



# Advisory Circular

**Subject: Operational Use of Remote On-Ground Ice Detection Systems (ROGIDS) for Post De-icing Applications**

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|-----------------|---------------|-----------------|------------|
| Issuing Office: | Standards     | Document No.:   | AC 602-001 |
| Activity Area:  | Qualifying    | Issue No.:      | 01         |
| File No.:       | A 5200-13-8-4 | Effective Date: | 2009-04-24 |
| RDIMS No.:      | 4679230-V2    |                 |            |

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## 1.0 INTRODUCTION

This Advisory Circular (AC) is provided for information and guidance purposes. It may describe 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

This AC provides:

- (a) guidelines and recommendations for air operators, private operators, deicing service providers, airport authorities and manufacturers of Remote On-Ground Ice Detection Systems (ROGIDS) regarding the use of these systems as a primary means for post deicing inspection of aircraft.
- (b) guidance on how to obtain approval to incorporate ROGIDS in an air operator's, private operator's or deicing service provider's approved deicing and anti-icing program.
- (c) guidance material and recommendations for Principal Operations Inspectors (POIs) or Civil Aviation Safety Inspectors (CASIs) when reviewing submissions for operational approval of ROGIDS.

### 1.2 Applicability

This document applies to air operators, private operators, CASIs, manufacturers of ROGIDS, deicing service providers and airport authorities. The applicant for ROGIDS use must be the holder of an air operator certificate, private operator certificate or the operator of an approved deicing facility.

### 1.3 Description of Changes

Not applicable.

## 2.0 REFERENCES AND REQUIREMENTS

### 2.1 Reference Documents

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

- (a) Part VI, Subpart 11 of the Canadian Aviation Regulations (CARs)—*Ground Icing Operations*;
- (b) Society of Automotive Engineers (SAE) Aerospace Standard (AS) 5681, *Minimum Operational Performance Specification for Remote On-Ground Ice Detection Systems*. This document is available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (USA and Canada) or 724-776-4970, [www.sae.org](http://www.sae.org).
- (c) Transport Canada Publication, TP 14052, Edition 02, April 2005—*Guidelines for Aircraft Ground Icing Operations*.
- (d) Federal Aviation Administration Advisory Circular (FAA AC) 120-60, 1994-05-19—*Ground Deicing and Anti-Icing Program*

### 2.2 Cancelled Documents

Not applicable.

### 2.3 Definitions and Abbreviations

- (1) The following definitions and abbreviations are used in this document:
  - (a) **Applicant:** The holder of an air operator certificate, private operator certificate or the operator of an approved deicing facility.
  - (b) **Post Deicing Check:** An examination of an aircraft's wings and/or other critical surfaces after deicing has been performed to determine the presence of any remaining frozen contamination.
  - (c) **Pre Deicing Check:** An examination of an aircraft's wings and/or other critical surfaces to check for the presence of frozen contamination. It is usually performed to determine the need for deicing.
  - (d) **Remote On-Ground Ice Detection System (ROGIDS):** A system or device that makes a remote measurement of a monitored surface to determine whether frozen contamination is present. For the purpose of this AC, the intended function of the ROGIDS is the detection of clear ice. ROGIDS may be hand-held, pedestal or vehicle mounted (hereafter referred to as the *platform type*).
- (2) For additional definitions see: SAE AS 5681, *Minimum Operational Performance Specification for Remote On-Ground Ice Detection Systems*, section 2.2 "Definitions" and AC 120-60, *Ground Deicing and Anti-icing Program*.

### 3.0 BACKGROUND

- (1) Ice formation on an aircraft's critical surface can adversely affect performance, stability, and control during take-off. In accordance with section 602.11 of the CARs, the pilot-in-command must ensure that aircraft critical surfaces are free from contamination prior to commencing a take-off. Currently, this inspection is done by visual or tactile inspection of the critical surfaces.
- (2) Research has shown that ROGIDS may perform more consistently and reliably than human visual and/or tactile methods of inspection for clear ice. Consequently, industry, FAA and Transport Canada developed SAE AS 5681 to establish a minimum operational performance specification for ROGIDS.
- (3) The deicing process will remove all contaminants (snow, frost, slush) from critical surfaces. These contaminants would normally be identified by a visual and/or tactile post deicing check. The presence of residual clear ice is not easily identified through either a visual or tactile inspection. When approved as part of an applicant's ground deicing and anti-icing program, a ROGIDS may be used as the sole (primary) means of performing the post deicing check for residual clear ice.
- (4) ROGIDS may also be used as a supplemental (advisory) means of performing a pre deicing check; it can only be used to supplement the other normal means of performing this check, such as visual and/or tactile inspections.
- (5) At this time, ROGIDS is not approved as a primary means for the detection of frost.

