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Advanced Surface Movement Guidance and Control System (A-SMGCS);
Part 3: Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed cooperative sensor including its interfaces

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Contents

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been produced by ETSI in response to mandate M/390 from the European Commission issued under Council Directive 98/34/EC [i.5] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations. The present document has been developed in cooperation with EUROCAE to support Essential Requirements of the Single European Sky Interoperability Regulation 552/2004 [i.1] and/or requirements given in implementing rules for interoperability based on the Single European Interoperability Regulation as defined in the Regulation (EC) N°716/2014 [i.8] (the "PCP regulation").

The presumption of conformity which is linked to the full application of ETSI EN 303 213 (parts 1 to 4, 7 and 8) can only be claimed after ETSI EN 303 213 (parts 1 to 4, 7 and 8) has been listed in the Official Journal of the European Union as Community Specification.

General and specific requirements for presumption of conformity to SES Interoperability Regulation 552/2004 [i.1] as amended by Regulation 1070/2009 [i.6] are given in the normative annexes of the present document.

NOTE: Other requirements and other EU Regulations and/or Directives may be applicable to the product(s) falling within the scope of the present document.

The present document is part 3 of a multi-part deliverable covering Advanced Surface Movement Guidance and Control System (A-SMGCS), as identified below:

Part 1: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS surveillance service including external interfaces";

Part 2: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS airport safety support service";

Part 3: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed cooperative sensor including its interfaces";

Part 4: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed non-cooperative sensor including its interfaces";

Part 5: "Harmonised Standard for access to the radio spectrum for multilateration equipment;

Part 6: "Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU for deployed surface movement radar sensors";

Part 7: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS routing service";

Part 8: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS guidance service".

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The European Union launched the Legislation "Single European Sky" (SES) in 2002 which was adopted in 2004 and amended by Regulation (EC) No 1070/2009 [i.6].

The SES legislation is based on a framework of 4 regulations, which includes the Interoperability Regulation [i.1]. The objective of the Interoperability Regulation is to ensure interoperability of the European Air Traffic Management Network (EATMN) consistent with air navigation services. Under this regulation, the use of a European Standard referenced in the Official Journal of the European Union as Community Specification (CS) is a means of compliance to the essential requirements of the Regulation and/or the relevant implementing rules for interoperability.

The present document takes into account the Council Decision 2009/320/EC [i.4] endorsing the European Air Traffic Management Master Plan of the Single European Sky ATM Research (SESAR) project.

This updated version takes into account the updated referenced documents from EUROCONTROL as well as Regulation (EC) No 716/2014 [i.8] (the "PCP regulation").

1 Scope

The present document is applicable to Advanced Surface Movement Guidance and Control System (A-SMGCS) Surveillance Service. This system provides enhanced surveillance functionalities, as well as a display to controllers with accurate and unambiguous identity and position information on the entire manoeuvring and movement area of aerodromes.

The present document provides a European Standard for Air Navigation Service Providers and/or Airport Operators, who have to demonstrate and declare compliance of their systems and procedures to the IOP regulation [i.1].

Any software elements related to the software assurance level of an A-SMGCS are outside of the scope of the present document. As such the essential requirements of the Interoperability Regulation are not considered for software elements within the present document.

The present document does not give presumption of conformity related to the maintenance requirements, constraints, procedure level, effect of harmful interference and civil/military coordination.

NOTE 1: For these ERs, please refer to the Air Navigation Service Provider procedures.

Requirements in the present document which refer to "should" statements or recommendations in the normatively referenced material (clause 2.1) are only to be interpreted as fully normative ("shall") for the purpose of compliance with the present document if they are unambiguously referred to from the present document. The reference to particular requirements is done either by citing the unambiguous requirement number or range of numbers (e.g. "[REQ 30.] to [REQ 35.]") or, if no requirement numbers are available, by indicating the paragraph and clause of the reference material where the requirement can be found.

The present document does not give presumption of conformity to any current interoperability Implementing Rules.

NOTE 2: Currently there are no relevant Implementing Rules for A-SMGCS.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] EUROCAE ED-117A, September 2016: "Minimum Operational Performance Specification for Mode S Multilateration Systems for use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS)".

[2] EUROCAE ED-87C, January 2015: "MASPS for Advanced Surface Movement Guidance and Control Systems (A-SMGCS)".

[3] EUROCONTROL-SPEC-171: "EUROCONTROL Specification for Advanced-Surfaced Movement Guidance and Control System (A-SMGCS) Services" (Edition 1, March 2018).

[4] ETSI EN 300 019-1-3 (V2.4.1) (04-2014): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations".

[5] ETSI EN 300 019-1-4 (V2.2.1) (04-2014): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weatherprotected locations".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (interoperability Regulation), OJ L 96, 31.03.2004, p. 26 as amended by Regulation (EC) No 1070/2009, OJ L 300, 14.11.2009, p. 34.

[i.2] Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation), OJ L 96, 31.03.2004, p. 1 as amended by Regulation (EC) No 1070/2009, OJ L 300, 14.11.2009, p. 34.

[i.3] ICAO Document 9830, AN/452: "Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual", First Edition, 2004.

[i.4] Council Decision 2009/320/EC endorsing the European Air Traffic Management Master Plan of the Single European Sky ATM Research (SESAR) project, 30.03.2009.

[i.5] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

[i.6] Regulation (EC) No 1070/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulations (EC) No 549/2004, (EC) No 550/2004, (EC) No 551/2004 and (EC) No 552/2004 in order to improve the performance and sustainability of the European aviation system, OJ L 300, 14.11.2009.

[i.7] Void.

[i.8] Regulation (EC) No 716/2014 of the European Parliament and of the Council of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan.

[i.9] ETSI EN 303 213-1: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 1: Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS Level 1 including external interfaces".

[i.10] ETSI EN 303 213-2: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 2: Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS Level 2 including external interfaces".

[i.11] ETSI EN 303 213-4 (all sub-parts): "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 4: Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed non-cooperative sensor including its interfaces".

[i.12] ETSI EN 303 213-7: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 7: Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS routing service".

[i.13] ETSI EN 303 213-8: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 8: Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS guidance service".

