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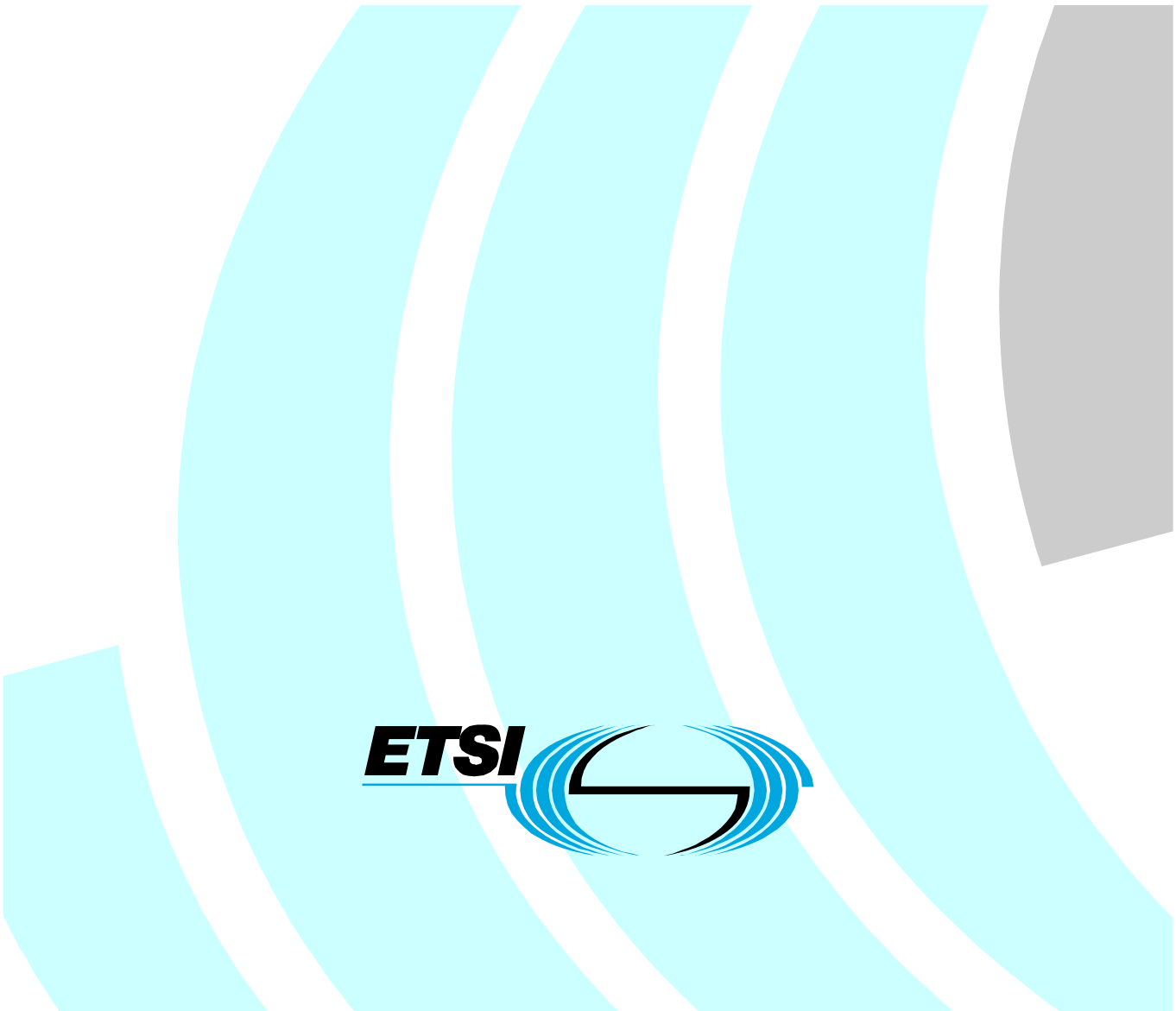
European Standard (Telecommunications series)

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; Sub-part 1: Generic requirements for non-cooperative sensor



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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Aeronautics (AERO), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to European Commission mandate M/390 for the Interoperability of the European Air Traffic Management Network.

The present document has been developed in cooperation with Eurocae for compliance with the 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 Sky Interoperability Regulation.

