to preclude fire and explosion.

2. Be designed to preclude the occurrence of self-sustaining, uncontrolled increases in temperature or pressure.

3. Not emit explosive or toxic gases in normal operation, or as a result of its failure, that may accumulate in hazardous quantities within the airplane.

4. Must meet the requirements of CS 25.863(a) through (d).

5. Not damage surrounding structure or adjacent systems, equipment or electrical wiring of the airplane from corrosive fluids or gases that may escape.

6. Have provisions to prevent any hazardous effect on structure or essential systems caused by the maximum amount of heat it can generate due to any failure of it or its individual cells.
7. Have a means to detect its failure and alert the flight crew in case its failure affects safe operation of the aircraft.

8. Have a means for the flight crew or maintenance personnel to determine the battery charge state if its function is required for safe operation of the airplane.

Note 1: A battery system consists of the battery and any protective, monitoring and alerting circuitry or hardware inside or outside of the battery. It also includes vents (where necessary) and packaging. For the purpose of this special condition, a battery and battery system are referred to as a battery.

Note 2: These special conditions apply to all non-rechargeable lithium battery installations in lieu of 25.1353(c)(1) through (c)(4). Section 25.1353(c)(1) through (c)(4) will remain in effect for other battery installations.

Note 3: For Very Small Non-rechargeable Lithium Batteries (equal or less than 2 Watt-hour of energy), an acceptable MoC with this Special Conditions is showing these batteries compliant with Underwriters Laboratories (UL) 1642

Note 4: For the purpose of SCs 7 and 8, "safe operation of the airplane" is defined as continued safe flight and landing following failures or other non-normal conditions. The following are examples of devices with batteries that are not required for safe operation of the airplane: emergency locator transmitters, underwater locator beacons, seat belt air bag initiators and flashlights. A backup flight instrument with a non-rechargeable lithium battery is an example that would be required for safe operation of the airplane.

Minimum Operational Performance Standards (MOPS) for Non–Rechargeable Lithium Batteries DO-227A + risk assessment at A/C level (limited to Special Conditions 3, 4, 5 & 6) is an acceptable MoC to the Special Conditions 1 to 6 contained in this CRI.

Alternative Means of Compliance can be proposed by the applicant to show compliance with the SC's included in this CRI and agreed by EASA in a case by case basis."

– END –

MCSD-01 (SC): MCS Data certification basis	
APPLICABILITY:	Model 700
REQUIREMENTS:	21.A.17B of Annex (Part 21) to Regulation (EU) 748/2012 (at the amendment specified in CRI A-01
ADVISORY MATERIAL:	Certification Memo CM-MCSD-001 issue 1 (dated: 29th October 2015

Special Condition

1. Type Rating Determination

The type rating proposed by Textron Aviation and evaluated by the Agency is the type rating for the purpose of Part-66 Aircraft Maintenance Licence (AML). Based on a favourable conclusion of the evaluation, this type rating will be included in the Type Certificate Data Sheet (TCDS).

The type rating(s) determined should address all (new) models/variants specified in the TCDS.

Following criteria should be evaluated to require a different maintenance type rating separate from the existing type ratings:

a) the aircraft is subject to a different aircraft type certificate; or
b) the aircraft is subject to a major modification for installation of another type of engine; or
c) the aircraft is subject to a STC for installation of another type of engine; or
d) the analysis on the minimum syllabus content and/or training duration results in an evident and substantial difference; or
e) such a recommendation is made by the Applicant or the Agency.

2. Minimum Syllabus Content

Textron Aviation shall provide the minimum syllabus content specified for the type. The minimum syllabus content should be clearly identified and allocated to one of the four “box” categories identified in GM No 3 to 21.A.15(d) (see Figure 1) in order to identify its mandatory or non-mandatory status. The contents should address the minimum theoretical and practical type training for Maintenance Certifying Staff.

