



# Terms of Reference

for a rulemaking task

## USE OF SIMILARITY ANALYSIS WHEN SHOWING COMPLIANCE TO SLD

### ICING SPECIFICATIONS

RMT.0572— ISSUE 1 — 28/01/2013

<b>Applicability</b>		<b>Process map</b>	
<b>Affected regulations and decisions:</b>	CS-25	Rulemaking lead	R4
<b>Affected stakeholders:</b>	Manufacturers of large aeroplanes	Concept paper	No
<b>Driver/origin:</b>	New ice protection rules planned with task RMT.0058; Request from industry	Rulemaking group	Yes
<b>Reference:</b>	N/A	RIA type	None
		Technical consultation during NPA drafting	No
		Publication date of the NPA	2014/Q4
		Duration of NPA consultation	3 months
		Review group	tbd
		Focused consultation	No
		Publication date of the Opinion	N/A
		Publication date of the Decision	2016/Q1



## 1. Issue and reasoning for regulatory change

NPA 2011-03 proposed new standards for certification of CS-25 large aeroplanes for flight in icing conditions. This includes a new Appendix O environment of Supercooled Large Droplets (SLD) icing conditions which is introduced in specifications related to ice protection of the aeroplane systems and equipment, and specifications related to performance and handling qualities.

The new paragraph CS 25.1420 will require the aeroplane being able to either safely exit following the detection of any or specifically identified Appendix O icing conditions, or safely operate without restrictions in the Appendix O - Icing conditions. Specifically, the proposed CS 25.1420(a) subparagraph would allow three options:

Detect Appendix O conditions and then operate safely while exiting all icing conditions (CS 25.1420(a)(1)).

Safely operate in a selected portion of Appendix O conditions, detect when the aeroplane is operating in conditions that exceed the selected portion, and then operate safely while exiting all icing conditions (CS 25.1420(a)(2)).

Operate safely in all of the Appendix O conditions (CS 25.1420(a)(3)).

To establish the aeroplane safe operation as will be required per CS 25.1420(a), CS 25.1420(b) would require both analysis and one test, or more as found necessary, to establish that the ice protection for the various components of the aeroplane is adequate.

During the certification process, the applicant would demonstrate compliance using a combination of analyses and test(s). The applicant's means of compliance would consist of analyses and the amount and types of testing it finds necessary to demonstrate compliance with the specification. The applicant would choose to use one or more of the tests identified in subparagraphs CS 25.1420(b)(1) through (b)(5).

These provisions do not foresee taking credit from the similarities of the proposed type of aeroplane compared to previously certified aeroplane(s) that proved by their service experience to be safe for flight in SLD icing conditions.

Nevertheless, it is recognised that many currently certified large aeroplanes have demonstrated, through their service experience, to be safe to operate in these conditions.

During the NPA 2011-03 consultation period, several large aeroplane manufacturers expressed their wish to have the possibility of taking credit of previous type designs to facilitate their showing of compliance with the proposed rule, and this was also suggested in the NPA 2011-03 Explanatory Note.

For this reason, the Agency proposed some provisions in the corresponding draft Acceptable Means of Compliance (AMC) material of NPA 2012-22 so that the applicant may use and take credit from similarity to a previous design having proven safe operation in SLD icing conditions. This would facilitate the demonstration of compliance with the specifications and it may remove the need for performing testing in natural or simulated SLD conditions. As the details of the method and the acceptance criteria to be used when conducting a similarity analysis are not provided in the draft AMC material mentioned above, the Agency decided to create a new rulemaking task to prepare a proposal that will further develop the above proposal. This would then provide a better assurance to applicants on the conditions required for a similarity analysis to be accepted by the Agency. This would also facilitate the certification process for both Industry and the Agency.

## 2. Objectives

Propose an amendment of CS-25 that would further develop the material proposed in the draft AMC material providing guidance on the possibility of conducting a similarity analysis when showing compliance to SLD related specifications.



### **3. Specific tasks and deliverables**

#### **3.1. Tasks**

- Review the AMC material provisions for a design similarity analysis;
- Develop more guidance on the criteria for deciding that a previous design proved to be safe for flight in SLD icing conditions;
- Identify any need to update the list of key elements identified in the AMC material when comparing similarities or differences in the designs;
- For each key element, consider developing detailed guidance on the expected analysis and associated pass-fail criteria;
- Consider the need to propose amendments of the Certification Specifications of Book 1 for introducing the design similarity analysis that are further explained in Book 2.

#### **3.2. Deliverables**

ED Decision with amendment to CS-25

#### **3.3. Focused consultation**

N/A

### **4. Profile and contribution of the rulemaking group**

The Group should include representatives from large aeroplane manufacturers and aviation authorities in the following expertise domains:

- Aerodynamic;
- Aeroplane performance & handling qualities; and
- Ice protection systems (airframe and powerplant).

### **5. Annex I: Reference documents**

#### **5.1. Affected regulations**

CS-25

#### **5.2. Affected decisions**

ED Decision 2003/02/RM

#### **5.3. Reference documents**

- NPA 2011-03 dated 21 March 2011, 'Large Aeroplane Certification Specifications in Supercooled Large Drop, Mixed phase, and Ice Crystal Icing Conditions';
- NPA 2012-22 dated 27 November 2012, 'Large Aeroplane Certification Specifications in Supercooled Large Drop, Mixed phase, and Ice Crystal Icing Conditions — Advisory Material'.