



The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Équipement de l'Aviation Civile

MINIMUM AVIATION SYSTEM PERFORMANCE SPECIFICATION FOR FOREIGN OBJECT DEBRIS DETECTION SYSTEM

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TABLE OF CONTENTS

CHAPTER 1	GENERAL	1
1.1	INTRODUCTION	1
1.2	PURPOSE AND SCOPE	1
1.3	GLOSSARY OF DEFINED TERMS.....	1
1.4	ABBREVIATIONS	2
1.5	REFERENCE DOCUMENTS	3
1.6	OPERATIONAL CONTEXT OF FOD DETECTION SYSTEM	3
1.6.1	Operational Environment	3
1.6.2	Operational objectives	3
1.6.3	FOD Detection System relationship with other subsystems.....	3
1.6.4	Training	4
1.6.5	Maintenance	4
1.7	FUNDAMENTAL SYSTEM DESIGN CONCEPTS	4
1.7.1	Modularity	4
1.7.2	Evolution	4
1.7.3	External Interoperability	4
1.7.4	Compliance with Applicable Aerodrome Requirements and Regulations	4
CHAPTER 2	SYSTEM DESCRIPTION	5
2.1	FOD DETECTION SYSTEM ARCHITECTURE	5
2.1.1	General	5
2.1.2	Basic Functional Elements of a FOD Detection System	5
2.1.3	User Interface	6
2.2	ADDITIONAL FUNCTIONS	6
2.2.1	Assistance for FOD Removal	6
2.2.2	Operational Statistics	6
2.2.3	Data availability.....	6
2.2.4	Multiple Displays	6
2.2.5	Manual Data Input.....	7
CHAPTER 3	SYSTEM PERFORMANCE.....	8
3.1	PERFORMANCE SPECIFICATIONS.....	8
3.1.1	Basic Functions.....	8
3.1.2	Detection Performance	8
3.1.3	User interface.....	10
3.1.4	Data management, recording and archiving.....	10
3.2	EXTERNAL INTERFACES	10
CHAPTER 4	TEST AND VERIFICATION	12
4.1	INTRODUCTION	12
4.2	SITE ACCEPTANCE TESTING METHODOLOGIES.....	12
4.2.1	Items to be detected	12
4.2.2	Time to Detection	12
4.2.3	Location Accuracy.....	13
4.2.4	Simultaneous Detection of Objects.....	13

4.2.5	Rejection of Aircraft and Vehicles	13
4.2.6	False Alert	13
4.2.7	Error Condition Reporting	14
4.2.8	User interface.....	14
4.2.9	External interface	14
4.2.10	Data Recording	15
4.2.11	Periodic and on-going performance verification (customer systems tests)	15
APPENDIX A LIST OF REFERENCE TARGETS		16
APPENDIX B LIST OF EUROCAE WG-83 MEMBERS.....		21
IMPROVEMENT SUGGESTION FORM		22

CHAPTER 1

GENERAL

1.1 INTRODUCTION

According to the EUROCAE definition (see ER-003), Foreign Object Debris (FOD) can be found on the aerodrome movement area, notably runways, taxiways and aprons, and poses both a safety risk and financial burden on aerodromes and for aircraft operators.

Therefore, this document deals with Automatic FOD Detection Systems and intends to provide technical inputs related to system performance. Part of this document also introduces the operational aspects.

1.2 PURPOSE AND SCOPE

This document is the Minimum Aviation System Performance Specification (MASPS) for Automatic FOD Detection Systems. It specifies system and equipment characteristics that should be used by designers, installers, manufacturers, service providers and users of systems intended for operational use at aerodromes. Functional requirements are used wherever possible to allow flexibility in the design of sub-system equipment.

This specification is produced from existing and proposed products, methods and requirements that support FOD detection and processing. Adherence to this specification will facilitate operational implementation of a FOD Detection System at an aerodrome in accordance with the aerodrome's operational requirements.

This chapter outlines the purpose of a FOD Detection System within an aerodrome. It describes the rationale for the system, the expected operational objectives, and outlines the fundamental design concepts. It contains definitions of terms used in the document, lists of abbreviations and references to other documents.

Chapter 2 outlines the enabling functions of a FOD Detection System and defines associated external interfaces.

Chapter 3 specifies performance requirements for the principal enabling functions of a FOD Detection System.

Chapter 4 describes methodologies for the test and verification of FOD Detection System performance requirements specified in Chapter 3 and contains descriptions of the recommended generic test procedures needed to verify compliance at both the functional element and overall system level.

1.3 GLOSSARY OF DEFINED TERMS

The following terms are used in this document:

Aerodrome (ICAO SARPS ANNEX 14)

A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Alert Report

A data record containing all relevant information about each FOD detected.

Apron (ICAO SARPS ANNEX 14)

A defined area on a land aerodrome intended to accommodate aircraft for the purpose of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

Categorisation

A function that groups the items of FOD according to their characteristics (eg. Material, colour, size).

False Alert

Alert raised by the system when, at the moment of detection, there is no object on the monitored surface.

FOD

An inanimate object within the movement area which has no operational or aeronautical function and which has the potential to be a hazard to aircraft operations.

FOD Alarm

Initiation of activities following the Alert, with the purpose of removing the FOD. This action is triggered by the system operator and, if available, can be transmitted to external interfaces.

FOD Alert

Notification by the FOD Detection System to the operator console and, if available, to the external interfaces that an object was detected on the monitored surface.

FOD False Alarm

A FOD Alarm causing the FOD Detection System operator to take action to remove a FOD that does not exist.

Inclement weather conditions

For the purpose of operational performance in this standard, inclement weather condition is defined as wind speed exceeding 60 knots (mean average) and/or precipitation exceeding 16mm/h.

