

ADVANCE-NOTICE OF PROPOSED AMENDMENT (A-NPA) No 2007-11

Possible course of action for EASA to address the issue of residue that can result from application of

DE-ICING / ANTI-ICING FLUIDS

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A. EXPLANATORY NOTE

I. General

1. The purpose of this Advance-Notice of Proposed Amendment (A-NPA) is to consult stakeholders on the appropriate measures to be taken in order to address potential safety hazards associated with the residues of fluids used for the de-icing and anti-icing of aircraft. The outcome of the A-NPA consultation will be used to define an EASA action plan to address this issue and more particularly the recommendations from accident investigators. When rulemaking will be necessary, then NPAs will be published for comments.
2. The Agency is directly involved in the rule-shaping process. It assists the Commission in its executive tasks by preparing draft regulations, and amendments thereof, for the implementation of the Basic Regulation¹ which are adopted as “Opinions” (Article 14.1). It also adopts Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance and Guidance Material to be used in the certification process (Article 14.2).
3. When preparing its rulemaking decision the Agency is required to follow a structured process as described in the EASA Rulemaking Procedure².
4. This rulemaking activity has been included in the Agency’s 2007 programmes at the request of the EASA Advisory Board³ in response to safety concerns raised by the UK Air Accidents Investigation Branch (AAIB), the German Federal Bureau of Aircraft Accident Investigation (BFU) and the aviation industry. It implements the rulemaking task MDM.040.
5. The text of this A-NPA has been developed by the Agency. It is submitted for consultation of all interested parties in accordance with Article 43 of the Basic Regulation and Articles 5(3) and 6 of the EASA Rulemaking Procedure.

II. Consultation

6. To achieve optimal consultation, the Agency is publishing the A-NPA on its internet site. Comments should be provided within 3 months in accordance with Article 6(4) of the EASA Rulemaking Procedure. Comments on this proposal should be submitted by one of the following methods:

CRT: Send your comments using the Comment-Response Tool (CRT) available at <http://hub.easa.europa.eu/crt/>

E-mail: In case the use of CRT is prevented by technical problems these should be reported to the [CRT webmaster](mailto:CRT_webmaster@easa.europa.eu) and comments sent by email to NPA@easa.europa.eu.

¹ Regulation (EC) No 1592/2002 of the European Parliament and of the Council of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency (*OJ L 240, 7.9.2002, p.1*). Regulation as last amended by Regulation (EC) No 334/2007 (*OJ L 88, 29.3.2007, p. 39*).

² Management Board decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material (“Rulemaking Procedure”), EASA MB/08/2007, 13.6.2007.

³ EASA Advisory Board, letter to EASA Executive Director, EAB/00063, 1.9.2006.

Correspondence: If you do not have access to internet or e-mail you can send your comment by mail to:
 Process Support
 Rulemaking Directorate
 EASA
 Postfach 10 12 53
 D-50452 Cologne
 Germany

Comments should be received by the Agency **by 31 October 2007**. If received after this deadline they might not be taken into account.

III. Comment Response Document

7. All comments received in time will be responded to and incorporated in a Comment Response Document (CRD). This may contain a list of all persons and/or organisations that have provided comments. The CRD will be widely available on the Agency's website.

IV. A-NPA Background

8. Description of the problem

8.1 A large number of events of stiff or frozen flight control systems have been reported, particularly on aircraft with non-powered flight control systems. These events were attributed to the re-hydration and subsequent freezing of the residues of thickened anti-icing fluids previously applied to the aircraft. A number of Safety Recommendations has been made by Accident Investigation agencies on this subject, including the UK Air Accident Investigation Branch (AAIB) and the German Federal Bureau of Aircraft Accident Investigation (BFU).

- 8.2 General summary of incidents

It is vital that aircraft are correctly de-iced/anti-iced in order to safely operate in weather conditions that may lead to the formation of frost and/or ice. However, the potential for problems due to the formation of residues, which may then lead to control restrictions, must also be recognised and appropriately managed.

The investigation into this subject, including discussions at a specific workshop, highlighted that there may be a number of ways of achieving the positions given in these Safety Recommendations. Some of these options may be more preferable than others from either a timescale or cost viewpoint. In addition, other actions may also be possible that minimise the burden when these fluids have been used. These include:

- i. the means to ensure the most appropriate fluid is available at the point of use
- ii. improvements in the identification and removal of residues
- iii. the development of fluids that do not contain agents that form re-hydratable residues.

- 8.3 This A-NPA 2007-11 is therefore published in response to the Safety Recommendations and in recognition of the possible options in order to identify the further actions that are required.

9. Recommendations from accident investigators

- 9.1 The publication of recommendations for the use of un-thickened fluids for aircraft with non-powered flight controls

AAIB Safety Recommendation 2005-135

It is recommended, that the Joint Aviation Authorities, in consultation with the European Aviation Safety Agency, issue safety documentation to strongly encourage operators of aircraft with non-powered flight controls to use Type I de-/anti-icing fluids, in preference to 'thickened' fluids, for de-icing.

BFU Safety Recommendation 08/06

The European national accident investigation authorities should recommend to their respective aviation authorities to see that not only thickened (Type II or Type IV) but also un-thickened (Type I) de-icing fluids are applied on airports regularly used by aircraft with non-powered flying controls and offering de-icing services.

BFU Safety Recommendation 07/06

The Federal Ministry of Transport, Building and Urban Affairs should agree with the Laender aviation authorities responsible for the airports on a joint procedure of the cognizant supervisory authorities designed to urge the ground services responsible for de-icing to apply not only thickened (Type II or Type IV) but also un-thickened (Type I) de-icing fluids on airports regularly used by aircraft with non-powered flying controls and offering de-icing services.

