

Draft

COMMISSION REGULATION (EC) No .../..

of [...]

Laying down requirements for the Performance and Interoperability of Surveillance for the Single European Sky

(Text with EEA relevance)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to the Regulation (EC) N° 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air traffic Management Network (the interoperability Regulation)¹ and in particular Article 3(1) thereof,

Having regard to Regulation (EC) No 549/2004 of the European Parliament and the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation)², and in particular Article 8(2) thereof,

Recitals

Whereas:

- (1) The European Organisation for the Safety of Air Navigation (EUROCONTROL) has been mandated in accordance with article 8(1) of the Regulation (EC) No 549/2004³ to develop requirements for the performance and the interoperability of surveillance within EATMN. This Regulation is based on the resulting mandate report of 2009.
- (2) Seamless operations are dependent on the coherence of the standards for the separation of aircraft applied within the airspace of the single European sky.
- (3) In the airspace of applicability of this Regulation, horizontal separations of 3 and 5 nautical miles between aircraft are the most commonly used.
- (4) Harmonisation of the end-to-end performance of the systems within the scope of this Regulation, supporting aircraft separations of 3 and 5 nautical miles, is essential for the achievement of interoperability and seamless operations. Common criteria should therefore be defined for their application.

¹ OJ L96,31.3.2004, p.26

² OJ L 96, 31.3.2004, p.1

³ OJ L 96, 31.3.2004, p. 1.

- (5) The identification of end-to-end performance requirements applicable to systems within the scope of this Regulation, supporting aircraft separations of 3 and 5 nautical miles, should be considered only as a first step which could be further developed in the future in order to include performance requirements supporting other separations or applications.
- (6) Common principles should be applied whenever surveillance data is exchanged between systems within the scope of this Regulation and external users, in order to ensure interoperability.
- (7) In order to ensure the desired interoperability, minimal capabilities applicable to the airborne constituents of the surveillance systems should be identified.
- (8) The air navigation service providers should be able to determine the best surveillance solutions for their particular environments, based on cost and performance.
- (9) Irrespective of the surveillance solution chosen by the air navigation service providers, the interoperability between the ground and the airborne systems is ensured by the Mode Select (hereinafter Mode S) and Automatic Dependent Surveillance - Broadcast (hereinafter ADS-B) capability of the airborne equipage.
- (10) Operators need sufficient notice to equip their aircraft with new capabilities, both for new aircraft and existing fleets. This should be taken into account when defining dates for mandatory equipage.
- (11) Criteria for possible exemption, based in particular on economic or compelling technical consideration, should be identified allowing operators exceptionally not to equip specific types of aircraft with some of the required capabilities. Appropriate procedures should be defined allowing the Commission to take decisions in this respect.
- (12) The 24-bit aircraft address should be assigned and operated in compliance with the International Civil Aviation Organisation (hereinafter ICAO) requirements in order to ensure the interoperability of the air and ground surveillance systems.
- (13) The foundation laid by the implementation by the operators of ADS-B ‘Out’ capabilities should pave the way towards new advanced applications using ADS-B ‘In’ functionality.
- (14) The performance of the systems within the scope of this Regulation and of their constituents should be assessed taking into account the local environment in which they operate.
- (15) The uniform application of specific procedures within the airspace of the single European sky is critical for the achievement of interoperability and seamless operations.
- (16) Spectrum used by surveillance systems should be protected to prevent harmful interference. Member States should take the necessary measures in this respect.
- (17) The level of performance of the systems within the scope of this Regulation should be regularly monitored by the air navigation service providers.

- (18) This Regulation should not cover military operations and training as referred in Article 1(2) of Regulation (EC) No 549/2004⁴.
- (19) With a view to maintaining or enhancing existing safety levels of operations, Member States should be required to ensure that the parties concerned conduct a safety assessment including hazard identification, risk assessment and mitigation processes. Harmonised implementation of these processes to the systems covered by this Regulation requires the identification of specific safety requirements for all interoperability and performance requirements.
- (20) Measures should be taken by air navigation service providers to ensure the appropriate security of the systems within the scope of this Regulation.
- (21) In accordance with Article 3(3) (d) of Regulation (EC) N°552/2004, implementing rules for interoperability should describe the specific conformity assessment procedures to be used to assess either the conformity or the suitability for use of constituents as well as the verification of systems.
- (22) The measures provided for in this Regulation are in accordance with the opinion of the Single Sky Committee established by Article 5 (1) of Regulation (EC) No 549/2004⁵.

