Transport Canada Transports Canada

Advisory Circular

Subject: **Runway Ice Control Chemicals**

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1.0 INTRODUCTION

(1) This Advisory Circular (AC) is provided for information and guidance purposes. It describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

(1) The purpose of this document is to provide airport operators with information regarding ice control chemicals suitable for airside application.

1.2 Applicability

(1) This document applies to Canadian airport operators and is also available to the aviation industry for information purposes.

1.3 Description of Changes

(1) Revision to Section 4.0 Requirements for Runway Ice Control Chemicals, (5).

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

(1) It is intended that the following reference materials be used in conjunction with this document:

- (a) Transport Canada Publication, TP 312 — *Aerodrome Standards and Recommended Practices*;
- (b) Advisory Circular (AC) 302-013 — *Airport Winter Maintenance and Planning*;
- (c) Service Difficulty Advisory (AV) 2009-03 — *Catalytic Oxidation of Aircraft Carbon Brakes due to Runway De-Icing (RDI) Fluids*;
- (d) Society of Automotive Engineers (SAE) Aerospace Material Specification (AMS) 1431 — *Compound, Solid Runway and Taxiway Deicing/Anti-Icing*;
- (e) SAE AMS 1435 — *Fluid, Generic, Deicing/Anti-Icing Runways and Taxiways*;
- (f) SAE Aerospace Information Report (AIR) 5567 — *Test Method for Catalytic Carbon Brake Disk Oxidation*; and
- (g) SAE AIR 6130 — *Cadmium Plate Cyclic Corrosion Test*.

2.2 Cancelled Documents

(1) As of the effective date of this document, the following document is cancelled:

- (a) Aerodrome Safety Circular (ASC) 2002-015-R1, Issue 01, 2004-08-26 — *Cancellation of Aerodrome Safety Circular 2002-015 De-icing Fluids Containing Potassium Formate dated 2002/04/12*.

(2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

2.3 Definitions and Abbreviations

(1) The following **definition**s are used in this document:

(a) **Ice**: water that has frozen on a surface and includes the condition commonly known as "black ice" and the condition where compacted snow has turned into a polished ice surface; and

(b) **Ice control chemicals**: chemicals used to prevent ice formation, to prevent ice from bonding to a surface or to break up or melt ice on a surface.

(2) The following **abbreviations** are used in this document:

(a) **AC**: Advisory Circular;

(b) **AIR**: Aerospace Information Report;

(c) **AMS**: Aerospace Material Specification;

(d) **ASC**: Aerodrome Safety Circular; and

(e) **SAE**: Society of Automotive Engineers.

3.0 BACKGROUND

(1) Ice control chemicals are applied to airside movement areas as part of airfield pavement winter maintenance operations. The use of ice control chemicals is an essential activity in maintaining safe winter operations.

(2) Ice control chemicals are used in different modes as follows:

(a) deicing – the chemical is applied on ice that has already formed on the pavement to weaken the ice-pavement bond so that the material can be removed by mechanical means;

(b) anti-icing – the chemical is applied in advance of, or at the same time as, ice formation on the pavement to prevent, or reduce, the formation of a strong bond between ice and the pavement.

(3) In the past, Urea was widely used, as it was the only runway ice control chemical available for airside applications. Although Urea is still used at a number of airports, it has a number of limitations including: (a) its practical low temperature effectiveness is normally considered to be approximately -7°C and (b) it has a relatively high biological oxygen demand.

(4) In the 1990's, ice control chemicals with an organic salt base (such as potassium acetate, sodium formate and potassium formate) were introduced. These ice control chemicals were developed to better comply with environmental regulations (lower biological oxygen demand) and to be more effective at lower temperatures than Urea.

(5) In recent years, new ice control chemicals have been developed including bio-based products, to improve compatibility with aircraft components and materials.

(6) Factors affecting the selection of ice control chemicals include compliance with applicable specifications and requirements, compatibility with aircraft materials and components, environmental impact, performance, effect on pavement materials, operational issues and cost.

4.0 REQUIREMENTS FOR RUNWAY ICE CONTROL CHEMICALS

(1) AC 302-013 – *Airport Winter Maintenance and Planning* – specifies that, on aircraft movement areas, the airport operator only use ice control chemicals that:

(a) have properties meeting the most current applicable Society of Automotive Engineers (SAE) Aerospace Material Specification (AMS**)**; or

(b) consist of the product commonly known as Urea.