3 Definition of terms and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in clause 1.4.1 of ED-117A [1], clause 1.7 of EUROCONTROL Specification for A-SMGCS Services [3] and the following apply:

advanced surface movement guidance and control system: system providing as a minimum surveillance

NOTE 1: It can include Airport Safety Support, Routing and Guidance to aircraft and vehicles in order to maintain the airport throughput under all local weather conditions whilst maintaining the required level of safety.

NOTE 2: This definition is derived from the EUROCONTROL Specification for A-SMGCS Services [i.3].

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

NOTE: This definition is derived from the ICAO Document 9830 [i.3].

apron: area on an aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance

NOTE 1: This definition is derived from the ICAO Document 9830 [i.3].

NOTE 2: De-icing platforms, including remote de-icing areas, are considered as apron areas.

availability: probability that a system or an item is in a functioning state at a given point in time

NOTE: This definition is derived from EUROCAE ED-87C [1].

classification: function which groups targets into various types (e.g. large, medium, small)

constituents: tangible objects such as hardware and intangible objects such as software upon which the interoperability of the EATMN depends

NOTE: This is the legally binding definition in the context of Single European Sky [i.2].

manoeuvring area: part of an aerodrome to be used for take-off, landing and taxiing of aircraft, excluding aprons

NOTE: This definition is derived from the ICAO Document 9830 [i.3].

movement area: part of an aerodrome to be used for take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and apron(s)

NOTE: This definition is derived from the ICAO Document 9830 [i.3].

procedure: standard method for either the technical or operational use of the system, in the context of agreed and validated concepts of operation requiring uniform implementation throughout the EATMN

NOTE: This is the legally binding definition in the context of Single European Sky [i.2].

system: aggregation of airborne and ground based constituents, as well as space-based equipment, that provides support for air navigation services for all phases of flight

NOTE: This is the legally binding definition in the context of Single European Sky [i.2].

target: vehicle or aircraft equipped with a Mode S, Mode A/C transponder or non-transponder device, which has been turned on and is functioning in compliance with its minimum operational performance specification

NOTE 1: Aircraft and vehicles are collectively referred to as mobiles.

NOTE 2: This definition is derived from EUROCAE ED-117A [1].

test targets: form of either fixed reflectors or active devices transponders, mounted at fixed positions or moving (with a known reference position) within the coverage volume

update: renewal of target reports relating to all targets under surveillance

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

A-SMGCS	Advanced Surface Movement Guidance and Control Systems
ASTERIX	All-purpose Structured EUROCONTROL Surveillance Information Exchange
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Service
CS	Community Specification
doa	date of announcement
dow	date of withdrawal
EATMN	European Air Traffic Management Network
EC	European Communities
EN	European Norm - (standard)
ER	Essential Requirement
EUROCAE	EURopean Organization for Civil Aviation Equipment
EUROCONTROL	EURopean Organization for the safety of air navigation
HMI	Human Machine Interface
ICAO	International Civil Aviation Organization
IOP Regulation	Interoperability Regulation
MASPS	Minimum Aviation Systems Performance Specification
MLAT	MuLtilATeration
PRA	Position Registration Accuracy
SES	Single European Sky
TMA	Terminal Manoeuvring Area

4 Requirements for implementing cooperative sensors for A-SMGCS Systems

4.1 Design Requirements for cooperative sensors for A-SMGCS Systems

4.1.1 Operating principles of the cooperative sensor

The operating principles of the cooperative sensor are defined in ED-117A [1], clause 1.6.2. The cooperative sensor shall receive Mode S messages as defined in ED-117A [1], clause 2.4.1 [REQ 5.].

4.1.2 Certification

The cooperative sensor shall comply with the requirements as defined in ED-117A [1], clause 2.3, [REQ 1.] and clause 2.8.1 [REQ 24.].

4.1.3 Software and Hardware Design

The Software and the design of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], clause 2.1 [REQ 1.], [REQ 2.], [REQ 3.], [REQ 4.] and clause 2.8 [REQ 22.], [REQ 23.], [REQ 25.] and [REQ 26.] and clause 2.9. All MLAT electrical equipment shall operate from standard mains voltage and frequency at the Aerodrome as defined in ED-117A [1], clause 2.8 [REC 17].

4.1.4 Capacity

The capacity of the cooperative sensor shall comply with the requirements as defined in ED-117A [1] 3.3.12. [REQ 66.], [REQ 67.] and [REQ 68.].

4.1.5 Void

4.1.6 System coverage

The system coverage of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], clause 3.1.1 [REQ 27.] and clause 3.3.2 [REQ 56.].

4.1.7 Identification

The identification within the cooperative sensor shall comply with the requirements as defined in ED-117A [1], clause 3.3.6 [REQ 60.], clause 3.3.7 [REQ 61.], clause 3.3.8 [REQ 62.] and ED-87C [2] 2.3.1.1.

4.1.8 Surveillance data output

The surveillance data output of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], clause 2.4.2 [REQ 6.] and [REQ 7], clause 3.1.6 [REQ 44.], [REQ 45.], [REQ 46.], clause 3.1.6.1 [REQ 48.], clause 3.1.6.2 [REQ 50.], clause 3.1.6.3 [REQ 51.] and [REQ 52.] and ED-87C [1] 2.3.1.2. As defined in ED-117A [1], clause 3.1.6, the MLAT System shall output MLAT Target Reports in accordance with ASTERIX Category 10 to support legacy systems.

4.1.9 Update Rate

The Target Report Update Rate of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], clause 3.1.6.3 [REQ 51.] and clause 3.3.3 [REQ 57.].

4.1.10 Integrity

The Integrity of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], clause 2.7. [REQ 21.].

As defined in ED-117A [1], clause 2.7 [REC 13.], mechanisms shall be put into place to inform the users of areas where performance has been reduced in a way that may affect the operation.

As defined in ED-117A [1], clause 2.7 [REC 14.], sensor cases and antennas shall be mounted on a suitable building, mast, or tower.

As defined in ED-117A [1], clause 2.7 [REC 15.], the stability of the installation site shall ensure system performance requirements under all specified operating weather conditions, in particular the specified operating wind speed and ice loading.

4.1.11 Expandability

The cooperative sensor shall be expandable as defined in ED-117A [1], clause 2.9.5 [REC 19.].