The presumption of conformity which is linked to the full application of EN 303 213 (parts 1 to 4) can only be claimed after EN 303 213 (parts 1 to 4) 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.8] 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 4, sub-part 1 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 Level 1 including external interfaces";

Part 2: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS Level 2 including external interfaces";

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":

Sub-part 1: "Generic requirements for a non-cooperative sensor";

Sub-part 2: "Specific requirements for a deployed Surface Movement Radar sensor".

Part 5: "Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for transmitters used in multilateration equipment";

Part 6: "Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for deployed surface movement radar sensors".

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):	18 months after doa

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.8].

The SES legislation is based on a framework of 4 regulations, which includes "the Interoperability Regulation" (EC 552/2004 [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 [i.4].

1 Scope

The present document is applicable to deployed non-cooperative sensor as a constituent of an Advanced Surface Movement Guidance and Control System.

The present document provides a European Standard for manufacturers of the non-cooperative sensor constituent, who have to demonstrate and declare conformity for their constituent to the IOP regulation.

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, environmental constraints, procedure level, effect of harmful interference and civil/military coordination.

NOTE: 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 to be interpreted as fully normative ("shall") for the purpose of compliance with the present document.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://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.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] EUROCAE ED-87B (ED-87B including Amendment No 1 published 01/2009): "MASPS for Advanced Surface Movement Guidance and Control Systems".

[2] EUROCAE ED-116 (ED-116 January 2004): "MOPS for Surface Movement Radar Sensor Systems for Use in A-SMGCS".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

[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 as amended by Regulation (EC) No 1070/2009.

[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 as amended by Regulation (EC) No 1070/2009.

[i.3] ETSI EN 303 213-6: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 6: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for deployed surface movement radar sensors".

[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] EUROCAE ED-128 (ED-128 published 08/2007): Guidelines for surveillance data fusion in advanced surface movement guidance and control systems (A-SMGCS) levels 1 and 2.

[i.6] ICAO Document 9830, AN/452, Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual, First Edition, 2004.

[i.7] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive) (OJ L 91, 07.04.1999).

[i.8] 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.9] IEC 60068-2-1: "Environmental testing - Part 2-1: Tests - Test A: Cold".

[i.10] IEC 60945: "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".

[i.11] IEC 60068-2-2: "Environmental testing - Part 2-2: Tests - Test B: Dry heat".

[i.12] ISO 3743: "Acoustics - Determination of sound power levels of noise sources - Engineering methods for small, movable sources in reverberant fields".

[i.13] 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.14] 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.15] ETSI EN 303 213-3: "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".

[i.16] ETSI EN 303 213-5: "Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 5: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for transmitters used in multilateration equipment".

[i.17] CENELEC EN 55022: "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement".

[i.18] CENELEC EN 61000-3-2: "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)".

[i.19] CENELEC EN 61000-3-3: "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection".

[i.20] CENELEC EN 61000-4-2: "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test".

[i.21] CENELEC EN 61000-4-3: "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test".

[i.22] CENELEC EN 61000-4-4: "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test".

[i.23] CENELEC EN 61000-4-5: "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity".

[i.24] CENELEC EN 61000-4-6: "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields".

[i.25] CENELEC EN 61000-4-11: "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests".

[i.26] IEC 60529: "Degrees of protection provided by enclosures (IP Code)".

[i.27] ISO 3746: "Acoustics -- Determination of sound power levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

A-SMGCS Level 1: A-SMGCS including a comprehensive Surveillance element capable of the location and classification of all aircraft and vehicles within the area of interest and the identification of cooperative aircraft and vehicles

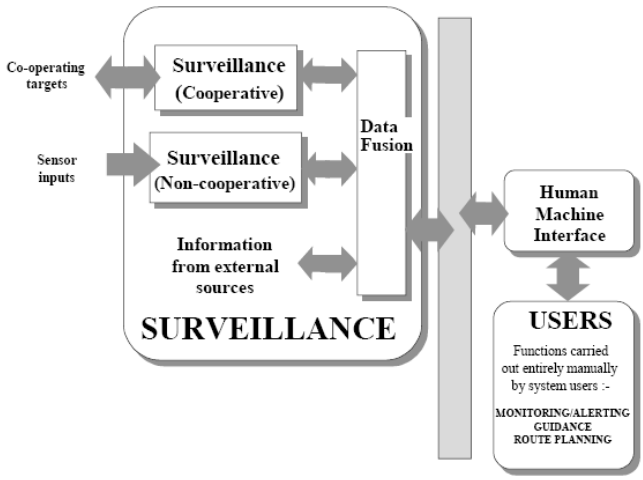

Figure 1: A-SMGCS Level 1 Functional Configuration

A-SMGCS Level 2: A-SMGCS including the capabilities of A-SMGCS Level 1 and uses the comprehensive surveillance data available to monitor the situation in the area of interest against a set of rules which will enable the system to alert the user to hazardous situations

