European Union Aviation Safety Agency

Notice of Proposed Amendment 2025-10 (B)

issued in accordance with Article 6 of Management Board Decision 01-2022

Proposed amendments to the Detailed Specifications, Acceptable Means of Compliance and Guidance Material as regards the certification or declaration of design compliance of ATM/ANS ground equipment (DS-GE.CER/DEC)

Contents

1. Proposed amendments

The amendments are arranged to show deleted, new and unchanged text as follows:

— deleted text is ~~struck through~~;

— new text is highlighted in blue;

— an ellipsis '[…]' indicates that the rest of the text is unchanged.

Draft detailed specifications

PART 1 — General — CERDEC.GEN.2

[…]

AMC1 GE.GEN.003 Software

(a) Software should be developed with an assurance level that is commensurate with the severity of the effect of failure.

(b) The software portability specification or equivalent should provide all the features required by the target hardware to ensure that software can run correctly.

~~*Note 1: The development assurance level for software supporting ATM/ANS functions is derived from the assurance level to be defined for these ATM/ANS functions.*~~

Note ~~2~~: Software development assurance should be understood to ensure that the likelihood of development errors causing or contributing to ATM/ANS failures is minimised with an appropriate level of rigour. In this respect, assurance applies also to the selection and installation of commercial off-the-shelf (COTS) software.

(c) The following apply to software assurance processes:

(1) The software assurance processes should provide evidence and arguments that, as a minimum, demonstrate the following:

(i) The software requirements correctly state what is required by the software, in order for the equipment to meet the requirements of the supported ATM/ANS functions. For that purpose, the software requirements should:

(A) be correct, complete and compliant with the upper-level requirements; and

(B) specify the functional behaviour (in nominal and downgraded modes), timing performance, capacity, accuracy, resource usage on the target hardware, robustness to abnormal operating conditions and overload tolerance, as appropriate, of the software.

(ii) The traceability is addressed in respect of all software requirements as follows:

(A) each software requirement should be traced to the same level of design at which its satisfaction is demonstrated;

(B) each software requirement allocated to a component should be traced to an upper-level requirement.

(iii) The software implementation does not contain functions that adversely affect the satisfaction of the functional specification.

(iv) The functional behaviour, timing performance, capacity, accuracy, resource usage on the target hardware (e.g. as defined in the software portability specification), robustness to abnormal operating conditions and overload tolerance of the implemented software comply with the software requirements.

(v) The software verification is correct and complete and is performed through analysis and/or testing and/or equivalent means commensurate with the allocated assurance level, as agreed with the competent authority.

(2) The evidence and arguments produced by the software assurance processes should be derived from:

(i) a known executable version of the software;

(ii) a known range of configuration data; and

(iii) a known set of software items and descriptions, including specifications, that have been used in the production of that version or can be justified as applicable to that version.

(3) The software assurance processes should determine the rigour with which the evidence and arguments are produced.

(4) The software assurance processes should include the activities necessary to ensure that the software life-cycle data can be shown to be under configuration control throughout the software life cycle, including the possible developments due to changes or corrections. They should include, as a minimum:

(i) configuration identification, traceability and status accounting activities, including archiving procedures;

(ii) problem reporting, tracking and corrective action management; and

(iii) retrieval and release procedures.

(5) The software assurance processes should also cover the particularities of specific types of software such as COTS, non-developmental software and previously developed software where generic assurance processes cannot be applied. The software assurance processes should include other means which demonstrate with sufficient confidence that the software meets its requirements. If sufficient assurance cannot be provided, complementary mitigation means aiming to decrease the impact of the specific failure modes of this type of software should be applied. These may include but are not limited to software and/or system architectural considerations.

~~GM1 GE.GEN.003 Software~~

~~Software includes different types of software such as COTS software, as well as previously and newly developed specific software.~~

~~GM2 GE.GEN.003 Software~~

~~(a) EUROCAE ED-153 — *Guidelines for ANS Software Safety Assurance* may be used to support the allocation of software assurance level (SWAL) associated with the assessment of failure conditions as defined in DS GE.GEN.007.~~

~~(b) EUROCAE ED-109A including Corrigendum 1 — *Software Integrity Assurance Considerations for CNS/ATM Systems* may be used to support the allocation of SWAL associated with the assessment of failure conditions as defined in DS GE.GEN.007~~

GM1 AMC1 GE.GEN.003 Software

ASSURANCE — SOFTWARE ASSURANCE PROCESSES

(a) The term ‘correct and complete with reference to software verification’ is understood to refer to all of the software requirements, which correctly state what is required of the software component by the risk assessment and mitigation process and the implementation of which is demonstrated to the level required by the software assurance level (SWAL).

(b) The term ‘software timing performance’ is understood to refer to the time allowed for the software to respond to given inputs or periodic events, and/or the performance of the software in terms of transactions or messages handled per unit time.

(c) The term ‘software capacity’ is understood to refer to the ability of the software to handle a given amount of data flow.

(d) The term ‘software accuracy’ is understood to refer to the required precision of the computed results.

(e) The term ‘software resource usage’ is understood to refer to the amount of resources within the computer system that can be used by the application software.

(f) The term ‘software robustness’ is understood to refer to the behaviour of the software in the event of unexpected inputs, hardware faults or power supply interruptions, either in the computer system itself or in connected devices.

(g) The term ‘overload tolerance’ is understood to refer to the behaviour of the system in the event of, and in particular its tolerance to, inputs occurring at a greater rate than expected during the normal operation of the system.

(h) The term ‘software life-cycle data’ is understood to refer to the data that is produced during the software life cycle and used to plan, direct, explain, define, record or provide evidence of activities. This data enables the software life-cycle processes, system or equipment approval and post-approval modification of the software item.

(i) The term ‘COTS’ is understood to refer to a commercially available application sold by vendors through public catalogue listings and not intended to be customised or enhanced.

GM2 AMC1 GE.GEN.003 Software

ASSURANCE — SOFTWARE ASSURANCE LEVEL (SWAL)

(a) For ATM/ANS equipment, the development assurance level for software supporting ATM/ANS functions is assigned by the DPO from the intended use of the equipment. It should be defined

and/or validated by the assessment of failure conditions of the supported ATM/ANS functions per DS GE.GEN.007, considering the assumptions about the intended use.

(b) The use of multiple SWALs would also allow for the possibility of managing varying levels of criticality of the different software components within the ATM/ANS equipment (with partitioning or other architectural strategies) through the same set of software assurance processes. When the software assurance processes employ several SWALs, they should define for each SWAL the level of rigour of the assurances required to achieve compliance with the intended use of the supported ATM/ANS functions. As a minimum:

(1) the level of rigour should increase as the criticality of the ATM/ANS functions supported by the software increases; and

(2) the variation in the level of rigour of the evidence and arguments for each SWAL should include a classification of the activities and objectives in accordance with the following criteria:

(i) required to be achieved with independence (i.e. the verification process activities are performed by a person (or persons) other than the developer of the item being verified);

(ii) required to be achieved; and

(iii) not required.

GM3 AMC1 GE.GEN.003 Software

ASSURANCE — SOFTWARE ASSURANCE LEVEL ALLOCATION

The process to allocate a SWAL to software consistently with its anticipated failure severity should consider the following elements:

(a) The SWAL allocation should relate the level of rigour of the software assurances to the anticipated severities of the failures of the functions supported by the software.

(b) The allocated SWAL should be commensurate with the worst effect that software malfunctions (i.e. the inability of a program to perform a required function correctly) or failures (i.e. the inability of a program to perform a required function) may cause, as anticipated by the DPO holder.

(c) The software components that cannot be shown to be independent of one another should be allocated the SWAL of the most critical of the dependent components. In this context, the term ‘software components’ is understood to refer to a building block that can be fitted to or connected with other reusable blocks of software, combining to create a custom software application. The term ‘independent software components’ refers to those software components that are not rendered inoperative by the same failure condition.

(d) The allocated SWALs should be consistent with the levels defined in the software assurance processes.

GM4 to AMC1 GE.GEN.003 Software

The DPO holder is responsible for the definition of the software assurance processes. Referenced guidance material includes:

(a) EUROCAE ED-109A including Corrigendum 1 — Software Integrity Assurance Considerations for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems, which may be used to support the allocation of SWALs associated with the assessment of failure conditions as defined in DS GE.GEN.007;

(b) EUROCAE ED-153 — Guidelines for ANS Software Safety Assurance, which may be used to support the allocation of SWALs associated with the assessment of failure conditions as defined in DS GE.GEN.007;

(c) EUROCAE ED-76B including Corrigendum 1 — Standards for Processing Aeronautical Data (only for aeronautical information service (AIS) providers);

(d) International Electrotechnical Commission IEC 61508-3 (Edition 2.0, April 2010) — Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 3: Software requirements;

(e) EUROCAE ED-12C — Software Considerations in Airborne Systems and Equipment Certification.

EUROCAE ED-109A and EUROCAE ED-12C make reference to some external documents (supplements), which are integral parts of the standards for the use of some particular technologies and development techniques. The supplements are:

— EUROCAE ED-216 — Formal Methods Supplement to ED-12C and ED-109A;

— EUROCAE ED-217 — Object-oriented Technology Supplement to EbD-12C and ED-109A;

— EUROCAE ED-218 — Model-based Development and Verification Supplement to ED-12C and ED-109A.

When tools are used during the software development life cycle, EUROCAE ED-215 — Software Tool Qualification Considerations may be considered in addition to EUROCAE ED-12C and EUROCAE ED-109A including Corrigendum 1.

[…]

Subpart A — Air traffic services

Section 1 — General — CER.ATSGEN.2

DS GE.CER.ATS.101 Scope

This Section defines the functional and performance standards applicable to the certification of the design, or of changes to the design, of ATM/ANS equipment, supporting air traffic control (ATC) services when enabling the separation of aircraft or the prevention of collision in relation to:

(a) flight data processing;

(b) advanced surface movement guidance and control system (A-SMGCS);

(c) data link applications;

(d) surveillance data processing~~.~~;

(e) ground-based safety nets;

(f) trajectory discrepancy monitoring (TDM).

DS GE.CER.ATS.110 ATS recording

(See GM1 GE.CER.ATS.110)

ATM/ANS equipment specified in this Subpart ~~is to~~ provides the capability to interface with systems providing recording and replay capability of technical and operational data, and status.

~~GM1 GE.CER.ATS.110 ATS recording~~

~~Additional information for recording can be found in EUROCAE ED-111 — *Functional Specifications for CNS/ATM Ground Recording.*~~

Section 2 — Flight data processing (FDP) — CER.AFDP.2

Section 2 — Flight data processing

[…]

FUNCTION

DS GE.CER.FDP.210 Flight data processing equipment

(See AMC1 GE~~C~~.CER.FDP.210 and GM1 GE.CER.FDP.210)

Flight data processing (FDP) equipment ~~supports notification, coordination, and transfer of flights between air traffic control units.~~:

(a) processes:

(1) ATC flight plan messages (APL);

(2) ATC flight plan change (ACH) messages;

(3) flight plans including:

(i) completeness verification,

(ii) correlation with surveillance data;

(b) provides:

(1) the first system activation message (FSA);

(2) arrival planning information (API);

(3) departure planning information (DPI);

(4) code request (COR);

(5) code release (CRE) messages;

(6) based on trajectory prediction, potential conflicts between flights in an area and in a time horizon extending up to 20 minutes ahead;

(7) ATC flight plan proposal (AFP) messages based on flight plan information;

(c) receives and processes:

(1) slot allocation messages (SAM);

(2) slot revision messages (SRM);

(3) slot cancellation messages (SRC);

(4) centralised code assignment and management system (CCAMS) messages;

(5) code assignment messages (CAM);

(6) code cancellation messages (CCM);

(7) flight update messages (FUM) and enhanced tactical flow management system (ETMS) flight data (EFD);

(d) consumes world area forecast system general regularly distributed information in binary form (GRIB) data;

(e) creates and manages a four-dimensional (4-D) trajectory for each flight plan.

AMC1 GE.CER.FDP.210 Flight data processing equipment

~~For the notification, coordination, and transfer of flights between air traffic control units,~~ FDP equipment should comply with the following specifications:

(a) EUROCONTROL SPEC-106, Edition 5.1, Specification for On-Line Data Interchange (OLDI), ~~Edition 5.1,~~ Chapter 4, Chapter 6, and Chapter 10;

(b) EUROCONTROL SPEC-107, Edition 3.4, Specification for ATS Data Exchange Presentation (ADEXP), ~~Edition 3.4,~~ Sections 1.4. points 3 and 4~~.~~;

(c) World Meteorological Organization IWXXM Version 2021-2;

(d) EUROCONTROL Base of aircraft data (BADA) family 3;

(e) ICAO Doc 4444, Procedures for Air Navigation Services, 16th Edition (2016), up to and including Amendment 12, Appendix 3;

(f) EUROCONTROL NM-27.0 Edition 12, — NM B2B Reference Manual — FFICE, Chapter 18.

GM1 GE.CER.FDP.210 Flight data processing equipment

(a) Additional information for the ATC flight plan proposal (AFP) message / ATC flight plan change (ACH) message / ATC flight plan (APL) message exchange can be found in:

(1) EUROCONTROL Flight Progress Messages (FPM) Document, Edition 2.900, Section 2.2.1;

(2) EUROCONTROL IFPS Users Manual, Edition MAINT-2, 25 June 2024, Chapters 125–133, 136 and 137.

(b) Additional information on the management of a four-dimensional (4-D) trajectory for each flight plan can be found in EUROCONTROL Guidance Material for Flight Data Processing System (FDPS), Edition 1.0, Section 5.

(c) Additional information for processing flight plans can be found in:

(1) ICAO Doc 9965 — Manual on Flight and Flow — Information for a Collaborative Environment (FF-ICE), first edition 2012: Implementation guidance;

(2) EUROCONTROL IFPS and RPL Dictionary of Messages, Edition 25.0, 12 October 2020;

(3) EUROCONTROL FPFDE NFPM Implementation Guidelines, Edition 5.0;

(4) EUROCONTROL Guidance Material for Flight Data Processing System (FDPS), Edition 1.0, Sections 3 and 4;

(5) EUROCONTROL Implementation Strategy for FPFDE NFPM, Edition 02-00;

(6) EUROCONTROL IFPS Users Manual, Edition MAINT-2, 25 June 2024, Section 5 and Appendix FF-ICE.

(d) Additional information for conflict detection based on trajectory prediction can be found in EUROCONTROL-SPEC-0139, Edition 2, Specification for Medium-term Conflict Detection.

(e) Additional information for the first system activation message (FSA), arrival planning information (API), departure planning information (DPI), flight update message (FUM), code request (COR), code release message (CRE), code assignment message and code cancellation message (CCM) exchange can be found in:

(1) EUROCONTROL IFPS Users Manual, Edition MAINT-2, 25 June 2024, Section 2.2;

(2) EUROCONTROL Guidance Material for Flight Data Processing System (FDPS), Edition 1.0, Section 4;

(3) EUROCONTROL ATFCM Users Manual;

(4) EUROCONTROL Flight Progress Messages (FPM) Document, Edition 2.900, Sections 2.2 and 2.3.