4.1.12 ASTERIX Interface

The cooperative sensor shall provide an ASTERIX Interface as defined in ED-117A [1], clause 3.1.6 [REQ 45.], [REQ 46.], [REQ 47.].

4.1.13 Mode S target processing

The cooperative sensor shall be capable to process Mode S target positions as defined in ED-117A [1], clause 3.1.1 [REQ 27.] and process duplicate aircraft addresses according to clause 3.1.2 [REQ 28.] and [REQ 29.].

The mode S target processing shall meet the requirements for reported position accuracy as defined in ED-117A [1], clause 3.3.9 [REQ 63.] and for gaps as defined in ED-117A [1] in clause 3.3.10 [REQ 64.].

4.1.14 Mode S Interrogation

The cooperative sensor shall be capable of interrogating mode S transponders as defined in ED-117A [1], clause 3.1.3 [REQ 31.] to [REQ 38.].

4.1.15 Reference transponders

Any test and reference transponders of the multilateration system shall perform as defined in ED-117A [1], clause 3.1.4 [REQ 39.] and [REQ 40.].

4.1.16 Target Report Initiation Time

The cooperative sensor shall have a target report initiation time as defined in ED-117A [1], clause 3.3.11 [REQ 65.].

4.1.17 Probability of Target Report

The cooperative sensor shall have a probability of target report as defined in ED-117A [1], clauses 3.3.4 [REQ 58.] and a Probability of False Detection requirement as defined in ED-117A [1], clause 3.3.5 [REQ 59.].

4.1.18 Probability of False Identification

The cooperative sensor shall comply with the Probability of False Identification requirement as defined in ED-117A [1], clause 3.3.7 [REQ 61.].

4.1.19 Switchover Time

For redundant systems the Switchover time shall comply with the requirement as defined in ED-117A [1], clause 3.3.15 [ORQ 15.].

4.1.20 Latency

The constituent latency shall meet the values specified in ED-117A [1], clause 3.3.13 [REQ 69.] when operating in data driven output mode.

4.2 Acceptance testing requirements for cooperative sensors for A-SMGCS Systems

4.2.1 Surveillance Element tests

The cooperative sensor shall perform the surveillance element tests as defined in ED-87C [2], clause 5.8.

4.2.2 Basic tests

The cooperative sensor shall perform the basic conformity tests as defined in ED-117A [1], clause 5.3.

4.2.3 Performance tests

The cooperative sensor shall perform the performance tests as defined in ED-117A [1], clauses 5.4 and 5.5.

4.3 Maintenance Requirements for cooperative sensors for A-SMGCS Systems

4.3.1 Continuity of Service

The cooperative sensor shall comply with the Continuity of Service requirement as defined in ED-117A [1], clauses 2.6.2, 2.6.3 and 2.6.46 [REQ 17.] and 2.6.5 [REQ 19.] and 2.6. [REQ 20.].

4.3.2 Service Life

The cooperative sensor shall comply with the Service life requirement as defined in ED-117A [1], clause 2.6.4, [REQ 18.].

4.4 Requirements for operation of cooperative sensors for A-SMGCS Systems

To ensure seamless operation, the constituent shall share and provide its information via the interfaces as defined in ED-87C [1], clause 2.5.1.1, ED-117A [1], clauses 3.1.6 [REQ 44.], [REQ 45.], [REC 20.], [REQ 46.], clause 3.1.6.1 [REQ 48.], clause 3.1.6.2 [REQ 50.], clause 3.1.6.3 [REQ 51.] and [REQ 52.] and ED-87C [1] 2.3.1.2.

For interoperability of the multilateration sensor with an A-SMGCS the constituent shall report integrity information as defined in ED-87C [1], clause 4.1.1, second and third paraphrase.

The constituent shall provide time synchronisation as defined in ED-87C [1], clause 4.1.3. and ED-117A [1], clause 2.4.3 [REQ 8.], and 3.3.14, [REQ 70.] and [REQ 71.].

4.5 Environmental Requirements for cooperative sensors for A-SMGCS Systems

4.5.1 Temperature and Humidity tolerance

The multilateration system ground station equipment shall be suitable for operation in partly temperature controlled locations, under the temperature and humidity conditions defined within ETSI EN 300 019 1-3 Class 3.2 [5].

The multilateration system ground station equipment installed at outdoor locations shall be suitable for operation in non-weather protected environments, under the conditions defined within ETSI EN 300 019 1-4 Class 4.1 [5].

The multilateration system central processing equipment shall be suitable for operation in temperature controlled locations, under the temperature and humidity conditions defined within ETSI EN 300 019 1-3 Class 3.6 [4].

4.5.2 Electromagnetic Interference and Susceptibility

The cooperative sensor shall comply with the Electromagnetic Interference and Susceptibility requirement as defined in ED-117A [1], clause 2.3, [REQ 2.], [REQ 3.] and [REQ 4.].

5 Testing

5.1 Surveillance Element tests

The cooperative sensor shall perform the surveillance element tests as defined in ED-87C [2], clause 5.8.

5.2 Basic tests

The cooperative sensor shall perform the basic conformity tests as defined in ED-117A [1], clause 5.3.

5.3 Performance tests

The cooperative sensor shall perform the performance tests as defined in ED-117A [1], clauses 5.4 and 5.5.

Annex SA (normative): Standards Annex

SA.1 Correspondence between the present document and the Single European Sky Interoperability Regulation as amended by Regulation (EC) No 1070/2009 for A SMGCS

The present annex provides a relationship between the present document and the Essential Requirements of the Single European Sky Interoperability Regulation [i.1] as amended by [i.6].

A-SMGCS shall comply with the Essential Requirements of the Interoperability Regulation [i.1] as defined and described in the traceability matrixes of the present annex (see tables SA.1 and SA.2).