- 9.2 The publication of requirements for operators of aircraft with non-powered flight controls to establish appropriate procedures for the identification and removal of residues

AAIB Safety Recommendation 2003-119

It is recommended that the CAA require operators of aircraft with non-powered flying controls that are vulnerable to the effects of freezing of re-hydrated de-icing fluid residues, to establish engineering procedures for the inspection and removal of such residues from critical control surfaces.

AAIB Safety Recommendation 2005-136

It is recommended that where the use of 'thickened' de-/anti-icing fluids is unavoidable, the Joint Aviation Authorities, in consultation with the European Aviation Safety Agency, ensure that operators of aircraft with non-powered flight controls who use such fluids, invoke controlled maintenance procedures for the frequent inspection for accumulations of fluid residues and their removal.

BFU Safety Recommendation 11/06

Considering the thickened de-icing fluids currently available EASA should impose a mandatory requirement on non-powered flying controlled aircraft manufacturers to develop reliable procedures for their aircraft types to ensure the identification and removal of re-hydrated de-icing fluid residues in such time as to prevent any risk to the safety of flight operation.

- 9.3 The certification/licensing of the providers of de-icing/anti-icing services

AAIB Safety recommendation 2005-148

It is recommended that prior to the European Aviation Safety Agency assuming responsibility for operational matters within Europe, they consider the future need for the training and licensing of companies who provide a de-/anti-icing service, so that anti-icing fluids are applied in an appropriate manner on all aircraft types, but specifically to ensure

that the entry of such fluids into flight control mechanisms and control surfaces is minimised.

BFU Safety Recommendation 09/06

Aircraft de-icing to maintain the airworthiness of aircraft during winter operation should be accomplished by certified and approved companies under the supervision of civil aviation authorities. If aircraft de-icing is not accomplished by an operator or an approved maintenance organisation the ground service “aircraft de-icing” should be subject to appropriate aeronautical regulation. EASA should agree with the European national authorities on establishing such regulations.

9.4 The development and certification of the fluids

AAIB Safety Recommendation 2003-82

It is recommended that the CAA should consult with anti-icing fluid manufacturers with a view to encouraging them to develop fluids, with suitable ‘holdover’ times, that incorporate gelling agents that are not rehydratable.

AAIB Safety Recommendation 2005-137

It is recommended that the European Aviation Safety Agency introduce certification requirements relating to de-/anti-icing fluids for use on aircraft with both powered and non-powered flight controls.

BFU Safety Recommendation 10/06

The expected drying and re-hydration properties of thickened de-icing fluids (Type II, III, IV) for aircraft de-icing should be described and defined by standardisation in such detail as to eliminate significant quality variations among the products of different manufacturers. EASA should develop certification criteria to establish mandatory limits for and require evidence of unrestricted suitability of such fluids for aircraft with non-powered flying controls.

10. Presentation of related activities

After having received the AAIB UK Safety recommendations, EASA set up an internal process to evaluate the safety recommendations. It furthermore took into account stakeholders’ concerns raised at the ERA Winter Operations Workshop held in Basel, Switzerland, in April 2006.

In recognition of the work being undertaken by various groups such as the JAA De-/Anti-Icing Steering Group, the SAE Residue Working Group, the AEA and FAA and of the need for a fully coordinated multidisciplinary approach the group established contacts with these groups to exchange information and views and cooperate in future activities.

The relevant bodies of AEA and ERA are monitoring de-/anti-icing related incidents and coordinating with the operators, and the SAE G-12 and EASA workings groups.

SAE G-12 are currently introducing changes into the SAE documentation to advocate the use of Type I fluids and to increase training for de-/anti-icing. In addition the SAE G-12 workgroups are reviewing additional possible solutions, as well as any new causes identified during the course of research studies.

It should be noted that the FAA are in the process of developing a standardized guidance material covering the training of de-icing personnel, application methods for the fluids, the management and quality control of the fluids and the communication process between third party providers and pilots.

The EASA finally envisages a number of potential actions covering design, continuing / continued airworthiness related to design, operations and airport areas. These are divided into immediate situation (short term) actions, future provisions & advancements in fluid technologies (medium term actions) and future aircraft design issues (long term actions). These options are described in more detail further below.

V. Possible EASA actions and timescales

Addressing the issue of residues that can result from application of de-icing/ anti-icing fluids needs to envisage a multi-disciplinary action plan.

The possible actions are classified by functional area (design/continued airworthiness related to design, operations, maintenance, service providers and aerodromes) and by proposed timescale (short term = less than 1 year, medium term = less than 3 years and long term = more than 3 years). The selection of an option in each functional area is independent, i.e. any combination of options can be chosen.

The possible options have been selected using regulatory impact assessments based on the information available to the Agency. These selected options may be seen as an action plan to address the issue.

The Agency could have started developing Notice of Proposed Amendments however decided to use the A-NPA tool to seek views on the appropriateness of the envisaged action plan and on the information included in the regulatory impact assessments.

Based on these views, the Agency will finalise the action plan in particular identifying the tasks that it will include in its rulemaking programme and the necessary coordination with other bodies when the actions would be outside the remit of the Agency

11. Design / Continued Airworthiness related to design

11.1 Options

Option 1:

It may be considered that the current Certification Specifications (CS-23, CS-25 etc.) are already sufficient in respect of design criteria for aircraft and their operation in icing conditions. In this case it may be considered that no further design action is required.

Option 2:

It may be considered appropriate to require Type Certificate Holders to review their current information and investigate and publish additional material to identify the recommended practices for the application of de-icing/anti-icing fluids, the methods for identifying residues and the processes for removal of such contaminants, where this is not already available.