(f) Additional information for the enhanced tactical flow management system flight data (EFD) exchange can be found in EUROCONTROL Flight Progress Messages (FPM) Document, Edition 2.900, Section 2.2.

(g) Additional information for the slot allocation message (SAM), slot revision message (SRM) and slot cancellation message (SRC) exchange can be found in EUROCONTROL ATFCM Users Manual, Section 8.2.3.

PERFORMANCE

[…]

~~AMC1 GE.CER.FDP.220 FDP equipment performance~~

~~(a) FDP equipment should comply with EUROCONTROL SPEC 106 Specification for On-Line Data Interchange (OLDI), Edition.5.1, Sections 4.6 and 5.2.~~

~~(b) Additional performance conditions applicable to the intended use of FDP equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

AMC1 GE.CER.FDP.220 FDP equipment performance

(a) FDP equipment should comply with:

(1) EUROCONTROL-SPEC-106, Edition 5.1, Specification for On-Line Data Interchange (OLDI), Sections 4.6 and 5.2;

(2) EUROCONTROL-SPEC-0100, Edition 2.0, EUROCONTROL Specification of Interoperability and Performance Requirements for the Flight Message Transfer Protocol (FMTP);

(3) EUROCONTROL-SPEC-0136, Edition 2.1, EUROCONTROL Specification for the Air Traffic Services Message Handling System (AMHS), Annex A, Section A.2.1.4;

(4) EUROCONTROL-SPEC-170, Edition 2.0, EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile.

(b) The probability of losing the FDP function should be less than 1×10^{-7} per operating hour.

INTERFACE

[…]

~~AMC1 GE.CER.FDP.230 FDP equipment interfaces~~

~~For the notification, coordination, and transfer of flights between air traffic control units, FDP equipment should comply with Part 3, Subpart A, Section 4 'Flight message transfer protocol (FMTP)' of this DS.~~

~~GM1 GE.CER.FDP.230 FDP equipment interfaces~~

~~Interfaces should include communications supporting external information exchanges and the human-machine interface (HMI) as defined in DS GE.GEN.005.~~

AMC1 GE.CER.FDP.230 FDP equipment interfaces

FDP equipment should comply with:

(a) DS-GE.CER/DEC, Part 3, Subpart A, Section 2 'ATS message handling system (AMHS)';

(b) DS-GE.CER/DEC, Part 3, Subpart A, Section 3 'System wide information management (SWIM) technical infrastructure';

(c) DS-GE.CER/DEC, Part 3, Subpart A, Section 4 'Flight message transfer protocol (FMTP)';

(d) World GRIB (World Meteorological Organization);

(e) EUROCONTROL-SPEC-106, Edition 5.1, Specification for On-Line Data Interchange (OLDI), Section 6;

(f) flight information exchange model (FIXM) flight and flow information for collaborative environment message v1.1.0 with core v4.3.0;

(g) EUROCONTROL IFPS Users Manual, Edition MAINT-2, 25 June 2024, Sections 125–133, 136 and 137.

GM1 GE.CER.FDP.230 FDP equipment interfaces

Additional information regarding the interfaces can be found in EUROCONTROL IFPS Users Manual, Edition MAINT-2.

Interfaces should include communications supporting the human–machine interface (HMI) as defined in DS GE.GEN.005.

Section 3 — Advanced surface movement guidance and control system (A-SMGCS) — CER.SMGC.1

[…]

PERFORMANCE

[…]

AMC1 GE.CER.ASMGCS.320 A-SMGCS performance

(a) A-SMGCS should comply with:

(1) EUROCAE ED-87E — Minimum Aviation System Performance Standard (MASPS) for Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Section 3;

~~(2) ETSI EN 303 213-5-1 (V1.1.1) (2020-03) Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 5: Harmonised Standard for access to radio spectrum for Multilateration (MLAT) equipment; Sub-part 1: Receivers and Interrogators;~~

~~(3) ETSI EN 303 213-5-2 (V1.1.1) (2022-04) Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 5: Harmonised Standard for access to radio spectrum for Multilateration (MLAT) equipment; Sub-part 2: Reference and Vehicle Transmitters;~~

(2)~~(4)~~ ETSI EN 303 213-6-1 (V3.1.1) (2019-07) Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 6: Harmonised Standard for access to radio spectrum for deployed surface movement radar sensors; Sub-part 1: X-band sensors using pulsed signals and transmitting power up to 100 kW.

~~(b) Additional performance conditions applicable to the intended use of A-SMGCS may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

INTERFACE

DS GE.CER.ASMGCS.330 A-SMGCS interfaces

(See GM1 GE.CER.ASMGCS.330 and AMC1 GE.CER.ASMGCS.330(a))

(a) The interfaces of A-SMGCS support the functions and levels of performance as required in DS GE.CER.ASMGCS.~~510~~310 and DS GE.CER.ASMGCS.~~520~~320.

[…]

Section 4 — Data link ~~services~~ equipment

4.1 — Data link systems — CER.ADLS.2

APPLICABILITY

DS GE.CER.DLS.401 Scope

This Section provides the functional and performance standards applicable to data link ~~equipment~~ systems providing ~~supporting~~ ATS B2 and ATN B1 services.

FUNCTION

DS GE.CER.DLS.410 DL equipment

(See AMC1 GE.CER.DLS.410 and GM1 GE.CER.DLS.410)

DL ~~equipment~~ systems provide~~s~~ capabilities to:

(a) establish CPDLC and ADS-C connections ~~transactions~~;

(b) exchange operational CPDLC ~~and ADS-C messages~~;

(ba) initiate and manage ADS-C contracts;

(bb) process ADS-C reports;

(c) transfer CPDLC authority;

(d) terminate CPDLC and ADS-C connections ~~transactions~~;

(e) update ADS-C data;

(f) forward logon parameters.

AMC1 GE.CER.DLS.410 DL equipment

DL ~~equipment~~systems should comply with:

(a) EUROCAE ED-~~228A~~ 228B — Safety and Performance Requirements Standard for ATS Data Communications (SPR Standard) including Corrigendum 1 ~~— *Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)*~~, Sections 3.1, 3.2, 3.3, 3.4, 3.7, 3.9, 4, 5.1, 5.2, 6.1 and 6.2 for the services ATC communications management (ACM), Clearance Request and Delivery (CRD), Information Exchange and Reporting (IER), and ATC microphone check (AMC) in line with CPDLC version 2 (v2) and version 4 (v4), and for the downlink of EPP through ADS-C in line with ADS-C version 1 (v1) and version 3 (v3);

(b) EUROCAE ED-~~229A~~ 229B — Interoperability Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 Interop Standard) including Corrigendum 1 and Change 1, Sections

~~2,~~ 3~~,~~ and 4~~, 5.1 and 5.3~~ for the services ATC communications management (ACM), Clearance Request and Delivery (CRD), Information Exchange and Reporting (IER), and ATC microphone check (AMC) in line with CPDLC version 2 (v2) and version 4 (v4), and for the downlink of EPP through ADS-C in line with ADS-C version 1 (v1) and version 3 (v3);

(c) EUROCAE ED-~~231A~~ 231B — Interoperability Requirements Standard for Baseline 2 ATS Data Communications and ATN Baseline 1 Accommodation (ATN Baseline 1 —~~-~~ Baseline 2 Interop Standard), including Change 1, Sections 2.2, 2.3, 4.1, 4.2, 4.4 and 5.1 for the services ATC communications management (ACM), ATC clearances (ACL), Clearance Request and Delivery (CRD), Information Exchange and Reporting (IER), and ATC microphone check (AMC) in line with CPDLC version 1 for ATN B1 and CPDLC versions 2 and 4 for ATS B2;

(d) EUROCONTROL-SPEC-106, Edition 5.1, EUROCONTROL Specification for On-Line Data Interchange (OLDI), Chapter 10 for LOF (Log-On Forwarding) and NAN (Next Authority Notified) messages, and Annex C.

[…]

PERFORMANCE

DS GE.CER.DLS.420 DL equipment performance

(See AMC1 GE.CER.DLS.420)

The performance of DL ~~equipment~~systems supports the timely exchange of context management (CM), CPDLC and ADS-C information ~~intended use~~.

AMC1 GE.CER.DLS.420 DL equipment performance

(a) DL ~~equipment~~systems should comply with EUROCAE ED-~~228A~~228B — Safety and Performance Requirements Standard for ATS Data Communications (SPR Standard) including Corrigendum 1 ~~— *Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)*~~, Sections 5.3 CPDLC Safety and Performance Requirements, and 6.3 ADS-C Safety and Performance Requirements.

~~(b) Additional performance conditions applicable to the intended use of DL equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

INTERFACE

DS GE.CER.DLS.430 DL equipment interfaces

(See AMC1 GE.CER.DLS.430(a) and AMC1 GE.CER.DLS.430(d))

(a) DL ~~equipment~~ system interfaces support the functions and levels of performance as required in DS GE.CER.DLS.~~610~~ 410 and DS GE.CER.DLS.~~620~~420.

(b) A clear and unambiguous means is provided to the air traffic controller to:

(1) initiate and to terminate CPDLC connections and ADS-C contracts;

(2) know in real time the identifiers of the connected aircraft;

(3) prepare and transmit uplink messages (UM);

(4) inform when operational downlink messages (DM) are received;

(5) inform that pending or open messages are waiting for a response;

(6) display all operational CPDLC messages (UM and DM) and ADS-C flight information, with minimal human action, in a format that is easy to comprehend and distinguishable from each other;

(7) determine the status of the data link equipment (CPDLC and ADS-C).

(c) A means is provided to the air traffic controller to prohibit the deletion, confirmation, or clearance of a CPDLC message until the entire message is displayed.

(d) A means is provided to interface with the logon and ADS-C common service (LACS).

AMC1 GE.CER.DLS.430(a) DL equipment interfaces

DL ~~equipment~~ systems should comply with:

(a) Part 2, Subpart B, Section 1 ‘Data communications’ of this DS; and

(b) Part 3, Subpart A, Section 4 ‘Flight message transfer protocol (FMTP)’ of this DS.

AMC1 GE.CER.DLS.430(d) DL equipment interfaces

DL systems should comply with EUROCONTROL-SPEC-193, Edition 1.0, EUROCONTROL Specification for Data Link Ground Distribution SWIM Services.

4.2 — Logon and ADS-C common service system — CER.LACS.1

APPLICABILITY

DS GE.CER.LACS.440 Scope

This Section provides the functional and performance standards applicable to systems providing LACS.

FUNCTION

DS GE.CER.LACS.450 LACS equipment

(See AMC1 GE.CER.LACS.450)

The LACS system provides capabilities to:

(a) establish data link connections;

(b) exchange logon information;

(c) initiate and manage ADS-C contracts;

(d) exchange ADS-C data.

AMC1 GE.CER.LACS.450 LACS equipment

(a) The LACS system should comply with EUROCONTROL-SPEC-192, Edition 1.0, EUROCONTROL Specification for Data Link Common Services for the Aeronautical Telecommunication Network (ATN), December 2023, Sections 3 and 4.

(b) The LACS system should not reject the logon following verification that the 'aircraft address' parameter does not indicate the 24-bit address of an aircraft on the logon reject list as per paragraph 3.5.1.1 [LS-FCT-0010] of EUROCONTROL-SPEC-192, Edition 1.0.

PERFORMANCE

DS GE.CER.LACS.460 LACS equipment performance

The performance of the LACS system supports the timely exchange of CM and ADS-C information.

INTERFACE

DS GE.CER.LACS.470 LACS equipment interfaces

(See AMC1 GE.CER.LACS.470)

The LACS system interfaces support the functions and levels of performance as required in DS GE.CER.LACS.450 and DS GE.CER.LACS.460.

AMC1 GE.CER.LACS.470 LACS equipment interfaces

The LACS system should comply with EUROCONTROL-SPEC-193, Edition 1.0, EUROCONTROL Specification for Data Link Ground Distribution SWIM Services.

Section 5 — Surveillance data processing (SDP) — CER.ASDP.1

APPLICABILITY

DS GE.CER.SDP.501 Scope

(See GM1 GE.CER.SDP~~E~~.501)

This Section provides the functional and performance standards applicable to surveillance data processing equipment supporting air traffic control (ATC) services when enabling the separation of aircraft or the prevention of collision.

[…]

PERFORMANCE

DS GE.CER.SDP.520 SDP equipment performance

(See AMC1 GE.CER.SDP~~E~~.520)

The performance of the surveillance data processing equipment supports the intended use.

AMC1 GE.CER.SDP.520 SDP equipment performance

(a) The assessment of the performance should be carried out as described in EUROCONTROL-SPEC-0147, Edition 1.2, EUROCONTROL Specification for ATM Surveillance System Performance, Section 3.

(b) ~~Additional performance conditions applicable to the intended use of surveillance data processing equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~The probability of loss of surveillance data processing function should be less than or equal to 2.5×10^{-5} per operating hour.

INTERFACE

DS GE.CER.SDP.530 Surveillance data processing equipment interface

(See AMC1 GE.CER.SDP.530)

Surveillance data processing equipment interface supports the functions and levels of performance as required in DS GE.CER.SPD~~E.710~~.510 and DS GE.CER.SPD~~E.720~~.520.

[…]

Section 6 — Ground-based safety nets

6.1 — Approach path monitor (APM) — CER.GAPM.1

APPLICABILITY

DS GE.CER.APM.610 Scope

This Section provides the functional and performance standards applicable to approach path monitor (APM) equipment.

FUNCTION

DS GE.CER.APM.615 APM function

(See GM1 GE.CER.APM.615 and GM2 GE.CER.APM.615)

APM equipment has the capability to provide the following:

(a) **Conflict detection**: APM detects deviations by monitoring the current position of the aircraft and comparing it with the predicted approach path using system tracks, environment data and QNH data.

(b) **Alert generation**: APM generates alerts for deviations below the glide slope, deviations above the glide slope and horizontal deviations.

GM1 GE.CER.APM.615 APM function

The purpose of APM equipment is to provide, in a timely manner, alerts to air traffic controllers to prevent deviations from the prescribed approach path that might result in an incident or accident.

APM implements an independent alerting mechanism within the ATC control loop to prevent controlled flight into terrain accidents. It generates alerts regarding aircraft altitude and track deviations during final approach, indicating situations that require attention or action. The ATC control loop describes the flow of information between the air traffic controller and the flight crew.

Additional information can be found in EUROCONTROL-GUID-162, Edition 1.0, EUROCONTROL Guidelines for Approach Path Monitor — Part I, Section 2.1.

GM2 GE.CER.APM.615 APM function

APM detects and generates alerts for deviations from the prescribed approach path, while minimising nuisance and false alerts, ensuring sufficient time for air traffic controllers and flight crews to perform the necessary actions. It should allow for alert inhibition for specific runways and individual flights, presenting status information and adaptation to procedures and conditions in distinct airspace volumes.