Table SA.1: Traceability from the Interoperability Regulation [i.1] to clauses of the present document

Essential requirements (ERs) of SES Interoperability Regulation, Annex II, Part A	Clause(s) of the present document	Qualifying remarks/Notes
ER A.1 Seamless operation.	4.1.1 Operating principles of the cooperative sensor 4.1.2 Certification 4.1.3 Software and Hardware Design 4.1.4 Capacity 4.1.6 System coverage 4.1.7 Identification 4.1.8 Surveillance data output 4.1.9 Update Rate 4.1.10 Integrity 4.1.11 Expandability 4.1.12 ASTERIX Interface 4.1.13 Mode S target processing 4.1.14 Mode S Interrogation 4.1.15 Reference transponders 4.1.16 Target Report Initiation Time 4.1.17 Probability of Target Report 4.1.18 Probability of False Identification 4.1.19 Switchover Time 4.1.20 Latency 4.2.1 Surveillance Element tests 4.2.2 Basic tests 4.2.3 Performance tests 4.3.1 Continuity of Service 4.3.2 Service Life 4.4 Requirements for operation of cooperative sensors for A - SMGCS Systems 4.5.1 Temperature and Humidity tolerance 4.5.2 Electromagnetic Interference and Susceptibility 5.1 Surveillance Element tests 5.2 Basic tests 5.3 Performance tests	-
ER A.2 Support for new concepts of operation.	Operation is only applicable at the system level.	
ER A.3 Safety.	The present document does not give presumption of conformity.	-
ER A.4 Civil-military coordination.	The present document does not give presumption of conformity.	

Essential requirements (ERs) of SES Interoperability Regulation, Annex II, Part A	Clause(s) of the present document	Qualifying remarks/Notes
ER A.5 Environmental constraints.	4.5.1 Temperature and Humidity tolerance 4.5.2 Electromagnetic Interference and Susceptibility	Depending on the installation site (indoor or outdoor) of the constituent, different requirements within the referenced clauses apply.
ER A.6 Principles governing the logical architecture of systems.	4.4 Requirements for operation of cooperative sensors for A-SMGCS Systems	-
ER A.7 Principles governing the construction of systems.	4.1.19 Switchover Time 4.1.20 Latency 4.3.1 Continuity of Service 4.3.2 Service Life	Switchover Time applies for constituents with redundant setup.
ER 1.1 Seamless operation of airspace management.	n/a	
ER 2.1 Seamless operation of air traffic flow management.	n/a	
ER 3.1.1 Seamless operation of flight data processing.	n/a	
ER 3.1.2 Support for new concepts of operation for flight data processing.	n/a	
ER 3.2.1 Seamless operation surveillance data processing systems.	n/a	
ER 3.2.2 Support for new concepts of operation for surveillance data processing systems.	n/a	
ER 3.3.1 Seamless operation of HMI systems.	n/a	
ER 3.3.2 Support for new concepts of operation for HMI systems.	n/a	
ER 4.1 Seamless operation of Communications systems and procedures for ground-to-ground, air-to-ground and air-to-air communications.	n/a	
ER 4.2 Support for new concepts of operation for Communications systems and procedures for ground-to-ground, air-to-ground and air-to-air communications.	n/a	
ER 5.1 Seamless operation of Navigation systems and procedures.	n/a	

Essential requirements (ERs) of SES Interoperability Regulation, Annex II, Part A	Clause(s) of the present document	Qualifying remarks/Notes
ER 6.1 Seamless operation of Surveillance systems and procedures.	4.1.1 Operating principles of the cooperative sensor 4.1.2 Certification 4.1.3 Software and Hardware Design 4.1.4 Capacity 4.1.6 System coverage 4.1.7 Identification 4.1.8 Surveillance data output 4.1.9 Update Rate 4.1.10 Integrity 4.1.11 Expandability 4.1.12 ASTERIX Interface 4.1.13 Mode S target processing 4.1.14 Mode S Interrogation 4.1.15 Reference transponders 4.1.16 Target Report Initiation Time 4.1.17 Probability of Target Report 4.1.18 Probability of False Identification 4.1.19 Switchover Time 4.1.20 Latency 4.2.1 Surveillance Element tests 4.2.2 Basic tests 4.2.3 Performance tests 4.3.1 Continuity of Service 4.3.2 Service Life 4.4 Requirements for operation of cooperative sensors for A-SMGCS Systems 4.5.1 Temperature and Humidity tolerance 4.5.2 Electromagnetic Interference and Susceptibility 5.1 Surveillance Element tests 5.2 Basic tests 5.3 Performance tests	
ER 7.1 Seamless operation of Systems and procedures for aeronautical information services.	n/a	
ER 7.2 Support for new concepts of operation for systems and procedures for aeronautical information services.	n/a	
ER 8.1 Seamless operation of systems and procedures for the use of meteorological information.	n/a	
ER 8.2 Support for new concepts of operation for systems and procedures for the use of meteorological information.	n/a	

Table SA.2: Traceability from clauses of the present document to the Interoperability Regulation [i.1]

Clause(s) of the present document	(Essential) Requirements (ERs) of SES Interoperability Regulation (as amended), Annex II, Parts A and B	Qualifying remarks/Notes
4.1.1 Operating principles of the cooperative sensor	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.2 Certification	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.3 Software and Hardware Design	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.4 Capacity	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.6 System coverage	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.7 Identification	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.8 Surveillance data output	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.9 Update Rate	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.10 Integrity	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.11 Expandability	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.12 ASTERIX Interface	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.13 Mode S target processing	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.14 Mode S Interrogation	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.15 Reference transponders	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.16 Target Report Initiation Time	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.17 Probability of Target Report	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.18 Probability of False Identification	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.19 Switchover Time	ER A.1 Seamless operation. ER A.7 Principles governing the construction of systems. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.1.20 Latency	ER A.1 Seamless operation. ER A.7 Principles governing the construction of systems. ER B.6 Seamless operation of Surveillance systems and procedures.	

Clause(s) of the present document	(Essential) Requirements (ERs) of SES Interoperability Regulation (as amended), Annex II, Parts A and B	Qualifying remarks/Notes
4.2.1 Surveillance Element tests	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.2.2 Basic tests	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.2.3 Performance tests	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.3.1 Continuity of Service	ER A.1 Seamless operation. ER A.7 Principles governing the construction of systems. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.3.2 Service Life	ER A.1 Seamless operation. ER A.7 Principles governing the construction of systems. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.4 Requirements for operation of cooperative sensors for A-SMGCS Systems	ER A.1 Seamless operation. ER A.6 Principles governing the logical architecture of systems. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.5.1 Temperature and Humidity tolerance	ER A.1 Seamless operation. ER A.5 Environmental constraints. ER B.6 Seamless operation of Surveillance systems and procedures.	
4.5.2 Electromagnetic Interference and Susceptibility	ER A.1 Seamless operation. ER A.5 Environmental constraints. ER B.6 Seamless operation of Surveillance systems and procedures.	
5.1 Surveillance Element tests	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
5.2 Basic tests	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	
5.3 Performance tests	ER A.1 Seamless operation. ER B.6 Seamless operation of Surveillance systems and procedures.	