This is considered necessary in support of Safety Recommendations 2003-119, 2005-136 and 11/06 and may take the form of an Airworthiness Directive.

It is considered to be a Short Term Action.

Option 3:

It may be considered that the current industry material standard documents, ISO 11075 & 11076 and SAE AMS 1424 & 1428, should be amended to better address the full range of properties required from de-icing/anti-icing fluids. The strength of amendments to be pursued may be set at different levels or be increased step by step: (a) improvement of current testing methods in order to provide relevant residue characteristics (b) reporting of characteristics in the material standards (c) segregation of recommended fluid application

methods (set in practice standards such as ARP 4737) in relation to residue characteristics (d) performance requirements based on residue characteristics in material standards. The SAE G-12 Committee is understood to be working on such considerations. Although this option does not lead to a regulatory solution the Agency could participate in the forums and working groups to develop the required amendments.

This is therefore considered a Medium Term Action.

Option 4:

It may be considered that the current use of an industry standard, such as ISO 11075 & 11076 and SAE AMS 1424 & 1428 documents, does not provide an appropriate level of confidence in the full range of properties required from de-icing/anti-icing fluids. In this case, the formal qualification of the fluids within a regulatory framework may be considered appropriate.

This would require the definition of the certification criteria, and the introduction of a regulatory framework in support of this.

This is considered necessary in support of Safety Recommendations 2003-82, 2005-137 and 10/06.

It is considered a Long Term Action.

Option 5:

It may be considered that the current Certification Specifications (CS-23, CS-25 etc.) are not sufficient in respect of design criteria for aircraft and their operation in icing conditions. In this case it may be considered that the current Certification Specifications should be reviewed and amended to require that future aircraft designs include an evaluation of the sensitivity to problems relating to the use of de-icing/anti-icing fluids and the provision of information to enable the effective management of the aircraft when such fluids are used.

This is considered to be a Long Term Action.

Option 6:

In addition to Option 5, it may also be considered that the enhancements to the Certification Specifications (CS-23, CS-25 etc.) given by Option 5 above, in part or in full, should be applied to existing in-service aircraft.

Hence, it may be considered appropriate to require this compliance by use of the retrospective mandatory action process.

The Agency is engaged in task 21.039 which will develop the necessary framework for the retrospective mandatory action process. This task will also define the framework for MMEL, for the definition of minimum syllabus for flight crew type rating training and the minimum syllabus for certifying staff type rating. An NPA should be ready by December 2007.

This is considered to be a Long Term Action.

11.2 Envisaged options

These options have been evaluated in a regulatory impact assessment (RIA) that is included in attachment 1: the conclusion of this RIA is to envisage a combination of options 2, 3 and 5

12. Operations

12.1 Regulation (EC) No 1899/2006 of the European Parliament and of the Council of 12 December 2006 (hereafter referred to as EU OPS) establishes Community requirements for

commercial air transport. With respect to icing conditions, EU OPS addresses ground and flight procedures, aircraft equipment, flight crew recurrent training and checking, and the content of the operations manual. EU OPS entered into force on 16 January 2007 and will become applicable as of 16 July 2008.

Joint Aviation Authorities (JAA) Requirements for Commercial Air Transportation (Aeroplanes) (hereafter referred to as JAR OPS 1) also contain provisions in the above mentioned areas, often in greater detail due to the differences between the legal framework of EU OPS versus JAR OPS 1.

The Agency is currently engaged in task OPS.001 which transposes JAR OPS 1 provisions into implementing rules and associated material for the envisaged amendment to Regulation (EC) No 1592/2002 of the European Parliament and of the Council of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency (hereafter referred to as the Basic Regulation). The Basic Regulation as amended will replace EU OPS once it becomes applicable.

In addition, the Agency has published Safety Information Notice 2006-09⁴ on 26 September 2006 as a means of providing related guidance material.

12.2 Options:

Option 1:

Do nothing.

Option 2:

Changes to the requirements and associated guidance material for this subject, taking the opportunity as far as feasible, to transpose the JAA material as part of the work of the task OPS.001. Areas for consideration could include additional regulation and/or specific guidance material on:

- the assessment, oversight and management of de-icing/anti-icing service providers
- the content, practices, procedures etc. to be embodied in the operators' processes with respect to selection, use and monitoring of types of fluid used, including the availability of de-/anti-icing fluids for aircraft with non-powered flight controls. (This is considered necessary in support of Safety Recommendation 2005-135.)
- the content, practices, processes etc. to be embodied in the operators' maintenance programme. (This is considered necessary in support of Safety Recommendation 2003-119, 2005-136 and 11/06.)
- the training requirements for crew regarding fluid types, their properties, use and limitations such that the adequacy and appropriateness of the provided service can be assessed. (This is considered necessary in support of Safety Recommendation 2005-148.)

12.3 Envisaged options:

These options have been evaluated in a regulatory impact assessment (RIA) that is included in attachment 1: the conclusion of this RIA is to envisage option 1

⁴ EASA Safety Information Notice 2006-09, Ground De-/Anti-Icing of Aeroplanes; Intake/Fan blade Icing and effects of fluid residues on flight controls, EASA, 26.9.2006

13. Maintenance

13.1 Commission Regulation (EC) No 2042/2003 has been reviewed and more specifically, Annexes I (PART-M), II (PART-145) and III (PART-66). With regard to Part-M and Part-145 an analysis has been carried out in the following areas:

- Maintenance programme
- Documentation
- Responsibilities and personnel requirements (or staff training)
- Exposition manuals
- Quality system
- Qualification and training for auditors both for authorities and organisations.