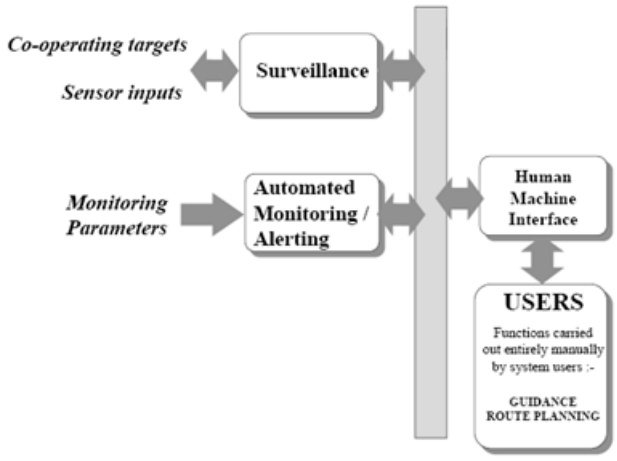

Figure 2: A-SMGCS Level 2 Functional Configuration

Advanced Surface Movement Guidance and Control Systems: systems providing routing, guidance, surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all local weather conditions within the aerodrome Visibility Operational Level (AVOL) while maintaining the required level of safety

NOTE: This definition is derived from the ICAO Document 9830 [i.6].

aerodrome: defined 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.6].

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

NOTE: This definition is derived from the ICAO Document 9830 [i.6].

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

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.6].

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.6].

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 groundbased 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: aircraft, vehicle or obstacle that is displayed on a surveillance display

NOTE: This definition is derived from the ICAO Document 9830 [i.6].

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

Further legally binding definitions in the context of Single European Sky are given in [i.2].

3.2 Abbreviations

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

A-SMGCS	Advanced Surface Movement Guidance and Control Systems
ATM	Air Traffic Management
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
ICAO	International Civil Aviation Organization
IOP Regulation	InterOPerability Regulation
MASPS	Minimum Aviation Systems Performance Specification
SES	Single European Sky
SMR	Surface movement radar

4 Requirements for implementing non-cooperative sensors for A-SMGCS Systems

This clause defines the minimum requirements for implementing a non-cooperative sensor into an A-SMGCS System.

4.1 Design Requirements for non-cooperative sensors for A-SMGCS Systems

4.1.1 Surveillance Element

The non-cooperative sensor shall be designed as a Surveillance Element for an A-SMGCS System and provide an interface as defined in ED-87B [1], clause 2.5.1.1.

4.1.2 Operation of Controls

The constituent shall be designed in respect of operation of Controls as defined in ED-116 [2], clause 2.3.

4.1.3 Coverage

The constituent shall have the minimum coverage as defined in ED-116 [2], clause 2.8.

4.1.4 Antenna Unit

The constituent shall have the antenna unit characteristics as defined in ED-116 [2], clause 2.9.

4.1.5 Transmitter and Receiver

The constituent shall have the Transmitter/Receiver characteristics as defined in ED-116 [2], clause 2.10.

NOTE: This requirement is in addition to the R&TTE directive [i.7] and considered in EN 303 213-6 [i.3].

4.1.6 Interfaces

4.1.6.1 Equipment Interfaces

The interfaces of the constituent shall be designed as defined in ED-116 [2], clause 2.11.

4.1.6.2 Datafusion

The interfaces for the data fusion in an A-SMGCS shall comply with the requirements as defined in ED-87B [1], clause 2.5.1.1.

NOTE: Guidance for the Data Fusion can be found in ED-128 [i.5].

4.1.7 External time reference

The constituent shall be designed to use an external time reference as defined in ED-116 [2], clause 2.12.

4.1.8 Safety

4.1.8.1 Health and Safety

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.13.

4.1.8.2 Safety interlocks

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.14.

4.1.8.3 Grounding

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.15.

4.1.8.4 Lightning protection

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.16.

4.1.9 Power supplies

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.19.

4.1.10 Reliability, availability and integrity

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.20.

4.1.11 Temperature and Humidity

The constituent shall comply with the requirements as defined in ED-116 [2], clause 3.2.1.

