

**TERMS OF REFERENCE**  
**Special Committee (SC) 230**  
**Airborne Weather Detection Systems**  
Revision 10

**REQUESTORS:**

Organization	Person
FAA Associate Administrator for Aviation Safety	Ms. Peggy Gilligan

**SC LEADERSHIP:**

Position	Name	Affiliation	Telephone	email	Change
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**BACKGROUND:**

RTCA/DO-220 provides the current Minimum Operational Performance Standards for Airborne Weather Radar with Forward-Looking Windshear Capability. It was published in 1993, with Change 1 added in 1995. Since then, significant technological advances in weather radar systems have occurred, but the MOPS has not been updated to accommodate these improvements. Modern weather radar systems may also include turbulence detection or other related features and functions that are not currently addressed by the MOPS. Revised guidance will enable a more efficient and standardized certification approach across the industry.

In April 2013, the FAA tasked an Industry Working Group to develop recommendations for an advisory circular for airworthiness approval for aircraft weather radar systems. The Industry Working Group recommends revising the outdated RTCA/DO-220, and DO-220 Change 1 to update the minimum operational performance standards for aircraft weather radar equipment.

(2015-03-17) - During the plenary meetings of SC-230, various committee members requested that the committee consider also revising DO-213, Minimum Operational Performance Standards for Nose-Mounted Radomes. The committee leadership agrees that DO-213 should be updated, and that it is appropriate to include that task under the Terms of Reference for SC-230.

(2015-06-16) - At the SC-230s fourth plenary meeting, the committee discussed the EUROCAE Working Group 95 (WG-95) new subgroup for long-range awareness of icing conditions.

WG-95 subgroup will create a report on the feasibility to standardize In-Flight Ice Crystals Long Range Awareness capabilities by Weather Radar (WXR), with at least the following objectives:

1) Take into account the impact of the new icing atmosphere characterized by the Appendix “D/P” definition introducing the Ice Crystals and mixed Icing conditions.

2) Describe intended function of Ice Crystals Long Range Icing Awareness functionality by Weather Radar and the Operational need of such function.

3) Identify possible standardization activities of short term functionalities, with the definition of minimum acceptable performance and validation and verification approach.

4) After 12 months, describe the maturity of the Ice Crystals Long Range Icing Awareness function by Weather Radar and provide recommendations on the way forward of the sub-group and the way to standardize Icing WXR functions using new or existing EUROCAE / RTCA documents.

The RTCA SC-230 members have expressed an interest in supporting this activity and would like to contribute to the feasibility report in a first step.

In order to accommodate this interest from SC-230 members, the leadership of SC-230 agrees that the duties of this committee should be extended beyond the publication of DO-220A and DO-213A, to allow SC-230 to contribute to the long-range icing awareness feasibility report as described above.

(2017-03-08) – since the publication of DO-213A and DO-220A in March of 2016, a few errata and opportunities for clarification have been identified in each document. As companies start to use these documents for certification more issues may arise. RTCA SC-230 plans to examine the reported issues and incorporate into a Change 1 for both documents.

(2018-06-21) – Subsequent to the creation of the Feasibility Study on Weather Radar for Ice Crystal Detection, the RTCA sent a letter to their industry partners to assess the need for radar detection of high altitude ice crystals, and to query the level of support for related follow-on activities. The feasibility report recommended that:

- additional research be conducted to better assess susceptibility of engines to high altitude ice,
- additional research data be gathered for evaluation and validation of icing detection methods, and
- development of meteorological models be initiated for development and validation of the icing detection function.

The respondents were supportive of continued research into the operational needs and benefits of radar-based ice crystal detection, the development of models that can assist in the development and validation of such systems, and the definition of a path to certification for this type of radar-based function. To this end, SC-230 will update DO-220A Change 1 to define the specifications for a radar-based ice crystal detection function.

SC-230 has also been asked by the Japan Aerospace Exploration Agency (JAXA), Mitsubishi Electric Corporation, and others to create a requirements document (MOPS) for airborne LIDAR systems. As a first step, SC-230 will undertake a feasibility study to determine realistic goals for an airborne LIDAR system for use as a clear air turbulence detection function, and to assess the ability of LIDAR to meet aircraft manufacturer needs for the detection of clear air turbulence.

**DELIVERABLES:**

Product	Description	FRAC Completion Due Date*	Change
DO-220B	Add requirements for a new function: Detection of High Altitude Ice Water Conditions using Airborne Weather Radar Systems	March 2023	

\*Note: Final Review and Comment (FRAC) Completion Due Date refers to the date that the committee plenary approves the document after completing the FRAC Process. SCs should submit the final document at least 45 days before the Program Management Committee (PMC) meeting where it will be considered for approval.

**SCOPE and COORDINATION:**

For Radar-Based Ice Crystal Detection:

Monitor ongoing government and industry research to better understand the susceptibility of engines and sensors to high altitude ice, assess additional research data for evaluation and validation of icing detection methods, and define meteorological models for development and validation of an icing detection function. Update DO-220A Change1 to define the specifications for a radar-based ice crystal detection function. Coordinate with interested government and industry partners as needed.

The committee is investigating the development of MOPS for:

- radar detection of volcanic ash,
- updates to the predictive windshear functionality to accommodate modern aircraft characteristics, and to include additional types of aircraft.

Based on the outcome of these investigations, further revisions to this ToR may apply.

**ENVISIONED USE OF DELIVERABLE(S)**

For Radar-Based Ice Crystal Detection, the revised MOPS may be used fo evaluating whether a TSO-C63() revision is warranted.

**SPECIFIC GUIDANCE:**

Radar-Based Ice Crystal Detection:

1. Continue to monitor research into operational implications of flight in ice crystal conditions, considering effects on both engines and sensors for a variety of equipment and aircraft types.
2. Continue to gather and analyze flight evaluation data to better characterize the ice crystal detection capability of modern radar systems.

3. Determine realistic goals for a radar-based ice crystal detection function, based on operational usefulness, and on feasibility given current technological constraints. These goals may include, but are not constrained to:
  - a. Detection thresholds
  - b. Probability of detection
  - c. Probability of missed detection
  - d. Probability of false and/or nuisance alerts
4. Review atmospheric models related to ice crystal phenomena. These models can be used in the development and validation of a radar ice crystal detection function.
5. Develop a set of test scenarios based on the above atmospheric models.
6. Update DO-220A Change 1 to add the specifications for a radar-based ice crystal detection function.

ICC Coordination – The special committee will inform the Integration and Coordination Committee (ICC) of the committee’s intentions through the Program Management Committee.

Coordination with RTCA SC-206, Aeronautical Information and Meteorological Data Link Services, if and as appropriate.

EUROCAE Coordination – This is an independent advisory committee, not a joint RTCA/EUROCAE committee. Coordination with EUROCAE will be undertaken, as appropriate.

Initial Documentation

<b>Documents</b>	<b>Intended Use</b>
FS-1, Feasibility Study Weather Radar for Ice Crystal Detection	Background information and summary of existing data.
DO-220A with Change 1	Example MOPS for radar-based functions.
DO-213A with Change 1	Radome performance implications of radar-based Ice Crystal Detection

**TERMINATION:**

When the scope of this Terms of Reference is complete, the committee will recommend to the PMC that the committee Sunset, go into Active Monitoring Mode, or spend a period of time in Hiatus. Any change/extension of the committee’s work program requires prior PMC approval.