RTCA, Inc.
1150 18th Street NW, Suite 910
Washington, DC 20036
USA

Safety, Performance and Interoperability Requirements Document Defining Takeoff Minima by Use of Enhanced Flight Vision Systems

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Prepared by: SC-213

FOREWORD

This document was prepared by Special Committee 213 jointly with EUROCAE Working Group 79 and approved by the RTCA Program Management Committee (PMC) and EUROCAE Council on October 5, 2018.

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- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;
- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and
- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

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EXECUTIVE SUMMARY

This document provides the minimum operational, safety, and performance requirements (SPR) and interoperability requirements by which takeoff operations using an Enhanced Flight Vision System (EFVS) can be safely conducted in natural visibilities lower than currently authorized. These takeoff minima and associated SPRs are established for the use of EFVS, treated as subsystems, which together with other subsystems including navigational aids and airport lighting and markings, meet the operational goal/intended function and achieve the levels of reliability, availability, and integrity consistent with other systems and subsystems used for the similar intended function and phase of flight. In this document, recommendations for EFVS takeoff minima are defined with various associated aircraft equipage, operational and interoperability requirements, and airport infrastructure. The visibility minima are defined in terms of natural visibility since, in the event of a failure or failures, the PF uses a combination of the remaining functional elements, other aircraft subsystems, and available out-the-window natural visual cues (e.g., lights and/or markings of the runway) to mitigate the failure effects and conduct a safe, successful takeoff or rejected takeoff.

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1 Introduction

This document is the minimum operational, safety, and performance requirements (SPR) and interoperability requirements (INTEROP) for Enhanced Flight Vision System (EFVS) associated with recommended takeoff minima.

Takeoff minima are established for the use of vision systems technologies, treated as subsystems, which together with other subsystems including navigational aids and airport lighting and markings, are used to accomplish the operational goal, achieve levels of reliability, availability, and integrity appropriate to the intended function and phase of flight. These levels are consistent with other systems and subsystems used for the same intended function and phase of flight.

Safety, performance, and interoperability requirements are derived from examination of the operation and the associated performance and safety analyses. The operation is outlined in the Operational Services and Environment Definition (OSED) in Appendix A. The Operational Performance Assessment (OPA) for this operation is established in Appendix B. Finally, the Operational Safety Assessment (OSA) is presented in Appendix C which analyzes the operational safety by considering potential hazards to which the flight crew and/or aircraft might be exposed during the EFVS takeoff operation and derives requirements in order to control the likelihood of the hazards and their effects. The assessment criteria are derived in whole or in part from applicable, existing guidance material which identifies airworthiness approval guidance for airborne systems used during a takeoff in low visibility weather conditions.

All material in this document was developed jointly by EUROCAE Working Group 79 (WG79) and RTCA Special Committee-213 (SC-213).

The requirements specified in this document are necessary to provide adequate assurance that the aircraft systems and other systems, when operating together, will perform their intended function – EFVS Takeoff – in an acceptably safe manner for the operations defined in the OSED. The system here includes the interaction and interoperability with ground and air navigation service provider elements.

1.1 Purpose of This Document

This document defines and allocates the set of minimum requirements for the end-to-end operational, safety, performance, and interoperability aspects for implementations of EFVS takeoff with recommended minima.

Allocation of these requirements is done by this SPR/INTEROP to the necessary domains of the aircraft with dependencies and assumptions, if necessary, to the airport operations, air navigation services providers (ANSP), and infrastructure level.

These requirements are intended to be used for approval processes including aircraft type design approval, aircraft operator operational approval, and (should they be necessary) Air Traffic Services (ATS) provider operational approval. Chapter 1.1.3 below provides more information on the use of this document for approvals.

In addition, this document provides guidance to determine the levels of design assurance and performance that are needed for each element (aircraft, operator, and, if applicable, ANSP—Air Navigation Service Provider and airport infra-structure level) to support the application.

1.1.1 Takeoff Minima by use of Enhanced Flight Vision Systems

An Enhanced Flight Vision System (EFVS) is an electronic means to provide a display of the forward external scene topography through the use of imaging sensors. The EFVS