Annex A (normative): Checklist

A.1 General

The purpose of the present annex is to provide a comprehensive traceability of evidence on constituents and system levels against clauses of the Essential Requirements (ERs) of the Interoperability Regulation [i.1] as amended by Regulation EC 1070/2009 [i.6], analysing keywords of these same essential requirements.

These keywords mainly address the phases of design, build, operation and maintenance of systems and constituents as well as specifically required qualities or attributes as defined in the ERs of the Interoperability Regulation [i.1].

A-SMGCS Systems shall comply with the Essential Requirements of the Interoperability Regulation [i.1] as defined and described in the tables of the present annex (table A.1 to table A.23).

NOTE: Whenever "n/a" is used, that means that a given ER and/or an associated "keyword" is not applicable for presumption of conformity.

A.2 Interoperability Regulation Annex II Essential Requirements; Part A: General requirements

Table A.1

1	**ER 1 seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Air traffic management systems and their constituents shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to ensure the seamless operation of the EATMN at all times and for all phases of flight. Seamless operation can be expressed, in particular, in terms of information sharing, including the relevant operational status information, common understanding of information, comparable processing performances and the associated procedures enabling common operational performances agreed for the whole or parts of the EATMN".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
1.1	Designed	ED-117A [1], clause 1.6.2, ED-117A [1], clause 2.3 [REQ 2.], [REQ 3.] and [REQ 4.], ED-117A [1], clause 2.4.1 [REQ 5.], ED-117A [1], clause 2.8 [REQ 22.], [REQ 23.], [REQ 25.], [REQ 26.], [REC 17.], ED-117A [1], clause 2.9.5 [REC 19.], ED-117A [1], clause 3.1.1 [REQ 27.], ED-117A [1], clause 3.1.3 [REQ 31.] to [REQ 38.], ED-117A [1], clause 3.1.4 [REQ 39.] and [REQ 40.], ED-117A [1], clause 3.1.2 [REQ 28.] and [REQ 29.], ED-117A [1], clause 3.3.2 [REQ 56.], ED-117A [1], clause 3.3.4 [REQ 58.], ED-117A [1], clause 3.3.5 [REQ 59.], ED-117A [1], clause 3.3.6 [REQ 60.], ED-117A [1], clause 3.3.7 [REQ 61.], ED-117A [1], clause 3.3.8 [REQ 62.], ED-117A [1], clause 3.3.9 [REQ 63.], ED-117A [1], clause 3.3.10 [REQ 64.], ED-117A [1], clause 3.3.11 [REQ 65.], ED-117A [1], clause 3.3.12 [REQ 66.], [REQ 67.] and [REQ 68.], ED-117A [1], clause 3.3.13 [REQ 69.], ED-117A [1], clause 3.3.15 [ORQ 15.], ETSI EN 300 019 1-3 Class 3.2 [4], ETSI EN 300 019 1-4 Class 4.1 [5], ETSI EN 300 019 1-3 Class 3.6 [4], ED-87C [2], clause 2.3.1.1.	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.

1	**ER 1 seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Air traffic management systems and their constituents shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to ensure the seamless operation of the EATMN at all times and for all phases of flight. Seamless operation can be expressed, in particular, in terms of information sharing, including the relevant operational status information, common understanding of information, comparable processing performances and the associated procedures enabling common operational performances agreed for the whole or parts of the EATMN".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
1.2	Built	ED-117A [1], clause 1.6.2, ED-117A [1], clause 2.4.1 [REQ 5.], ED-117A [1], clause 5.3, ED-117A [1], clauses 5.4 and 5.5, ED-87C [2], clause 5.8.	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.
1.3	Maintained	ED-117A [1], clause 2.6.2, ED-117A [1], clause 2.6.3, ED-117A [1], clause 2.6.4, [REQ 17.] and [REQ 18.], ED-117A [1], clause 2.6.5, [REQ 19.], ED-117A [1], clause 2.6.6, [REQ 20.].	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.
1.4	Operated	ED-117A [1], clause 1.6.2, ED-117A [1], clause 2.4.1 [REQ 5.], ED-117A [1], clause 2.7. [REQ 21.], [REC 13.], [REC 14.] and [REC 15.].	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.
1.5	Information Sharing	ED-117A [1], clause 2.4.2 [REQ 6.] and [REQ 7], ED-117A [1], clause 2.4.3 [REQ 8.], ED-117A [1], clause 3.1.6 [REQ 44.], [REQ 45.], [REC 20.], [REQ 46.], [REQ 47.], ED-117A [1], clause 3.1.6.1 [REQ 48.], ED-117A [1], clause 3.1.6.2 [REQ 50.], ED-117A [1], clause 3.1.6.3 [REQ 51.] and [REQ 52.] and ED-87C [1], clause 2.3.1.2, ED-117A [1], clause 3.3.3. [REQ 57.], ED-117A [1], clause 3.3.14, [REQ 70.] and [REQ 71.], ED-87C [1], clause 2.5.1.1, ED-87C [1], clause 4.1.1, second and third paraphrase, ED-87C [1], clause 4.1.3.	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.

Table A.2

2	**ER 2 Support for new concepts of operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"The EATMN, its systems and their constituents shall support, on a coordinated basis, new agreed and validated concepts of operation that improve the quality, sustainability and effectiveness of air navigation services, in particular in terms of safety and capacity.* *The potential of new concepts, such as collaborative decision-making, increasing automation and alternative methods of delegation of separation responsibility, shall be examined taking due account of technological developments and of their safe implementation, following validation".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
2.1	Validated concepts of operation - safety	Operation is only applicable at the system level.	The present document does not give presumption of conformity.
2.2	Validated concepts of operation - capacity	Operation is only applicable at the system level.	The present document does not give presumption of conformity.
2.3	Validated concepts of operation - quality	Operation is only applicable at the system level.	The present document does not give presumption of conformity.