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

4.2.1 Environmental testing procedures

The SMR manufacturer shall provide sufficient functional test data to show compliance of the equipment before, during and after the various tests detailed in table 1.

Table 1: Functional tests

Test	Condition	Limit Indoor/Outdoor	Description of test configuration can be found in
Low Temp	Storage: Operate:	-40 °C / -65 °C 10 °C / -25 °C	IEC 60068-2-1 [i.9], Test Ad IEC 60945 [i.10]
High Temp	Storage: Operate:	+65 °C / +65 °C +30 °C / +55 °C	IEC 68-2-2 [i.11] Bd. IEC 945 [i.10]
Env. Protection	Operate:	Not Applicable / IP 52	IEC 60529 [i.26]
Acoustic Noise	Operate	55 dB (A) / 70 dB (A) Reference level 1 pW	DS/ISO 3743 [i.12] or ISO 3746 [i.27] IEC 60945 [i.10]
Radiated and Conducted Emission	Operate	Class B	EN 55022 [i.17]
Current Harmonics, Emission	Operate		EN 61000-3-2 [i.18]
Voltage Fluctuations, Emission	Operate		EN 61000-3-3 [i.19]
Electro Static Discharges Susceptibility	Operate	±4 kV Contact discharge ±8 kV Air discharge	EN 61000-4-2 [i.20]
Radiated Susceptibility	Operate	10 V/m, 80 % AM 27 MHz to 1 000 MHz and 1 000 MHz to 2 000 MHz	EN 61000-4-3 [i.21]
Bursts Susceptibility	Operate	AC power port: ±2 kV Signal Ports: ±2 kV (Only wire > 3 m)	EN 61000-4-4 [i.22]
Surges Susceptibility	Operate	AC power-port: ±4 kV CM, 12 Ω ±2 kV DM, 2 Ω Shielded signal cables: ±2 kV CM, 2 Ω	EN 61000-4-5 [i.23]
Conducted Susceptibility	Operate	AC-power ports: 10 VRMS, 80 % AM Separate earth: 10 VRMS, 80 % AM Signal & data lines: 10 VRMS, 80 % AM (Only cables > 3 m)	EN 61000-4-6 [i.24]
Supply Voltage Interruptions / Dips, Susceptibility	Operate	AC-power input port: Reduction Time 3 % 10 ms 60 % 100 ms <95 % 5 s	EN 61000-4-11 [i.25]

4.2.2 Factory testing procedures

The manufacturer shall perform the factory testing procedures as defined in ED-116 [2], clauses 5.2 and 5.4.

4.2.3 Site testing procedures

The manufacturer shall perform the on site testing procedures as defined in ED-116 [2], clauses 6.2 and 6.3.

NOTE: Test site tests in ED-116 [2], clause 6.4 consists tests which may not be applicable for other non cooperative sensors other than SMR. The site tests for the other cooperative sensors may be described in future sub parts of the present document.

4.3 Maintenance Requirements for non-cooperative sensors for A-SMGCS Systems

The constituent shall comply with the maintenance requirements as defined in ED-116 [2], clause 2.21.

4.4 Requirements for operation non-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-116 [2], clause 2.11.

4.5 Environment

4.5.1 Electromagnetic interference and susceptibility

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.17 second paragraph.

NOTE: This requirement is in addition to the R&TTE directive [i.7] and considered in EN 303 213-6 [i.3].

4.5.2 Noise and vibration

The constituent shall comply with the requirements as defined in ED-116 [2], clause 2.18.

5 Testing

The testing of non-cooperative sensors is covered with the build requirements from clause 4.2.

Annex SA (normative): Standards Annex

This annex provides a relationship between the present document and the Essential Requirements of the Single European Sky Interoperability Regulation.

The A-SMGCS non-cooperative sensor constituent shall comply with the Essential Requirements of the Interoperability Regulation as defined and described in the traceability matrixes of this annex (tables SA1 and SA2).