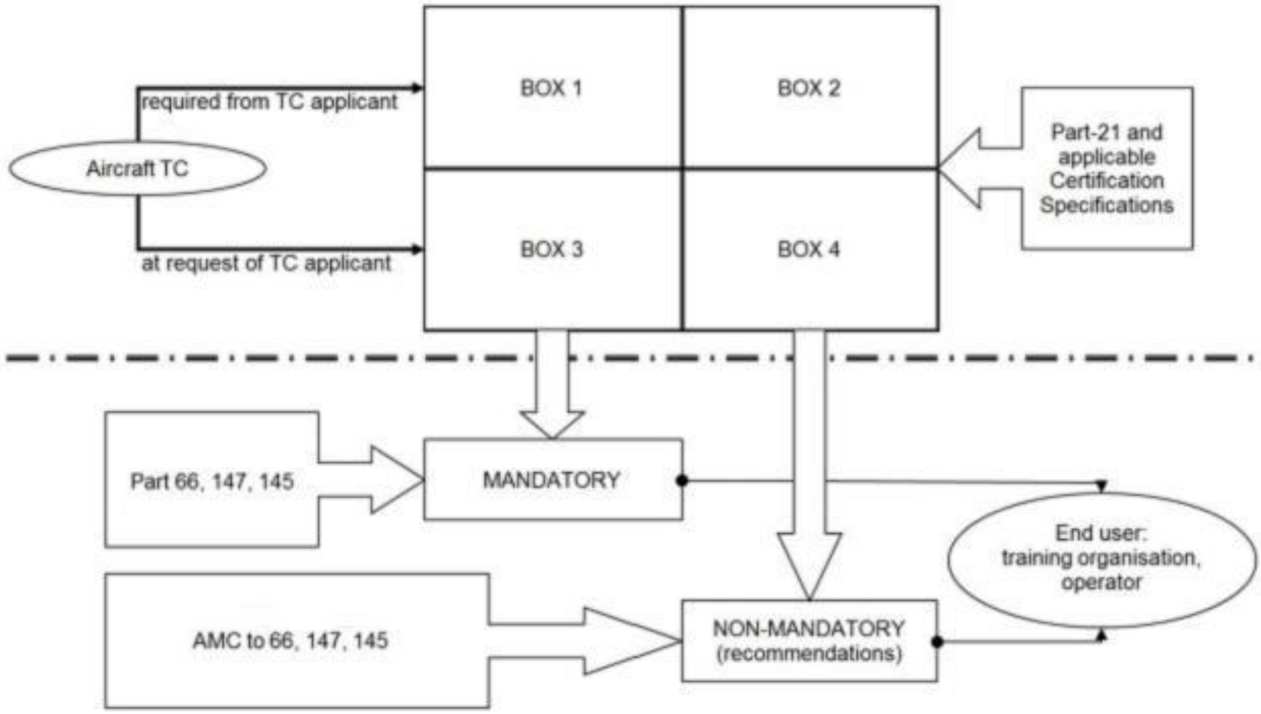

Figure 1

Box1

- Type rating determination (see para. 1).
- The base aircraft configuration relevant to maintenance type training and which should be addressed in accordance with the certificated type design. This configuration should be detailed to the ATA system – subsystem level and include the categorisation of technical information to be addressed in training (e.g. location, description, indication, normal operation, abnormal operation, MMEL specific maintenance actions called in some MMEL items dispatch condition as maintenance procedure(s) (M)). The list should be detailed to ATA component level in cases when the novelty or other characteristics of the component justify/require such a detail. The certificated a/c configuration detailed in Box1 should cover the complete base aircraft configuration relevant to maintenance type rating training and should leave the certificated configuration options (i.e. options at system, subsystem or equipment/appliance level in addition to/in place of the base configuration) to be addressed in Boxes 3 and 4.
- MASE (Maintenance Area of Special Emphasis): any element considered by the applicant as having a degree of novelty, specificity or uniqueness relevant to the maintenance of his product. This could be a technical or operational feature that maintenance personnel need to be aware of and take into consideration.

Box2

- Student prerequisites (knowledge, experience, qualification) for the particular a/c type training (e.g. previous exposure to and type of a/c maintenance experience; a/c type maintenance related elements for composite repair and bonding and appropriate knowledge, experience, and awareness in accordance with AMC 20-29, SAE AIR 5719)
- The logical sequence (i.e. time wise order) of imparting training elements from minimum syllabus if any (e.g. ATA29 training on hydraulic system(s) configuration should precede ATA27 training on flight controls actuation).

Box3

- All elements which should be considered in addressing difference training between types or between models under the same type (as categorised in Appendix I to AMCs of Part-66). Those elements should be identified using the same criteria utilised for Box 1.
- Optional systems.

Box4

- All and any elements identified by applying the Box2 type of content rationale and which should be considered in addressing a difference training between types or models under the same type (as categorised in Appendix I to AMCs of Part-66).
- Course outline, which may include footprints, all learning objectives, examination elements… or full developed course on request when available.
- Potential use of specific Maintenance Simulation Training Devices (MSTD) to be used in imparting some of the type training minimum syllabus elements;
- Type rating training course instructional duration (i.e. consolidated per the whole course and/or segregated per elements of the minimum syllabus);
  Note: in the absence of any recommendation about the overall course length, the figures as mentioned in Part 66, Appendix III, 3.1 will apply.
- Outlines of any other supplemental courses e.g. for engine run-up, advanced T/S, special complex composite repairs, specific basic knowledge training needed.
- Any other additional elements (i.e. in addition to and beyond the Box1, Box2 and Box3 content) which are recommended by the TCH to the OSD-MCSD user.

– END –

DEV-E25.981-01 (Deviation): Deviation to CS 25.981(b)(3), M25.1(a), M25.1(b) and M25.2(b) of appendix M of CS 25 amdt. 15 for fuel tank flammability reduction means	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.981 (b)(3), M25.1(a), M25.1(b) and M25.2(b) of appendix M as they relate to the requirements of CS 25.981(b) amdt.15
ADVISORY MATERIAL:	--

Deviation

1.1 AFFECTED CS

CS 25.981 (b)(3)

Any active Flammability Reduction means introduced to allow compliance with sub-paragraph (2) must meet appendix M of CS-25.

M25.1 Fuel tank flammability exposure requirements

(a) The Fleet Average Flammability Exposure level of each fuel tank, as determined in accordance with Appendix N of CS-25, must not exceed 3 percent of the Flammability Exposure Evaluation Time (FEET), as defined in Appendix N of CS-25. If flammability reduction means (FRM) are used, neither time periods when any FRM is operational but the fuel tank is not inert, nor time periods when any FRM is inoperative may contribute more than 1.8 percent to the 3 percent average fleet flammability exposure of a tank.

(b) The Fleet Average Flammability Exposure, as defined in Appendix N of this part, of each fuel tank for ground, takeoff/climb phases of flight during warm days must not exceed 3 percent of FEET in each of these phases. The analysis must consider the following conditions.

(1) The analysis must use the subset of flights starting with a sea level ground ambient temperature of 26.7°C [80° F] (standard day plus 11.7°C (21� F) atmosphere) or more, from the flammability exposure analysis done for overall performance.

(2) For the ground, takeoff/climb phases of flight, the average flammability exposure must be calculated by dividing the time during the specific flight phase the fuel tank is flammable by the total time of the specific flight phase.

(3) Compliance with this paragraph may be shown using only those flights for which the aeroplane is dispatched with the flammability reduction means operational.

M25.2 Showing compliance

(b) The applicant must validate that the FRM meets the requirements of paragraph M25.1 of this appendix with any aeroplane or engine configuration affecting the performance of the FRM for which approval is sought.

1.2 PRE-CONDITIONS FOR APPLICATION OF THE DEVIATION

None.

1. APPLICABLE ESSENTIAL REQUIREMENTS OF REGULATION (EU) 2018/1139 TO BE COMPLIED WITH

Annex II (Essential requirements for airworthiness)

1.3. Systems and equipment (other than non-installed equipment):

1.3.1. *The aircraft must not have design features or details that experience has shown to be hazardous.*

2.3. Product operations must be protected from hazards resulting from adverse external and internal conditions, including environmental conditions.

2. MITIGATING FACTORS

The following mitigating factors shall be met:

- Flammability performance comparable to a Conventional Unheated Aluminum Wing fuel Tank without a FRM (For example a dual electric pump engine feed system) is demonstrated;
- No involvement of external heat exchanger(s) is ensured that could introduce flammable fluid leakage issues in areas outside of the tank;
- The introduction of ignition sources by the FRM into the fuel tank is minimized in comparison to a classic dual electric pumps engine feeding system;

The time the FRM system is inoperative is limited to an amount to be agreed by EASA.

– END –

D-20 (ESF): Pressurisation and Low Pressure Pneumatic System	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1438
ADVISORY MATERIAL:	AMC 25.1438

ESF

CS 25.1438 Pressurisation and Low Pressure Pneumatic System

a) This requirement applies to pneumatic systems and elements (components and ducting) served by gas storage devices such as, evacuation, water systems, accumulators and/or pressurised gas from compressors such as engine and APU bleed air, air conditioning, pressurisation, engine starting, ice protection, and pneumatic actuation systems. Design compliance may be in the form of analysis, test, or combination of analysis and test. All foreseen normal and failure mode combinations of environmental loads (installation, thermal, vibration, and aerodynamic), pressures, temperatures, material properties, and dimensional tolerances must be considered. This requirement is not applicable to portable gas storage devices.

b) Each element of the system must be designed to operate without detrimental permanent deformation or increase in design leakage that would prevent the element from performing its intended function.

