



U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Use of Remote On-Ground Ice
Detection System

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Initiated by: AFS-200

Change:

1. PURPOSE. This advisory circular (AC) provides a standard means for a certificate holder to obtain approval for use of a Remote On-Ground Ice Detection System (ROGIDS). The purpose of this system is to identify clear ice after deicing as a replacement for or to augment the post-deicing visual and tactile check of aircraft surfaces. This approval is essential to the ground-deicing/anti-icing program contained within Title 14 of the Code of Federal Regulations (14 CFR) part 121, § 121.629, part 135, § 135.227, or part 125, § 125.221.

2. APPLICABILITY. This document applies to certificate holders, aviation safety inspectors (ASI), manufacturers of ROGIDS, aircraft ground-deicing service providers, and airport authorities. The applicant, for use of ROGIDS as a portion of the operator's approved aircraft ground-deicing program, must have a valid air operator certificate (AOC).

3. DEFINITIONS.

a. Applicant. An AOC holder.

b. Critical Surfaces. Critical surfaces are areas of the aircraft that include, but are not limited to, all aerodynamic surfaces that produce lift, thrust, provide for aircraft control, provide sensing for instrument indication, or that if contaminated could cause adverse effects during takeoff and initial climb (such as upper surfaces of the fuselage of aircraft with tail-mounted engines). Critical surfaces also include other areas that the Federal Aviation Administration (FAA), aircraft manufacturer, or the operator has designated. Critical surfaces may be defined in the Airplane Flight Manual (AFM).

c. Pre-Deicing Aircraft Inspection. An inspection of the aircraft to check for the presence of frozen contamination. Flightcrews and other personnel normally perform this inspection to determine the need for deicing/anti-icing as part of the winter preflight procedures. This inspection must be both a visual and tactile check for hard-wing aircraft (i.e., wing without leading edge devices/slats).

d. Post-Deicing Check. A check, after deicing fluid application, to ensure all aircraft surfaces are free of frozen contaminants. This check must be both a visual and a tactile check for hard-wing aircraft.

e. Frozen Contaminants. As used in this AC, frozen contaminants include frost, ice, snow, and slush.

f. 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).

g. Significant/Substantial Change. A significant/substantial change means an alteration to the design of the ROGIDS that is deemed to have an appreciable effect on ROGIDS operation and/or compliance to the performance requirements stated in the current edition of the Society of Automotive Engineers (SAE) Aerospace Standard (AS) 5681, Minimum Operational Performance Specification for Remote On-Ground Ice Detection Systems. Examples of significant/substantial changes are: the ice detection technique, types of sensors, or built-in light sources.

4. RELATED READING MATERIAL. You can find additional information in FAA AC 120-60, Ground Deicing and Anti-icing Program, available at <http://rgl.faa.gov>. In addition, SAE AS 5681 is available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001; telephone number: 877-606-7323 (USA and Canada) or 724-776-4970; <http://www.sae.org>.

5. BACKGROUND. Frozen contaminants on an aircraft's critical surfaces can adversely affect performance, stability, and control during takeoff. The pilot in command (PIC) must ensure that all critical surfaces are free of frozen contamination prior to commencing a takeoff. 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, the FAA, and Transport Canada (TC) developed SAE AS 5681 to establish a Minimum Operational Performance Specification (MOPS) for ROGIDS.

a. Post-Deicing Check. A visual and/or tactile post-deicing check can easily identify frost and snow. However, it is not easy to identify the presence of residual clear ice through either a visual or tactile inspection. When approved as part of a certificate holder's ground deicing and anti-icing program, the certificate holder may use the ROGIDS as the sole (primary) means of performing the post-deicing check for residual clear ice.

b. Pre-Deicing Check. Certificate holders may also use ROGIDS as a supplemental (advisory) means of performing a pre-deicing check. Certificate holders can only use ROGIDS to supplement other approved means of performing this check, such as visual and/or tactile inspection.

NOTE: At this time, the FAA has not approved ROGIDS as a primary means for the detection of frost or snow. Therefore, the ROGIDS does not eliminate any requirement for a visual/tactile post deicing inspection for frost or snow.

6. DISCUSSION. Before a certificate holder requests the use of a ROGIDS for post-deicing/anti-icing checks, the manufacturer must provide the certificate holder a declaration that the design, verification, validation, testing, and analysis confirms that the ROGIDS complies

with all the requirements of SAE AS 5681. The manufacturer must document any noncompliance in the declaration. The manufacturer must make the documentation required in SAE AS 5681 sections 3.11 and 3.12 available to the certificate holder and the certificate holder's principal operations inspector (POI) upon request.