SA1: Correspondence between the present document and the Single European Sky Interoperability Regulation for the A-SMGCS non-cooperative sensor constituent

Table SA1: Traceability from Interoperability Regulation 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 1 Seamless operation	4.1.1 Surveillance Element 4.1.2 Operation of Controls 4.1.3 Coverage 4.1.4 Antenna Unit 4.1.5 Transmitter and Receiver 4.1.6.1 Equipment Interfaces 4.1.6.2 Datafusion 4.1.7 External time reference 4.1.8.1 Health and Safety 4.1.8.2 Safety interlocks 4.1.8.3 Grounding 4.1.8.4 Lightning protection 4.1.9 Power supplies 4.1.10 Reliability, availability and integrity 4.1.11 Temperature and Humidity 4.2.1 Environmental testing procedures 4.2.2 Factory testing procedures 4.2.3 Site testing procedures 4.3 Maintenance Requirements for non-cooperative sensors for A-SMGCS Systems 4.4 Requirements for operation non-cooperative sensors for A-SMGCS Systems	
ER 2 Support for new concepts of operation		Operation is only applicable at the system level
ER 3 Safety	n/a	
ER 4 Civil-military coordination		The present document does not give presumption of conformity
ER 5 Environmental constraints	4.5.1 Electromagnetic interference and suspectibility 4.5.2 Noise and vibration	
ER 6 Principles governing the logical architecture of systems	n/a	
ER 7 Principles governing the construction of systems	n/a	

(Essential) Requirements (ERs) of SES Interoperability Regulation, Annex II, Part B	Clause(s) of the present document	Qualifying remarks/Notes
ER 1.1 Seamless operation of airspace management		Not covered by EN 303 213 (parts 1 to 4)
ER 2.1 Seamless operation of air traffic flow management		Not covered by EN 303 213 (parts 1 to 4)
ER 3.1.1 Seamless operation of flight data processing		Not covered by EN 303 213 (parts 1 to 4)
ER 3.1.2 Support for new concepts of operation for flight data processing		Not covered by EN 303 213 (parts 1 to 4)
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 Human-machine interface systems	n/a	
ER 3.3.2 Support for new concepts of operation for Human-machine interface 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		Not covered by EN 303 213 (parts 1 to 4)
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		Not covered by EN 303 213 (parts 1 to 4)
ER 5.1 Seamless operation of Navigation systems and procedures		Not covered by EN 303 213 (parts 1 to 4)
ER 6.1 Seamless operation of Surveillance systems and procedures		Not covered by EN 303 213 (parts 1 to 4)
ER 7.1 Seamless operation of Systems and procedures for aeronautical information services		Not covered by EN 303 213 (parts 1 to 4)
ER 8.1 Seamless operation of systems and procedures for the use of meteorological information.		Not covered by EN 303 213 (parts 1 to 4)
ER 8.2 Support for new concepts of operation for systems and procedures for the use of meteorological information.		Not covered by EN 303 213 (parts 1 to 4)

Table SA2: Traceability from clauses of the present document to Interoperability Regulation

Clause(s) of the present document	(Essential) Requirements (ERs) of SES Interoperability Regulation, Annex II, Part A and B	Qualifying remarks/Notes
4.1.1 Surveillance Element	ER 1 Seamless operation	
4.1.2 Operation of Controls	ER 1 Seamless operation	
4.1.3 Coverage	ER 1 Seamless operation	
4.1.4 Antenna Unit	ER 1 Seamless operation	
4.1.5 Transmitter and Receiver	ER 1 Seamless operation	
4.1.6.1 Equipment Interfaces	ER 1 Seamless operation	
4.1.6.2 Datafusion	ER 1 Seamless operation	
4.1.7 External time reference	ER 1 Seamless operation	
4.1.8.1 Health and Safety	ER 1 Seamless operation	
4.1.8.2 Safety interlocks	ER 1 Seamless operation	
4.1.8.3 Grounding	ER 1 Seamless operation	
4.1.8.4 Lightning protection	ER 1 Seamless operation	
4.1.9 Power supplies	ER 1 Seamless operation	
4.1.10 Reliability, availability and integrity	ER 1 Seamless operation	
4.1.11 Temperature and Humidity	ER 1 Seamless operation	
4.2.1 Environmental testing procedures	ER 1 Seamless operation	
4.2.2 Factory testing procedures	ER 1 Seamless operation	
4.2.3 Site testing procedures	ER 1 Seamless operation	
4.3 Maintenance Requirements for non-cooperative sensors for A-SMGCS Systems	ER 1 Seamless operation	
4.4 Requirements for operation non-cooperative sensors for A-SMGCS Systems	ER 1 Seamless operation	
4.5.1Electromagnetic interference and suspectibility	ER 5 Environmental constraints	
4.5.2 Noise and vibration	ER 5 Environmental constraints	

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.

