

## CORRIGENDUM

**Corrigendum to Decision 2016/010/R of the Executive Director of the Agency of 22 June 2016 amending Decision No 2003/002/RM of the Executive Director of the Agency of 17 October 2003 on Certification Specifications and Acceptable Means of Compliance for Large Aeroplanes ('CS-25') 'CS-25 – Amendment 18'**

- (a) deleted text is marked with ~~strike through~~;
- (b) new or amended text is highlighted in grey;

**The changes below are reflected in the consolidated CS-25 Amendment 18.**

### **AMC 25.21(g)**

#### **Performance and Handling Characteristics in Icing Conditions**

(...)

1 *Purpose.*

(...)

1.4 Section 5 describes acceptable methods and procedures that an applicant may use to show that an aeroplane meets these requirements. Depending on the design features of a specific aeroplane as discussed in Appendix 3 of this AMC, its similarity to other types or models, and the service history of those types or models, some judgement will often be necessary for determining that any particular method or procedure is adequate for showing compliance with a particular requirement. **AMC 25.1420(f) provides guidance for comparative analysis as an acceptable means of compliance to meet these requirements.**

(...)

4 *Requirements and Guidance.*

(...)

4.4.6 Certification experience has also shown that runback ice may be critical for propellers, and propeller analyses do not always account for it. Therefore, runback ice on the propeller should be addressed. Research has shown that ice accretions on propellers, and resulting thrust decrement, may be larger in Appendix O (supercooled large drop) icing conditions than in Appendix C icing conditions for some designs. This may be accomplished through aeroplane performance checks in natural icing conditions, icing tanker tests, icing wind tunnel tests, aerodynamic analysis, or the use of an assumed (conservative) loss in propeller efficiency. Testing should include a range of outside air temperatures, including warmer (near freezing) temperatures that could result in runback icing.

For the Appendix O icing conditions, the applicant may use a comparative analysis. AMC 25.1420(f) provides guidance for comparative analysis.

4.8.2.2 Normal operating procedures provided in the AFM should reflect the procedures used to certify the aeroplane for flight in icing conditions. This includes configurations, speeds, ice protection system operation, power plant and systems operation, for take-off, climb, cruise, descent, holding, go-around, and landing. For aeroplanes not certified for flight in all of the supercooled large drop atmospheric icing conditions defined in Appendix O to CS-25, procedures should be provided for safely exiting all icing conditions if the aeroplane encounters Appendix O icing conditions that exceed the icing conditions the aeroplane is certified for. Information to be provided in the AFM may be based on the information provided in the reference fleet AFM(s), or other operating manual(s) furnished by the TC holder, when comparative analysis is used as the means of compliance.

(...)

## 5 Acceptable Means of Compliance - General.

(...)

5.1.5 Appropriate means for showing compliance include the actions and items listed in Table 1 below. These are explained in more detail in the following sections of this AMC.

TABLE 1: Means for Showing Compliance

Flight Testing	Flight testing in dry air using artificial ice shapes or with ice shapes created in natural icing conditions.
Wind Tunnel Testing and Analysis	An analysis of results from wind tunnel tests with artificial or actual ice shapes.
Engineering Simulator Testing and Analysis	An analysis of results from engineering simulator tests.
Engineering Analysis	An analysis which may include the results from any of the other means of compliance as well as the use of engineering judgment.
Ancestor Aeroplane Analysis	An analysis of results from a closely related ancestor aeroplane.
Comparative analysis for showing compliance in SLD icing conditions	An analysis which substantiates that a new or derivative aeroplane model has at least the same level of safety in all supercooled liquid water icing conditions that a reference fleet has achieved. Guidance is provided in AMC 25.1420(f). The use of a comparative analysis is only an option for showing compliance with CS-25 specifications relative to Appendix O icing conditions; it is not an option for showing compliance with CS-25 specifications relative to Appendix C icing conditions.

(...)

## 5.6 Ancestor Aeroplane Analysis.

5.6.1 To help substantiate acceptable performance and handling characteristics, the applicant may use an analysis of an ancestor aeroplane that includes the effect of the ice accretions as defined in Part II of Appendix C and Appendix O to CS-25. This analysis should consider the similarity of the configuration, operating envelope, performance and handling characteristics, and ice protection system of the ancestor aeroplane to the one being certified.

5.6.2 The analysis may include flight test data, dry air wind tunnel test data, icing tunnel test data, engineering simulator analysis, service history, and engineering judgement.

### 5.7 Comparative Analysis.

For showing compliance with the CS-25 certification specifications relative to SLD icing conditions represented by Appendix O, the applicant may use a comparative analysis. AMC 25.1420 (f) provides guidance for comparative analysis.

(...)

## Appendix 1 - Airframe Ice Accretion

### A1.1 General.

(...)

f. The applicant should determine the most critical ice accretion in terms of handling characteristics and performance for each flight phase. Parameters to be considered include:

- flight conditions (for example, aeroplane configuration, speed, angle-of-attack, altitude) and
- atmospheric icing conditions for which certification is desired (for example, temperature, liquid water content (LWC), mean effective drop diameter (MED), drop median volume diameter (MVD)).

If a comparative analysis (refer to AMC 25.1420(f)) is used as the means of compliance with the CS-25 certification specifications relative to the Appendix O icing conditions, the most critical ice accretions determined for Appendix C icing conditions are acceptable.

## AMC 25.1420

### Supercooled large drop icing conditions

(...)

#### 1.2.2.4 (...)

- The applicant can show that the icing event history of all conventionally designed aeroplanes of conventional design is relevant to the aeroplane being considered for certification.

(...)

## AMC 25.1593

**Exposure to volcanic cloud hazards**

(...)

[Amdt No: 25/2013]

**AMC to Appendix Q**

**(SAL) 25.5 Safe operational and flight characteristics**

(...)

[Amdt No: 25/2013]

Note: Page numbering is corrected as follows: 2-App ~~Q~~<sup>Q-1</sup>