13.2 The analysis showed that Regulation 2042/2003 does not contain a great level of detail in general. The major objectives are already described in current Regulation (EC) 2042/2003. If further detail is required, the Agency proposes the draft text to AMC material for Part-M in Attachment 4 and the draft text to AMC and Guidance Material for Part-145 in Attachment 6

If the Agency decided to introduce more detailed regulatory material on de-/anti-icing, this may raise questions in principle with respect to the appropriate level of detail that this regulation should contain.

13.3 This A-NPA is intended to address the issues identified in Safety Recommendations as specified in paragraph 9. Additionally, the opportunity to amend AMC material related to Regulation 2042/2003 has been used to propose some particular recommendations about seasonal or special activities in Attachment 4

13.4 The details of the training in the area of de-icing/anti-icing of aircraft⁵ was also addressed by EASA rulemaking task group 66.011, in charge of revisiting the maintenance type rating where a training is required (Part 66 Appendix III – refer to NPA n°07/2007). After further consideration, the existing provisions for the syllabus and its content were found sufficient to cover the de-icing / anti-icing issue as well as the sensitivity of an aircraft, for licensed engineers. Additionally, this particular point was passed to rulemaking task 21-039 where recommendations how to build a training (task analysis and justifications about the duration of a type training) course are to be addressed (NPA expected to be issued by December 2007).

13.5 Options

Option 1:
Do nothing.

Option 2:
Changes to the requirements and associated guidance material for this subject. Areas for consideration could include the need for additional regulation and/or specific guidance material on:

- the training requirements regarding fluid types, properties and use and the implications on the maintenance regime for an aircraft.

⁵ UK AAIB Safety Recommendation 2005-148

- 13.6 Envisaged options:
These options have been evaluated in a regulatory impact assessment (RIA) that is included in attachment 1: the conclusion of this RIA is to envisage option 2
14. Service Providers
- 14.1 Safety Recommendations 2005-148 and 09/06, supported by the views held at the above mentioned ERA Workshop, considered that the de-icing/anti-icing service providers should be licensed (regulated) thus bringing them in line with other critical service providers, for example fuel provisioning.
- 14.2 The following options may be considered:
- Option 1
Do nothing: it may be considered that licensing/regulating the de-icing/anti-icing service providers will not improve safety.
 - Option 2
Encourage the development of industry standards and industry monitoring programme: it may be considered that industry standards and monitoring programmes may bring an appropriate increase in safety.
 - Option 3
Regulatory approval of service providers: it may be considered that regulatory approval of service providers is necessary to achieve an acceptable level of safety (this option is currently outside the scope of the Agency).
- 14.3 Envisaged options;
These options have been evaluated in a regulatory impact assessment (RIA) that is included in attachment 1: the conclusion of this RIA is to envisage option 2
15. Aerodromes
- 15.1 Any action here can only be taken when the EASA is competent for the safety regulation of aerodromes.
- Safety Recommendations 08/06 and 07/06, supported by the views held at the above mentioned ERA Workshop, considered that some mechanism was required to ensure that the range of de-icing and anti-icing fluids is made available at all appropriate locations.
- 15.2.1 Options:
- Option 1:*
Do nothing
- Option 2:*
Rulemaking. Some mechanism is required to ensure that the range of de-icing and anti-icing fluids is made available at all appropriate locations.
This is considered to be a Long Term Action
- 15.3 Envisaged options:
These options have been evaluated in a regulatory impact assessment (RIA) that is included in attachment 1: the conclusion of this RIA is to envisage Option 2.

16. Summary of possible options envisaged by EASA

The Agency envisages the action plan below:

- a combination of options 2, 3 and 5 for design/ continued airworthiness related to design;
- option 1 for operations,
- Option 2 for maintenance,
- Option 2 for service providers; and
- Option 2 for aerodromes.

The purpose of the A-NPA is seek the views of the envisaged options and the stakeholders are invited to reply to the 4 questions below.

Question 1: appropriateness of the envisaged options:

The views of stakeholders are sought on the action plan, with particular emphasis on:

- Identification of any other course of action
- Options not identified.
- Necessary coordination with other bodies when the action is not within the remit of the Agency

Question 2: regulatory impact assessment

In addition stakeholders are invited to comment of the information included into the regulatory impact assessment and to provide any further information.

Question 3: Service providers:

Specific comments are requested on:

- The area to be licensed/regulated, for example the scope of service provided. Any scope must be related to the equipment available and staff competency, hence is linked to a demonstrated capability and therefore may need to be aircraft type specific;
- The training requirements (fluid types, properties, storage and application)

Question 4: Aerodromes

Specific comments are requested on:

- the minimum range of products to be available (fluid types, properties, storage and application)
- Should this be a new regulation or which regulation(s) should be amended to best address this.

The replies will assist the Agency in finalising the action plan in particular identifying the tasks that it will include in its rulemaking programme and the necessary coordination with other bodies when the actions would be outside the remit of the Agency

B. ATTACHMENTS

Attachment 1- Regulatory impact assessment for Design / Continued Airworthiness related to design

1. Options

The options identified:

Option 1:

Do nothing. It may be considered that the current Certification Specifications (CS-23, CS-25 etc.) are already sufficient in respect of design criteria for aircraft and their operation in icing conditions. In this case it may be considered that no further design action is required.

Option 2:

It may be considered appropriate to require Type Certificate Holders to review their current information and investigate and publish additional material to identify the recommended practices for the application of de-icing/anti-icing fluids, the methods for identifying residues and the processes for removal of such contaminants, where this is not already available.