Additional information with regard to these capabilities can be found in EUROCONTROL-GUID-162, Edition 1.0, EUROCONTROL Guidelines for Approach Path Monitor — Part I, Section 3.3, requirements APM-07 to APM-16.

PERFORMANCE

DS GE.CER.APM.620 APM performance

(See GM1 GE.CER.APM.620 and GM2 GE.CER.APM.620)

The performance of the APM equipment supports the intended use.

GM1 GE.CER.APM.620 APM performance

Information pertaining to alerting performance can be found in EUROCONTROL-GUID-162, Edition 1.0, EUROCONTROL Guidelines for Approach Path Monitor — Part I, Section 3.3.1.

GM2 GE.CER.APM.620 APM performance

Information pertaining to test scenarios can be found in EUROCONTROL-GUID-162, Edition 1.0, EUROCONTROL Guidelines for Approach Path Monitor — Part III, Section 7.

Such scenarios evaluate:

(a) the desired behaviour of the APM equipment for relevant mid-air situations;

(b) the optimisation, preventing one situation leading to a declined performance in other relevant situations.

INTERFACE

DS GE.CER.APM.625 APM interfaces

(See AMC1 GE.CER.APM.625 and GM1 GE.CER.APM.625)

APM equipment interfaces support the functions and levels of performance as required in DS GE.CER.APM.615 and DS GE.CER.APM.620.

AMC1 GE.CER.APM.625 APM interfaces

(a) APM equipment should provide interfaces for:

(1) input data:

(i) surveillance data,

(ii) flight data,

(iii) environment data;

(2) output data:

(i) alert data.

(b) The interfaces of APM equipment should comply with the formats in:

(1) EUROCONTROL-SPEC-0149-17, Edition 1.13, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 17 Category 004: Safety Net Messages;

(2) EUROCONTROL-SPEC-0149-9, Edition 1.21, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 9 Category 062: SDPS Track Messages;

(3) EUROCONTROL-SPEC-0149-15, Edition 1.6, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 15 Category 065: SDPS Service Status Reports.

GM1 GE.CER.APM.625 APM interfaces

Additional information can be found in EUROCONTROL-GUID-162, Edition 1.0, EUROCONTROL Guidelines for Approach Path Monitor — Part I, Section 2.4.3.

6.2 — Area proximity warning (APW) — CER.GAPW.1

APPLICABILITY

DS GE.CER.APW.630 Scope

This Section provides the functional and performance standards applicable to area proximity warning (APW) equipment.

FUNCTION

DS GE.CER.APW.635 APW

(See GM1 GE.CER.APW.635 and GM2 GE.CER.APW.635)

APW equipment has the capability to provide the following:

(a) **Conflict detection**: APW detects potential or actual airspace infringements by predicting the future position of an aircraft using its current track and velocity.

(b) **Alert generation**: APW generates alerts to notify air traffic controllers of potential or actual airspace infringements.

GM1 GE.CER.APW.635 APW

The purpose of APW equipment is to provide, in a timely manner, alerts to air traffic controllers to prevent deviations from the predicted track that might result in an incident or accident.

APW incorporates independent alerting mechanisms into the ATC control loop to alert controllers about any unauthorised entry into an airspace volume. It generates alerts for existing or upcoming situations based on the position and speed of an aircraft relative to that airspace volume. The ATC control loop describes the flow of information between the air traffic controller and the flight crew.

Additional information can be found in EUROCONTROL-GUID-161, Edition 1.0, EUROCONTROL Guidelines for Area Proximity Warning — Part I, Section 2.1.

GM2 GE.CER.APW.635 APW

APW detects and generates alerts for deviations from the predicted track for eligible aircraft, ensuring sufficient time for air traffic controllers and flight crews to perform the necessary actions, allowing for alert inhibition for predefined airspace volumes and individual flights. It should present status information and adaptation to procedures and conditions in distinct airspace volumes.

Additional information with regard to these capabilities can be found in EUROCONTROL-GUID-161, Edition 1.0, EUROCONTROL Guidelines for Area Proximity Warning — Part I, Section 3.3, requirements APW-07 to APW-16.

PERFORMANCE

DS GE.CER.APW.640 APW performance

(See GM1 GE.CER.APW.640 and GM2 GE.CER.APW.640)

The performance of the APW equipment supports the intended use.

GM1 GE.CER.APW.640 APW performance

Information pertaining to alerting performance can be found in EUROCONTROL-GUID-161, Edition 1.0, EUROCONTROL Guidelines for Area Proximity Warning — Part I, Section 3.3.1.

GM2 GE.CER.APW.640 APW performance

Information pertaining to test scenarios can be found in EUROCONTROL-GUID-161, Edition 1.0, EUROCONTROL Guidelines for Area Proximity Warning — Part III, Section 7.

Such scenarios evaluate:

(a) the desired behaviour of the APW equipment for relevant mid-air situations;

(b) the optimisation, preventing one situation leading to a declined performance in other relevant situations.

INTERFACE

DS GE.CER.APW.645 APW interfaces

(See AMC1 GE.CER.APW.645 and GM1 GE.CER.APW.645)

APW equipment interfaces support the functions and levels of performance as required in DS GE.CER.APW.635 and DS GE.CER.APW.640.

AMC1 GE.CER.APW.645 APW interfaces

(a) APW equipment should provide interfaces for:

(1) input data:

(i) surveillance data,

(ii) flight data,

(iii) environment data;

(2) output data:

(i) alert data.

(b) The interfaces of APW equipment should comply with the formats in:

(1) EUROCONTROL-SPEC-0149-17, Edition 1.13, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 17 Category 004: Safety Net Messages;

(2) EUROCONTROL-SPEC-0149-9, Edition 1.21, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 9 Category 062: SDPS Track Messages;

(3) EUROCONTROL-SPEC-0149-15, Edition 1.6, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 15 Category 065: SDPS Service Status Reports.

GM1 GE.CER.APW.645 APW interfaces

Additional information can be found in EUROCONTROL-GUID-161, Edition 1.0, EUROCONTROL Guidelines for Area Proximity Warning — Part I, Section 2.4.3.

6.3 — Minimum safe altitude warning (MSAW) — CER.MSAW.1

APPLICABILITY

DS GE.CER.MSAW.650 Scope

This Section provides the functional and performance standards applicable to minimum safe altitude warning (MSAW) equipment.

FUNCTION

DS GE.CER.MSAW.655 MSAW

(See GM1 GE.CER.MSAW.655 and GM2 GE.CER.MSAW.655)

MSAW equipment has the capability to provide the following:

(a) **Conflict detection**: MSAW detects potential proximity to terrain and obstacles by predicting the future position of an aircraft using its current track and velocity.

(b) **Alert generation**: MSAW generates alerts for potential or actual proximity to terrain or obstacles.

GM1 GE.CER.MSAW.655 MSAW

The purpose of MSAW equipment is to provide, in a timely manner, alerts to air traffic controllers to prevent deviations below the minimum safe altitude that might result in an incident or accident.

MSAW implements independent alerting mechanisms within the ATC control loop to prevent controlled flight into terrain incidents or accidents. It generates alerts related to aircraft proximity to terrain or obstacles. The ATC control loop describes the flow of information between the air traffic controller and the flight crew.

Additional information can be found in EUROCONTROL-GUID-160, Edition 1.0, EUROCONTROL Guidelines for Minimum Safe Altitude Warning — Part I, Section 2.1.

GM2 GE.CER.MSAW.655 MSAW

MSAW detects and generates alerts for deviations below the minimum safe altitude for eligible aircraft, while minimising nuisance and false alerts, ensuring sufficient time for air traffic controllers and flight crews to perform the necessary actions, allowing for alert inhibition for predefined airspace volumes and individual flights. It should present status information and adaptation to procedures and conditions in distinct airspace volumes.

Additional information with regard to these capabilities can be found in EUROCONTROL-GUID-160, Edition 1.0, EUROCONTROL Guidelines for Minimum Safe Altitude Warning — Part I, Section 3.3, requirements from MSAW-07 to MSAW-16.

PERFORMANCE

DS GE.CER.MSAW.660 MSAW performance

(See GM1 GE.CER.MSAW.660 and GM2 GE.CER.MSAW.660)

The performance of MSAW equipment supports the intended use.

GM1 GE.CER.MSAW.660 MSAW performance

Information pertaining to alerting performance can be found in EUROCONTROL-GUID-160, Edition 1.0, EUROCONTROL Guidelines for Minimum Safe Altitude Warning — Part I, Section 3.3.1.

GM2 GE.CER.MSAW.660 MSAW performance

Information pertaining to test scenarios can be found in EUROCONTROL-GUID-160, Edition 1.0, EUROCONTROL Guidelines for Minimum Safe Altitude Warning — Part III, Section 8.

Such scenarios evaluate:

(a) the desired behaviour of the MSAW equipment for relevant mid-air situations;

(b) the optimisation, preventing one situation from leading to a declined performance in other relevant situations.

INTERFACE

DS GE.CER.MSAW.665 MSAW interfaces

(See AMC1 GE.CER.MSAW.665 and GM1 GE.CER.MSAW.665)

MSAW equipment interfaces support the functions and levels of performance as required in DS GE.CER.MSAW.655 and DS GE.CER.MSAW.660.

AMC1 GE.CER.MSAW.665 MSAW Interfaces

(a) MSAW equipment should provide interfaces for:

(1) input data:

(i) surveillance data,

(ii) flight data,

(iii) environment data,

(iv) meteorological data (QNH, temperature);

(2) output data:

(i) alert data.

(b) The interfaces of MSAW equipment should comply with the formats in:

(1) EUROCONTROL-SPEC-0149-17, Edition 1.13, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 17 Category 004: Safety Net Messages;

(2) EUROCONTROL-SPEC-0149-9, Edition 1.21, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 9 Category 062: SDPS Track Messages;

(3) EUROCONTROL-SPEC-0149-15, Edition 1.6, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 15 Category 065: SDPS Service Status Reports.

GM1 GE.CER.MSAW.665 MSAW interfaces

Additional information can be found in EUROCONTROL-GUID-160, Edition 1.0, EUROCONTROL Guidelines for Minimum Safe Altitude Warning — Part I, Section 2.4.3.

6.4 — Short-term conflict alert (STCA) — CER.STCA.1

APPLICABILITY

DS GE.CER.STCA.670 Scope

This Section provides the functional and performance standards applicable to short-term conflict alert (STCA) equipment.

FUNCTION

DS GE.CER.STCA.675 STCA

(See GM1 GE.CER.STCA.675 and GM2 GE.CER.STCA.675)

STCA equipment has the capability to provide the following:

(a) **Conflict detection**: STCA detects potential loss of separation or near misses between aircraft by predicting the future positions of the aircraft using its current track and velocity.

(b) **Alert generation**: STCA generates alerts for potential or actual aircraft proximity.

GM1 GE.CER.STCA.675 STCA

The purpose of STCA equipment is to provide, in a timely manner, alerts to air traffic controllers to prevent loss-of-separation situations that might result in an incident or accident.

STCA incorporates alerting logic into the ATC control loop, providing notifications about current or potential situations concerning the proximity, relative positions and speeds of aircraft. The ATC control loop describes the flow of information between the air traffic controller and the flight crew.

Additional information can be found in EUROCONTROL-GUID-159, Edition 1.0, EUROCONTROL Guidelines for Short Term Conflict Alert — Part I, Sections 2.1 and 3.3, requirements STCA-07 to STCA-16.

GM2 GE.CER.STCA.675 STCA

STCA equipment detects and generates alerts for potential loss of separation involving at least one eligible aircraft, while minimising nuisance and false alerts, ensuring sufficient time for air traffic controllers and flight crews to perform the necessary actions, allowing for alert inhibition for predefined airspace volumes and individual flights. It should present status information and adapt to procedures and conditions in distinct airspace volumes.

Additional information with regard to these capabilities can be found in EUROCONTROL-SPEC-0108, Edition 1.0, EUROCONTROL Specification for Short Term Conflict Alert, Section 4.3, requirements STCA-08 to STCA-17.

PERFORMANCE

DS GE.CER.STCA.680 STCA performance

(See GM1 GE.CER.STCA.680 and GM2 GE.CER.STCA.680)

The performance of the STCA equipment supports the intended use.

GM1 GE.CER.STCA.680 STCA performance

Information pertaining to alerting performance can be found in EUROCONTROL-GUID-159, Edition 1.0, EUROCONTROL Guidelines for Short Term Conflict Alert — Part I, Section 3.3.1.

GM2 GE.CER.STCA.680 STCA performance

Information pertaining to test scenarios can be found EUROCONTROL-GUID-159, Edition 1.0, EUROCONTROL Guidelines for Short Term Conflict Alert — Part III, Section 7.

Such scenarios evaluate:

(a) the desired behaviour of the STCA equipment for relevant mid-air situations;

(b) the optimisation, preventing one situation leading to a declined performance in other relevant situations.

INTERFACE

DS GE.CER.STCA.685 STCA interfaces

(See AMC1 GE.CER.STCA.685 and GM1 GE.CER.STCA.685)

STCA equipment interfaces support the functions and levels of performance as required in DS GE.CER.STCA.675 and DS GE.CER.STCA.680.

AMC1 GE.CER.STCA.685 STCA interfaces

(a) STCA equipment should provide interfaces for:

(1) input data:

(i) surveillance data,

(ii) flight data,

(iii) environment data;

(2) output data:

(i) alert data.

(b) The interfaces of STCA equipment should comply with the formats in:

(1) EUROCONTROL-SPEC-0149-17, Edition 1.13, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 17 Category 004: Safety Net Messages;

(2) EUROCONTROL-SPEC-0149-9, Edition 1.21, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 9 Category 062: SDPS Track Messages;

(3) EUROCONTROL-SPEC-0149-15, Edition 1.6, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 15 Category 065: SDPS Service Status Reports.

GM1 GE.CER.STCA.685 STCA interfaces

Additional information can be found in EUROCONTROL-GUID-159, Edition 1.0, EUROCONTROL Guidelines for Short Term Conflict Alert — Part I, Section 2.4.3.

Section 7 — Trajectory discrepancy monitoring (TDM) — CER.GTDM.1

APPLICABILITY

DS GE.CER.TDM.700 Scope

This Section provides the functional and performance standards applicable to trajectory discrepancy monitoring (TDM) between downlinked aircraft intended trajectory and ground system trajectory equipment.

FUNCTION

DS GE.CER.TDM.710 TDM functions

(See AMC1 GE.CER.TDM.710, AMC2 GE.CER.TDM.710 and GM1 GE.CER.TDM.710)

TDM equipment has the capability to provide the following:

(a) **Discrepancy detection**: The TDM function receives and processes the aircraft derived flight management system (FMS) trajectory (EPP data) via ADS-C and compares the two-dimensional (2D) trajectory information with the 2D trajectory calculated by the FDP.

(b) **Annunciation**: When a discrepancy between the aircraft derived 2D trajectory information and the 2D trajectory calculated by the FDP has been detected, the TDM function provides an annunciation.