Table A.3

3	**ER 3 Safety**			
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Systems and operations of the EATMN shall achieve agreed high levels of safety. Agreed safety management and reporting methodologies shall be established to achieve this.* *In respect of appropriate ground-based systems, or parts thereof, these high levels of safety shall be enhanced by safety nets which shall be subject to agreed common performance characteristics.* *A harmonized set of safety requirements for the design, implementation, maintenance and operation of systems and their constituents, both for normal and degraded modes of operation, shall be defined with a view to achieving the agreed safety levels, for all phases of flight and for the entire EATMN.* *Systems shall be designed, built, maintained and operated, using the appropriate and validated procedures, in such a way that the tasks assigned to the control staff are compatible with human capabilities, in both the normal and degraded modes of operation, and are consistent with required safety levels.* *Systems shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to be free from harmful interference in their normal operational environment"*.			
	Keywords	**Evidence on constituent level**	**Evidence on system level**	**Evidence at procedure level**
3.1	Design	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.
3.2	Implementation	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.
3.3	Maintenance	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.
3.4	Operation	Operation is only applicable at the system level.	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.
3.5	Human capabilities	n/a	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.
3.6	Harmful interference	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.

Table A.4

4	**ER 4 Civil-military coordination**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"The EATMN, its systems and their constituents shall support the progressive implementation of civil/military coordination, to the extent necessary for effective airspace and air traffic flow management, and the safe and efficient use of airspace by all users, through the application of the concept of the flexible use of airspace.* *To achieve these objectives, the EATMN, its systems and their constituents shall support the timely sharing of correct and consistent information covering all phases of flight, between civil and military parties.* *Account should be taken of national security requirements".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
4.1	Flexible use of airspace	The present document does not give presumption of conformity	The present document does not give presumption of conformity.
4.2	Timely sharing	n/a	The present document does not give presumption of conformity.
4.3	National security requirements	n/a	The present document does not give presumption of conformity.

Table A.5

5	**ER 5 Environmental constraints**			
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Systems and operations of the EATMN shall take into account the need to minimize environmental impact in accordance with Community legislation".*			
	Keywords	**Evidence on constituent level**	**Evidence on system level**	**Evidence at procedure level**
5.1	Minimize environmental impact - ATS	ETSI EN 300 019 1-3 Class 3.2 [4] ETSI EN 300 019 1-4 Class 4.1 [5] ETSI EN 300 019 1-3 Class 3.6 [4] ED-117A [1], clause 2.3 [REQ 2.], [REQ 3.] and [REQ 4.]	n/a	The present document does not give presumption of conformity.
5.2	Minimize environmental impact - materials	The present document does not give presumption of conformity	n/a	n/a

Table A.6

6	**ER 6 Principles governing the logical architecture of systems**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Systems shall be designed and progressively integrated with the objective of achieving a coherent and increasingly harmonized, evolutionary and validated logical architecture within the EATMN".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
6.1	Designed and progressively integrated.	ED-117A [1], clause 2.4.2, ED-117A [1], clause 2.4.3 [REQ 8.], ED-117A [1], clause 2.6, ED-117A [1], clause 3.3.14, [REQ 70.] and [REQ 71.], ED-87C [1], clause 2.5.1.1, ED-87C [1], clause 4.1.3.	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.

Table A.7

7	**ER 7 Principles governing the construction of systems**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Systems shall be designed, built and maintained on the grounds of sound engineering principles, in particular those relating to modularity, enabling interchangeability of constituents, high availability, and redundancy and fault tolerance of critical constituents".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
7.1	Modularity, interchangeability.	The present document does not give presumption of conformity.	The present document does not give presumption of conformity.
7.2	High availability, Redundancy and fault tolerance.	ED-117A [1], clause 3.3.15 [ORQ 15.], ED-117A [1], clause 3.3.13 [REQ 69.], ED-117A [1], clause 2.6.2, ED-117A [1], clause 2.6.3, ED-117A [1], clause 2.6.4, [REQ 17.] and [REQ 18.], ED-117A [1], clause 2.6.5, [REQ 19.], ED-117A [1], clause 2.6.6, [REQ 20.].	The present document does not give presumption of conformity.

A.3 Interoperability Regulation, Annex II Essential Requirements, Part B: Specific requirements

A.3.1 Systems and procedures for airspace management

Table A.8

1.1	**ER 1.1 Seamless operation**			
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Information relating to pre-tactical and tactical aspects of airspace availability shall be provided to all interested parties in a correct and timely way so as to ensure an efficient allocation and use of airspace by all airspace users. This should take into account national security requirements".*			
	Keywords	**Evidence on constituent level**	**Evidence on system level**	**Evidence at procedure level**
1.1.1	Pre-tactical aspects of airspace availability	n/a	n/a	n/a
1.1.2	Tactical aspects of airspace availability	n/a	n/a	n/a
1.1.3	Correct and timely way	n/a	n/a	n/a
1.1.4	National security requirements	n/a	n/a	n/a

Requirements for systems and procedures for airspace management are not applicable for deployed cooperative sensors in A-SMGCS and are not covered by the present document.

A.3.2 Systems and procedures for air traffic flow management

Table A.9

2.1	**ER 2.1 Seamless operation**			
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Systems and procedures for air traffic flow management shall support the sharing of correct, coherent and relevant strategic, pre-tactical and tactical, as applicable, flight information covering all phases of flight and offer dialogue capabilities with a view to achieving optimized use of airspace".*			
	Keywords	**Evidence on constituent level**	**Evidence on system level**	**Evidence at procedure level**
2.1.1	Strategic	n/a	n/a	n/a
2.1.2	Pre-tactical	n/a	n/a	n/a
2.1.3	Tactical	n/a	n/a	n/a

A.3.3 Systems and procedures for air traffic services

A.3.3.1 Flight data processing systems

Table A.10

3.1.1	**ER 3.1.1 Seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: "Flight data processing systems shall be interoperable in terms of the timely sharing of correct and consistent information, and a common operational understanding of that information, in order to ensure a coherent and consistent planning process and resource-efficient tactical coordination throughout the EATMN during all phases of flight. In order to ensure safe, smooth and expeditious processing throughout the EATMN, flight data processing performances shall be equivalent and appropriate for a given environment (surface, terminal manoeuvring area (TMA), en-route), with known traffic characteristics and exploited under an agreed and validated operational concept, in particular in terms of accuracy and error tolerance of processing results".		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
3.1.1.1	Timely sharing	n/a	n/a
3.1.1.2	Performance appropriate for environment	n/a	n/a
3.1.1.3	Accuracy and error tolerance	n/a	n/a