7. ACCEPTANCE PROCESS. This AC describes one of several acceptable means of integrating the use of ROGIDS into a certificate holder's approved aircraft ground deicing/anti-icing program. The certificate holder may use other means if it establishes them as acceptable means of assuring operational safety and if the FAA approves them in the operator's approved aircraft ground deicing/anti-icing program.

a. Initiation of Request. The certificate holder initiates the request for use of a ROGIDS by contacting the approving authority, usually the POI. To ensure appropriate coordination and regulatory involvement, the FAA recommends that the certificate holder seek POI input during the early stages of the test plan or procedure development specified in SAE AS 5681 sections 5, 6, and 7.

b. POI Observation. The POI may request to be present for all or part of the tests specified in SAE AS 5681. Alternatively, the POI may require an independent observer, such as a Designated Engineering Representative (DER), to witness the tests.

c. Failed Tests. The certificate holder must report any tests in sections 4 through 6 of SAE AS 5681 that it failed to the POI, along with the corrective action taken, before the Installed Equipment Operational Evaluation. Failed tests may create operational limitations in the use of the ROGIDS. For example, if the certificate holder finds that the ROGIDS operates only down to temperatures of -27 °C instead of -30 °C, then it may report this as an operational limitation.

d. Acceptance Processes. There are two acceptance processes: an Initial Acceptance Process and a Subsequent Acceptance Process. The two processes differ in that:

(1) The certificate holder must follow the Initial Acceptance Process for installations of:

- ROGIDS models not previously accepted; or
- New models of previously accepted ROGIDS that incorporate significant/substantial changes.

(2) The certificate holder must follow the Subsequent Acceptance Process for all other installations.

e. Initial Acceptance Process.

(1) Table 1, Roles and Responsibilities Matrix for Initial Acceptance Process, highlights the specific roles and responsibilities of the certificate holder, the equipment manufacturer, and the POI for each stage of the Initial Acceptance Process. The certificate holder must satisfactorily complete sections 3 to 7 of SAE AS 5681 for the Initial Acceptance Process.

(2) SAE 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. The certificate holder must conduct these operations in accordance with the criteria in sections 7.3.2 to 7.3.8 of AS 5681.

TABLE 1. ROLES AND RESPONSIBILITIES MATRIX FOR INITIAL ACCEPTANCE PROCESS

Stage	Certificate Holder	Equipment Manufacturer	Principal Operations Inspector (POI)	Comments
1. Initiation	Contacts the POI and expresses intentions to incorporate Remote On-Ground Ice Detection System (ROGIDS) into its deicing program.	Supports certificate holder.	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.	See Society of Automotive Engineers (SAE) Aerospace Standards (AS) 5681, appendix D—Determination of ROGIDS Acceptable Latent Failure Rate.
3. Test Plans (Environmental and Operational Performance Tests)	Reviews and comments as necessary.	Prepares test plans.	Reviews and comments as necessary.	Prepared in accordance with SAE AS 5681 section 3.10
4. Conformity Inspection	Supports equipment manufacturer.	Conducts conformity inspection.	Independent conformity inspection by regulatory authority at the discretion of the POI.	Purpose is to ensure that the ROGIDS being tested is representative of production equipment.
5. Environmental Tests	Optional witnessing.	Conducts tests.	Optional witnessing.	See AS 5681 section 5.
6. Operational Performance Tests	Optional witnessing.	Conducts tests.	Optional witnessing.	See AS 5681 section 6
7. Design Reports	Reviews and comments as necessary.	Prepares reports.	Reviews and comments as necessary.	These reports deal with AS 5681 section 3.
8. Test Reports	Reviews and comments as necessary.	Prepares reports.	Reviews and comments as necessary.	These reports deal with AS 5681 sections 5 and 6.
9. Operational Evaluation Plan	Reviews and comments as necessary.	Prepares evaluation plan.	Reviews and comments as necessary.	
10. Installed Equipment Conformity Inspection	Supports equipment manufacturer.	Conducts conformity inspection.	Independent conformity inspection by regulatory authority at the discretion of the POI.	Purpose is to ensure that installed equipment is representative of production equipment and installed in accordance with the manufacturer's instructions.

TABLE 1. ROLES AND RESPONSIBILITIES MATRIX FOR INITIAL ACCEPTANCE PROCESS (Continued)

Stage	Certificate Holder	Equipment Manufacturer	POI	Comments
11. Installed Equipment Operational Evaluation	Conducts evaluations.	Supports certificate holder.	Witnesses all or part of evaluation, as appropriate.	See AS 5681 section 7. 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 certificate holder.	Reviews and comments as necessary.	See AS 5681 section 7.2.1.
13. Incorporation into Ground Deicing and Anti-icing Program	Submits revision to ground deicing and anti-icing program, including operating, training and maintenance procedures.	Supports certificate holder.	Reviews for acceptability and approval for inclusion in ground deicing and anti-icing program.	

f. Subsequent Acceptance Process.