AMC1 GE.CER.TDM.710 TDM functions

The TDM equipment should only issue discrepancy annunciations when the:

(a) aircraft FMS is, as a minimum, in lateral conformance;

(b) aircraft downlinked data is technically complete and error free.

AMC2 GE.CER.TDM.710 TDM functions

When the content of the downlinked aircraft intended trajectory does not reflect the operational area of interest or is not credible, the system should provide such an indication of this discrepancy.

GM1 GE.CER.TDM.710 TDM functions

The TDM equipment calculates, for each ADS-C-equipped and ADS-C-connected aircraft in the operational area of interest, discrepancies between the ground 2D trajectory and the downlinked aircraft 2D trajectory starting from the current aircraft position in such a manner that the number of nuisance and false alerts are kept to a minimum. Additional information can be found in:

(a) EUROCONTROL-GUID-194, Edition 1.0, EUROCONTROL Guidelines for Initial Trajectory Information Sharing, Section 4.3.5.2;

(b) EUROCAE ED-228B — Safety and Performance Requirements Standard for ATS Data Communications including Corrigendum 1, Appendix B: Provision of Extended Projected Profile Data.

PERFORMANCE

DS GE.CER. TDM.720 TDM performance

The performance of the TDM equipment supports the intended use for flights operating above FL285.

INTERFACE

DS GE.CER.TDM.730 TDM interfaces

(See AMC1 GE.CER.TDM.730 and GM1 GE.CER.TDM.730)

TDM equipment interfaces support the functions and levels of performance as required in DS GE.CER.TDM.710 and DS GE.CER.TDM.720.

AMC1 GE.CER.TDM.730 TDM interfaces

(a) TDM equipment should use the inputs:

(1) aircraft intended 2D trajectory (ADS-C/EPP data);

(2) ground system 2D trajectory (FDP data).

(b) TDM equipment should provide the outputs:

(1) aircraft intended and ground 2D trajectories and discrepancy indications;

(2) indications that aircraft intended trajectory does not reflect the full route.

GM1 GE.CER.TDM.730 TDM interfaces

Aircraft intended trajectory information (as described in DS-GE.CER/DEC, Part 2, Subpart A, Section 4 'Data link equipment') is received:

(a) directly from the aircraft by means of ADS-C; and/or

(b) via the ADS-C central service via system wide information management (SWIM).

Subpart B — Air-to-ground communications (A/G COM)

Section 1 — Data communications — CER.DCOM.2

APPLICABILITY

[…]

GM1 GE.CER.AGDC.101 Scope

Considering ATN Data Link Architecture, the ATM/ANS equipment supporting air-to-ground data communications are ~~inter alia~~:

(a) VDL2 Ground Station (VGS) for air-to-ground data communications, operating in the band 117,975~~–~~137 MHz;

(aa) SATCOM ground system (SGS) using L band, anchoring the radio frequency communication with the aircraft via the satellite and supporting the air interface protocols required for data transmission over the satellite link;

(b) gateways for the ATN/AOC data link messages ground distribution;

(c) ATN G/G and A/G OSI routers.

FUNCTION

DS GE.CER.AGDC.110 Data communications equipment

(See AMC1 GE.CER.AGDC.110, AMC2 GE.CER.AGDC.110 and AMC3 GE.CER.AGDC.110)

Air-to-ground data communications equipment supports the timely exchange of CM, CPDLC and ADS-C information over different air-ground links ~~intended use~~.

AMC1 GE.CER.AGDC.110 Data communications equipment — VDL ~~M~~2

VGS ~~radio~~ equipment should comply with:

(a) ETSI EN 301 841-1 (V1.4.1) (2015-04) VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 1: Physical layer and MAC sub-layer.

(b) ETSI EN 301 841-2 (V1.2.1) (2019-05) VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 2: Upper layers.

AMC2 GE.CER.AGDC.110 Data communications equipment — ATN routers

ATN/OSI routers should comply with ICAO Doc 9880 — Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Third Edition, 2024, Part III — Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS).

AMC3 GE.CER.AGDC.110 Data communications equipment — SATCOM system

SGS radio equipment should comply with EUROCAE ED-242C — MASPS for AMS(R)S Data and Voice Communications Supporting Required Communications Performance (RCP) and Required Surveillance Performance (RSP).

PERFORMANCE

DS GE.CER.AGDC.120 Data communications equipment performance

(See AMC1 GE.CER.AGDC.120, AMC2 GE.CER.AGDC.120 and GM1 GE.CER.AGDC.120)

The performance of air-to-ground data communications equipment supports the exchange of CM, CPDLC and ADS-C information ~~the intended use~~.

AMC1 GE.CER.AGDC.120 Data communications equipment performance — VDL ~~M~~2

(a) VGS ~~Air~~air-to-ground data communications equipment should comply with:

(1) EUROCAE ED-~~228A~~ 228B — ~~*Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)*~~ Safety and Performance Requirements Standard for ATS Data Communications (SPR Standard) including Corrigendum 1 ~~with respect to the air-ground link~~;

(2) RTCA D0-224D Signal-In-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications including Compatibility with Digital Voice Techniques;

(3) ARINC 631-~~7~~8 VHF DIGITAL LINK (VDL) MODE 2 IMPLEMENTATION PROVISIONS;

(4) ICAO Doc 9776, Manual on VHF Digital Link (VDL) Mode 2, Edition 2, 2015;

~~(5) regarding the performance of ATN routers, in ICAO Doc 9880 - Technical Specifications for ATN using ISO/OSI Standards and Protocols, Second Edition, 2016, Part III – Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS);~~

(5) ETSI EN 301 841-3 V2.1.1 (2016-09) VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 3: Harmonized EN covering the essential requirements of Article 3.2 of the R&TTE Directive.

~~(b) Additional performance conditions applicable to the intended use of air-to-ground data communications equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

AMC2 GE.CER.AGDC.120 Data communications equipment performance — SATCOM system

SGS equipment should comply with:

(a) EUROCAE ED-228B — Safety and Performance Requirements Standard for ATS Data Communications (SPR Standard), including Corrigendum 1;

(b) EUROCAE ED-242C — MASPS FOR AMS(R)S Data and Voice Communications Supporting Required Communications Performance (RCP) and Required Surveillance Performance (RSP).

[…]

INTERFACE

DS GE.CER.B.AGDC.130 Air-to-ground data communications equipment interfaces

(See AMC1 GE.CER.~~AGDG~~ AGDC.130)

Air-to-ground data communications equipment interfaces support the functions and levels of performance as required in DS GE.CER.AGDC.110 and DS GE.CER.AGDC.120.

AMC1 GE.CER.AGDC.130 Air-to-ground data communications equipment interfaces

~~Air-to-ground data communications equipment interfaces should comply with:~~

~~(a) ARINC 631-7 VHF DIGITAL LINK (VDL) MODE 2 IMPLEMENTATION PROVISIONS;~~

~~(b) ICAO Doc 9776 Manual on VHF Digital Link (VDL) Mode 2,~~

~~(c) regarding ATN routers: ICAO Doc 9880 - Technical Specifications for ATN using ISO/OSI Standards and Protocols, Ed.2, Part III – Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS).~~

(a) VGS equipment should comply with:

(1) ETSI EN 301 841-1 (V1.4.1) (2015-04) VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 1: Physical layer and MAC sub-layer;

(2) ARINC 631-8 VHF DIGITAL LINK (VDL) Mode 2 Implementation Provisions, and

(i) for VDL Mode2 Upper Layer, all functionality identified as 'M' (mandatory) for the ground station support in Attachment 2 (Data Link Layer PICS) and Attachment 3 (Sub-network Layer PICS);

(3) ICAO Doc 9776 — Manual on VHF Digital Link (VDL) Mode 2, Edition 2, 2015.

(b) ATN routers should comply with ICAO Doc 9880 — Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Third Edition, 2024, Part III — Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS).

Section 2 — Voice communications

2.1 — Air-to-ground voice radio communications (AGRC) — CER.RCOM.2

APPLICABILITY

DS GE.CER.~~AGVC~~AGRC.201 Scope

[…]

FUNCTION

DS GE.CER.~~AGVC~~AGRC.210 Air-to-ground voice communications

[…]

AMC1 GE.CER.~~AGVC~~AGRC.210 Air-to-ground voice communications

[…]

PERFORMANCE

DS GE.CER.~~AGVC~~AGRC.220 Air-to-ground voice communications performance

(See AMC1 GE.CER.AGVC.220, AMC2 GE.CER.AGVC.220 and AMC3 GE.CER.AGVC.220)

The performance of the air-to-ground voice radio communication equipment supports the intended use.

AMC1 GE.CER.~~AGVC~~AGRC.220 Air-to-ground voice communications performance

(a) The air-to-ground voice communication equipment should comply with:

(1) ICAO Annex 10, Volume III, Part 2 (Second Edition – July 2007 incorporating Amendment No 91), Chapter 2, 'Aeronautical Mobile Service', Section 2.2.1.2 'Power'.

(2) ETSI EN 300 676-2 (V2.1.1) (2015-12) Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Part 2: Harmonised Standard covering the essential requirements of ~~a~~Article 3.2 of ~~the~~ Directive 2014/53/EU.

~~(b) Additional performance conditions applicable to the intended use of air-to-ground voice communication radios may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

AMC2 GE.CER.~~AGVC~~AGRC.220 Voice delay

The voice delay for ground transmission components should comply with EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Section 2.3, requirement 6 [REQ RADIO PERFORMANCE].

AMC3 GE.CER.~~AGVC~~AGRC.220 Climax performance

In multi-carrier/climax operations, the difference between the longest and the shortest voice latencies for ground transmission components should comply with:

(a) EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Section 2.3, requirement 7 [REQ RADIO PERFORMANCE];

(b) EUROCAE ED-~~-~~137/1C — Interoperability Standards ~~F~~for VOIP ATM Components (Volume 1: Radio), Section 5.6.3 – Climax-Time-Delay~~.~~;

(c) EUROCAE ED-137/1B — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Section 5.6.3 — Climax-Time-Delay.

DS GE.CER.~~AGVC~~AGRC.225 Voice coding

(See AMC1 GE.CER.AGVC.225)

~~The a~~Air-to-ground voice communications equipment supports voice codec.

AMC1 GE.CER.~~AGVC~~AGRC.225 Voice coding

The air-to-ground voice communications equipment should comply with:

(a) EUROCAE ED-137/1C — Interoperability Standards ~~F~~for VOIP ATM Components (Volume 1: Radio), Section 4.2.3, requirement 5 —~~–~~ [AUDIO] Voice coding requirement.

(b) EUROCAE ED-137/1B — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Section 4.2.3, requirement 5 — [AUDIO] Voice coding requirement.

DS GE.CER.~~AGVC~~AGRC.230 RTP Class of service (CoS)

(See AMC1 GEC.CER.AGVC.230)

~~The a~~Air-to-ground voice communications equipment supports differentiated services ~~(DiffServ)~~.

AMC1 GE.CER.~~AGVC~~AGRC.230 Class of service (CoS)

Differentiated services should comply with:

(a) EUROCAE ED-137/1C Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Section 5.2.3, requirement 7 — [RTP] RTP Class of Service (CoS)~~.~~;

(b) EUROCAE ED-137/1B — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Section 5.2.3, requirement 7 — [RTP] RTP Class of Service (CoS).

INTERFACE

[…]

AMC1 GE.CER.~~AGVC~~AGRC.240 Air-to-ground voice communications interfaces

(a) Air-to-ground voice communications equipment should support the following interfaces:

(1) analogue 4W and 4WE&M;

(2) voice over IP (VoIP);

(b) Air-to-ground voice communications equipment should comply with:

(1) ICAO Annex 10, Volume III, Part 2 (Second Edition – July 2007 incorporating Amendment No 91), Chapter 2, 'Aeronautical Mobile Service', Section 2.1;

(2) ICAO Annex 10, Volume III, Part 2 (Second Edition – July 2007 incorporating Amendment No 91), Chapter 2, 'Aeronautical Mobile Service', Sections 2.2.1.1, 2.2.1.3 and 2.2.1.4;

(3) EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Section 2.2.1;

(4) EUROCAE ED-137.1C — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Sections 2.3, 3.1, 3.3, 3.4, 3.8.4~~,~~ and 5.5.4;~~.~~

(5) EUROCAE ED-137.1B — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Sections 2.3, 3.1, 3.3, 3.4, 3.8.4 and 5.5.4.

2.2 — Air-to-ground voice communication system (AGVC) — CER.COMF.1

APPLICABILITY

DS GE.CER.AGVC.250 Scope

This Section provides the functional and performance standards applicable to the air-to-ground function within a voice communication system (VCS) composed of the following elements:

(a) HMI,

(b) voice switch,

(c) radio media gateways.

FUNCTION

DS GE.CER.AGVC.255 VCS air-to-ground functions

(See AMC1 GE.CER.AGVC.255 and GM1 GE.CER.AGVC.255)

The VCS air-to-ground function has the capability to provide the following:

(a) radio access modes (off/deselected, receive only, transmit and receive);

(b) frequency technical state information;

(c) receiver status notification;

(d) transmitter status notification;

(e) push-to-talk failure notification;

(f) radio coverage extension by combining two or more radio sites (Climax);

(g) selection of the best signal provided by two or more radio receivers (best signal selection (BSS));

(h) automatic retransmission of one received signal on other preselected radio frequencies (cross-coupling or X-couple).

AMC1 GE.CER.AGVC.255 VCS air-to-ground voice functions

The VCS air-to-ground function should comply with the requirements of EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Section 2.4, namely:

(a) requirement 1 [REQ RADIO FUNCTIONAL] Radio access modes of operation;

(b) requirement 2 [REQ RADIO FUNCTIONAL] Transmit configuration description, parts a) and b);

(c) requirement 9 [REQ RADIO FUNCTIONAL] Frequency technical state info display (OOS only);

(d) requirement 15 [REQ RADIO FUNCTIONAL] Cross-coupling facility to be implemented;

(e) requirement 16 [REQ RADIO FUNCTIONAL] Quantity of frequencies in a cross-coupled frequency group;

(f) requirement 22 [REQ RADIO FUNCTIONAL] Precedence over cross-coupling transmission;

(g) requirement 23 [REQ RADIO FUNCTIONAL] Aircraft call / cross-coupled frequency distinction;

(h) requirement 24 [REQ RADIO FUNCTIONAL] First received A/C call used as cross-coupled group's incoming frequency;

(i) requirement 25 [REQ RADIO FUNCTIONAL] Climax operation to be implemented;

(j) requirement 26 [REQ RADIO FUNCTIONAL] Echo prevention for Climax operation;

(k) requirement 27 [REQ RADIO FUNCTIONAL] BSS functionality to be implemented;

(l) requirement 31 [REQ RADIO FUNCTIONAL] BSS time delay difference compensation;

(m) requirement 39 [REQ RADIO FUNCTIONAL] PTT failure notification.

GM1 GE.CER.AGVC.255 VCS air-to-ground voice functions

The VCS air-to-ground function allows radio telephone conversations to take place between users connected to the VCS and to mobile units, primarily aircraft but also ground mobiles.