Table A.11

3.1.2	**ER 3.1.2. Support for new concepts of operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: "*Flight data processing systems shall accommodate the progressive implementation of advanced, agreed and validated concepts of operation for all phases of flight, in particular as envisaged in the ATM MasterPlan.* *The characteristics of automation-intensive tools must be such as to enable coherent and efficient pre-tactical and tactical processing of flight information in parts of the EATMN.* *Airborne and ground systems and their constituents supporting new, agreed and validated concepts of operation shall be designed, built, maintained and operated, using appropriate and validated procedures, in such a way as to be interoperable in terms of timely sharing of correct and consistent information and a common understanding of the current and predicted operational situation".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
3.1.2.1	Airborne systems - design	n/a	n/a
3.1.2.2	Airborne systems - built	n/a	n/a
3.1.2.3	Airborne systems - maintained	n/a	n/a
3.1.2.4	Airborne systems - operated	n/a	n/a
3.1.2.5	Ground systems - design	n/a	n/a
3.1.2.6	Ground systems - built	n/a	n/a
3.1.2.7	Ground systems - maintained	n/a	n/a
3.1.2.8	Ground systems - operated	n/a	n/a

A.3.3.2 Surveillance data processing systems

Table A.12

3.2.1	**ER 3.2.1 Seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Surveillance data processing systems shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to provide the required performance and quality of service within a given environment (surface, TMA, en-route) with known traffic characteristics, in particular in terms of accuracy and reliability of computed results, correctness, integrity, availability, continuity and timeliness of information at the control position.* *Surveillance data processing systems shall accommodate the timely sharing of relevant, accurate, consistent and coherent information between them to ensure optimized operations through different parts of the EATMN".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
3.2.1.1	Designed	n/a	n/a
3.2.1.2	Built	n/a	n/a
3.2.1.3	Maintained	n/a	n/a
3.2.1.4	Operated	n/a	n/a

Table A.13

3.2.2	**ER 3.2.2. Support for new concepts of operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Surveillance data processing systems shall accommodate the progressive availability of new sources of surveillance information in such a way as to improve the overall quality of service, in particular as envisaged in the ATM MasterPlan".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
3.2.2.1	Availability of new sources	n/a	n/a

A.3.3.3 HMI systems

Table A.14

3.3.1	**ER 3.3.1 Seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"HMIs of ground air traffic management systems shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to offer to all control staff a progressively harmonised working environment, including functions and ergonomics, meeting the required performance for a given environment (surface, TMA, en-route), with known traffic characteristics".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
3.3.1.1	Designed	n/a	n/a
3.3.1.2	Built	n/a	n/a
3.3.1.3	Maintained	n/a	n/a
3.3.1.4	Operated	n/a	n/a

Table A.15

3.3.2	**ER 3.3.2. Support for new concepts of operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"HMI systems shall accommodate the progressive introduction of new, agreed and validated concepts of operation and increased automation, in such a way as to ensure that the tasks assigned to the control staff remain compatible with human capabilities, in both the normal and degraded modes of operation".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
3.3.2.1	Human capabilities	n/a	n/a

A.3.4 Communications systems and procedures for ground-to-ground, air-to-ground and air-to-air communications

Table A.16

4.1	**ER 4.1 Seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Communication systems shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to achieve the required performances within a given volume of airspace or for a specific application, in particular in terms of communication processing time, integrity, availability and continuity of function.* *The communications network within the EATMN shall be such as to meet the requirements of quality of service, coverage and redundancy".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
4.1.1	Designed	n/a	n/a
4.1.2	Built	n/a	n/a
4.1.3	Maintained	n/a	n/a
4.1.4	Operated	n/a	n/a
4.1.5	Quality of service, coverage, redundancy	n/a	n/a

Table A.17

4.2	**ER 4.2 Support for new concepts of operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Communication systems shall support the implementation of advanced, agreed and validated concepts of operation for all phases of flight, in particular as envisaged in the ATM MasterPlan".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
4.2.1	Support the implementation	n/a	n/a

A.3.5 Navigation systems and procedures

Table A.18

5.1	**ER 5.1 Seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Navigation systems shall be designed, built, maintained and operated using appropriate and validated procedures in such a way as to achieve the required horizontal and vertical navigation performance, in particular in terms of accuracy and functional capability, for a given environment (surface, TMA, en-route), with known traffic characteristics and exploited under an agreed and validated operational concept".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
5.1.1	Designed	n/a	n/a
5.1.2	Built	n/a	n/a
5.1.3	Maintained	n/a	n/a
5.1.4	Operated	n/a	n/a

A.3.6 Surveillance systems and procedures

Table A.19

6.1	**ER 6.1 Seamless operation**
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Surveillance systems shall be designed, built, maintained and operated using appropriate and validated procedures in such a way as to provide the required performance applicable in a given environment (surface, TMA, en-route) with known traffic characteristics and exploited under an agreed and validated operational concept, in particular in terms of accuracy, coverage, range and quality of service.* *The surveillance network within the EATMN shall be such as to meet the requirements of accuracy, timeliness, coverage and redundancy. The surveillance network shall enable surveillance data to be shared in order to enhance operations throughout the EATMN".*