### 4.0 DISCUSSION

- (1) The prerequisite for operational approval to use ROGIDS for post deicing inspections is to document compliance with the mandatory design and performance test requirements in AS 5681. Compliance checklists (see section 3.13 of the AS 5681) provided by the applicant will facilitate this task. It is acceptable for the compliance checklists to provide a cross reference between requirements in sections 3 to 7 of AS 5681 and documents from the manufacturer demonstrating compliance.
- (2) *Design Requirements (sections 3 and 4 of AS 5681):* The manufacturer will provide to the end user a declaration that the equipment complies with all the design requirements. Any design documentation required in AS 5681 will be made available to the POI upon request.

- (3) *Performance Test Requirements (sections 5 to 7 of AS 5681)*: There are three types of performance test requirements:
  - (a) Minimum Performance Specification in Environmental Test Conditions (Required tests and recommended tests. The end user and the equipment manufacturer will define which, if any, recommended tests are conducted);
  - (b) Minimum Operational Performance Tests; and
  - (c) Installed Equipment Operational Evaluation.
- (4) The manufacturer is to provide the end user a declaration that verification, validation, testing and analysis have demonstrated that the equipment complies with all the test requirements. Any non-compliances are to be documented in the declaration. The documentation required in section 3.11 "Test Procedures" and 3.12 "Test Reports" of AS 5681 will be made available to the POI upon request.

## 5.0 ACCEPTANCE PROCESS

- (1) This AC describes an acceptable means, but not the only means, of integrating the use of ROGIDS into a certificate holder's Ground Deicing and Anti-Icing Program; another means may be used if it is established as an acceptable means of assuring operational safety.
- (2) The applicant initiates the request for use of a ROGIDS by contacting the approving authority, usually the POI. To ensure appropriate coordination and regulatory involvement, it is recommended that the applicant seek POI input during the early stages of the test plan or procedure development specified in sections 5,6 and 7 of AS 5681.
- (3) The POI may witness all or part of the tests specified in AS 5681. Alternatively, the POI may require an independent observer, such as a Designated Engineering Representative (DER), to witness the tests.
- (4) Any tests in sections 4 to 6 of AS 5681 that were failed will be reported to the POI before the Installed Equipment Operational Evaluation. Failed tests may create operational limitations in the use of the ROGIDS. (For example, if the ROGIDS is found to operate only down to temperatures of -27°C instead of -30°C, then it may be reported as an operational limitation).
- (5) There are two acceptance processes: an Initial Acceptance Process and a Subsequent Acceptance Process.
- (6) The *Initial Acceptance Process* will be followed for installations of:
  - (a) ROGIDS models not previously accepted; or
  - (b) New models of previously accepted ROGIDS that incorporate significant/substantial changes.
- (7) The *Subsequent Acceptance Process* will be followed for all other installations.

### 5.1 Initial Acceptance Process

- (1) Appendix A highlights the specific roles and responsibilities of the applicant, the equipment manufacturer and the POI for each stage of the *Initial Acceptance Process*. sections 3 to 7 of AS 5681 are to be satisfactorily completed for the *Initial Acceptance Process*.
- (2) AS 5681 section 7.3.1 states: "The total number of deicing operations that will be evaluated will be provided in separate regulatory guidance material for the initial evaluation and follow on evaluations". For an initial acceptance, the initial evaluation requires a minimum of 100 deicing operations. These will be conducted in accordance with the criteria in sections 7.3.2 to 7.3.8 of AS 5681.