PERFORMANCE

DS GE.CER.AGVC.260 VCS air-to-ground performance

(See AMC1 GE.CER.AGVC.260)

The VCS air-to-ground function performance supports the intended use in the intended operational environment.

AMC1 GE.CER.AGVC.260 VCS air-to-ground voice quality

The VCS air-to-ground function should comply with EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Sections 2.3 and 6.3.1, requirement 1 [REQ VOICE QUALITY] Mean opinion score of A/G & G/G communications > 4.

INTERFACE

DS GE.CER.AGVC.265 VCS air-to-ground VoIP interfaces

(See AMC1 GE.CER.AGVC.265 and GM1 GE.CER.AGVC.265)

The VCS air-to-ground function provides VoIP interfaces to support the functions and levels of performance as required in DS GE.CER.AGVC.255 and DS GE.CER.AGVC.260.

AMC1 GE.CER.AGVC.265 VCS air-to-ground VoIP interfaces

The VCS air-to-ground function should comply with:

(a) EUROCAE ED-137/1B — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), VCS mandatory requirements in Sections 2.3, 3.1, 3.3, 3.4, 3.5, 3.6, 3.8.1, 4.2.3, 5.5 and 6.4;

(b) EUROCAE ED-137/1C — Interoperability Standards for VOIP ATM Components (Volume 1: Radio) including EUROCAE Change 1 and 2 to ED-137/1C, VCS mandatory requirements in Sections 2.3, 3.1, 3.3, 3.4, 3.5, 3.6, 3.8.1, 4.2.3, 5.5 and 6.4.

GM1 GE.CER.AGVC.265 VCS air-to-ground VoIP interfaces

Additional information and guidance for the VoIP function can be found in EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Section 2.2.1.

DS GE.CER.AGVC.270 VCS air-to-ground RTP class of service

(See AMC1 GE.CER.AGVC.270)

The VCS air-to-ground function provides interfaces to support differentiated services.

AMC1 GE.CER.AGVC.270 VCS air-to-ground RTP class of service

Differentiated services should comply with:

(a) EUROCAE ED 137/1B — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Section 5.2.3, requirement 7;

(b) EUROCAE ED 137/1C — Interoperability Standards for VOIP ATM Components (Volume 1: Radio), Section 5.2.3, requirement 7.

DS GE.CER.AGVC.275 VCS air-to-ground analogue interfaces

(See AMC1 GE.CER.AGVC.275)

The VCS air-to-ground function provides interfaces to support the operation of analogue radio equipment.

AMC1 GE.CER.AGVC.275 VCS air-to-ground analogue interfaces

The VCS air-to-ground function analogue interfaces should comply with analogue 4W and 4WE&M signalling.

Subpart A — Ground-to-ground communications (COM)

Section 1 — General — DEC.GCOMGEN.2

DS GE.DEC.GGCOM.101 Scope

This Subpart provides the functional and performance standards applicable to the following ground-to-ground data communications:

(a) ATS message handling system (AMHS);

(b) system wide information management (SWIM) technical infrastructure;

(c) flight message transfer protocol (FMTP).;

(d) ground-to-ground data communications;

(e) ground-to-ground voice communications.

Section 2 — ATS message handling system (AMHS) — DEC.AMHS.1

[…]

PERFORMANCE

[…]

AMC1 GE.DEC.AMHS.230 AMHS performance

(a) Basic and extended AMHSs should comply with EUROCONTROL-SPEC-0136, Edition 2.1, EUROCONTROL Specification for the Air Traffic Services Message Handling System (AMHS), Section A.2.1.4.

~~(b) Additional performance conditions applicable to the intended use of AMHS may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

Section 3 — System wide information management (SWIM) technical infrastructure — DEC.SWIM.1

[…]

FUNCTION

[…]

AMC1 GE.DEC.SWIM.310 SWIM

The SWIM technical infrastructure should comply with EUROCONTROL-SPEC-170, Edition ~~1.1~~2.0, EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile.

PERFORMANCE

[…]

AMC1 GE.DEC.SWIM.320 SWIM performance

(a) The SWIM ~~T~~technical infrastructure should comply with EUROCONTROL-SPEC-170, Edition ~~1.1~~2.0, EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile.

~~(b) Additional performance conditions applicable to the intended use of SWIM technical infrastructure yellow profile may be defined as required. Such potential additional performance conditions may be derived from activities related to DS.GE.GEN.002, DS.GE.GEN.003, DS.GE.GEN.004 and DS.GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

INTERFACE

[…]

AMC1 GE.DEC.330 SWIM Interfaces

The SWIM technical infrastructure interfaces should comply with EUROCONTROL-SPEC-170, Edition ~~1.1~~2.0, EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile.

Section 4 — Flight message transfer protocol (FMTP) — DEC.FMTP.1

[…]

PERFORMANCE

[…]

AMC1 GE.DEC.FMTP.420 FMTP performance

(a) The FMTP should comply with EUROCONTROL-SPEC-0100, Edition 2.0, EUROCONTROL Specification of Interoperability and Performance Requirements for the Flight Message Transfer Protocol (FMTP).

~~(b) Additional performance conditions applicable to the intended use of the FMTP may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

Section 5 — Ground-to-ground data communications (GGDC) — DEC.DCOM.1

APPLICABILITY

DS GE.DEC.GGDC.501 Scope

(See GM1 GE.DEC.GGDC.501)

This Section provides the functional and performance standards applicable to ground-to-ground data communications equipment.

GM1 GE.DEC.GGDC.501 Scope

Considering ATN data link architecture, the ATM/ANS equipment supporting ground-to-ground data communications are, inter alia:

(a) ATN end systems;

(b) ADS-C common service equipment, including ADS-C/EPP and CM logon information distribution.

FUNCTION

DS GE.DEC.GGDC.510 Data communications equipment

(See AMC1 GE.DEC.GGDC.510 and AMC2 GE.DEC.GGDC.510)

Ground-to-ground data communications equipment supports the communication exchange for ATN end systems and the exchange of ADS-C/EPP and CM logon information from the ADS-C common service.

AMC1 GE.DEC.GGDC.510 Data communications equipment — ATN end systems

ATN end systems should comply with ICAO Doc 9880 — Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Third Edition, 2024, Part III — Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS).

AMC2 GE.DEC.GGDC.510 Data communications equipment — ADS-C common service

The ADS-C common service should comply with EUROCONTROL-SPEC-192, Edition 1.0, EUROCONTROL Specification for Data Link Common Services for the Aeronautical Telecommunication Network (ATN), December 2023, Chapters 3 and 4.

PERFORMANCE

DS GE.DEC.GGDC.520 Ground-to-ground data communications equipment performance

The performance of ground-to-ground data communications equipment supports the intended use.

INTERFACE

DS GE.DEC.GGDC.530 Ground-to-ground data communications equipment interfaces

(See AMC1 GE.CER.GGDG.530)

Ground-to-ground data communications equipment interfaces support the functions and levels of performance as required in DS GE.CER.AGDC.510 and DS GE.CER.AGDC.520.

AMC1 GE.DEC.GGDC.530 Ground-to-ground data communications equipment interfaces

ATN end systems should comply with ICAO Doc 9880 — Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Third Edition, 2024, Part III — Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS).

Section 6 — VCS ground-to-ground function (GGVC) — DEC.VCOM.1

APPLICABILITY

DS GE.DEC.GGVC.601 Scope

This Section provides the functional and performance standards applicable to the ground-to-ground function within a voice communication system (VCS) composed of the following elements:

(a) HMI,

(b) voice switch,

(c) media gateways to legacy systems.

FUNCTION

DS GE.DEC.GGVC.610 VCS ground-to-ground function

(See AMC1 GE.CER.GGVC.610)

The ground-to-ground function of a VCS has the capability to provide:

(a) primary telephone services:

(1) direct access (DA) calls,

(2) instantaneous access (IA) calls,

(3) indirect access (IDA) calls;

(b) ATS and public addressing and numbering schemes;

(c) inter-ATSU supplementary telephone services:

(1) call transfer,

(2) call conferencing;

(d) ATSU internal supplementary telephone services:

(1) call hold,

(2) call diversion,

(3) redial.

AMC1 GE.DEC.GGVC.610 VCS ground-to-ground function

The ground-to-ground function of a VCS should comply with EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Sections 3.3.1, 3.3.2.1, 3.3.3.1, 3.3.5, 3.3.8, 3.3.11, 3.4.1.1, 3.4.1.2, 3.4.2.3, 3.4.2.5 and 3.4.2.9.

PERFORMANCE

DS GE.DEC.GGVC.620 VCS ground-to-ground function performance

(See AMC1 GE.DEC.GGVC.620 and AMC2 GE.DEC.GGVC.620)

The performance of the ground-to-ground function of a VCS is to be suitable for the intended use.

AMC1 GE.DEC.GGVC.620 VCS ground-to-ground function response times

The ground-to-ground function response times of a VCS should comply with EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Sections 3.3.2.2 and 3.3.3.4.

AMC2 GE.DEC.GGVC.620 VCS ground-to-ground function voice quality

The ground-to-ground function voice quality of a VCS should comply with EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Section 6.3, requirements 1, 2, 7, 8, 9 and 10.

INTERFACE

DS GE.DEC.GGVC.630 VCS ground-to-ground function interfaces

(See AMC1 GE.DEC.GGVC.630)

The ground-to-ground function of VCS equipment provides interfaces to support the functions and levels of performance as required in DS GE.DEC.GGVC.610 and DS GE.DEC.GGVC.620.

AMC1 GE.DEC.GGVC.630 VCS ground-to-ground function interfaces

Ground-to-ground voice communications equipment should comply with:

(a) EUROCAE ED-136 — Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements, Section 3.6.1;

(b) EUROCAE ED-137/2B — Interoperability Standards for VoIP ATM components — Volume 2: Telephone, Sections 2.2, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 4.3, 4.5, 4.6, 4.8 and 4.9;

(c) EUROCAE ED-137/2C — Interoperability Standards for VoIP ATM components — Volume 2: Telephone, mandatory requirements in Sections 2.2, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.5, 4.6, 4.9 and 5.2;

(d) EUROCAE ED-137/2C — Interoperability Standards for VoIP ATM components — Volume 2: Telephone, Addendum 3 to Volume 2: Instantaneous Access Call, mandatory requirements.

Subpart B — Navigation (NAV)

Section 1 — General — DEC.NAVGEN.1

~~Reserved~~

DS GE.DEC.NAV.101 Scope

This Subpart provides the functional and performance standards applicable to the following ground navigation aid equipment:

(a) instrument landing system (ILS),

(b) distance-measuring equipment (DME),

(c) very-high-frequency (VHF) omnidirectional range (VOR),

(d) non-directional beacon (NDB),

(e) ground-based augmentation system (GBAS),

(f) satellite-based augmentation system (SBAS).

Section 2 — Instrument landing system (ILS) — DEC.GILS.1

APPLICABILITY

DS GE.DEC.ILS.201 Scope

(See GM1 GE.DEC.ILS.201)

This Section provides the functional and performance standards applicable to the following ILS ground equipment:

(a) VHF localiser equipment, associated monitor system, remote control and indicator equipment,

(b) ultra-high-frequency (UHF) glide path equipment, associated monitor system, remote control and indicator equipment,

(c) glide path verification checks.

Note: Point (c) verification checks are only applicable if that function is provided by marker beacons or DME.

GM1 GE.DEC.ILS.201 Scope

ILS ground equipment supports different ILS performance categories as follows:

(a) **Facility performance category I**: This covers an ILS that provides guidance information from the coverage limit of the ILS to the point at which the localiser course line intersects the ILS glide path at a height of 30 m (100 ft) or less above the horizontal plane containing the threshold.

(b) **Facility performance category II**: This covers an ILS that provides guidance information from the coverage limit of the ILS to the point at which the localiser course line intersects the ILS glide path at a height of 15 m (50 ft) or less above the horizontal plane containing the threshold.

(c) **Facility performance category III**: This covers an ILS that, with the aid of ancillary equipment where necessary, provides guidance information from the coverage limit of the facility to and along the surface of the runway.

FUNCTION

DS GE.DEC.ILS.210 ILS function

(See AMC1 GE.DEC.ILS.210 and GM1 GE.DEC.ILS.210)

The ILS has the capability to provide vertical and lateral guidance information.

AMC1 GE.DEC.ILS.210 ILS function

(a) The VHF localiser equipment should comply with the following sections of ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93:

(1) for facility performance category I, Sections:

(i) 3.1.2.7 to 3.1.2.7.1 inclusive,

(ii) 3.1.3.1 to 3.1.3.2.2 inclusive,

(iii) 3.1.3.3.1 to 3.1.3.3.2.1 inclusive,

(iv) 3.1.3.3.4,

(v) 3.1.3.4.1,

(vi) 3.1.3.9.1 to 3.1.3.9.2 inclusive,

(vii) 3.1.3.11.1;

(2) for facility performance category II, Sections:

(i) 3.1.2.7 to 3.1.2.7.1 inclusive,

(ii) 3.1.3.1 to 3.1.3.2.1 inclusive,

(iii) 3.1.3.2.2.1,

(iv) 3.1.3.3.1 to 3.1.3.3.2 inclusive,

(v) 3.1.3.3.2.2,

(vi) 3.1.3.3.4,

(vii) 3.1.3.4.2,

(viii) 3.1.3.9.1 to 3.1.3.9.2 inclusive,

(ix) 3.1.3.11.1;

(3) for facility performance category III, Sections:

(i) 3.1.2.7 to 3.1.2.7.1 inclusive,

(ii) 3.1.3.1 to 3.1.3.2.1 inclusive,

(iii) 3.1.3.2.2.2,

(iv) 3.1.3.3.1 to 3.1.3.3.2 inclusive,

(v) 3.1.3.3.2.3,

(vi) 3.1.3.3.4 to 3.1.3.3.5 inclusive,

(vii) 3.1.3.4.2,

(viii) 3.1.3.9.1 to 3.1.3.9.2 inclusive.

(b) The UHF glide path equipment should comply with the following sections of ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93:

(1) for facility performance category I, Sections:

(i) 3.1.5.1.1 to 3.1.5.1.2.1 a) inclusive,

(ii) 3.1.5.1.3,

(iii) 3.1.5.1.5 to 3.1.5.1.6 inclusive,

(iv) 3.1.5.2.1 to 3.1.5.2.2 inclusive,

(v) 3.1.5.3,

(vi) 3.1.5.4.1,

(vii) 3.1.5.7.1 a) to d) inclusive, 3.1.5.7.1 f) and 3.1.5.7.1 g);

(2) for facility performance category II, Sections:

(i) 3.1.5.1.1 to 3.1.5.1.2.1 a),

(ii) 3.1.5.1.3 to 3.1.5.1.4,

(iii) 3.1.5.2.1 to 3.1.5.2.2,

(iv) 3.1.5.3,

(v) 3.1.5.4.2,

(vi) 3.1.5.7.1 a) to c) inclusive and 3.1.5.7.1 e) to g) inclusive;

(3) for facility performance category III, Sections:

(i) 3.1.5.1.1,

(ii) 3.1.5.1.2,

(iii) 3.1.5.1.2.1 b),

(iv) 3.1.5.2.1 to 3.1.5.2.2 inclusive,

(v) 3.1.5.3,

(vi) 3.1.5.4.2.