For demonstrating compliance, the following factors are to be applied to the pressure at the associated temperature for the most critical of the following conditions. The pressure must be applied long enough to ensure complete expansion of the test element. After being subjected to the above conditions and on normal operating conditions being restored, the element should operate as designed.

1) 1.5 times maximum normal operating pressure

2) 1.33 times the failure pressure occurring in the probability range between 10E-03 to 10E-05 failures per flight hour

3) 1.0 times the failure pressure occurring in the probability range between 10E-05 and 10E-07 failures per flight hour

4) 1.0 times the maximum normal operating pressure in combination with the limit structural loads.

c) Each element of the system must be designed to operate without rupture or increase in design leakage that is likely to endanger the aeroplane or its occupants. For demonstrating compliance, the following factors are to be applied to the pressure at the associated temperature for the most critical of the following conditions. The pressure must be applied long enough to ensure complete expansion of the test element. After being subjected to the above conditions and on normal operating conditions being restored, the element need not operate normally.

1) 3.0 times maximum normal operating pressure. Except for pressurisation system elements, which shall use a factor of 2.0 time maximum normal operating pressure

2) 2.66 times the failure pressure occurring in the probability range between 10E-03 to 10E-05 failures per flight hour

3) 1.5 times the failure pressure occurring in the probability range between 10E-05 to 10E-07 failures/flight hour is applicable to components. Except for ducting which shall use a factor of 2.0 times the failure pressure occurring in the probability range between 10E-05 to 10E-07 failures per flight hour

4) 1.0 times the failure pressure occurring in the probability range 10E-07 and 10E-09 failures per flight hour

5) 1.5 times the maximum normal operating pressure in combination with the 1.0 times the ultimate structural loads.

d) If the failure of an element can result in a hazardous condition, it must be designed to withstand the fatigue effects of all cyclic pressures, including transients, and associated externally induced loads and perform as intended for the design life of the element under all environmental conditions for which the aeroplane is certified.

e) In addition, each gas storage device installed on an aeroplane must meet the requirement of this rule and not cause hazardous effects by exploding.

– END –

D-24 (ESF): Flight Control System Failure Criteria	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.671(c)(2), 25.1309
ADVISORY MATERIAL:	FCHWG §25.671 ARAC recommendation

ESF

CS 25.671(c)(2) requires that the aeroplane is shown to be capable of Continued Safe Flight and Landing (CSFL) within the normal flight envelope, and without requiring exceptional piloting skill or strength, after "Any combination of failures not shown to be extremely improbable, excluding jamming (for example, dual electrical or hydraulic system failures, or any single failure in combination with any probable hydraulic or electrical failure)".

The "single plus probable" criterion stipulated in subparagraph (c)(2) has generated a fair amount of confusion in terms of the expected means of compliance. The strictest interpretation of the rule is not easily met, and it has not been uniformly applied. An ARAC group was established to address this and other elements of §25.671. The ARAC recommendation proposes to replace the current "single plus probable" criterion with a clearer standard.
In lieu of paragraph 25.671(c)(2), the following, as proposed in the ARAC recommendation, would apply:

"(c) The airplane must be shown by analysis, test, or both, to be capable of continued safe flight and landing after any of the following failures, including jamming, in the flight control system and surfaces (including trim, lift, drag, and feel systems) within the normal flight envelope, without requiring exceptional piloting skill or strength. Probable failures must have only minor effects and must be capable of being readily counteracted by the pilot.

…

(2) Any combination of failures not shown to be extremely improbable. Furthermore, in the presence of any single failure in the flight control system, any additional failure states that could prevent continued safe flight and landing shall have a combined probability of less than 1 in 1000. This paragraph excludes failures of the type defined in (c)(3)."

Definitions

- Latent = dormant = hidden
- A failure is latent until it is made known to the flight crew or maintenance personnel.
- A significant latent failure is one, which would in combination with one or more specific failures, or events result in a Hazardous or Catastrophic Failure Condition (AMC 25.1309 5.o).

– END –

D-30 (ESF): Cabin Outflow Valve	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.841 (b)(1), CS 25.843(b)(1), amdt. 15
ADVISORY MATERIAL:	--

ESF

1. Affected CS

CS 25.841 (b)(1) and CS 25.841 (b)(3) at amdt.15

2. Intent of the CS, compensating Factors and/or alternative requirements

See section "**Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)**" and **"Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation"** in the ELOS Memo "TXTAV-014180-SM-12" attached.

Federal Aviation Administration

Memorandum

Date: 8/30/17

To: Manager, Wichita ACO Branch, AIR-7K0

From: Manager, Transport Standards Branch, AIR-670

Prepared by: Adam Hein, AIR-7K2

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Cabin Outflow Valve on a Model 700 airplane, FAA Project No. TXTAV-014180

ELOS Memo #: TXTAV-014180-SM-12

Regulatory Ref: §§ 25.365, 25.841, 25.843, and 25.1309

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Standards Branch (TSB) on the establishment of an equivalent level of safety (ELOS) finding for the Textron Aviation Inc. (Textron) Model 700 airplane.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.841(b)(1) requires:

> *(b) Pressurized cabins must have at least the following valves, controls, and indicators for controlling cabin pressure:*
> *(1) Two pressure relief valves to automatically limit the positive pressure differential to a predetermined value at the maximum rate of flow delivered by the pressure source. The combined capacity of the relief valves must be large enough so that the failure of any one valve would not cause an appreciable rise in the pressure differential. The pressure differential is positive when the internal pressure is greater than the external.*

Section 25.843(b)(1) requires:

> *(b) Functional tests. The following functional tests must be performed:*
> *(1) Tests of the functioning and capacity of the positive and negative pressure differential valves, and of the emergency release valve, to simulate the effects of closed regulator valves.*

The Textron Model 700 combines one of the two valves required by § 25.841(b)(1) with the Outflow Control Valve (OCV) and is therefore not literally compliant to this rule. In addition, the OCV is software controlled and the positive pressure relief function of this valve cannot be tested independently of the basic pressure relief function. This design is not literally compliant to § 25.843(b)(1).