HAS ADOPTED THIS REGULATION:

Article 1

Subject matter and scope

- 1. This Regulation lays down requirements on the systems contributing to the provision of surveillance information in order to ensure the harmonisation of performance, the interoperability and the efficiency of these systems within the EATMN and for the purpose of civil-military coordination.
- 2. This Regulation shall apply to:
 - (a) airborne constituents of the surveillance systems and associated procedures;
 - (b) ground-based surveillance systems, their constituents and associated procedures;
 - (c) surveillance data processing systems, their constituents and associated procedures;
 - (d) ground-ground communications systems, their constituents and associated procedures used for distribution of surveillance data;
- 3. This Regulation shall apply to all flights operating as general air traffic in accordance with instrument flight rules within the airspace of the ICAO EUR and AFI region where Member States are responsible for provision of air traffic services in accordance with the service provision Regulation (EC) No 550/2004⁶.

⁴ OJ L 96, 31.3.2004, p. 1.

⁵ OJ L 96, 31.3.2004, p. 1.

⁶ OJ L 96, 31.3.2004, p. 10.

Article 2

Definitions

1. For the purpose of this Regulation the definitions set out in Regulation (EC) No 549/2004 shall apply.
2. In addition to the definitions referred to in paragraph 1 the following definitions shall apply:
 - (1) ‘ADS-B’ means a surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems.
 - (2) aircraft identification means a group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft call sign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground air traffic services communications.
 - (3) ‘air traffic service provider’ means any public or private entity providing air traffic services for general air traffic.
 - (4) ‘Coasted’ means extrapolated for a period longer than the maximum update period.
 - (5) ‘communications system’ means the aggregation of airborne and ground-based constituents, as well as space based equipment, supporting aeronautical fixed and mobile services to enable ground-to-ground, air-to-ground and air-to-air communications for ATC purposes.
 - (6) ‘continuity’ means the probability that a system will perform its required function without unscheduled interruption, assuming that the system is available at the initiation of the intended operation.
 - (7) ‘availability’ means the probability that a system will perform its required function at the initiation of the intended operation.
 - (8) ‘co-operative surveillance system’ means a surveillance system requiring both ground and airborne components to determine surveillance data items (e.g. SSR and transponder).
 - (9) ‘coordinated universal time’ (hereinafter ‘UTC’) means the accepted international standard for clock time.
 - (10) ‘external surveillance data user’ means the entity that receives surveillance data from a surveillance data provider whose surveillance system is external to that of the entity.
 - (11) ‘extrapolated’ means to project, predict or extend known data based upon values within an already observed time interval
 - (12) ‘horizontal position error’ means the difference between the aircraft reference 2D position and the reported 2D position at the time the 2D position is output from the surveillance system.
 - (13) ‘operator’ means a person, organisation or enterprise engaged in or offering to engage in an aircraft operation.
 - (14) ‘opportunity traffic’ means traffic used for an activity without having it arranged for the purpose of that activity; e.g. for monitoring surveillance performance.

- (15) ‘secondary surveillance radar’ means a surveillance radar system which uses transmitters/receivers (interrogators) and transponders.
- (16) ‘surveillance radar’ means a radar equipment used to determine the position of an aircraft in range and azimuth.
- (17) ‘state aircraft’ means any aircraft used for military, customs and police.
- (18) ‘surveillance data processing system’ means a system that processes all surveillance inputs received to form a best estimate of the current aircraft positions.
- (19) ‘surveillance data provider’ means the organisation responsible for the provision of a surveillance service, certified in accordance with Regulation (EC) No 2096/2005⁷
- (20) ‘surveillance system’ means the aggregation of airborne and ground-based constituents used to determine the respective positions of aircraft.
- (21) ‘transport type State aircraft’ means fixed wing State aircraft that are designed for the purpose of transporting persons and/or cargo.

Article 3

Performance requirements

1. Air traffic service providers shall establish standards for the separation of aircraft that ensure seamless operations within the airspace under their responsibility and at the boundary with adjacent airspaces.
2. Air navigation service providers shall ensure that systems referred to in Article 1(2) (b) to (d) are deployed as necessary to support the separation standards specified in paragraph 1.
3. Air navigation service providers shall ensure that when systems referred to in Article 1(2) (b) to (d) are deployed to support aircraft separation minima of 3 and 5 nautical miles they comply with the requirements specified in Annex I.

Article 4

Interoperability requirements

1. Air navigation service providers and organisations providing surveillance data shall ensure that all surveillance data transferred outside of their systems identified in Article 1(2) (b) to (d) to external surveillance data users complies with the requirements specified in Annex II.
2. Air navigation service providers and organisations providing surveillance data, when transferring surveillance data outside of their systems identified in Article 1(2) (b) to (d) to external surveillance data users, shall establish formal arrangements with these users for the exchange of the data in accordance with the requirements specified in Annex III.
3. Air navigation service providers and organisations providing surveillance data shall ensure that, by 5 February 2015, their co-operative surveillance systems are interoperable with aircraft equipped in accordance with paragraphs 4, 5, 6, 7, 8 and 9.
4. Without prejudice to Article 7, operators shall ensure that aircraft operating flights referred to in Article 1(3) with an individual certificate of airworthiness first issued on or

⁷ OJ L 335, 21.12.2005, p. 13.

after 1 January 2012 are equipped with secondary surveillance radar transponders and have the capability defined in Annex IV Part A.