(2) The current SAE specifications for runway ice control chemicals include:

(a) SAE AMS 1431 – *Compound, Solid Runway and Taxiway Deicing/Anti-Icing*; and

(b) SAE AMS 1435 – *Fluid, Generic, Deicing/Anti-Icing Runways and Taxiways*.

The latest revision of the specification would apply. The specifications are available for purchase at http://www.sae.org.

(3) The above specifications require manufacturers or suppliers to demonstrate through testing using a recognized independent lab that the product complies with the most current applicable specification and to provide the airport operator with a lab certification stating that the chemical conformed to the specification.

(4) The manufacturer or supplier should demonstrate by test results using a recognized independent lab that the product complies with all applicable environmental laws and regulations. The test data pertaining to the environmental impact of applying the chemicals should be provided to the airport operator by the manufacturer or supplier.

(5) For new liquid ice control chemicals not currently available or in use at Canadian airports, it is recommended that the manufacturer or supplier demonstrate that the product doesn't adversely affect the friction characteristics of runway pavements, by providing friction test results conducted using a continuous friction measuring device. Using the manufacturer's recommended application rates on a bare and dry pavement test section, the measured friction levels should be relatively close to or higher than baseline self-wetting tests conducted on the same surface.

(6) Transport Canada does not maintain a list of ice control chemicals complying with the requirements above. It is the responsibility of airport operators to ensure that ice control chemicals used at their airports meet the specified requirements.

4.1 Compatibility with Aircraft Materials and Components

(1) Since the introduction of ice control chemicals with an organic salt base, there have been concerns regarding catalytic oxidation of aircraft carbon brakes and corrosion of aircraft components with cadmium plating, due to exposure of the materials/components to the organic salts in the ice control chemicals. Airport operators should inform air carriers serving their airport as to the type of ice control chemicals being used or planned to be used on the airside movement areas.

(2) SAE AIR 5567 *Test Method for Catalytic Carbon Brake Disk Oxidation* is a test method for assessing the relative effects of ice control chemicals on carbon brake oxidation. SAE AMS 1431 and SAE AMS 1435 require that ice control chemicals be tested for catalytic oxidation of carbon in accordance with SAE AIR 5567 and that the results be reported for information purposes. Per SAE AIR 5567, the lower the mean normalized carbon weight loss (%) for a runway ice control chemical, the lower the risk of carbon brake damage through catalytic oxidation.

(3) SAE AIR 6130 *Cadmium Plate Cyclic Corrosion Test* is a test method for assessing the cyclic effects of ice control chemicals on cadmium plated airplane parts. SAE AMS 1431 and SAE AMS 1435 require that ice control chemicals be tested for cyclic immersion of cadmium plate in accordance with SAE AIR 6130 and that the results be reported for information purposes.

(4) ASC- 2002-015-R1 *Cancellation of Aerodrome Safety Circular 2002-015 De-icing Fluids Containing Potassium Formate dated 2002/04/12* cancelled an earlier ASC recommending that airport operators refrain from using ice control chemicals that contain potassium formate on aircraft movement areas. This previous recommendation was based on a Service Bulletin issued by the Boeing Company which indicated that some models of the B737 were prone to suffer corrosion of electrical connectors in the wheel-well when operating on runways that were treated

with ice control chemicals containing potassium formate. The problem appeared to be limited to the Boeing B-737 new generation series and action was taken by aircraft manufacturers to address the issue. Based on this information and on the fact that an Airworthiness Directive was issued, the recommendation was cancelled. However, airport operators using potassium formate should inform upon request, the air carriers that this ice control chemical is being used on their facilities.

5.0 INFORMATION MANAGEMENT

(1) Not applicable.

6.0 DOCUMENT HISTORY

(1) Advisory Circular (AC) 302-014 Issue 01, RDIMS 8110938 (E), 8127002 (F), dated 2013-07-24 – Runway Ice Control Chemicals.

7.0 CONTACT OFFICE

For more information, please contact the appropriate Transport Canada Regional Civil Aviation Office at the following address:

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Transport Canada documents or intranet pages mentioned in this document are available upon request through the Contact Office.