(c) For facility performance categories I, II and III, the ILS should provide an indication of the operational status of all ILS ground equipment.

(d) ILSs that include marker beacons should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections 3.1.7.7.1 and 3.1.7.7.2.

(e) ILSs that include a far field monitor should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Attachment C, Sections 2.8.5.1 and 2.8.5.5.

GM1 GE.DEC.ILS.210 ILS function

Information pertaining to the use of a far field monitor can be found in ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Attachment C, Section 2.8.5.

PERFORMANCE

DS GE.DEC.ILS.220 Performance

(See AMC1 GE.DEC.ILS.220)

ILS ground equipment performance is to be commensurate with the facility performance category.

AMC1 GE.DEC.ILS.220 Performance

(a) The VHF localiser equipment should comply with the following sections of ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93:

(1) for facility performance category I, Sections:

(i) 3.1.3.2.3,

(ii) paragraphs a), d) and e) of 3.1.3.5.1 to 3.1.3.5.3,

(iii) 3.1.3.5.3.3 a),

(iv) 3.1.3.5.3.4 a) and 1) or 3.1.3.5.3.5,

(v) 3.1.3.5.3.6.1,

(vi) 3.1.3.6.1 a),

(vii) 3.1.3.7.1 to 3.1.3.7.2 a) inclusive,

(viii) 3.1.3.7.4;

(2) for facility performance category II, Sections:

(i) 3.1.2.7 to 3.1.2.7.1 inclusive,

(ii) 3.1.3.5.1 to 3.1.3.5.2 inclusive,

(iii) 3.1.3.5.3 b), d) and e),

(iv) 3.1.3.5.3.3 a),

(v) 3.1.3.5.3.4 a) and 1) or 3.1.3.5.3.5,

(vi) 3.1.3.5.3.6.1,

(vii) 3.1.3.6.1 b),

(viii) 3.1.3.7.1 to 3.1.3.7.2 a) inclusive,

(ix) 3.1.3.7.3 to 3.1.3.7.4 inclusive;

(3) for facility performance category III, Sections:

(i) 3.1.2.7 to 3.1.2.7.1 inclusive,

(ii) 3.1.3.5.1 to 3.1.3.5.2 inclusive,

(iii) 3.1.3.5.3 c), d) and e),

(iv) 3.1.3.5.3.2,

(v) 3.1.3.5.3.3 b),

(vi) 3.1.3.5.3.4 b) and 2) or 3.1.3.5.3.5,

(vii) 3.1.3.5.3.6.1,

(viii) 3.1.3.6.1 c),

(ix) 3.1.3.7.1 to 3.1.3.7.2 b) inclusive,

(x) 3.1.3.7.4.

(b) The UHF glide path equipment should comply with the following sections of ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93:

(1) for facility performance category I, Sections:

(i) 3.1.5.5.1,

(ii) 3.1.5.5.2 a), d) and e),

(iii) 3.1.5.5.2.1,

(iv) 3.1.5.5.3 a),

(v) 3.1.5.5.3.1 a) and 1) or 3.1.5.5.3.2,

(vi) 3.1.5.6.1 to 3.1.5.6.2 inclusive,

(vii) 3.1.5.6.5 to 3.1.5.6.6 inclusive;

(2) for facility performance category II, Sections:

(i) 3.1.5.5.1,

(ii) 3.1.5.5.2 b), d) and e),

(iii) 3.1.5.2.3 a),

(iv) 3.1.5.5.3.1 a) and 1) or 3.1.5.5.3.2,

(v) 3.1.5.6.3,

(vi) 3.1.5.6.5,

(vii) 3.1.5.6.7;

(3) for facility performance category III, Sections:

(i) 3.1.5.2.3,

(ii) 3.1.5.5.1,

(iii) 3.1.5.5.2 c), d) and e),

(iv) 3.1.5.5.2.2,

(v) 3.1.5.5.3 b),

(vi) 3.1.5.5.3.1 b) and 2) or 3.1.5.5.3.2,

(vii) 3.1.5.6.4,

(viii) 3.1.5.6.5,

(ix) 3.1.5.6.8.

(c) ILSs that include marker beacons should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections 3.1.7.4.2 and 3.1.7.5.

(d) ILSs that include DME should comply with PART 3, Subpart B, Section 3 'Distance-measuring equipment (DME)', of this DS.

INTERFACE

DS GE.DEC.ILS.230 Interfaces

(See AMC1 GE.DEC.ILS.230)

The ILS ground subsystem provides the interfaces that support the functions and levels of performance as required in DS GE.DEC.ILS.210 and DS GE.DEC.ILS.220.

AMC1 GE.DEC.ILS.230 Interfaces

The ILS ground subsystem should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections 3.1.3.11.1, 3.1.5.7.1 a)–c) and 3.1.5.7.1 e)–g).

INTEGRITY

DS GE.DEC.ILS.240 Integrity — continuity

(See GM1 GE.DEC.ILS.240)

(a) For facility performance category I:

(1) the probability of not radiating false guidance signals is not less than $1 - 0.5 \times 10^{-7}$ in any one landing; and

(2) the probability of not losing the radiated guidance is greater than $1 - 4 \times 10^{-6}$ in any period of 15 seconds.

(b) For facility performance categories II and III:

(1) the probability of not radiating false guidance signals is not less than $1 - 0.5 \times 10^{-9}$ in any one landing; and

(2) the probability of not losing the radiated guidance is greater than $1 - 2 \times 10^{-6}$ in any period of 15 seconds.

GM1 GE.DEC.ILS.240 Integrity — continuity

Additional information can be found in ICAO EUR Doc 016 — European Guidance Material on Integrity Demonstration in Support of Certification of ILS and MLS Systems, Second Edition, 2019, paragraphs 5 and 7.1 and Appendix E.

Section 3 — Distance-measuring equipment (DME) — DEC.GDME.1

APPLICABILITY

DS GE.DEC.DME.301 Scope

This Section provides the functional and performance standards applicable to the distance-measuring equipment narrow radiated spectrum (DME/N) when used as a navigational aid for en route, terminal and approach or precision approach when used in lieu of marker beacons. The approach function includes glide path verification checks for ILS approach operations.

The system provides the aircraft with a slant range between the aircraft and the ground station antennas.

FUNCTION

DS GE.DEC.DME.310 DME ground transponder

(See AMC1 GE.DEC.DME.310, AMC2 GE.DEC.DME.310, and AMC3 GE.DEC.DME.310)

DME equipment is to have the capability to provide the slant range distance to suitably equipped aircraft through the reception and transmission of radio signals in the 960 MHz to 1 164 MHz range.

AMC1 GE.DEC.DME.310 Reception

The reception and decoding function should comply with:

(a) EUROCAE ED-57, Edition 2 — Minimum Operational Performance Specification for Distance Measurement Equipment (DME/N and DME/P) (Ground Equipment), Sections 3.3 and 3.4, applicable to DME/N systems;

(b) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections:

(1) 3.5.4.2.3.1 a) and b),

(2) 3.5.4.2.3.2 a),

(3) 3.5.4.2.3.3,

(4) 3.5.4.2.3.5,

(5) 3.5.4.2.4.1,

(6) 3.5.4.2.5,

(7) 3.5.4.2.6.1,

(8) 3.5.4.2.6.2,

(9) 3.5.4.2.6.5,

(10) 3.5.4.2.7 to 3.5.4.2.10 inclusive,

(11) 3.5.4.4.1,

(12) 3.5.4.4.3 to 3.5.4.4.3.1 inclusive.

AMC2 GE.DEC.DME.310 Transmission

The transmission function should comply with:

(a) EUROCAE ED-57, Edition 2 — Minimum Operational Performance Specification for Distance Measurement Equipment (DME/N and DME/P) (Ground Equipment), Sections 3.2 and 3.5, applicable to DME/N systems;

(b) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections:

(1) 3.5.3.6.1 to 3.5.3.6.2.2 inclusive,

(2) 3.5.3.6.3 to 3.5.6.6.5 inclusive,

(3) 3.5.4.1.

AMC3 GE.DEC.DME.310 Monitor and automatic control

The monitor and automatic control function should comply with:

(a) EUROCAE ED-57, Edition 2 — Minimum Operational Performance Specification for Distance Measurement Equipment (DME/N and DME/P) (Ground Equipment), Section 3.6, applicable to DME/N systems;

(b) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections 3.5.4.7.1–3.5.4.7.2.

PERFORMANCE

DS GE.DEC.DME.320 Reply–delay accuracy

(See AMC1 GE.DEC.DME.320)

The DME ground transponder provides a reply–delay accuracy commensurate with its intended use.

AMC1 GE.DEC.DME.320 Reply–delay accuracy

The DME ground transponder reply–delay accuracy should comply with:

(a) EUROCAE ED-57, Edition 2 — Minimum Operational Performance Specification for Distance Measurement Equipment (DME/N and DME/P) (Ground Equipment), Section 3.1.1, applicable to DME/N systems;

(b) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.5.4.5.2.

DS GE.DEC.DME.330 Reply capability

(See AMC1 GE.DEC.DME.330)

The DME ground transponder provides a reply capability that is commensurate with its intended use.

AMC1 GE.DEC.DME.330 Reply capability

The DME ground transponder reply capability should comply with:

(a) EUROCAE ED-57, Edition 2 — Minimum Operational Performance Specification for Distance Measurement Equipment (DME/N and DME/P) (Ground Equipment), Section 3.1.2, applicable to DME/N systems;

(b) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.5.4.6.

DS GE.DEC.DME.340 Continuity of service

(See GM1 GE.DEC.DME.340)

The DME ground transponder fulfils a continuity-of-service objective commensurate with its intended operational use.

GM1 GE.DEC.DME.340 Continuity of service

Continuity-of-service performance may be evaluated by means of the design mean time between outages (MTBO), where an outage is defined as any unanticipated cessation of signal transmission due to equipment design failures.

Typical design MTBO values fall between 4 000 and 10 000 hours.

INTERFACE

DS GE.DEC.DME.350 External control and monitoring

(See AMC1 GE.DEC.DME.350)

The DME ground transponder provides the capability for local and remote:

(a) status reporting;

(b) control;

(c) configuration (optional for remote).

AMC1 GE.DEC.DME.350 External control and monitoring

DME ground transponder external control and monitoring should comply with EUROCAE ED-57, Edition 2 — Minimum Operational Performance Specification for Distance Measurement Equipment (DME/N and DME/P) (Ground Equipment), Section 3.7, applicable to DME/N systems.

INTEGRITY

DS GE.DEC.DME.360 Integrity

(See GM1 GE.DEC.DME.360)

The probability of a DME ground transponder radiating an erroneous signal is less than 1×10^{-7} per operating hour.

GM1 GE.DEC.DME.360 Integrity

The demonstration methodology referenced in GM1 GE.DEC.ILS.240 for ILSs is applicable to DME.

Section 4 — VHF omnidirectional range (VOR) — DEC.GVOR.1

APPLICABILITY

DS GE.DEC.VOR.401 Scope

This Section provides the functional and performance standards applicable to VOR ground stations for:

(a) Doppler very-high-frequency omnidirectional range (DVOR);

(b) conventional very-high-frequency omnidirectional range (CVOR).

FUNCTION

DS GE.DEC.VOR.410 Transmission

(See AMC1 GE.DEC.VOR.410)

VOR equipment provides:

(a) a carrier signal of between 108 MHz and 117.95 MHz;

(b) a reference signal, with a 30 Hz phase not dependent on the relative azimuth of the receiver for:

(1) CVOR — a 9 960 Hz amplitude modulation (AM) subcarrier with frequency modulation,

(2) DVOR — a 30 Hz AM subcarrier;

(c) a variable signal, with a 30 Hz phase dependent on the relative azimuth of the receiver for:

(1) CVOR — a 30 Hz AM subcarrier,

(2) DVOR — a 9 960 Hz AM subcarrier with frequency modulation;

(d) a phase difference between the reference and relative signals corresponding to the relative azimuth of the receiver;

(e) an identification signal, Morse-keyed on a 1 020 Hz subcarrier;

(f) a voice channel, subcarrier-modulated in the range of 300 Hz to 3 000 Hz.

AMC1 GE.DEC.VOR.410 Transmission

VOR equipment should comply with:

(a) EUROCAE ED-52, Edition 2 — Minimum Performance Specification for Ground Conventional and Doppler Very High Frequency Omni Range (CVOR and DVOR) Equipment:

(1) for CVOR, Sections:

(i) 3.1.1 to 3.1.1.3 inclusive,

(ii) 3.1.3.1.1,

(iii) 3.1.3.2.1,

(iv) 3.1.3.3.1,

(v) 3.1.3.4 to 3.1.5.1 inclusive,

(vi) 3.1.5.2.1,

(vii) 3.1.5.3,

(viii) 3.1.6.1,

(ix) 3.1.8;

(2) for DVOR, Sections:

(i) 3.1.1 to 3.1.2 inclusive,

(ii) 3.1.3.1.2,

(iii) 3.1.3.2.2,

(iv) 3.1.3.3.2,

(v) 3.1.3.4 to 3.1.5.1 inclusive,

(vi) 3.1.5.2.2,

(vii) 3.1.5.3,

(viii) 3.1.6.2 to 3.1.8 inclusive;

(b) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections 3.3.1, 3.3.2 and 3.3.3.

DS GE.DEC.VOR.420 Control and monitoring

(See AMC1 GE.DEC.VOR.420)

VOR equipment provides control and monitoring functions that are commensurate with the intended use.

AMC1 GE.DEC.VOR.420 Control and monitoring

VOR equipment should comply with:

(a) EUROCAE ED-52, Edition 2 — Minimum Performance Specification for Ground Conventional and Doppler Very High Frequency Omni Range (CVOR and DVOR) Equipment, Sections 3.3, 3.4.2 and 3.4.3;

(b) ICAO Annex 10 — Aeronautical Telecommunications, Volume 1: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.3.7.

PERFORMANCE

DS GE.DEC.VOR.430 Performance

(See AMC1 GE.DEC.VOR.430)

VOR equipment performance is to be commensurate with the intended use.

AMC1 GE.DEC.VOR.430 Performance

VOR equipment should comply with EUROCAE ED-52, Edition 2 — Minimum Performance Specification for Ground Conventional and Doppler Very High Frequency Omni Range (CVOR and DVOR) Equipment, Section 1.4.

DS GE.DEC.VOR.440 Continuity of service

(See GM1 GE.DEC.VOR.440)

VOR equipment fulfils a continuity-of-service objective commensurate with its intended operational scope.

GM1 GE.DEC.VOR.440 Continuity of service

Continuity-of-service performance may be evaluated by means of the design mean time between outages (MTBO), where an outage is defined as any unanticipated cessation of signal-in-space due to equipment design failures.