Option 3:

It may be considered that the current industry material standard documents, ISO 11075 & 11076 and SAE AMS 1424 & 1428, should be amended to better address the full range of properties required from de-icing/anti-icing fluids. The strength of amendments to be pursued may be set at different levels or be increased step by step: (a) improvement of current testing methods in order to provide relevant residue characteristics (b) reporting of characteristics in the material standards (c) segregation of recommended fluid application methods (set in practice standards such as ARP 4737) in relation to residue characteristics (d) performance requirements based on residue characteristics in material standards. The SAE G-12 Committee is understood to be working on such considerations. Although this option does not lead to a regulatory solution and is outside the scope of EASA, the Agency could participate in the forums and working groups to develop the required amendments.

Option 4:

It may be considered that the current use of an industry standard, such as ISO 11075 & 11076 and SAE AMS 1424 & 1428 documents, does not provide an appropriate level of confidence in the full range of properties required from de-icing/anti-icing fluids. In this case, the formal qualification of the fluids within a regulatory framework may be considered appropriate.

Option 5:

It may be considered that the current Certification Specifications (CS-23, CS-25 etc.) are not sufficient in respect of design criteria for aircraft and their operation in icing conditions. In this case it may be considered that the current Certification Specifications should be reviewed and amended to require that future aircraft designs include an evaluation of the sensitivity to problems relating to the use of de-icing/anti-icing fluids and the provision of information to enable the effective management of the aircraft when such fluids are used.

Option 6:

In addition to Option 5, it may also be considered that the enhancements to the Certification Specifications (CS-23, CS-25 etc.) given by Option 5 above, in part or in full, should be applied to existing in-service aircraft.

A combination of options is also feasible.

The preferred option selected:

Please refer to paragraph 3. Summary and Final Assessment.

2. Sectors concerned

The sectors directly concerned are aircraft manufacturers and fluids manufacturers with consequential impact on operators.

3. Impacts

i. Safety impact

Option 1 will not improve safety and will not reply to the safety recommendations. Option 2 will bring immediate safety benefits but will not address the characteristics of fluids and will not address aircraft design issues. Option 3 will address the characteristics of fluids but will not make such characteristics mandatory. Option 3 will not address the issue at aircraft level. Compared to option 3, Option 4 will mandate the characteristics of fluids. Option 5 will address the design of future aircraft but will not address the characteristics of fluids. Compared to option 5, Option 6 addresses the design of existing aircraft. The combination of options 2, 6 and 4 is likely to bring the highest safety benefit.

ii. Economic impact

Option 1 has no economic impact. Option 2 should have a limited economic impact as it does not affect aircraft design. However, the possibility exists that the Type Certificate Holders safety recommendations may require additional inspections and maintenance tasks. Option 3 may make the fluids more expensive as they will have new characteristics. Compared to option 3, option 4 will add the costs of certification. Option 5 will have a significant economic impact for future aircraft design. Option 6 is likely to have the highest economic impact as it could imply modifications to existing aircraft.

iii. Environmental impact

None for options 1, 2, 5 and 6. Options 3 and 4 may have an impact, depending on the new fluids characteristics.

iv. Social impact

None.

v. Other aviation requirements outside EASA scope

None.

vi. Foreign comparable regulatory requirements

Option 4, 5 and 6 if pursued unilaterally have the highest potential of introducing differences with other legislation.

4. Summary and Final Assessment

Comparison of the positive and negative impacts for each option evaluated:

Option 1 has no effects. Other options bring safety improvements but at a cost depending of the option chosen. Options 3 and 4 may have an environmental impact. Option 4, 5 and 6 if

applied unilaterally have the highest potential to introduce differences with other countries' legislation.

A summary describing who would be affected by these impacts and analysing issues of equity and fairness:

Sectors directly affected are the aircraft manufacturers and fluid manufacturers.

Final assessment and recommendation of a preferred option:

On balance the Agency would recommend a combination of option 2, 3 and 5.

Attachment 2 - Regulatory Impact Assessment for Operations

1. Options

a. The options identified:

Option 1:

Do nothing. The major objectives are already described in current Regulation (EC) 1899/2006 (EU OPS). Detailed provisions contained in JAR-OPS 1 are currently transposed into implementing rules and associated material for the envisaged amendment to Regulation (EC) No 1592/2002, replacing EU OPS once it becomes applicable. Therefore there is no need for additional wording.

Option 2:

Additional rulemaking could address:

- the assessment, oversight and management of de-icing/anti-icing service providers
- the content, practices, procedures etc to be embodied in the operators' processes with respect to selection, use and monitoring of types of fluid used, including the availability of de-/anti-icing fluids for aircraft with non-powered flight controls
- the content, practices, processes etc. to be embodied in the operators maintenance programme
- the training requirements for crew regarding fluid types, their properties, use and limitations such that the adequacy and appropriateness of the provided service can be assessed.

b. The preferred option selected:

The Agency recommends Option 1 as EU OPS / JAR-OPS 1 are in the process of being transposed into new implementing rules for Regulation 1592/2002.

2. Sectors concerned of the preferred option selected

As no change to existing text is proposed, operators and de-icing/anti-icing service providers will not be affected.

