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

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FOREWORD

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- 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

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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 vision 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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TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Purpose of This Document 1
1.1.1 Takeoff Minima by use of Enhanced Flight Vision Systems 1
1.1.2 ETOS Intended Function 3
1.1.3 Use of Document for Approvals 3
1.1.4 Background – Vision Systems Technologies 4
1.1.5 EFVS Takeoff System (ETOS) Concept 5
1.1.6 Relationship to Other Applications 6
1.2 Scope of the Document 7
1.3 Structure of This Document 7
1.3.1 Document Organization 7
1.4 Aircraft Equipment Information Vulnerabilities 8
1.5 References 9
1.5.1 ICAO 9
1.5.2 Society of Automotive Engineering (SAE) Documents 9
1.5.3 FAA Documents 10
1.5.4 EASA / TCCA 10
1.5.5 EUROCAE/RTCA Documents 10

2 APPROACH AND METHODOLOGY 13

2.1 Document Development Process 13
2.2 Methodology 13
2.2.1 Operational Services and Environment Definition (OSED) 13
2.2.2 Safety and Performance Requirements 13
2.2.3 Interoperability Requirements (Interop) 14
2.3 Key Terms 14
2.3.1 Use of Requirements and Recommendations and Key Words 14
2.3.2 Assumptions 15
2.3.3 Mitigation means 15
2.3.4 Requirements 15
2.3.5 Recommendations 16

3 SAFETY AND PERFORMANCE REQUIREMENTS (SPR) 17

3.1 Introduction 17
3.1.1 OPA Process 17
3.1.2 OSA Process 17
3.1.2.1 Mitigation Means 18
3.1.3 SPR Process 18
3.2 Assumptions 19
3.2.1 General Assumptions 19
3.2.2 Environmental Assumptions 19
3.2.3 Other Assumptions 19
3.3 Operational Requirements 19
3.4 ETOS Requirements 21
3.4.1 Functional Requirements 21
3.4.1.1 Airport / ANSP Requirements 22
3.4.2 Performance Requirements 22
3.4.2.1 Integrity and Safety Requirements 23

3.5 Data Requirements 24
3.6 Recommendations and Design Considerations 25
3.7 Training Considerations 25

4 INTEROPERABILITY REQUIREMENTS 27

4.1 Purpose of Interoperability Requirements 27
4.2 Scope of Interoperability Requirements 27
4.2.1 ETOS Domains 27
4.2.1.1 Ownship Domain 27
4.2.1.2 Other Aircraft and Vehicles Domain 27
4.2.1.3 Ground Domain 27
4.3 ETOS Interoperability Requirements 27
4.3.1 Interop Data 28

5 MEMBERSHIP 29

APPENDIX A: OPERATIONAL SERVICES AND ENVIRONMENT DEFINITION A-1

A.1 Introduction A-1
A.2 Background – Aerodrome Operations A-1
A.3 Background – Takeoff Operations A-2
A.4 Roles and Responsibilities A-4
A.4.1 Airport A-4
A.4.2 Air Traffic Control – If Active A-4
A.4.3 Flight crew A-5
A.5 Intended Function A-5
A.6 EFVS Takeoff - Concept of Operations A-5
A.6.1 Impact on Phraseology A-9
A.6.2 Airspace Characteristics A-9
A.6.3 Partial and Mixed Equipage Considerations A-9
A.6.3.1 Air Traffic Control – If Active A-9
A.6.3.2 Cockpit A-10
A.6.3.3 Air Traffic Control – Tower Not Active A-10

APPENDIX B: OPERATIONAL PERFORMANCE ASSESSMENT B-1

B.1 Introduction B-1
B.1.1 Purpose B-1
B.1.2 General Performance Requirements B-1
B.1.3 Compliance testing B-2

APPENDIX C: OPERATIONAL SAFETY ASSESSMENT (OSA) C-1

C.1 Objectives / Scope C-1
C.2 System Safety Overview C-1
C.2.1 EFVS Environment C-2
C.3 OHA Process C-2
C.3.1 Hazard Assessment C-2
C.3.2 System Safety Levels and Probabilities C-3
C.3.3 Design Assurance Levels and Demonstration C-3
C.3.4 Environmental Qualification C-3
C.3.5 Safety Demonstration C-3
C.3.5.1 Mitigations C-3

C.3.5.2 Additional possible mitigations beyond minimal set C-5
C.3.5.3 Mitigations not considered to be acceptable at this time C-6
C.4 Minimum Safety Requirements C-6
C.4.1 Overall Objectives C-6
C.4.1.1 Assumptions C-7
C.5 ETOS-500 FHA: No lower than 500 ft visibility, Type 1/E Runway or better, at least 2 RVR Reporting C-8
C.6 ETOS-1000 FHA: no lower than 1000 ft visibility C-15

APPENDIX D: ACRONYMS D-1

APPENDIX E: GLOSSARY E-1

TABLE OF TABLES

Table 1-1: Summary of Visibility Minima Operation 3

Table 3-1: Operational Requirements 19

Table 3-2: ETOS Functional Requirements 21

Table 3-3: ETOS Performance Requirements 22

Table 3-4: ETOS Safety Requirements 23

Table A-1: Lowest Allowable Visibility Minima per OpSpec C078/C079 ..... A-3

Table C-1: Hazard Assessment Effects, Probabilities and Design Assurance Levels C-2

Table D-1: Acronyms D-1

Table E-1: Glossary E-1

TABLE OF FIGURES

Figure 1-1: Example Minimum ETOS-1000 Information Concept Overview 6

Figure 1-2: Example Minimum ETOS-500 Information Concept 6

Figure 2-1: Schematic of Requirements Relationships 16

Figure A-1: Example ETOS-1000 Concept A-8

Figure A-2: Example ETOS-500 Concept A-9

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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

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