Typical design MTBO values fall between 4 000 and 10 000 hours.

INTEGRITY

DS GE.DEC.VOR.450 Integrity

(See GM1 GE.DEC.VOR.450)

The probability of VOR equipment radiating an erroneous signal is less than 1×10^{-7} per operating hour.

GM1 GE.DEC.VOR.450 Integrity

The demonstration methodology referenced in GM1 GE.DEC.ILS.240 for ILSs is applicable to VOR equipment.

Section 5 — Non-directional radio beacon (NDB) — DEC.GNDB.1

APPLICABILITY

DS GE.DEC.NDB.501 Scope

This Section provides the functional and performance standards applicable to non-directional radio beacon (NDB) transmitters.

FUNCTION

DS GE.DEC.NDB.510 NDB

(See AMC1 GE.DEC.NDB.510)

An NDB transmitter is to have the capability to:

(a) radiate an omnidirectional signal between 190 kHz and 1 750 kHz;

(b) be identified by a two- or three-letter International Morse Code identifier.

AMC1 GE.DEC.NDB.510 NDB

The NDB transmitter should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.4.1.

PERFORMANCE

DS GE.DEC.NDB.520 Performance

(See AMC1 GE.DEC.NDB.520 and AMC2 GE.DEC.NDB.520)

NDB transmitter performance is to be suitable for the intended use.

AMC1 GE.DEC.NDB.520 Performance

The NDB transmitter should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Sections 3.4.2.1, 3.4.4.2, 3.4.5.2–3.4.5.4 and 3.4.6.

AMC2 GE.DEC.NDB.520 Monitoring

The NDB transmitter should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.4.8.

DS GE.DEC.NDB.530 Continuity of service

(See GM1 GE.DEC.NDB.530)

The NDB transmitter fulfils a continuity-of-service objective commensurate with its intended operational scope.

GM1 GE.DEC.NDB.530 Continuity of service

Continuity-of-service performance may be evaluated by means of the design mean time between outages (MTBO), where an outage is defined as any unanticipated cessation of signal-in-space due to equipment design failures.

Typical design MTBO values fall between 4 000 and 10 000 hours.

Section 6 — Ground-based augmentation system (GBAS) — DEC.GBAS.1

APPLICABILITY

DS GE.DEC.GBAS.601 Scope

(See GM1 GE.DEC.GBAS.601)

This Section provides the functional, performance and interface standards applicable to a ground-based augmentation system (GBAS) ground equipment operating in the 108 MHz to 117.975 MHz VHF band.

GBAS ground equipment supports both approach and positioning services.

GM1 GE.DEC.GBAS.601 Applicability

GBAS approach service type D specifications do not apply to facility approach service type C ground equipment.

FUNCTION

DS GE.DEC.GBAS.610 GBAS ground functions

(See AMC1 GE.DEC.GBAS.610 and GM2 GE.DEC.GBAS.610)

GBAS ground equipment is to have the capability to provide data and corrections for the global navigation satellite system (GNSS) ranging signals over a digital data broadcast.

GBAS ground equipment provides the following functions:

(a) GNSS reference receiver;

(b) reference processing;

(c) data broadcast transmission;

(d) integrity monitoring;

(e) local and remote control and status;

(f) operation and maintenance.

AMC1 GE.DEC.GBAS.610 GBAS ground functions

(a) GBAS ground equipment should comply with:

(1) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Sections 3.6.7.2 and 3.6.7.3;

(2) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision

Approach and Landing, including Change 1, Sections 3.7.2.1 to 3.7.2.3 inclusive, 3.8 and 3.9.

(b) GBAS ground equipment that supports facility approach service type D should also comply with:

(1) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.6.7.4;

(2) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Section 3.7.2.5.

GM1 GE.DEC.GBAS.610 GBAS ground functions

Additional information on the functions of GBAS ground equipment can be found in EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Sections 1.5.3 and 1.6.

PERFORMANCE

DS GE.DEC.GBAS.620 GBAS ground performance

(See AMC1 GE.DEC.GBAS.620, AMC2 GE.DEC.GBAS.620, AMC3 GE.DEC.GBAS.620 and GM1 GE.DEC.GBAS.620)

GBAS ground equipment performance is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.GBAS.620 GBAS — service volume

The service volume should comply with:

(a) ICAO Annex 10 — Aeronautical Telecommunications, Volume I, Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.5.3;

(b) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Section 3.1.

AMC2 GE.DEC.GBAS.620 GBAS — accuracy

The accuracy should comply with:

(a) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.6.7.1.1;

(b) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Section 3.4.

AMC3 GE.DEC.GBAS.620 Data communications

GBAS ground equipment should comply with ETSI EN 303 084 (V2.1.1) (2016-08) Ground Based Augmentation System (GBAS) VHF Ground-Air Data Broadcast (VDB); Technical characteristics and methods of measurement for ground-based equipment; Harmonised Standard covering the essential requirements of Article 3.2 of Directive 2014/53/EU.

GM1 GE.DEC.GBAS.620 GBAS ground subsystem performance

Additional information on GBAS ground equipment performance can be found in ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Appendices B and C.

DS GE.DEC.GBAS.630 Continuity of service

(See AMC1 GE.DEC.GBAS.630 and AMC2.GE.DEC.GBAS.630)

GBAS ground equipment fulfils a continuity-of-service objective commensurate with its intended operational use.

AMC1 GE.DEC.GBAS.630 GBAS ground subsystem continuity of service

GBAS ground equipment should comply with:

(a) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.6.7.1.3;

(b) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Section 3.2.

AMC2 GE.DEC.GBAS.630 GBAS ground subsystem availability

GBAS ground equipment should comply with EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Section 3.5.

INTERFACE

DS GE.DEC.GBAS.640 GBAS interfaces

(See AMC1 GE.DEC.GBAS.640 and GM1 GE.DEC.GBAS.640)

GBAS ground equipment interfaces are to be suitable for the intended use in the intended operational environment. They are to be interfaces that support corresponding levels of performance and functions as required in DS GE.DEC.GBAS.610, DS GE.DEC.GBAS.620 and DS GE.DEC.GBAS.630.

AMC1 GE.DEC.GBAS.640 GBAS interfaces

(a) GBAS ground equipment interfaces should comply with:

(1) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.5.4 and Appendix B, Sections 3.6.2, 3.6.3, 3.6.4.2, 3.6.4.3, 3.6.4.3.1, 3.6.5 and 3.6.6;

(2) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Sections 3.6, 3.7.1, 3.7.1.1, 3.7.1.2, 3.7.1.3 and 3.7.1.4.

(b) GBAS ground equipment supporting facility approach service type D should also comply with:

(1) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Sections 3.6.4.3.2.2, 3.6.4.3.2.3, 3.6.4.4 and 3.6.4.11;

(2) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Sections 3.7.1.5 and 3.7.1.7.

GM1 GE.DEC.GBAS.640 GBAS interfaces

Additional information on GBAS interfaces can be found in ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Appendices A, K, M and Q.

INTEGRITY

DS GE.DEC.GBAS.650 Integrity

(See AMC1 GE.DEC.GBAS.650 and GM1 GE.DEC.GBAS.650)

GBAS ground equipment integrity performance is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.GBAS.650 Integrity

GBAS ground equipment integrity performance should comply with:

(a) ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.6.7.1.2;

(b) EUROCAE ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Sections 2.2.3 and 3.3.

GM1 GE.DEC.GBAS.650 Integrity

Additional information on GBAS ground equipment integrity performance can be found in ED-114B — Minimum Operational Performance Standard for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to Support Precision Approach and Landing, including Change 1, Appendices D, E, G, L and O.

Section 7 — Satellite-based augmentation system (SBAS) — DEC.SBAS.1

APPLICABILITY

DS GE.DEC.SBAS.701 Scope

This Section provides the functional, performance and interface standards applicable to a satellite-based augmentation system (SBAS).

An SBAS supports different types of service for en route, terminal and approach.

FUNCTION

DS GE.DEC.SBAS.710 SBAS functions

(See AMC1 GE.DEC.SBAS.710)

An SBAS supports one or more of the following functions:

(a) provision of a pseudo-range signal with an accuracy indicator from an SBAS satellite — L1 SBAS ranging;

(b) determination and transmission of GNSS satellite health status — L1 SBAS GNSS satellite status;

(c) provision of GNSS satellite ephemeris and clock corrections (short- and long-term) to be applied to the pseudo-range measurements from satellites — L1 SBAS basic differential correction;

(d) determination and transmission of ionospheric corrections — L1 SBAS precise differential correction;

(e) provision of ionosphere-free ranging capability using L1 and L5 signals from SBAS satellites — dual-frequency, multi-constellation (DFMC) SBAS ranging;

(f) determination and transmission of GNSS satellite health status, satellite ephemeris and clock corrections to be applied to the ionosphere-free pseudo-range measurements from satellites and associated integrity data — DFMC SBAS ionosphere-free differential correction;

(g) broadcast of service indication data — service indication;

(h) broadcast of clock–ephemeris covariance matrix data — clock–ephemeris covariance matrix.

AMC1 GE.DEC.SBAS.710 SBAS functions

An SBAS should comply with one or more of the following sections of ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93:

(a) for L1 SBAS ranging: Section 3.7.3.4.3 and Appendix B, Section 3.5.7.2;

(b) for L1 SBAS GNSS satellite status: Appendix B, Section 3.5.7.3;

(c) for L1 SBAS basic differential correction: Appendix B, Section 3.5.7.4;

(d) for L1 SBAS precise differential correction: Appendix B, Section 3.5.7.5;

(e) for DFMC SBAS ranging: Appendix B, Section 3.5.14.2;

(f) for DFMC SBAS ionosphere-free differential correction: Appendix B, Section 3.5.14.3;

(g) the combination of SBAS functions required to provide each of the SBAS service levels: defined in Section 6.2.1;

(h) for service indication: Appendix B, Sections 3.5.4.9 and 3.5.7.6.2;

(i) for the clock–ephemeris covariance matrix: Appendix B, Section 3.5.7.6.3.

DS GE.DEC.SBAS.720 Monitoring

(See AMC1 GE.DEC.SBAS.720)

An SBAS provides monitoring functions that are commensurate with the intended use.

AMC1 GE.DEC.SBAS.720 Monitoring

An SBAS should:

(a) for an SBAS L1 signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.7.7;

(b) for an SBAS DFMC signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.14.4.

PERFORMANCE

DS GE.DEC.SBAS.730 SBAS performance

(See AMC1 GE.DEC.SBAS.730 and AMC2 GE.DEC.SBAS.730)

SBAS performance is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.SBAS.730 SBAS performance

SBAS performance should:

(a) for signal-in-space performance, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.2.4;

(b) for service area, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.4.4.

AMC2 GE.DEC.SBAS.730 SBAS performance

When combined with one or more GNSS elements and a fault-free receiver, the SBAS robustness to core satellite constellation failures should:

(a) for L1 SBAS, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.7.8;

(b) for DFMC SBAS, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.14.5.

INTERFACE

DS GE.DEC.SBAS.740 SBAS interfaces

(See AMC1 GE.DEC.SBAS.740)

SBAS interfaces are to be suitable for the intended use in the intended operational environment. The subsystem is to provide interfaces that support corresponding levels of function and performance as required in DS GE.DEC.SBAS.710, DS GE.DEC.SBAS.720 and DS GE.DEC.SBAS.730.

AMC1 GE.DEC.SBAS.740 SBAS interfaces

(a) Radio frequency characteristics, should:

(1) for an SBAS L1 signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume 1: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.4.5 and Appendix B, Section 3.5.2;

(2) for an SBAS L5 signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.4.6 and Appendix B, Section 3.5.9.

(b) SBAS network time should:

(1) for L1 SBAS, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.4.7.1;

(2) for DFMC SBAS, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.4.7.2.

(c) L1 SBAS navigation information should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.4.8.

(d) DFMC SBAS navigation information should comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Section 3.7.3.4.9.

DS GE.DEC.SBAS.750 SBAS data applications

(See AMC1 GE.DEC.SBAS.750)

SBAS data parameters are to be suited for the intended use in the intended operational environment.

AMC1 GE.DEC.SBAS.750 SBAS data applications

SBAS data parameters should:

(a) for an SBAS L1 signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.5;

(b) for an SBAS DFMC signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.12.

DS GE.DEC.SBAS.760 SBAS message tables

(See AMC1.GE.DEC.SBAS.760)

SBAS message format is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.SBAS.760 SBAS message tables

SBAS message format should:

(a) for an SBAS L1 signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.6;

(b) for an SBAS DFMC signal, comply with ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Appendix B, Section 3.5.13.

DS GE.DEC.SBAS.770 Interfaces between SBASs

(See GM1 GE.DEC.SBAS.770)

The interfaces between SBASs are to be suitable for the intended use in the intended operational environment.

GM1 GE.DEC.SBAS.770 Interfaces between SBASs

Guidance material on the interfaces between different SBAS service providers is provided in ICAO Annex 10 — Aeronautical Telecommunications, Volume I: Radio Navigation Aids, Eighth Edition, July 2023, incorporating Amendment No 93, Attachment D, Section 6.3.

Subpart C — Surveillance (SUR)

Section 1 — General — DEC.SURGEN.2

DS GE.DEC.~~MSS~~SUR.101 Scope

This Subpart provides standards applicable to the following surveillance technologies:

(a) Mode S;

(b) ADS-B;

(c) wide area multilateration (WAM);~~.~~

(d) primary surveillance radar (PSR);

(e) multilateration (MLAT);

(f) surface movement radar (SMR).

Section 2 — Mode S ground station (MSS) — DEC.MSGS.1

[…]

FUNCTION

DS GE.DEC.MSS.210 Data items

(See AMC1 GE.DEC.MSS.210)

The MSS has the capability to detect aircraft equipped with a transponder and provide the following ~~the~~ data items:

[…]

PERFORMANCE

[…]

AMC1 GE.DEC.MSS.230 MSS performance

[…]

~~(c) Additional performance conditions applicable to the intended use of the MSS may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed~~.

Section 3 — ADS-B — DEC.ADSB.1

[…]

PERFORMANCE

[…]

AMC1 GE.DEC.ADSB.320 ADS-B surveillance equipment performance

(a) […]

~~(b) Additional performance conditions applicable to the intended use of ADS-B surveillance equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.~~

Section 4 — Wide area multilateration (WAM) — DEC.AWAM.1

~~General~~

~~Reserved~~

APPLICABILITY

DS GE.DEC.WAM.401 Scope

This Section provides the functional, performance and interface standards applicable to WAM surveillance equipment composed of the following elements:

(a) receivers,

(b) interrogators,

(c) central processor,

(d) network equipment,

(e) control and monitoring.