Annex A (normative): Checklist

The purpose of this annex is to provide a comprehensive traceability of evidence on constituents and system levels against sub-clauses of the Essential Requirements (ERs) of the Interoperability Regulation (EC 552/2004 [i.1]) as amended by Regulation EC 1070/2009 [i.8], analyzing 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 SES Interoperability Regulation.

The A-SMGCS non-cooperative sensor constituent shall comply with the Essential Requirements of the Interoperability Regulations as defined and described in the tables of this annex.

A.1 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.8] 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-87B [1], clause 2.5.1.1 Surveillance ED-116 [2], clause 2.3 Operation of Controls ED-116 [2], clause 2.8 SMR coverage ED-116 [2], clause 2.9 Antenna Unit characteristics ED-116 [2], clause 2.10 Transmitter/Receiver characteristics ED-116 [2], clause 2.11 Equipment interfaces ED-116 [2], clause 2.12 External time reference ED-116 [2], clause 2.13 Health and Safety ED-116 [2], clause 2.14 Safety interlocks ED-116 [2], clause 2.15 Grounding ED-116 [2], clause 2.16 Lightning protection ED-116 [2], clause 2.17 Electromagnetic interference and suspectibility ED-116 [2], clause 2.18 Noise and vibration ED-116 [2], clause 2.19 Power supplies ED-116 [2], clause 2.20 Reliability, availability and integrity ED-116 [2], clause 3.2.1 Temperature and Humidity ED-128 [i.5], clause 2.2.1 Surveillance ED-128 [i.5], clause 3.3.2 Non-Cooperative Sensor Systems	The present document does not give presumption of conformity
1.2	Built	ED-116 [2], clause 5.2 General conditions for testing (Factory) ED-116 [2], clause 5.4 Performance tests (Factory) ED-116 [2], clause 6.2 General conditions for testing (Site) ED-116 [2], clause 6.3 Basic conformity tests (Site)	The present document does not give presumption of conformity
1.3	maintained	ED-116 [2], clause 2.21 Maintainability	The present document does not give presumption of conformity
1.4	Operated	Operation is only applicable at the system level	The present document does not give presumption of conformity
1.5	information sharing	ED-116 [2], clause 2.11 Equipment interfaces	The present document does not give presumption of conformity

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 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.8] 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	n/a	The present document does not give presumption of conformity	The present document does not give presumption of conformity
3.2	Implementation	n/a	The present document does not give presumption of conformity	The present document does not give presumption of conformity
	Keywords	**Evidence on constituent level**	**Evidence on system level**	**Evidence at procedure level**
3.3	Maintenance	n/a	The present document does not give presumption of conformity	n/a
3.4	Operation	n/a	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	n/a	The present document does not give presumption of conformity	n/a

Table A.4

4	**ER 4 Civil-military coordination**		
	Regulation (EC) 552/2004 [i.1] as amended by Regulation (EC) 1070/2009 [i.8] 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	The present document does not give presumption of conformity	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**			
	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	n/a	The present document does not give presumption of conformity	The present document does not give presumption of conformity
5.2	Minimize environmental impact - materials	ED-116 [2], clause 2.17 Electromagnetic interference and suspectibility ED-116 [2], clause 2.18 Noise and vibration	The present document does not give presumption of conformity	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.8] 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	n/a	The present document does not give presumption of conformity

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.8] 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	n/a	The present document does not give presumption of conformity
7.2	High availability, Redundancy and fault tolerance	n/a	The present document does not give presumption of conformity

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

A.2.1 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.8] 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**
1.1.1	Modularity, interchangeability	n/a	Not covered by EN 303 213 (parts 1 to 4)
1.1.2	High availability	n/a	Not covered by EN 303 213 (parts 1 to 4)
1.1.3	Redundancy and fault tolerance	n/a	Not covered by EN 303 213 (parts 1 to 4)

A.2.2 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.8] 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	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
2.1.2	Pre-tactical	n/a	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
2.1.3	Tactical	n/a	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)

A.2.3 Systems and procedures for air traffic services

A.2.3.1 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.8] 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	Not covered by EN 303 213 (parts 1 to 4)
3.1.1.2	Performance appropriate for environment	n/a	Not covered by EN 303 213 (parts 1 to 4)
3.1.1.3	Accuracy and error tolerance	n/a	Not covered by EN 303 213 (parts 1 to 4)