## 5.2 Subsequent Acceptance Process

- (1) Appendix B highlights the specific roles and responsibilities of the applicant, the equipment manufacturer, and the POI for each stage of the *Subsequent Acceptance Process*.
- (2) Data generated from the *Initial Acceptance Process* falls into two categories and may be reused in the *Subsequent Acceptance Process*.
- (3) The first category includes design and test data showing compliance to AS 5681 sections 3 to 6. If the data from the *Initial Acceptance Process* is available, it may be reused for subsequent installations at the discretion of the POI. If the data are not available, the *Initial Acceptance Process* (see section 5.1 of this AC) will be completed.
- (4) The second category includes operational evaluation data showing compliance to section 7 of AS 5681. Where operational evaluation data from the *Initial Acceptance Process* is available, only a limited number of additional deicing operations are required for the operational evaluation, as described below:
  - (a) If the only change from the initial installation is the facility where the ROGIDS is located, and there are no significant differences in lighting type, aircraft type (see Note), fluid brands, and/or platform types, then transfer of the operational evaluation data may be accepted at the discretion of the POI, and no additional deicing operations would be required.

**Note:**

*The primary concerns when assessing the impact of various aircraft types on the use of ROGIDS are the aircraft material, the surface finish and/or the surface treatment of the monitored surface.*

- (b) If there are significant differences in lighting type, aircraft type, fluid brands, and/or platform types, then the following additional operational evaluations are to be performed:
  - (i) Where there are significant differences in lighting type, aircraft type or fluid brands, a minimum of 30 deicing operations are required; these will be conducted in accordance with the criteria in section 7.3.2 of AS 5681.
  - (ii) Where a different platform type is used, a minimum of 20 deicing operations are required; these will be conducted in accordance with the criteria in sections 7.3.3 to 7.3.8 of AS 5681.

## 5.3 Installed Equipment Operational Evaluation Considerations

- (1) The Installed Equipment Operational Evaluation will be performed during actual aircraft deicing operations.
- (2) A minimum of two qualified deicing operators will participate in both the Initial and the Subsequent Operational Evaluations. The number of deicing operations should be distributed among the operators as evenly as possible.

## 6.0 APPROVAL

- (1) To incorporate ROGIDS into their operations, the applicant will submit:
  - (a) a revision to the ground deicing and anti-icing program that identifies the intended use and any operational limitations of the ROGIDS, and includes changes to the maintenance and training programs;
  - (b) a description of ROGIDS equipment and installation; and
  - (c) compliance checklists as described in section 4.0 of this AC.

- (2) The ROGIDS may be approved as part of the applicant's approved deicing and anti-icing program once the applicant has demonstrated that the ROGIDS meets the requirements of AS 5681 and this AC.
- (3) Ongoing acceptance is contingent on the applicant ensuring that changes to lighting type, aircraft type, fluid brands, and/or platform types have been assessed and addressed.

## 7.0 CONTACT OFFICE

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Suggestions for amendment to this document are invited, and should be submitted via the Transport Canada Civil Aviation Issues Reporting System (CAIRS) at the following Internet address:

<http://www.tc.gc.ca/AviationCivile/ServicesdeGestion/AQ/ssqac.htm>

or by e-mail at: [CAIRS\\_NCR@tc.gc.ca](mailto:CAIRS_NCR@tc.gc.ca)

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**APPENDIX A—ROLES AND RESPONSABILITIES MATRIX FOR INITIAL ACCEPTANCE PROCESS**