Applicable regulation(s)

§§ 25.365, 25.841, 25.843, and 25.1309

Regulation(s) requiring an ELOS finding

§§ 25.841(b)(1) and 25.843(b)(1)

Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)

Compensating factors, which will provide a level of safety equivalent to literal compliance to §§ 25.841(b)(1) and 25.843(b)(1) for the Model 700 are as follows:

- The Pressure Relief Valve (PRV) and Cabin Pressure Control System (CPCS) Controller / OCV electronic differential pressure limiting functions are independent. This independence will prevent an uncontrollable over-pressure condition and such a condition is extremely improbable taking into account latent failure of the PRV for compliance with § 25.1309(b).
- The CPCS Controller electronically begins to open the OCV prior to the cabin-to-ambient differential pressure reaching the limit to prevent the cabin-to-ambient differential pressure from exceeding the limit while in automatic operation.
- The fully pneumatic PRV limits the cabin to ambient differential pressure to a limit slightly higher than the OCV limit and will be shown by flight testing on a production representative Model 700 aircraft to be adequately sized to prevent exceeding the differential pressure limits in the event of a failure of the CPCS Controller and/or OCV in combination with the maximum rate of inflow from the air conditioning system.
- A "CABIN DELTA P" crew alerting system message and "Cabin Delta P" aural warning will warn the flight crew of the excessive differential pressure condition to allow them to manually control and monitor the cabin pressure using the Level A CPCS Controller monitor/manual control channel. The cabin differential pressure display and warnings will be shown to provide a Level A design assurance path totally independent from any automatic or manual cabin pressure control function and from the Level A equivalent PRV function.
- In addressing § 25.843(b)(1), Textron will verify the PRV and CPCS controller can independently function to limit the positive cabin differential pressure during flight tests. Flight tests will also verify that the negative pressure relief check valve and CPCS controller can independently function to limit the negative differential pressure.
- The maximum relief valve setting for the Model 700 is defined as the maximum pressure allowed by the PRV, including tolerance. The limit pressure used for compliance with § 25.365(d) is 1.33 times this pressure.

- A common mode analysis will be performed to show the potential for common cause failures and development errors are adequately mitigated, and that the proposed design is equivalently safe or safer, to the design as prescribed by § 25.841.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The compensating factor(s) raise the level of safety to that required by § 25.841(b)(1) by providing two independent valves, ensuring sufficient independence between them, and providing a cockpit annunciation in the event of excessive pressure to allow the crew to adjust cabin pressure manually. The OCV and the PRV each have the capacity to limit the positive pressure differential under the maximum operating condition. Textron will demonstrate by analysis and testing that the OCV and PRV satisfy the intent of §§ 25.841(b)(1) and 25.843(b)(1).

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper SM-12, titled "Cabin Outflow Valve." This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TSB has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulations:

§ 25.841(b)(1) Pressurized cabins.
§ 25.843(b)(1) Tests for pressurized cabins.

(documented in ELOS Memorandum TXTAV-014180-SM-12)

CHRISTOPHER R PARKER Digitally signed by CHRISTOPHER R PARKER
Date: 2017.08.30 15:00:24 -07'00'

Transport Standards Branch,
Policy & Innovation Division
Aircraft Certification Service

Date

ELOS Originated by: Wichita ACO Branch	ACO Manager: Margaret Kline	Routing Code: AIR-7K0

– END –

D-31 (ESF): Cabin Entry Door Latching and Locking Independence	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.783(d)(2) amdt. 15
ADVISORY MATERIAL:	--

ESF

1. Affected CS

CS 25.783(d)(2) at amdt.15

2. Intent of the CS, compensating Factors and/or alternative requirements

See section "**Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)**" and **"Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation"** in the ELOS Memo "TXTAV-014180-SM-10" attached.

Federal Aviation Administration

Memorandum

Date: October 6, 2016

To: Manager, Wichita ACO, ACE-115W

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Adam Hein, ACE-116W

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Cabin Entry Door Latching and Locking Independence on a Textron Aviation Inc. Model 700 airplane, FAA Project # TXTAV-014180

ELOS Memo #: TXTAV-014180-SM-10

Regulatory Ref: § 25.783(d)(2)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Textron Aviation Inc. Model 700 airplane.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.783(d)(2) requires:

(d) Latching and locking. The latching and locking mechanisms must be designed as follows:

(2) The latches and their operating mechanism must be designed so that, under all airplane flight and ground loading conditions, with the door latched, there is no force or torque tending to unlatch the latches. In addition, the latching system must include a means to secure the latches in the latched position. This means must be independent of the locking system.

The Textron Model 700 cabin entry door latches are secured by a means that is not completely independent of the locking system.

Applicable regulation(s)

14 CFR 25.783(d)(2)

Regulation(s) requiring an ELOS finding

14 CFR 25.783(d)(2)

Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)

The compensating factors that provide an ELOS for the regulation not met are as follows:

- More latches are provided than are necessary to prevent the door from opening.
- A separate latch securing means is provided for each latch.
- Using a common operating system for the six latch securing means and the six locks results in fewer mechanism components and subsequently fewer issues related to wear, backlash, friction, jamming, incorrect assembly, incorrect adjustment, parts becoming loose, disconnected, or unfastened, parts breaking, fracturing, bending, or flexing beyond the extent intended.
- The common operating system is held in the latched and locked position by the rotary actuator pawl which engages a feature on the inner handle.
- Incorrect adjustment of a latch securing means results in detectable system jams.
- Force in the latching direction is provided by an extension spring and, during pressurized flight, the vent panel. The latching direction force acts upon the common operating system.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The compensating factor(s) raise the level of safety to that required by § 25.783(d)(2) by incorporating redundant, robust and independent design features that prevent the cabin entry door from opening in flight.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper SM-10, titled Cabin Entry Door Latching and Locking Independence. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s):
§ 25.783(d)(2) Fuselage Doors.
(documented in TAD ELOS Memorandum TXTAV-014180-SM-10)

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Date: 2016.10.06 13:21:51 -07'00'

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by: Wichita Aircraft Certification Office	ACO Manager: Margaret Kline	Routing Symbol: ACE-115W

– END –

D-32 (ESF): Ditching Emergency Exits for Passengers	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.807(i), 25.1411(a)(b) amdt. 15
ADVISORY MATERIAL:	--

ESF

1. Affected CS

CS 25.807 (i) amdt. 15

2. Intent of the CS, compensating Factors and/or alternative requirements

See section "**Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)**" and **"Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation"** in the ELOS Memo "TXTAV-014180-A-04" attached.