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.8] 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	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
3.1.2.2	Airborne systems - built	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
3.1.2.3	Airborne systems - maintained	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
3.1.2.4	Airborne systems - operated	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
3.1.2.5	Ground systems - design	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
3.1.2.6	Ground systems - built	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
3.1.2.7	Ground systems - maintained	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)
3.1.2.8	Ground systems - operated	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)

A.2.3.2 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.8] 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	The present document does not give presumption of conformity
3.2.1.2	Built	n/a	The present document does not give presumption of conformity
3.2.1.3	Maintained	n/a	The present document does not give presumption of conformity
3.2.1.4	Operated	n/a	The present document does not give presumption of conformity

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.8] 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	The present document does not give presumption of conformity

A.2.3.3 Human-machine interface 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.8] requires that: "Human-machine interfaces 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 harmonized 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	The present document does not give presumption of conformity
3.3.1.2	Built	n/a	The present document does not give presumption of conformity
3.3.1.3	Maintained	n/a	The present document does not give presumption of conformity
3.3.1.4	Operated	n/a	The present document does not give presumption of conformity

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.8] requires that: "Human-machine interface 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	The present document does not give presumption of conformity

A.2.4 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.8] 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	Not covered by EN 303 213 (parts 1 to 4)
4.1.2	Built	n/a	Not covered by EN 303 213 (parts 1 to 4)
4.1.3	Maintained	n/a	Not covered by EN 303 213 (parts 1 to 4)
4.1.4	Operated	n/a	Not covered by EN 303 213 (parts 1 to 4)
4.1.5	Quality of service, coverage, redundancy	n/a	Not covered by EN 303 213 (parts 1 to 4)

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.8] 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	Not covered by EN 303 213 (parts 1 to 4)

A.2.5 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.8] 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	Not covered by EN 303 213 (parts 1 to 4)
5.1.2	Built	n/a	Not covered by EN 303 213 (parts 1 to 4)
5.1.3	Maintained	n/a	Not covered by EN 303 213 (parts 1 to 4)
5.1.4	Operated	n/a	Not covered by EN 303 213 (parts 1 to 4)

A.2.6 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.8] 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	n/a	Not covered by EN 303 213 (parts 1 to 4)
6.1.2	Built	n/a	Not covered by EN 303 213 (parts 1 to 4)
6.1.3	Maintained	n/a	Not covered by EN 303 213 (parts 1 to 4)
6.1.4	Operated	n/a	Not covered by EN 303 213 (parts 1 to 4)

A.2.7 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.8] 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	Not covered by EN 303 213 (parts 1 to 4)
7.1.2	Standardized data set	n/a	Not covered by EN 303 213 (parts 1 to 4)

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.8] 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	Not covered by EN 303 213 (parts 1 to 4)

A.2.8 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.8] 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	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)

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.8] 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	Not covered by EN 303 213 (parts 1 to 4)	Not covered by EN 303 213 (parts 1 to 4)

Annex B (informative): The EN title in the official languages

Language	EN title
Bulgarian	
Czech	
Danish	
Dutch	
English	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; Sub-part 1: Generic requirements for non-cooperative sensor
Estonian	
Finnish	
French	
German	
Greek	
Hungarian	
Icelandic	
Italian	
Latvian	
Lithuanian	
Maltese	
Norwegian	
Polish	
Portuguese	
Romanian	
Slovak	
Slovenian	
Spanish	
Swedish	

Annex C (informative): Bibliography

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ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".

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-117 (November2003): "MOPS for Mode S Multilateration Systems for Use in A-SMGCS".

EUROCONTROL 07/01/11-06 (Edition 2.0, December 2006): "Functional Specification for A-SMGCS Implementation Level 1".

EUROCONTROL 07/01/11-04 (Edition 2.0, December 2006): "Operational Concept and Requirements for A-SMGCS Implementation Level 1".

EUROCONTROL 06/11/27-18 (V1.1, December 2006): "Human Factor Case for A-SMGCS".

EUROCONTROL: "European Action Plan for the Prevention of Runway Incursions".

EUROCONTROL 06/11/24-16 (V1.0, October 2006: "Final Report on the Generic Cost Benefit Analysis of A-SMGCS".

EUROCONTROL 07/01/09-01 (V2.0: November 2006): "A-SMGCS Levels 1 & 2 Preliminary Safety Case".

History

Document history			
V1.1.1	December 2009	Public Enquiry	PE 20100420: 2009-12-21 to 2010-04-20