FUNCTION

DS GE.DEC.WAM.410 WAM function

(See AMC1 GE.DEC.WAM.410 and GM1 GE.DEC.WAM.410)

WAM surveillance equipment has the capability to detect aircraft equipped with a transponder and to provide the following data items:

(a) measured horizontal position (WGS84 coordinates);

(b) barometric pressure altitude (flight level and Mode C code);

(c) aircraft identification (aircraft/target identification and Mode 3/A code);

(d) communications / airborne collision avoidance system (ACAS) capability and flight status, including:

(1) special position indicator (SPI),

(2) flight status (on ground / airborne);

(e) time of applicability;

(f) time of report transmission;

(g) horizontal position accuracy;

(h) 24-bit ICAO aircraft address;

(i) ACAS resolution advisories;

(j) comm-B data selector (BDS) register data, including:

(1) data link capability,

(2) ground-initiated comm-B (GICB) capability,

(3) MCP/FCU selected altitude,

(4) roll angle,

(5) true track angle,

(6) ground speed,

(7) magnetic heading,

(8) indicated airspeed,

(9) Mach number,

(10) vertical rate,

(11) barometric pressure setting,

(12) track angle rate,

(13) true airspeed;

(k) system and service status reports.

AMC1 GE.DEC.WAM.410 WAM function

(a) WAM surveillance equipment should comply with EUROCAE ED-142 — Technical Specification for Wide Area Multilateration (WAM) Systems, Sections 2.2, 3.2.1, 3.2.2.1 and 3.2.2.2.

(b) The Mode S interrogator used by the WAM system should comply with PART 3, Subpart C, Section 2 ‘Mode S ground station (MSS)’, of this DS.

GM1 GE.DEC.WAM.410 WAM function

Additional information with regard to system requirement testing can be found in EUROCAE ED-142 — Technical Specification for Wide Area Multilateration (WAM) Systems, Section 5.4.

PERFORMANCE

DS GE.DEC.WAM.420 WAM performance

(See AMC1 GE.DEC.WAM.420 and GM1 GE.DEC.WAM.420)

WAM surveillance equipment performance is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.WAM.420 WAM performance

WAM surveillance equipment should comply with EUROCAE ED-142 — Technical Specification for Wide Area Multilateration (WAM) Systems, Section 3.3.

GM1 GE.DEC.WAM.420 WAM performance

Additional information with regard to testing can be found in EUROCAE ED-142 — Technical Specification for Wide Area Multilateration (WAM) Systems, Section 5.4.

INTERFACE

DS GE.DEC.WAM.430 WAM interfaces

(See AMC1 GE.DEC.WAM.430)

WAM surveillance equipment interfaces support the functions and levels of performance as required in DS GE.DEC.WAM.410 and DS GE.DEC.WAM.420.

AMC1 GE.DEC.WAM.430 WAM interfaces

(a) WAM surveillance equipment should output the following data items:

(1) target report (plot/track) data,

(2) service messages (overall system status, subsystem status, WAM reference position).

(b) Point (a) outputs should comply with:

(1) EUROCONTROL-SPEC-0149-14, Edition 1.11, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 14 Category 20: Multilateration Target Reports;

(2) EUROCONTROL-SPEC-0149-14A, Edition 1.5, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 14 Category 020: Multilateration Target Reports, Appendix A: Reserved Expansion Field;

(3) SUR.ET1.ST05.2000-STD-18-02, Edition 1.3, EUROCONTROL Standard Document for Surveillance Data Exchange — Part 18 Category 019: Multilateration System Status Messages.

Section 5 — Primary surveillance radar (PSR) — DEC.APSR.1

APPLICABILITY

DS GE.DEC.PSR.501 Scope

This Section provides the functional, performance and interface standards applicable to a PSR system composed of the following elements:

(a) transmitter function,

(b) receiver function,

(c) processor function,

(d) control and monitoring function.

FUNCTION

DS GE.DEC.PSR.510 PSR function

(See AMC1 GE.DEC.PSR.510 and GM1 GE.DEC.PSR.510)

The PSR should be capable of detecting aircraft whose characteristics are relevant to its intended use and operational environment and capable of providing range and azimuth information.

AMC1 GE.DEC.PSR.510 PSR function

The PSR should comply with EUROCAE ED-288 — Technical Specification for an Independent Non-cooperative Surveillance (INCS) System, Sections 2.3, 2.4, 2.10, 3.2 and 3.5.

GM1 GE.DEC.PSR.510 PSR function

Additional information with regard to testing can be found in EUROCAE ED-288 — Technical Specification for an Independent Non-cooperative Surveillance (INCS) System, Sections 5 and 6.

PERFORMANCE

DS GE.DEC.PSR.520 PSR performance

(See AMC1 GE.DEC.PSR.520)

PSR performance is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.PSR.520 PSR performance

The PSR should comply with:

(a) EUROCAE ED-288 — Technical Specification for an Independent Non-cooperative Surveillance (INCS) System, Sections 2.7.1, 2.7.2, 2.9, 3.3.1–3.3.4, 3.3.7 and 3.3.8;

(b) ETSI EN 303 364-1-1 (V1.1.1) (2025-06) Primary Surveillance Radar (PSR); Harmonised Standard for access to radio spectrum; Part 1: Air Traffic Control (ATC) PSR sensors operating in the frequency band 1 215 MHz to 1 400 MHz (L band); Sub-part 1: Radar systems using reflector antennas,

or

ETSI EN 303 364-2 (V1.1.1) (2021-02) Primary Surveillance Radar (PSR); Harmonised Standard for access to radio spectrum; Part 2: Air Traffic Control (ATC) PSR sensors operating in the frequency band 2 700 MHz to 3 100 MHz (S band),

or

ETSI EN 303 364-3 (V1.1.1) (2019-07) Primary Surveillance Radar (PSR); Harmonised Standard for access to radio spectrum; Part 3: Air Traffic Control (ATC) PSR sensors operating in the frequency band 8 500 MHz to 10 000 MHz (X band).

GM1 GE.DEC.PSR.520 PSR performance

Additional information with regard to testing can be found in EUROCAE ED-288 — Technical Specification for an Independent Non-cooperative Surveillance (INCS) System, Sections 5 and 6.

INTERFACE

DS GE.DEC.PSR.530 PSR interfaces

(See AMC1 GE.DEC.PSR.530)

PSR interfaces support the functions and levels of performance as required in DS GE.DEC.PSR.510 and DS GE.DEC.PSR.520.

AMC1 GE.DEC.PSR.530 PSR interfaces

The PSR should comply with:

(a) EUROCAE ED-288 — Technical Specification for an Independent Non-cooperative Surveillance (INCS) System, Section 2.2;

(b) EUROCONTROL-SPEC-0149-28, Edition 1.2, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 28 Category 015: INCS System Target Reports;

(c) EUROCONTROL-SPEC-0149-30, Edition 1.0, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 30 Category 016: Independent Non-Cooperative Surveillance System Configuration Reports;

(d) EUROCONTROL-SPEC-0149-26, Edition 1.5, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 26 Category 025: CNS/ATM Ground System Status Reports;

(e) EUROCONTROL-SPEC-0149-2b, Edition 1.29, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 2b Category 034: Monoradar Service Messages;

(f) EUROCONTROL-SPEC-0149-4, Edition 1.32, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 4 Category 048: Monoradar Target Reports;

(g) EUROCONTROL-SPEC-0149-4A, Edition 1.13, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 4 Category 048: Monoradar Target Reports — REF, Appendix A: Reserved Expansion Field;

(h) EUROCONTROL-SPEC-0149-20, Edition 1.3, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 20 Category 247: Version Number Exchange;

(i) EUROCONTROL-SPEC-0149-20A, Edition 1.0, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 20 Category 247: Version Number Exchange, Appendix A: Reserved Expansion Field.

Section 6 — Multilateration (MLAT) — DEC.MLAT.1

APPLICABILITY

DS GE.DEC.MLAT.601 Scope

This Section provides the functional, performance and interface standards applicable to multilateration (MLAT) equipment used for aerodrome surface surveillance consisting of the following elements:

(a) receivers,

(b) interrogators,

(c) central processor,

(d) network equipment,

(e) control and monitoring.

FUNCTION

DS GE.DEC.MLAT.610 MLAT function

(See AMC1 GE.DEC.MLAT.610)

(a) MLAT has the capability to detect aircraft equipped with a transponder and to provide the following data items:

(1) measured horizontal position (WGS84 coordinates and/or Cartesian coordinates);

(2) barometric pressure altitude (flight level and Mode C code);

(3) aircraft identification (aircraft/target identification and Mode 3/A code);

(4) communications/ACAS capability and flight status, including:

(i) special position indicator (SPI),

(ii) flight status (on ground / airborne);

(5) time of applicability;

(6) 24-bit ICAO aircraft address;

(7) duplicated or illegal Mode S aircraft address;

(8) system and service status reports.

(b) MLAT has the capability to detect aircraft equipped with an ADS-B transmitter and provide the following data items:

(1) 24-bit ICAO aircraft address;

(2) aircraft identification (aircraft/target identification and Mode 3/A code);

(3) special position indication (SPI);

(4) emergency status;

(5) ADS-B version number;

(6) ADS-B emitter category;

(7) horizontal position (WGS84);

(8) horizontal position quality indicators;

(9) system design assurance;

(10) velocity over ground;

(11) velocity quality indicator;

(12) aircraft length and width;

(13) GNSS antenna offset;

(14) vertical rate;

(15) selected altitude;

(16) barometric pressure setting;

(17) ACAS active resolution advisories.

AMC1 GE.DEC.MLAT.610 MLAT function

MLAT should comply with EUROCAE ED-117A — Minimum Operational Performance Specification for Mode S Multilateration Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Sections 2.4, 2.5, 2.6.5, 3.1.1 to 3.1.5 inclusive, 3.1.6.1.1, 3.1.6.3 and 3.1.6.4.

PERFORMANCE

DS GE.DEC.MLAT.620 MLAT performance

(See AMC1 GE.DEC.MLAT.620 and GM1 GE.DEC.MLAT.620)

MLAT performance is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.MLAT.620 MLAT performance

MLAT should comply with:

(a) EUROCAE ED-117A — Minimum Operational Performance Specification for Mode S Multilateration Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Sections 2.6.6, 2.7 and 3.3;

(b) ETSI EN 303 213-5-1 (V2.1.1) (2023-10) Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 5: Harmonised Standard for access to radio spectrum for Multilateration (MLAT) equipment; Subpart 1: Receivers and interrogators.

GM1 GE.DEC.MLAT.620 MLAT performance

Additional information with regard to testing can be found in EUROCAE ED-117A — Minimum Operational Performance Specification for Mode S Multilateration Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Section 5 and Appendix 1.

INTERFACE

DS GE.DEC.MLAT.630 MLAT interfaces

(See AMC1 GE.DEC.MLAT.630)

MLAT interfaces support the functions and levels of performance as required in DS GE.DEC.MLAT.610 and DS GE.DEC.MLAT.620.

AMC1 GE.DEC.MLAT.630 MLAT interfaces

MLAT interfaces should comply with:

(a) EUROCAE ED-117A — Minimum Operational Performance Specification for Mode S Multilateration Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Section 2.4;

(b) EUROCONTROL-SPEC-0149-14, Edition 1.11, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 14 Category 20: Multilateration Target Reports;

(c) EUROCONTROL-SPEC-0149-14A, Edition 1.5, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 14 Category 020: Multilateration Target Reports, Appendix A: Reserved Expansion Field;

(d) SUR.ET1.ST05.2000-STD-18-02, Edition 1.3, EUROCONTROL Standard Document for Surveillance Data Exchange — Part 18 Category 019: Multilateration System Status Messages;

(e) EUROCONTROL-SPEC-0149-26, Edition 1.5, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 26 Category 025: CNS/ATM Ground System Status Reports;

(f) EUROCONTROL-SPEC-0149-12, Edition 2.6, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 12 Category 21: ADS-B Target Reports;

(g) EUROCONTROL-SPEC-0149-12A, Edition 1.5, EUROCONTROL Specification for Surveillance Data Exchange — ASTERIX Part 12 Category 021: ADS-B Target Reports, Appendix A: Reserved Expansion Field.

Section 7 — Surface movement radar (SMR) — DEC.ASMR.1

APPLICABILITY

DS GE.DEC.SMR.701 Scope

This Section provides the functional, performance and interface standards applicable to surface movement radar (SMR) equipment composed of the following elements:

(a) antenna unit,

(b) transmitter unit,

(c) receiver unit,

(d) target extractor unit,

(e) control and monitoring unit.

FUNCTION

DS GE.DEC.SMR.710 SMR function

(See AMC1 GE.DEC.SMR.710)

SMR has the capability to detect aircraft, vehicles and obstacles and provide the following data items:

(a) message type,

(b) data source identifier,

(c) target report descriptor,

(d) time,

(e) position report,

(f) target size and orientation,

(g) system status.

AMC1 GE.DEC.SMR.710 SMR function

(a) SMR should comply with EUROCAE ED-116 — Minimum Operational Performance Specification for Surface Movement Radar Sensor Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Sections 2.3, 2.8 (paragraph 2), 2.9.3, 2.9.4, 2.9.5, 2.9.6, 2.10, 2.12, 2.14, 2.20.3, 2.21.3 and 3.3.1.

(b) SMR should provide a slant range correction commensurate with antenna height.

PERFORMANCE

DS GE.DEC.SMR.720 SMR performance

(See AMC1 GE.DEC.SMR.720 and GM1 GE.DEC.SMR.720)

SMR performance is to be suitable for the intended use in the intended operational environment.

AMC1 GE.DEC.SMR.720 SMR performance

(a) The SMR should comply with:

(1) EUROCAE ED-116 — Minimum Operational Performance Specification for Surface Movement Radar Sensor Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Sections 2.20.1, 2.20.2, 3.4.1–3.4.9 and 3.4.11–3.4.13;

(2) ETSI EN 303 213-6-1 (V3.1.1) (2019-07) Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 6: Harmonised Standard for access to radio spectrum for deployed surface movement radar sensors; Sub-part 1: X-band sensors using pulsed signals and transmitting power up to 100 kW;

(3) ETSI EN 301 489-54 (1.1.1) (2023-04) ElectroMagnetic Compatibility (EMC) Standard for Radio Equipment and Services; Part 54: Specific conditions for ground based aeronautical and meteorological radars; Harmonised Standard for electromagnetic compatibility.

(b) The SMR should provide a control and monitoring interface based on standard communication protocols.

GM1 GE.DEC.SMR.720 SMR performance

Additional information with regard to testing can be found in EUROCAE ED-116 — Minimum Operational Performance Specification for Surface Movement Radar Sensor Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Sections 4, 5 and 6.

INTERFACE

DS GE.DEC.SMR.730 SMR interfaces

(See AMC1 GE.DEC.SMR.730)

SMR interfaces support the functions and levels of performance as required in DS GE.DEC.SMR.710 and DS GE.DEC.SMR.720.

AMC1 GE.DEC.SMR.730 SMR interfaces

The SMR should comply with:

(a) EUROCAE ED-116 — Minimum Operational Performance Specification for Surface Movement Radar Sensor Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Section 2.12;

(b) SUR.ET1.ST05.2000-STD-07-01, Edition 1.1, EUROCONTROL Standard Document for Surveillance Data Exchange — ASTERIX Part 7 Category 010: Transmission of Monosensor Surface Movement Data.