	Keywords	Evidence on constituent level	Evidence on system level
6.1.1	Designed	ED-117A [1], clause 1.6.2, ED-117A [1], clause 2.3 [REQ 2.], [REQ 3.] and [REQ 4.], ED-117A [1], clause 2.4.1 [REQ 5.], ED-117A [1], clause 2.8 [REQ 22.], [REQ 23.], [REQ 25.], [REQ 26.], [REC 17.], ED-117A [1], clause 2.9.5 [REC 19.], ED-117A [1], clause 3.1.1 [REQ 27.], ED-117A [1], clause 3.1.3 [REQ 31.] to [REQ 38.], ED-117A [1], clause 3.1.4 [REQ 39.] and [REQ 40.], ED-117A [1], clause 3.1.2 [REQ 28.] and [REQ 29.], ED-117A [1], clause 3.3.2 [REQ 56.], ED-117A [1], clause 3.3.4 [REQ 58.], ED-117A [1], clause 3.3.5 [REQ 59.], ED-117A [1], clause 3.3.6 [REQ 60.], ED-117A [1], clause 3.3.7 [REQ 61.], ED-117A [1], clause 3.3.8 [REQ 62.], ED-117A [1], clause 3.3.9 [REQ 63.], ED-117A [1], clause 3.3.10 [REQ 64.], ED-117A [1], clause 3.3.11 [REQ 65.], ED-117A [1], clause 3.3.12 [REQ 66.], [REQ 67.] and [REQ 68.], ED-117A [1], clause 3.3.13 [REQ 69.], ED-117A [1], clause 3.3.15 [ORQ 15.], ETSI EN 300 019 1-3 Class 3.2 [4], ETSI EN 300 019 1-4 Class 4.1 [5], ETSI EN 300 019 1-3 Class 3.6 [4], ED-87C [2], clause 2.3.1.1.	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.
6.1.2	Built	ED-117A [1], clause 1.6.2, ED-117A [1], clause 2.4.1 [REQ 5.], ED-117A [1], clause 5.3, ED-117A [1], clauses 5.4 and 5.5, ED-87C [2], clause 5.8.	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.
6.1.3	Maintained	ED-117A [1], clause 2.6.2, ED-117A [1], clause 2.6.3, ED-117A [1], clause 2.6.4, [REQ 17.] and [REQ 18.], ED-117A [1], clause 2.6.5, [REQ 19.], ED-117A [1], clause 2.6.6, [REQ 20.].	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.
6.1.4	Operated	ED-117A [1], clause 1.6.2, ED-117A [1], clause 2.4.1 [REQ 5.], ED-117A [1], clause 2.7. [REQ 21.], [REC 13.], [REC 14.] and [REC 15.].	

6.1.5	Information Sharing	ED-117A [1], clause 2.4.2 [REQ 6.] and [REQ 7], ED-117A [1], clause 2.4.3 [REQ 8.], ED-117A [1], clause 3.1.6 [REQ 44.], [REQ 45.], [REC 20.], [REQ 46.], [REQ 47.], ED-117A [1], clause 3.1.6.1 [REQ 48.], ED-117A [1], clause 3.1.6.2 [REQ 50.], ED-117A [1], clause 3.1.6.3 [REQ 51.] and [REQ 52.] and ED-87C [1], clause 2.3.1.2, ED-117A [1], clause 3.3.3. [REQ 57.], ED-117A [1], clause 3.3.14, [REQ 70.] and [REQ 71.], ED-87C [1], clause 2.5.1.1, ED-87C [1], clause 4.1.1, second and third paraphrase, ED-87C [1], clause 4.1.3.	Presumption of conformity is given by the present document in conjunction with ETSI EN 303 213-1 [i.9], ETSI EN 303 213-2 [i.10], ETSI EN 303 213-4 (both sub-parts) [i.11], ETSI EN 303 213-7 [i.12] and ETSI EN 303 213-8 [i.13] as applicable.

A.3.7 Systems and procedures for aeronautical information services

Table A.20

7.1	**ER 7.1 Seamless operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Accurate, timely and consistent aeronautical information shall be provided progressively in an electronic form, based on a commonly agreed and standardized data set.* *Accurate and consistent aeronautical information, in particular concerning airborne and ground-based constituents or systems, shall be made available in a timely manner".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
7.1.1	Accurate, timely and consistent	n/a	n/a
7.1.2	Standardized data set	n/a	n/a

Table A.21

7.2	**ER 7.2 Support for new concepts of operation**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Increasingly accurate, complete and up-to-date aeronautical information shall be made available and used in a timely manner in order to support continuous improvement of the efficiency of airspace and airport use".*		
	Keywords	**Evidence on constituent level**	**Evidence on system level**
7.2.1	Increasingly accurate, complete and up-to-date	n/a	n/a

A.3.8 Systems and procedures for the use of meteorological information

Table A.22

8.1	**ER 8.1 Seamless operation**			
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Systems and procedures for the use of meteorological information shall improve the consistency and timeliness of its provision and the quality of its presentation, using an agreed data set".*			
	Keywords	**Evidence on constituent level**	**Evidence on system level**	**Evidence at procedure level**
8.1.1	Consistency and timeliness	n/a	n/a	n/a

Table A.23

8.2	**ER 8.2 Support for new concepts of operation**			
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.6] requires that: *"Systems and procedures for the use of meteorological information shall improve the promptness of its availability and the speed with which it may be used, in order to support continuous improvement of the efficiency of airspace and airport use".*			
	Keywords	**Evidence on constituent level**	**Evidence on system level**	**Evidence at procedure level**
8.2.1	Promptness, speed	n/a	n/a	n/a

Annex B (informative): Bibliography

- ICAO Annex 14: "Aerodrome Design and Operations, volume 1".
- ETSI EN 303 213-5: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 5: Harmonized Standard for access to the radio spectrum for multilateration equipment; Sub-part 1: Receivers and Interrogators".
- ICAO Annex 10: "Aeronautical communications".
- ICAO Document 9476: "Manual of Surface Movements and Guidance Control Systems (SMGCS)".
- ICAO EUR Manual on A-SMGCS.
- Council Resolution of 7 May 1985 on a new approach to technical harmonization and standards, OJ C 136, 04.06.1985.
- ETSI TR 102 579: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Report providing guidance for the production of Community Specifications for application under the Single European Sky Interoperability Regulation EC 552/2004".
- EUROCAE ED-128 (08/2007): "Guidelines for surveillance data fusion in advanced surface movement guidance and control systems (A-SMGCS) levels 1 and 2".

Annex C (informative): Change History

Date	Version	Information about changes
August 2018	2.1.2	Document editing finished – preparation for TB Approval prior to ENAP

History

Document history		
V1.1.1	October 2010	Publication
V1.2.0	November 2018	EN Approval Procedure AP 20190219: 2018-11-21 to 2019-02-19