3. Impacts

i. Safety impact

None.

ii. Economic impact

None.

iii. Environmental impact

None.

iv. Social impact

None.

v. Other aviation requirements outside EASA scope

None.

vi. Foreign comparable regulatory requirements

The United States Code of Federal Regulations (CFR) Title 14, Aeronautics and Space Part 121 (hereafter referred to as FAA Part 121) of the Federal Aviation Administration

contains provisions for commercial air transport operation in icing conditions (FAA Part 121.629). It is supplemented by Advisory Circular AC 120-60B. FAA Part 121 requires each operator to follow an FAA-approved de-icing programme in accordance with the applicable approved operations specifications (Ops Specs para. A023). The FAA mandates initial and annual recurrent ground training and testing for flight crew members, qualification for all other affected personnel (e.g. aircraft dispatchers, ground crews, contract personnel) concerning the specific requirements of the approved programme and each person's responsibilities and duties under the approved programme.

No equivalent regulation does address in detail the maintenance practices for de-icing/anti-icing practices. Some National Competent Authorities like Sweden have issued some recommendations or national bulletins aiming at raising the awareness of their national operators.

4. Summary and Final Assessment

a. Comparison of the positive and negative impacts for each option evaluated

There is no immediate safety benefit from developing additional rulemaking material as EU OPS / JAR-OPS 1 are in the process of being transposed into new implementing rules for Regulation 1592/2002.

b. A summary describing who would be affected by these impacts and analysing issues of equity and fairness

There is no additional rulemaking burden on the industry.

c. Final assessment and recommendation of a preferred option

The introduction of additional rulemaking text should be deferred until JAR-OPS 1 has been transposed into implementing rules for Regulation 1592/2002 and the effect of these rules has been evaluated.

Attachment 3 - Regulatory Impact Assessment for Maintenance

1. Options

a. The options identified:

Option 1:

Do nothing. The major objectives are already described in current Regulation (EC) 2042/2003. Therefore there is no need for additional wording.

Option 2:

Rulemaking. Regulation 2042/2003 does not contain a great level of detail in general. If further detail is required, the Agency proposes the draft text in attachment 1.

The preferred option selected:

The Agency suggests that clarifying regulatory text by adding more details is the most effective solution to mitigate the problem.

b. Sectors concerned

The Type Certificate Holders will have to provide the operators with their recommendations about the possible consequences of de-icing/anti-icing activities. The operators will have to address these suggestions in their maintenance programme and justify the inspection intervals. The Maintenance organisation will have to comply with the maintenance programme, inspect and remove residues. Maintenance staff will have to be properly trained.

2. Impacts

i. Safety impact

Better consideration given in the regulation to this concern will enhance the level of safety by raising the awareness of the stakeholders and will encourage the operators to query the Type Certificate Holder and to comply with its recommendations.

There is a synergy between Option 2 of the Design Options and the intention to clarify the regulatory text as described here.

The proposal re-enforces the attention of the operator whose maintenance programme does not tackle the risk of build up of residues and upholds organisational procedures to correctly spot the issue.

Part 66 licensed engineers and auditors should be better trained as the training syllabus will be re-enforced.

ii. Economic impact

There is no economic impact for the operators who have already fully implemented the Type Certificate Holder recommendations. The impact is only for operators who, so far, have not taken into account safety recommendations from the Type Certificate Holder. The possibility exists that Type Certificate Holder safety recommendations may require additional inspections and maintenance tasks.

iii. Environmental impact

None.

iv. Social impact

None.

v. Other aviation requirements outside EASA scope

None.

vi. Foreign comparable regulatory requirements

No equivalent regulation addresses in detail the maintenance practices for de-icing/anti-icing activities. Some National Member States like Sweden have previously issued some recommendations or some national safety bulletins aiming at better informing their national operators.

3. Summary and Final Assessmenta. Comparison of the positive and negative impacts for each option evaluated:

The increased safety benefits outweigh the economic impact of the proposed actions.

b. A summary describing who would be affected by these impacts and analysing issues of equity and fairness:

Operators and maintenance organisations would be affected. There is no issue of equity and fairness as guidelines will be applicable to all.

c. Final assessment and recommendation of a preferred option:

Clarifying the regulatory text by adding guidance material is the preferred option. This will provide best practice for operators to help manage this issue. This is expected to improve the level of safety, particularly to aircraft that are sensitive to residue build-up. Industry will benefit, as de-icing/anti-icing related incidents should be reduced.

Attachment 4 – Acceptable Means of Compliance to Part-M⁶

I. AMC M.A.201 (h) Responsibilities

1. Reference to aircraft includes the components fitted to or intended to be fitted to the aircraft
2. The performance of ground de-icing and anti-icing, **cleaning, re-fuelling, servicing** activities does not require a Part-145 approval. Nevertheless, the removal of panels, cowls or covers, and use of special tools to achieve such tasks will have to be performed within a controlled maintenance environment subject to Part 145.A.50 (release to service).
3. The requirement means that the operator is responsible for determining what maintenance is required, when it has to be performed and by whom and to what standard, in order to ensure the continuing airworthiness of the aircraft being operated.
4. An operator should therefore have adequate knowledge of the design status (type specification, customer options, airworthiness directives (AD), modifications, operational equipment) and required and performed maintenance. Status of aircraft design and maintenance should be adequately documented to support the performance of the quality system.
5. An operator should establish adequate co-ordination between flight operations and maintenance to ensure that both will receive all information on the condition of the aircraft necessary to enable both to perform their tasks.
6. The requirement does not mean that an operator himself performs the maintenance (this is to be done by a maintenance organisation approved under Part-145) but that the operator carries the responsibility for the airworthy condition of aircraft it operates and thus should be satisfied before the intended flight that all required maintenance has been properly carried out.
7. When an operator is not appropriately approved in accordance with Part-145, the operator should provide a clear work order to the maintenance contractor. The fact that an operator has contracted a maintenance organisation approved under Part-145 should not prevent it from checking at the maintenance facilities on any aspect of the contracted work if he wishes to do so to satisfy his responsibility for the airworthiness of the aircraft.