Federal Aviation Administration

Memorandum

Date: August 31, 2016

To: Manager, Wichita ACO, ACE-115W

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: My Ngoc Tran, ACE-118W

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Ditching Emergency Exits for Passengers on the Textron Aviation Inc. Model 700, FAA Project # TXTAV-014180

ELOS Memo #: TXTAV-014180-A-04

Regulatory Ref: § 25.807(i)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Textron Aviation Inc. Model 700 airplane.

Background

The Model 700 is a 12 passenger (plus two crew) pressurized low-wing monoplane configured with two emergency exits, one on each side of the aircraft. The right hand side has an over wing exit meeting at least the dimensions of a Type III exit and complies with Title 14, Code of Federal Regulations (14 CFR) 25.807(i). However, the left side emergency exit is the main cabin entry door, which is a Type III exit where expected flotation in fresh water places the lower sill below the waterline in some aircraft weight and center of gravity conditions.

Applicable regulation(s)

§ 25.807(i)

Regulation(s) requiring an ELOS finding

§ 25.807(i)

Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment needed for equivalency)

The secondary escape route is the main cabin entry door, which may be used for evacuation by deploying the water barrier prior to ditching. Deployment of the water barrier is required prior to ditching, and subsequent opening of the main cabin entry door. It is a specific design objective that no special training or experience is required to deploy the water barrier. The simplicity of the design would allow even naïve occupants to complete the deployment and traverse the barrier with ease and rapidity. Complete deployment instructions will be placarded adjacent to the water barrier.

Figure A shows a cross section of the fuselage at the cabin entry door and illustrates the relationship between the cabin entry door threshold, the deployed water barrier, and the initial waterline with the door closed. The water pressure due to head and the force necessary to push the cabin entry door open against the water pressure has been estimated to be less than 15 pounds at the top edge of the door; a sufficiently small force that is well within the normal passenger capabilities. The water barrier on the Model 700 consists of a hinged floor panel permanently located at the door opening that is rotated up to extend across the door opening and retained by a self-engaging latch. The panel is designed to react to water pressure and is designed to take an occupants weight in the event that evacuees elect to step on rather than over the barrier panel. Figure B presents a cross-section of the fuselage with the cabin entry door open and the barrier panel deployed with the aircraft in the initial float attitude. The barrier panel is estimated to provide an initial free board height of approximately 8.7 inches and requires a maximum step-up height from the threshold of approximately 6 inches. Figure C is a view looking inboard with the cabin entry door open and water barrier deployed, illustrating that the clear opening on the left side of the aircraft will be approximately 25 inches wide and 60 inches high, which is in excess of the Type III emergency exit dimensions required by § 25.807(i).