(1) Table 2, Roles and Responsibilities Matrix for Subsequent Acceptance Process, highlights the specific roles and responsibilities of the certificate holder, 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. Certificate holders and POIs may reuse the data in the Subsequent Acceptance Process.

(3) The first category includes design and test data showing compliance with SAE AS 5681 sections 3 to 6. If the data from the Initial Acceptance Process is available, the certificate holder may reuse it for subsequent installations at the discretion of the POI. If the data is not available, the certificate holder must complete the Initial Acceptance Process (see section 7.1).

(4) The second category includes operational evaluation data showing compliance with SAE AS 5681 section 7. Where operational evaluation data from the Initial Acceptance Process is available, the FAA requires only a limited number of additional deicing operations 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 (halogen, sodium vapor, metal halide, etc.), aircraft types (B-1900, CRJ, A-320, B-767, A-380, etc.), fluid brands, and/or platform types, then the FAA may accept transfer of the operational evaluation data at the discretion of the POI, with no additional deicing operations required.

(b) If there are significant differences in lighting type, aircraft type, fluid brands, and/or platform types, then the certificate holder must perform the following additional operational evaluations:

1. Where there are significant differences in lighting type, aircraft type, or fluid brands, a minimum of 30 deicing operations are required. The certificate holder must conduct these in accordance with the criteria in section 7.3.2 of SAE AS 5681.

2. Where the certificate holder uses a different platform type, a minimum of 20 deicing operations are required. The certificate holder must conduct these in accordance with the criteria in sections 7.3.3 to 7.3.8 of SAE AS 5681.

TABLE 2. ROLES AND RESPONSIBILITIES MATRIX FOR SUBSEQUENT ACCEPTANCE PROCESS

Stage	Certificate Holder	Equipment Manufacturer	Principal Operations Inspector (POI)	Comments
1. Initiation	Contacts the POI and expresses intentions to incorporate Remote On-Ground Ice Detection System (ROGIDS) into its deicing program.	Supports certificate holder.	Defines regulatory authority involvement in project.	Define planned activities and schedule.
2. Review Existing Design and Test Data	Proposes and justifies the use of previously accepted data and reports.	Supports certificate holder.	Confirms the data from the Initial Acceptance Process is available and appropriate prior to initiating operational evaluation testing.	
3. Operational Evaluation Plan	Reviews and comments as necessary.	Prepares evaluation plan.	Reviews and comments as necessary.	
4. Installed Equipment Conformity Inspection	Supports equipment manufacturer.	Conducts conformity inspection.	Independent conformity inspection by regulatory authority at the discretion of the 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 Society of Automotive Engineers (SAE) Aerospace Standards (AS) 5681 sections 7.2, 7.3, and 7.4.	Supports certificate holder.	Witnesses all or part of the evaluation as appropriate.	
6. Installed Equipment Operational Evaluation Report	Prepares reports.	Supports certificate holder.	Reviews and comments as necessary.	See SAE AS 5681 section 7.2.1.
7. Incorporation into Ground Deicing and Anti-icing Program	Submits revision to ground deicing and anti-icing program, including operating, training and maintenance procedures.	Supports certificate holder.	Reviews for acceptability and approval for inclusion in-ground deicing and anti-icing program.	

g. Installed Equipment Operational Evaluation Considerations.

(1) The certificate holder must perform the Installed Equipment Operational Evaluation during actual aircraft deicing operations.

(2) A minimum of two qualified deicing operators must participate in both the Initial and the Subsequent Operational Evaluations. The certificate holder should distribute the number of deicing operations among the operators as evenly as possible.

8. APPROVAL.

a. Required Items. To incorporate ROGIDS into its operations, the certificate holder must submit:

(1) A revision to their aircraft ground deicing/anti-icing program that identifies the intended use, location, operational procedures, and any operational limitations of the ROGIDS. In addition, this request must include necessary changes to the appropriate maintenance and training programs;

(2) A description of ROGIDS equipment and installation; and

(3) Compliance checklists as described in paragraph 6 of this document.

b. Approval. The FAA may approve ROGIDS as part of the certificate holder's approved deicing and anti-icing program once the certificate holder has demonstrated that the ROGIDS meets the requirements of SAE AS 5681 and this AC.

c. Ongoing Acceptance. Ongoing acceptance is contingent on the certificate holder ensuring that it has assessed and addressed changes to lighting type, aircraft type, fluid brands, and/or platform types. The ROGIDS must also continue to operate in accordance with SAE AS 5681, this AC, and the certificate holder's approved aircraft ground deicing/anti-icing program.

ORIGINAL SIGNED BY

/s/ Raymond Towles for

John M. Allen

Director, Flight Standards Service