| <b>Stage</b>  | <b>Applicant</b>   | <b>Equipment Manufacturer</b>  | <b>POI</b>  | <b>Comments</b>  |
|---|--|--------------------------------|---|--|
| 1. Initiation   | Contacts the POI and expresses intentions to incorporate ROGIDS into their deicing program | Supports applicant             | Defines regulatory authority involvement in project                                     | Define planned activities and schedule   |
| 2. Design   | Provides input into design   | Presents proposed design       | May comment on proposed hardware and software assurance levels and system safety design |  |
| 3. Test Plans (Environmental and Operational Performance Tests) | Review and comment as necessary  | Prepares test plans            | Review and comment as necessary   | Prepared in accordance with section 3.10 of AS 5681  |
| 4. Conformity Inspection  | Supports equipment manufacturer  | Conducts conformity inspection | Independent conformity inspection by regulatory authority at the discretion of POI      | Purpose is to ensure that ROGIDS being tested is representative of production equipment  |
| 5. Environmental Tests  | Optional witnessing  | Conducts tests                 | Optional witnessing   | See section 5 of AS 5681   |
| 6. Operational Performance Tests                                | Optional witnessing  | Conducts tests                 | Optional witnessing   | See section 6 of AS 5681   |
| 7. Design Reports   | Review and comment as necessary  | Prepares reports               | Review and comment as necessary   | These reports deal with section 3 of AS 5681 "Design Requirements"   |
| 8. Test Reports   | Review and comment as necessary  | Prepares reports               | Review and comment as necessary   | These reports deal with sections 5 and 6 of AS 5681  |
| 9. Operational Evaluation Plan                                  | Review and comment as necessary  | Prepares evaluation plan       | Review and comment as necessary   |  |
| 10. Installed Equipment Conformity Inspection                   | Support equipment manufacturer   | Conducts conformity inspection | Independent conformity inspection by regulatory authority at the discretion of POI      | Purpose is to ensure that installed equipment is representative of production equipment and installed in accordance with the manufacturer's instructions |

**APPENDIX A (CONT'D)— ROLES AND RESPONSABILITIES MATRIX FOR INITIAL ACCEPTANCE PROCESS**

| Stage  | Applicant  | Equipment Manufacturer | POI   | Comments   |
|--|--|------------------------|---|--|
| 11. Installed Equipment Operational Evaluation               | Conducts evaluations   | Supports applicant     | Witness all or part of evaluation as appropriate  | See section 7 of AS 5681. Prior to beginning the Installed Equipment Operational Evaluation, all testing specified through Chapter 6 in AS 5681 must be completed. |
| 12. Installed Equipment Operational Evaluation Report        | Prepares reports   | Supports applicant     | Review and comment as necessary   | See section 7.2.1 of AS 5681   |
| 13. Incorporation into Ground Deicing and Anti-icing Program | Submit revision to ground deicing and anti-icing program, including operating, training and maintenance procedures | Supports applicant     | Review by POI for acceptability and approval for inclusion in ground deicing and anti-icing program |  |

**APPENDIX B—ROLES AND RESPONSIBILITIES MATRIX FOR SUBSEQUENT ACCEPTANCE PROCESS**

| <b>Stage</b>  | <b>Applicant</b>   | <b>Equipment Manufacturer</b>  | <b>POI</b>   | <b>Comments</b>  |
|---|--|--------------------------------|--|--|
| 1. Initiation   | Contacts the POI and expresses intentions to incorporate ROGIDS into their deicing program                         | Supports applicant             | Defines regulatory authority involvement in project  | Define planned activities and schedule.  |
| 2. Review Existing Design and Test Data                     | Propose and justify use of previously accepted data and reports  | Supports applicant             | Confirm the data from the Initial Acceptance Process is available and appropriate prior to initiating operational evaluation testing |  |
| 3. Operational Evaluation Plan                              | Review and comment as necessary  | Prepares evaluation plan       | Review and comment as necessary  |  |
| 4. Installed Equipment Conformity Inspection                | Support equipment manufacturer   | Conducts conformity inspection | Independent conformity inspection by regulatory authority at the discretion of POI   | Purpose is to ensure that installed equipment is representative of production equipment and installed in accordance with the manufacturer's instructions |
| 5. Installed Equipment Operational Evaluation               | Conducts evaluations in accordance with Sections 7.2, 7.3 and 7.4 of this AC                                       | Supports applicant             | Witness all or part of evaluation as appropriate   |  |
| 6. Installed Equipment Operational Evaluation Report        | Prepares reports   | Supports applicant             | Review and comment as necessary  | See AS 5681, Section 7.2.1   |
| 7. Incorporation into Ground Deicing and Anti-icing Program | Submit revision to ground deicing and anti-icing program, including operating, training and maintenance procedures | Supports applicant             | Review by POI for acceptability and approval for inclusion in ground deicing and anti-icing program                                  |  |