II. AMC M.B.102 (c) Competent authority – Qualification and training

1. Competent authority inspectors should have:
 - 1.1 practical experience and expertise in the application of aviation safety standards and safe operating practices;
 - 1.2 comprehensive knowledge of:
 - (a). relevant parts of implementing rules, certification specifications and guidance material;
 - (b). the competent authority's procedures;
 - (c). the rights and obligations of an inspector;
 - (d). quality systems;
 - (e). continuing airworthiness management;

⁶ The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

1. deleted text is shown with a strike through: ~~deleted~~
2. new text is highlighted with grey shading: **new**
3.

Indicates that remaining text is unchanged in front of or following the reflected amendment.

....

(f). operational procedures when impacting the management of continuing airworthiness and the maintenance.

1.3 training on auditing techniques.

1.4 five years relevant work experience to be allowed to work as an inspector independently. This may include experience gained during training to obtain the subparagraph 1.5 qualification.

1.5 a relevant engineering degree or an aircraft maintenance technician qualification with additional education. ‘relevant engineering degree’ means an engineering degree from aeronautical, mechanical, electrical, electronic, avionic or other studies relevant to the maintenance and continuing airworthiness of aircraft/aircraft components.

1.6 knowledge of a relevant sample of the type(s) of aircraft gained through a formalised training course.

1.7 knowledge of maintenance standards.

2. In addition to technical competency, inspectors should have a high degree of integrity, be impartial in carrying out their tasks, be tactful, and have a good understanding of human nature.

3. A programme for continuation training should be developed which provides for the inspectors, at regular intervals, to visit appropriate manufacturers and attend technical symposia as well as training or refresher courses to gain first-hand knowledge of new developments. As a general policy, it is not desirable for the inspectors to obtain technical qualifications from those entities under their direct regulatory jurisdiction.

III. Appendix I to AMC M.A.302 and AMC M.B.301 (b)

Content of the maintenance programme

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6.5.10 Evaluation and review.

Each programme should describe the procedures and individual responsibilities in respect of continuous monitoring of the effectiveness of the programme as a whole. The time periods and the procedures for both routine and non-routine reviews of maintenance control should be detailed (progressive, monthly, quarterly, or annual reviews, procedures following reliability “standards” or “alert levels” being exceeded, etc.).

6.5.10.1 Each Programme should contain procedures for monitoring and, as necessary, revising the reliability “standards” or “alert levels”. The organisational responsibilities for monitoring and revising the “standards” should be specified together with associated time scales.

6.5.10.2 Although not exclusive, the following list gives guidance on the criteria to be taken into account during the review.

- (a) Utilisation (high/low/seasonal)
- (b) Fleet commonality.
- (c) Alert Level adjustment criteria.
- (d) Adequacy of data.
- (e) Reliability procedure audit.
- (f) Staff training.
- (g) Operational and maintenance procedures such as:

- cleaning of the aircraft or engine or components,

- special inspection program and removal of fluid residue built up after de-icing /anti-icing tasks as requested by the Type Certificate Holder

- special operations involving contaminated runways, medical transportation, fuel contamination environment, cargo transportation of special products such as corrosive, dirty fluid...

- special seasonal operations involving use of special equipment for hot or cold seasons (brakes, air conditioning, use of APU, avionic compartment etc.)

....

IV. Appendix V to AMC M.A.704 continuing airworthiness management organisation exposition

PART 1 CONTINUING AIRWORTHINESS MANAGEMENT PROCEDURES

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1.11 Pre-flight inspections

(This paragraph should show how the scope and definition of pre-flight inspection, which are usually performed by the operating crew, is kept consistent with the scope of the maintenance performed by the contracted maintenance organisations. It should show how the evolution of the pre-flight inspection content and the maintenance programme are concurrent, each time necessary.)

(The following paragraphs are self explanatory. Although these activities are normally not performed by continuing airworthiness personnel, these paragraphs have been placed here in order to ensure that the related procedures are consistent with the continuing airworthiness activity procedures.)

- a) Preparation of aircraft for flight
- b) Sub-contracted ground handling function
- c) Security of Cargo and Baggage loading
- d) Control of refueling, Quantity/Quality
- e) Control of snow, ice dust, anti-icing / de-icing fluid type residue and sand contamination to an approved standard

Attachment 5 – Acceptable Means of Compliance to Part-145⁷

V. AMC 145.A.70(a) Maintenance organisation exposition

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PART 2

ADDITIONAL LINE MAINTENANCE PROCEDURES

L2.1 Line maintenance control of aircraft components, tools, equipment etc.

L2.2 Line maintenance procedures related to servicing/fuelling/~~de-icing~~ inspection after applying de-icing / anti-icing process, including the removal of fluid residues etc.

L2.3 Line maintenance control of defects and repetitive defects.

L2.4 Line procedure for completion of technical log.

L2.5 Line procedure for pooled parts and loan parts.

L2.6 Line procedure for return of defective parts removed from aircraft.

L2.7 Line procedure control of critical tasks.

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VI. AMC 145.B.10 (3) Competent authority – Qualification and training

1. Competent authority surveyors should have:

1.1 practical experience and expertise in the application of aviation safety standards and safe operating practices;

1.2 comprehensive knowledge of:

a. relevant parts of implementing rules, certification specifications and guidance material;

b. the competent authority's procedures;

c. the rights and obligations of a surveyor;

d. quality systems;

e. continuing airworthiness management;

f. operational procedures when impacting the management of continuing airworthiness activities and the maintenance.

1.3 training on auditing techniques.