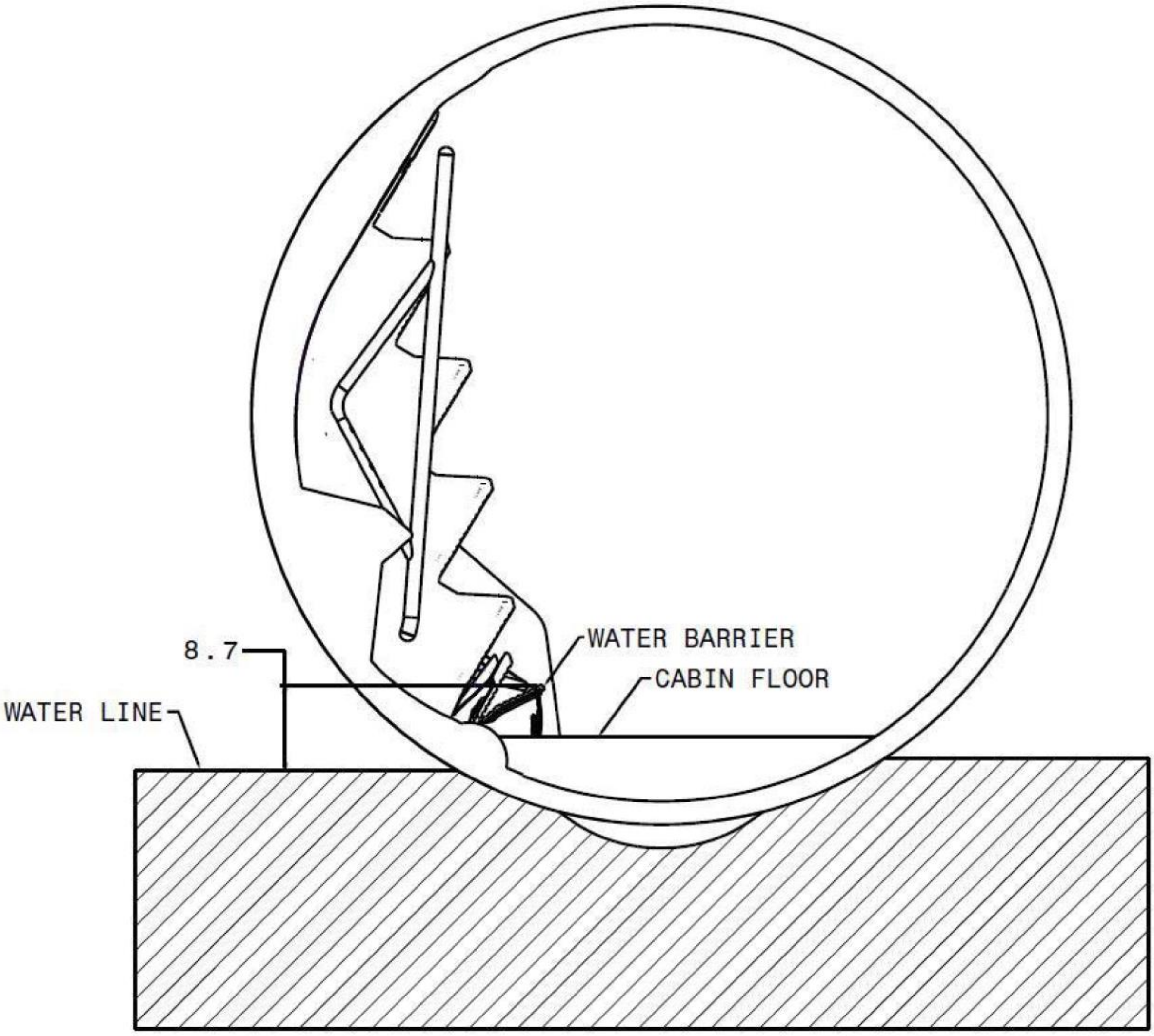

Figure A

ELOS Memo No. TXTAV-014180-A-04 4

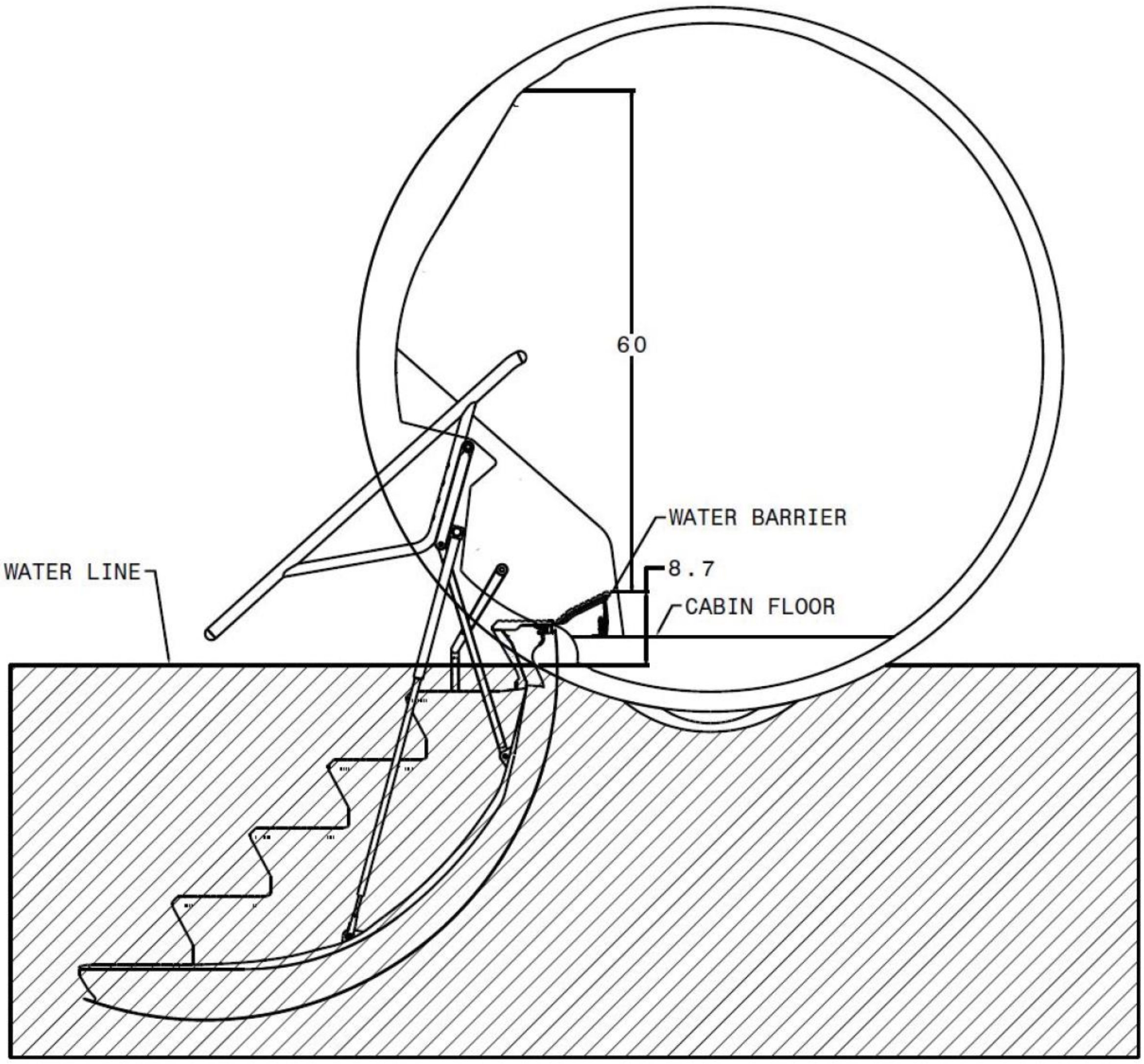

Figure B

ELOS Memo No. TXTAV-014180-A-04 5

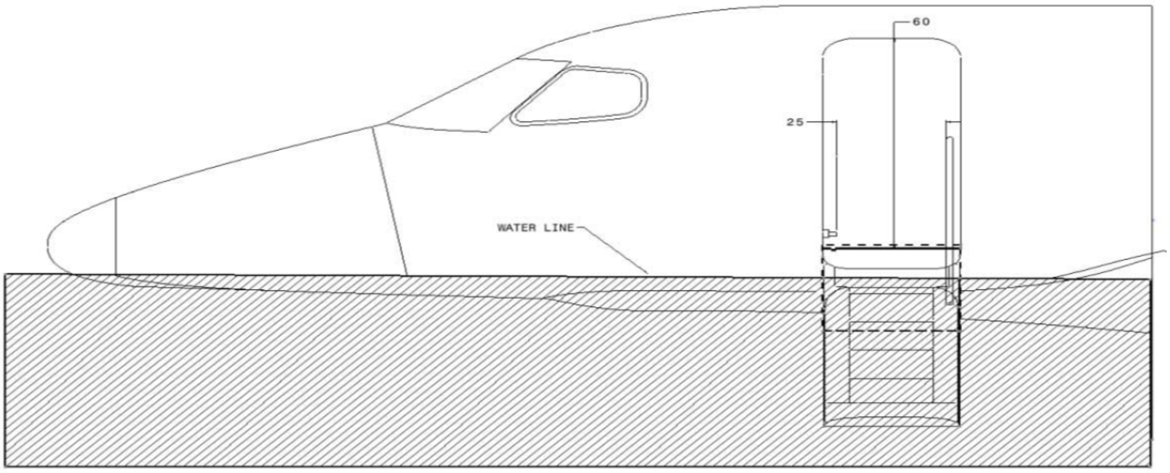

Figure C

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The compensating factors raise the level of safety to that required by § 25.807(i) by the use of the water barrier described in the previous paragraphs. The water barrier will permit the use of the main cabin entry door as a ditching emergency exit on the left side of the aircraft. The over wing emergency escape hatch serves as the required exit on the right side of the aircraft and is unaffected by the use of the water barrier.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper A-04, titled Ditching Emergency Exits for Passengers. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

Equivalent Level of Safety Finding has been made for the following regulation:
14 CFR 25.807(i) Ditching Emergency Exits for Passengers
(documented in TAD ELOS Memo TXTAV-014180-A-04)

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Date: 2016.08.31 14:14:39 -07'00'

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Memo No. TXTAV-014180-A-04 6

ELOS Originated by: Wichita Aircraft Certification Office	ACO Manager: Margaret Kline	Routing Symbol: ACE-115W

– END –

E-07 (ESF): Digital-Only Display of Engine Operating Parameters	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1549(a)(b)(c) amdt. 15
ADVISORY MATERIAL:	--

ESF

1. Affected CS

CS 25.1549(a)(b)(c) at amdt.15

2. Intent of the CS, compensating Factors and/or alternative requirements

See section "**Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)**" and **"Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation"** in the ELOS Memo "TXTAV-014180-P-13" attached.

