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Minimum Operational Performance Standards for Nose-Mounted Radomes

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FOREWORD

This document with was prepared by Special Committee 230 (SC-230) and approved by the RTCA Program Management Committee (PMC) on June 21, 2018.

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EXECUTIVE SUMMARY

Nose-mounted radome characteristics have a significant impact on windshear detection systems. Since the last revision to DO-213, there have been many advances in the field of radome design and testing. In conjunction with the creation of DO-220A, SC-230 has also created DO-213A to incorporate updates and corrections to the previous version. This document establishes radome performance requirements to ensure that the radome characteristics do not adversely interfere with the performance of weather radar systems, including those with predictive windshear functions. It also includes testing requirements to ensure that the radome continues to perform correctly after repair.

Change 1 of this document implements the following changes:

Pg.	Section or Item	Description of Change
3	1.8 Definitions of Terms	Updated definition of Transmission Efficiency, Average.
8	2.3.1.2 Testing of New Designs for Moisture Entry	Inserted new informative note.
13	2.4.1.2 Radome Finish	New paragraph addressing final finish paint.
13	2.4.1.3.2 Quality Assurance / Production Testing	Changed requirement for testing all polarizations to testing at least one applicable polarization.
19	2.4.3.2 Sidelobe Levels	Inserted new Note 1.
20	2.4.3.4 Incident Reflection	Removed requirement for the incident reflection test during quality assurance/production testing.
20	2.4.3.5 Beam Deflection	Removed requirement for the beam deflection test during quality assurance/production testing.

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1 PURPOSE AND SCOPE

1.1 Introduction

This document contains minimum operational performance standards for radomes for use with airborne weather radars with or without forward-looking windshear detection capability. These standards specify radome characteristics for designers, manufacturers, installers, and users of the equipment.

The radome is an integral part of the aircraft's structural, aerodynamic, and electromagnetic design. In radome design, these factors must be considered for certification.

Compliance with these standards is one means of assuring that the radome will perform its intended function(s) satisfactorily under all conditions normally encountered in routine aeronautical operations. Any regulatory application of this document is the sole responsibility of appropriate governmental agencies.

Section 1 of this document provides information needed to understand the rationale for radome characteristics and requirements stated in the remaining sections. It describes typical equipment applications and operational goals, as envisioned by RTCA, and establishes the basis for the standards stated in Sections 2 through 3. This section also includes definitions and assumptions essential to proper understanding of this document.

Section 2 contains the minimum performance standards for the equipment under standard and environmental conditions. Also included are recommended ground test procedures necessary to show equipment compliance with the stated minimum requirements.

Section 3 describes the performance required of the installed radome.

Appendix A is an informative appendix, which discusses typical causes of radome performance degradation.

Appendix B is an informative appendix. It provides general guidelines for proper radome maintenance and repair.

Appendix C, a normative appendix, describes test range qualification.

Appendix D, a normative appendix, illustrates sidelobe level determination.

The word "radome" as used herein includes all components necessary (as determined by the manufacturer or installer) for the radome to perform its function properly. For example, the "radome" normally includes the basic radome structure (electromagnetic window), a paint system on the outside (standard aircraft polyurethane paint or a rain erosion paint), antistatic protection system, other rain erosion protection such as an adhesive-backed polyurethane film or rubber boot, lightning protection devices, etc. In this illustrative example, all these components comprise the "radome." It should not be inferred that every radome configuration will necessarily include (or be limited to) these components or units. This will depend on the design chosen by the radome manufacturer.

Some radome designs, as an example, may not include rain erosion protection or antistatic protection, *per se*.

1.2 System Overview

The radome as part of the radar system is an electromagnetic window, tuned to the operating frequencies of the radar equipment within the radome. It protects the antenna from the environment outside the aircraft, which includes aerodynamic pressure, rain, static electricity, lightning, hail, bird strikes, and other impact loads.

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