1.4 five years relevant work experience to be allowed to work as a surveyor independently. This may include experience gained during training to obtain the 1.5 qualification.

1.5 a relevant engineering degree or an aircraft maintenance technician qualification with additional education. 'relevant engineering degree' means an engineering degree from aeronautical, mechanical, electrical, electronic, avionic or other studies relevant to the maintenance and continuing airworthiness of aircraft/aircraft components.

1.6 knowledge of maintenance standards.

⁷ The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

1. deleted text is shown with a strike through: ~~deleted~~

2. new text is highlighted with grey shading: **new**

3.

Indicates that remaining text is unchanged in front of or following the reflected amendment.

....

2. In addition to technical competency, surveyors should have a high degree of integrity, be impartial in carrying out their tasks, be tactful, and have a good understanding of human nature.
3. A programme for continuation training should be developed that ensures that the surveyors remain competent to perform their allocated tasks.

VII. GM 145.A.30(j)(4) Personnel requirements (Flight crew)

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2. For the holder of an JAR FCL F/EL, JAR FCL 4 subpart D gives details on the theoretical and practical knowledge and skill requirements from which appendix 1 to JAR FCL 4.160 Technical Training Course (TTC) details the following subjects:

(See JAR-FCL 4.160(b)(1))

Familiarisation with basic maintenance procedures, to give additional technical background knowledge, especially with respect to the implication of systems malfunctions, and to train the applicant in maintenance related to the Minimum equipment list (MEL). The theoretical knowledge instruction consists of 100 hours and includes the following elements:

1. Airframe and systems
2. Electrics
3. Powerplant and emergency equipment
4. Flight instruments and automatic flight control systems

Practical skills training provided by an organisation approved under Part-145 is given which includes 35 days practical experience in the following subjects:

- Fuselage and flight controls
- Engines
- Instruments
- Landing gear and brakes
- Cabin/cockpit/emergency equipment
- De-icing / anti-icing activities and subsequent inspections including removal of any residue
- Ground handling and servicing
- Certificate of completion

Following successful completion of the technical training, the training organisation carrying out the theoretical knowledge instruction and/or the practical skill training should provide the applicant with a certificate of satisfactory completion of the course, or part thereof.

Attachment 6 - Regulatory Impact Assessment for Service providers

1. Options

a. The options identified:

Option 1:

Do nothing. It may be considered that licensing/regulating the de-icing/anti-icing service providers will not improve safety.

Option 2:

Encourage the development of industry standards and industry monitoring programmes. Although this option does not lead to a regulatory solution, it may be considered that industry standards and monitoring programmes may bring an appropriate increase in safety.

Option 3:

Regulatory approval of service providers: it may be considered that regulatory approval of service providers is necessary to achieve an acceptable level of safety.

The preferred option selected:

Please refer to paragraph 3.

b. Sectors concerned

Service providers are directly affected.

2. Impacts

i. Safety impact

Option 1 will not improve safety. Option 2 should improve safety if there is a general commitment by all parties involved to develop and apply a standard. Option 3 will enforce a common standard and therefore provide improved safety.

ii. Economic impact

Option 1 has no economic impact. Option 2 will have limited economic impact and will allow a more efficient and effective oversight of service providers by operators. Option 3 will have the greatest economic impact due to the introduction of an approval system.

iii. Environmental impact

None.

iv. Social impact

Option 1 has no social impact. Option 2 and 3 could both potentially have a social impact if the service provider cannot achieve the standard or approval.

v. Other aviation requirements outside EASA scope

None.

vi. Foreign comparable regulatory requirements

Option 1 has no impact. Options 2 and 3 may bring differences with other countries.

3. Summary and Final Assessment

a. Comparison of the positive and negative impacts for each option evaluated:

Option 1 has no impact. Options 2 and 3 will bring safety improvement. Option 3 will have the highest cost.

b. A summary describing who would be affected by these impacts and analysing issues of equity and fairness:

Sectors directly affected are service providers and operators.

c. Final assessment and recommendation of a preferred option:

The Agency recommends Option 2 and welcomes the views of stakeholders on which option to take.

Attachment 7 - Regulatory Impact Assessment for Aerodromes

1. Options

a. The options identified:

Option 1:

Do nothing

Option 2:

Rulemaking. Some mechanism is required to ensure that the range of de-icing and anti-icing fluids is made available at all appropriate locations.

The preferred option selected:

Please refer to paragraph 3. Summary and Final Assessment.

b. Sectors concerned

Aerodromes owners and operators are directly affected.

2. Impacts

i. Safety impact

Option 1 has no safety impacts. Option 2 will ensure that a range of fluids is available thus allowing operators to use the most appropriate fluid, and therefore will enhance safety.

ii. Economic impact

Option 1 has no impact. Option 2 will have a cost as it will require the provision and maintenance of a range of fluids some of which may not be often used.

iii. Environmental impact

Option 1 has no impact. Option 2 could have an impact depending on the management, storage and disposal of the fluids.

iv. Social impact

None.

v. Other aviation requirements outside EASA scope

Option 1 has no impact. Option 2 has no impact as it is a long term action and EASA should be competent by then.

vi. Foreign comparable regulatory requirements

Option 1 has no impact. Option 2 if applied unilaterally will introduce differences with foreign countries.

3. Summary and Final Assessment

a. Comparison of the positive and negative impacts for each option evaluated

Option 1 has no impact. Option 2 will improve safety but will have a cost.

b. A summary describing who would be affected by these impacts and analysing issues of equity and fairness:

Aerodromes owners and operators are directly affected.

c. Final assessment and recommendation of a preferred option:

The Agency recommends Option 2 and welcomes the views of stakeholders.