Federal Aviation Administration

Memorandum

Date: May 12, 2017

To: Manager, Wichita ACO, ACE-115W

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Jeff Englert, ACE-116Wp

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Digital-Only Display of Engine Operating Parameters on a Model 700 airplane, FAA Project No. TXTAV-014180

ELOS Memo #: TXTAV-014180-P-13

Regulatory Ref: §§ 25.901, 25.903, 25.1305, 25.1309, 25.1321, 25.1322, and 25.1549

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Model 700 airplane.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.1549 at Amendment 25-40 requires the following for powerplant and auxiliary power unit instruments:

For each required powerplant and auxiliary power unit instrument, as appropriate to the type of instrument—

(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 takeoff and precautionary range must be marked with a yellow arc or a yellow line; and

(d) Each engine, auxiliary power unit, or propeller speed range that is restricted because of excessive vibration stresses must be marked with red arcs or red lines.

ELOS Memo No. TXTAV-014180-P-13 2

The Model 700 design for powerplant instruments does not have a green arc or green line marking for the normal operating range for all powerplant parameters. Therefore, the Model 700 airplane does not directly comply with § 25.1549(a), (b), and (c).

The range markings are intended to indicate to a flightcrew member, at a glance, that system operation is being accomplished in a safe or unsafe condition. With the advent of full authority digital engine controls (FADEC), the primary means of assuring operation within some safe engine operating limits has been taken over by automated protection features within these engine controls. Hence, such controls may be considered to provide compensating features when establishing whether or not providing a green arc or a green line, to indicate a safe condition for continuous operation, provides an ELOS. If a FADEC is designed to assure a given engine operating limit is not exceeded, then the flightcrew is no longer the primary means of preventing an exceedance of that limit. In addition, the need for flightcrew awareness of the exceedance limit, as required by the § 25.1549 markings, is greatly diminished.

The following Model 700 powerplant parameters do not have red, green or yellow arcs, denoting emergency, cautionary, or normal operating ranges; high-pressure rotor speed (N2), oil pressure, oil temperature and fuel flow.

Applicable regulation(s)

§§ 25.901, 25.903, 25.1305, 25.1309, 25.1321, 25.1322, and 25.1549

Regulation(s) requiring an ELOS finding

§§ 25.1549(a), (b), (c)

Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)

The Model 700 airplanes are equipped with engines that are each controlled by full authority digital engine controls (FADEC). The engine high pressure rotor speed (N2), oil pressure, oil temperature and fuel flow parameters are processed by the Garmin G5000 Avionics system and displayed on the appropriate flight display. These parameters are displayed in green, black, white, amber or red colors, with an inverse video in some cases to indicate the following:

- Green text against a black background: Normal operating range
- Black text on amber inverse video: In cautionary range (above steady state high limit or below steady state low limit)
- White text on red inverse video: Exceedances (above transient high limit or below transient low limit)
- Amber dashes: Invalid signal (indication of out of range or unreliable signal because it is either not available or exceeds the capability of the instrument)

The engine installation manual defines a precautionary range before the redline limit and an amber band is incorporated into the display. The FADEC engine control system serves as an automatic regulating device that limits the speeds from exceeding the redline limit and alleviates the flightcrew from having to continuously monitor values for exceedances. Additional overspeed protection is accomplished via independent dedicated sensors and controlling hardware within the FADEC and fuel metering unit. The airplane flight manual (AFM) contains procedures following an N2 exceedance event.

The engine oil pressure and oil temperature parameters are not used for controlling the engine. Low and high indications in the amber precautionary range have associated AFM procedures for flightcrew actions. The AFM contains procedures following an exceedance event.

Crew alerting system (CAS) messages are annunciated when a low oil pressure limit is encountered with associated AFM procedures for appropriate flightcrew actions.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The compensating factor(s) raise the level of safety to that required by § 25.1549 by the engine FADEC control system providing continuous monitoring in-flight of the operating condition of the engine high pressure rotor speed (N2). The FADEC control system's automatic generation of warnings to the cockpit, with associated flightcrew procedures, and engine automatic shutdown if a limit is exceeded, provide an ELOS as that established by providing analog displays. Additionally, although noncompliant with the regulation, the parameters displayed in green provide an ELOS to indicate normal operating range and are backed by CAS automatic annunciations of range exceedance, with associated flightcrew procedures, and no immediate action required by the flightcrew to respond are considered to provide an ELOS as that established by providing analog displays.

The color changing digital display of oil temperature, oil pressure, and fuel flow parameters provide an ELOS as that established by providing analog displays, because these parameters have limited limits. Oil temperature has only cautionary limits, oil pressure has only an upper limit, the lower is a cautionary value, and fuel flow has no limitations.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper, P-13, titled Digital-Only Display of Engine Operating Parameters. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s):
§ 25.1549(a), (b), (c) Powerplant and auxiliary power unit instruments.
(documented in TAD ELOS Memorandum TXTAV-014180-P-13)

ROBERT C JONES Digitally signed by ROBERT C JONES
Date: 2017.05.12 14:45:48 -07'00'

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by: Wichita Aircraft Certification Office	ACO Manager: Margaret Kline	Routing Symbol: ACE-115W

– END –

E-08 (ESF): Thrust Reverser Testing	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.934, CS-E 890
ADVISORY MATERIAL:	EASA CM-PFIS-002 Issue 1, dated 8th March 2012 “Approval of Engine Use with a Thrust Reverser”

ESF

Use of EASA CM-PFIS-002 provides for an already acceptable alternative to meet the requirements in subject.

– END –

ESF-E25.1141-01 (ESF): Powerplant Valve Indication	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1141 (f)(2) amdt. 15
ADVISORY MATERIAL:	--

ESF

1. Affected CS

CS 25.1141(f)(2).

2. Intent of the CS, compensating Factors and/or alternative requirements

See section "**Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)**" and **"Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation"** in the ELOS Memo "TXTAV-014180-P-05" attached.