Manoeuvring Area (ICAO SARPS ANNEX 14)

Part of an aerodrome used for take-off, landing and taxiing of aircraft, excluding Aprons.

Monitored surface

Part of an aerodrome that is monitored by a FOD Detection System.

Modularity

Characteristics of a system that describes its capability to be enhanced by the addition of one or more modules to improve its technical or functional performance.

Movement Area (ICAO SARPS ANNEX 14)

Part of an aerodrome to be used for take-off, landing and taxiing of aircraft, consisting of the Manoeuvring Area and Aprons.

Obstacle (ICAO SARPS ANNEX 14)

All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

- are located on an area intended for the surface movement of aircraft
- extend above a defined surface intended to protect aircraft in flight
- stand outside those defined surfaces and have been assessed as being a hazard to air navigation.

Requirement

An identifiable element of a function specification that can be validated and against which an implementation can be verified.

1.4**ABBREVIATIONS**

The following abbreviations are used in this document.

AGL	Airfield Ground Lighting
A-SMGCS	Advanced Surface Movement Guidance and Control System
ASTERIX Exchange	All Purpose Structured EUROCONTROL Surveillance Information
ATC	Air Traffic Control
ATM	Air Traffic Management
CSV	Comma Separated Value
EASA	European Aviation Safety Agency
EUROCAE	European Organisation for Civil Aviation Equipment
FOD	Foreign Object Debris
HMI	Human Machine Interface

ICAO	International Civil Aviation Organisation
LVP	low Visibility Procedure
MASPS	Minimum Aviation System Performance Specification
PFA	Probability of False Alert
PPE	Personal Protective Equipment
SARPS	Standards and Recommended Practices
WGS-84	World Geodetic Survey (1984)

1.5 REFERENCE DOCUMENTS

Advisory Circular FAA AC 150/5210-24 – Aerodrome Foreign Object Debris (FOD) Management

Advisory Circular FAA AC 150/5220-24 Airport Foreign Object Debris (FOD) - Detection Equipment, 09/30/2009

ICAO Annex14 (Aerodrome design and operations)

ER 003 - Definition and Taxonomy for Foreign Object Debris

ASTERIX Category 239

1.5.1 Supplementary documents

Commission Regulation (EU) No 139/2014 ('The implementing rules for aerodromes')

Acceptable Means of Compliance and Guidance Material for Aerodromes:

AMC/GM to Annex IV-Part Operations Requirements (Part-ADR.OPS)

1.6 OPERATIONAL CONTEXT OF FOD DETECTION SYSTEM

1.6.1 Operational Environment

FOD can appear at any location on the manoeuvring area; however, FOD on runways is the most serious safety hazard. For this reason, this document focuses mainly on FOD detection on runways; however, it doesn't preclude the potential for a system to be used for taxiway and apron monitoring.

The FOD Detection System should be compatible with the aerodrome environment and operations (e.g. snow removal operations, aircraft typology, amount of traffic, climate etc).

1.6.2 Operational Objectives

The objectives of the FOD Detection System are to increase the likelihood of detection of FOD on the area being monitored and to assist in deciding the necessary course of action.

The overall objective is to enhance safety performance and reduce the costs to operators by reducing risks of incidents and accidents on the manoeuvring area because of FOD. The aim is for FOD Detection Systems to be integrated into an aerodrome safety management system.

As far as technically feasible, weather conditions should not adversely impact the system performance. The FOD Detection System should be monitoring the surface continuously (24/7).

1.6.3 FOD Detection System Relationship with other Subsystems

As the existence of FOD on the manoeuvring area has the potential to affect aerodrome operations, a FOD Detection System should be fully integrated into any relevant systems and be supplementary to existing airside safety operations concerning manoeuvring area inspections.

It is not possible to describe in detail how this integration can be achieved because aerodrome operations may be organised differently at different aerodromes. Local considerations, policies and procedures will ultimately determine the extent of integration.

1.6.4 Training

It is essential that a training program is delivered for the system operator and maintenance provider detailing the following aspects:

- Standard operating procedures
- Maintenance procedures (1st, 2nd level support according to needs)

1.6.5 Maintenance

To ensure continuous function of a FOD Detection System, a maintenance schedule should be agreed between the customer and the supplier.

1.7 FUNDAMENTAL SYSTEM DESIGN CONCEPTS

1.7.1 Modularity

The FOD Detection System consists of subsystems which, when integrated, are designed to meet the specific operational requirements of the customer. The system should be modular so that a wide range of requirements can be met. A modular system consists of subsystems that can be added or removed to tailor the system performance to the operational and functional requirements. Adding or removing a subsystem should not affect the performance and function of other subsystems.

A modular system is also a potential way to achieve a system or implementation that is scalable to the operational environment.

1.7.2 Evolution

FOD Detection Systems should allow for technological and operational changes and enhancements, which will allow service providers to update, change or add to the FOD Detection System capability.

1.7.3 External Interoperability

A standard interface has been defined using the ASTERIX Category 239 to facilitate the integration of the FOD Detection System into existing aerodrome monitoring systems. The use of the messages distributed via this interface depends on the operational concept for the handling of FOD. Possible applications are the display of the FOD location to the FOD removal team, the integration of FOD alerts into an A-SMGCS system or the simple provision of the FOD information to the Air Traffic Controller.

In addition, an external interface for the transmission of the video image used for FOD validation should be made available. This is outside the capabilities of the ASTERIX interface.

1.7.4 Compliance with Applicable Aerodrome Requirements and Regulations

The installation of the FOD Detection System should be compliant with all requirements and regulations applicable at the site of installation.