Federal Aviation Administration

Memorandum

Date: August 3, 2017

To: Manager, Wichita ACO, ACE-115W

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Jeff Englert, ACE-116W

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Powerplant Valve Indication on Textron Aviation Inc. Model 700 Airplanes, FAA Project No. TXTAV-014180

ELOS Memo #: TXTAV-014180-P-05

Regulatory Ref: 14 CFR 21.21(b)(1) and 25.1141(f)(2)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for Textron Aviation Inc. Model 700 airplanes.

Background

Amendment 25-72 of Title 14, Code of Federal Regulations (14 CFR) 25.1141(f)(2) requires power assisted valve controls located in the cockpit to have a means to indicate to the flightcrew when a valve is:

i. in the fully open or fully closed position, or

ii. moving between the fully open and fully closed position.

The Model 700 aircraft utilizes throttle levers and Run/Stop switches located in the cockpit to control engine operation through power assisted valves, located within the Honeywell AS907-2-1S engine hydromechanical unit (HMU). The throttle levers and RUN/STOP switches do not provide HMU valve position indications in accordance with the requirements of § 25.1141(f)(2).

Applicable regulation(s)

14 CFR 21.21(b)(1) and 25.1141(f)(2)

ELOS Memo No. TXTAV-014180-P-05 Page 2

Regulation(s) requiring an ELOS finding

§ 25.1141(f)(2)

Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)

The compensating design features of the system are:

- The engine's Full-Authority Digital Electronic Control (FADEC) controls and monitors the HMU fuel valves that shutoff fuel to the engine.
- The HMU has two independent fuel valves (metering valve and pressurizing valve) that shutoff the fuel supplied to the fuel nozzles via the flow divider valve.
- Engine operating parameters are provided to the flightcrew to assist in determining proper engine operation.

AS907 engine power management sets and controls engine operation and power as a function of the aircraft power lever position and applicable aircraft input signals. The FADEC automatically sets thrust proportional to throttle lever angle (TLA) position. The RUN/STOP switch sends engine run or shutdown signals to the FADEC. The RUN/STOP switch position is indicated on the switch but feedback from the valve position is not included. Either signal source causes the FADEC to command the HMU to operate internal valves.

The engine has two independent methods of shutting off fuel flow to the engine. During normal operation, fuel flow to the flow divider valve, which distributes fuel to the nozzles, is physically shutoff by either the fuel metering valve or the pressurizing valve.

The FADEC continuously monitors the position of the metering valve during engine starting and operation. If the metering valve is not in the commanded position or not tracking properly then a FADEC fault will be posted. In a similar manner, if the other valves in the HMU fail to achieve commanded position during a start or when running, improper valve position is either indicated by FADEC fault messages or manifested to the crew by abnormal engine behavior. During normal engine operation and shutdowns on the ground, the FADEC checks the position of HMU metering valve. The FADEC posts faults when the valves do not respond as commanded or are detected in the incorrect position, which are annunciated to the crew as a no dispatch ENG CTRL FAULT CAS message.

If normal engine shutdown fails to shut down the engine, the ENG FIRE switch can be used. The switch cuts off the aircraft fuel supply to the HMU by closing the fuel firewall shutoff valve. The fuel firewall shutoff valve position is annunciated to the crew.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

ELOS Memo No. TXTAV-014180-P-05, Revision 1 Page 3

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The intent of § 25.1141(f)(2) is to mitigate the potential for the flightcrew to select an inappropriate position for, or be unaware of the position of, powerplant valves that are controlled from the flight deck.

When the engine is running, the metering valve positioning is dynamic and readily ascertained from engine indications and from engine behavior. Pilot control of the metering valve is essentially controlled by moving the throttle lever. The engine thrust is directly related to N1 (fan speed). The FADEC calculates the appropriate N1 speed setting corresponding to the TLA position selected. The FADEC sets this N1 through the control of the metering valve. If the N1, N1 BUGS, N2 (high pressure turbine speed), and interstage turbine temperature (ITT) are in the normal range then the metering valve is operating properly. If any of these parameters fall out of normal limits, crew alerting system messages are annunciated, there are associated abnormal engine indication system (EIS) indications, and faults posted. Flightcrew corrective actions are addressed in the Airplane Flight Manual (AFM) procedures.

The FADEC's monitoring of the operating condition of valves within the HMU with associated flightcrew procedures provide an equivalent level of safety as that established by § 25.1141(f)(2).

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project issue paper P-05. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Technical Innovation Policy Branch has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS memorandum number must be listed in the Type Certificate Data Sheet under the Certification Basis section. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings has been made for the following regulation(s):
14 CFR 25.1141(f)(2) Powerplant controls: general
(documented in ELOS Memorandum TXTAV-014180-P-05, Revision 1)

DIANE M COOK Digitally signed by DIANE M COOK
Date: 2020.12.17 14:09:56 -05'00'

Technical Innovation Policy Branch
Policy and Innovation Division
Aircraft Certification Service

Date

ELOS Originated by: Wichita ACOB	ACO Manager: Paul Nguyen	Routing Symbol: AIR-7K0

– END –

F-26 (ESF): Non-magnetic Standby Compass	
APPLICABILITY:	Model 700
REQUIREMENTS:	CS 25.1303(a)(3), 25.1327 (b), and 25.1547
ADVISORY MATERIAL:	AMC 25.1327

ESF

1) Independency from the primary and standby system (source and display of heading information) should be established in all foreseeable operating conditions. In normal conditions, each PFD uses the on side source for heading, and other sources may be used both as a backup to the PFD sources and to the electronic standby indicator. Hence, required independency may be compromised in the event that the same heading source is selected for the electronic standby indicator and on one PFD;

2) The applicant to provide assessment that the reliability of the electronic standby indicator is commensurate with the identified hazard level.

3) Additional availability assessments should be provided;

    a) Direction indication should be available immediately following the loss of the primary dedicated navigation (heading data) source without additional crewmember action, and after any single failure or combination of failures. The alternative magnetic heading source must provide availability at least equivalent to the availability level offered by a traditional non-stabilized magnetic direction indicator.
    Automatic reversion of the alternate source for heading data is expected, in case of failure of the primary source of heading information.
    For the proposed ESF, a crew action is required to select the alternate heading source when the normal electronic standby indicator heading source fails. However, heading source availability may be compromised. The applicant is requested to justify why the manual reversion to the alternate heading source in case of failure of the primary heading source is acceptable.

    b) Direction indication should not be adversely affected following a power interruption.

    c) Operation during and after exposure to HIRF environment should be established.

    d) Operation after exposure to indirect effect of lightning should be established.

– END –

Acronyms and Abbreviations

TCDS	Type Certificate Data Sheet
SC	Special Condition
DEV	Deviation
ESF	Equivalent Safety Finding

– END –