5. Without prejudice to Article 7, operators shall ensure that aircraft with a maximum certificated take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability greater than 250 knots, operating flights referred to in Article 1(3), with an individual certificate of airworthiness first issued on or after 1 January 2012 are equipped with secondary surveillance radar transponders and have the capability to provide the surveillance data as defined in Annex IV Part B.
6. Without prejudice to Article 7, operators shall ensure that fixed wing aircraft with a maximum certificated take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability greater than 250 knots, operating flights referred to in Article 1(3), with an individual certificate of airworthiness first issued on or after 1 January 2012 are equipped with secondary surveillance radar transponders and have the capability to provide the surveillance data as defined in Annex IV Part C.
7. Without prejudice to paragraph 10 and Article 7, operators shall ensure that aircraft operating flights referred to in Article 1(3), with an individual certificate of airworthiness first issued before 1 January 2012, are equipped with secondary surveillance radar transponders and have the capability defined in Annex IV Part A by 5 February 2015.
8. Without prejudice to paragraph 10 and Article 7, operators shall ensure that, aircraft with a maximum certificated take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability greater than 250 knots, operating flights referred to in Article 1(3), with an individual certificate of airworthiness first issued before 1 January 2012 are equipped with secondary surveillance radar transponders and have the capability to provide the surveillance data as defined in Annex IV Part B by 5 February 2015.
9. Without prejudice to paragraph 10 and Article 7, operators shall ensure that, fixed wing aircraft with a maximum certificated take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability greater than 250 knots, operating flights referred to in Article 1(3), with an individual certificate of airworthiness first issued before 1 January 2012 are equipped with secondary surveillance radar transponders and have the capability to provide the surveillance data as defined in Annex IV Part C by 5 February 2015.
10. Paragraphs, 8 and 9 shall not apply to aircraft that will cease operation before 31 December 2017.
11. Without prejudice to Article 7, Member States may impose carriage requirements according with paragraphs 5 and 8 to all aircraft operating flights referred to in Article 1(3) in areas where surveillance services using only the surveillance data identified in Annex IV Part B are provided by air navigation service providers, for the separation of aircraft.

Article 5

Spectrum protection and infrastructure rationalisation

1. Air navigation service providers and organisations providing surveillance data shall ensure that the levels of interrogation from their surveillance systems do not use more than 1/4th of the reply rates (average per second) specified in ICAO standards of Annex 10 Volume IV § 3.1.2.10.3.7 for any single aircraft.

2. Air navigation service providers and organisations providing surveillance data shall ensure that ground surveillance system implementing interrogation/reply or broadcast protocols based on the 1030/1090 MHz RF link comply with the provisions of the ICAO standards specified in Annex 10 Volume IV Chapter 3 and Chapter 5.
3. Member States shall take the necessary measures to ensure that, the putting into service and the use of surveillance systems does not produce harmful mutual interference between them.
4. Air navigation service providers and organisations providing surveillance data shall assess the availability of suitable surveillance data from existing systems before introducing new or replacement surveillance interrogators.
5. Air navigation service providers and organisations providing surveillance data shall ensure that aggregate transmission rates and power output levels employed by their surveillance systems are limited to those necessary to meet the operational requirement.

Article 6

Associated procedures

1. Air navigation service providers shall assess the level of performance of systems used for the provision of safe separation between aircraft before putting them into service as well as regularly during the service, in accordance with the requirements specified in Annex V
2. Operators shall check at least every 2 years that the level of performance of secondary surveillance radar transponders complies with the requirements specified in Annex IV.
3. Member States shall ensure that the assignment of 24-bit aircraft addresses to aircraft equipped in accordance with Articles 4(4) and 4(6) complies with the ICAO standards specified in Annex 10 Volume III Second edition Chapter 9 and its appendix.
4. Operators shall ensure that aircraft equipped in accordance with Article 4(4) and 4(6) operate with a 24-bit ICAO aircraft address that corresponds to the registration that has been assigned by the State in which they are registered.

Article 7

State aircraft

1. Member States shall ensure that State aircraft operating in accordance with Article 1(3) are equipped with secondary surveillance radar transponders with the capability defined in Annex IV Part A, by 5 February 2015, without prejudice to paragraph 2.
2. Member States shall communicate to the Commission by 1 January 2014 at the latest the list of State aircraft that cannot be equipped with surveillance systems that comply with the requirements specified in Annex IV Part A, together with the justification for non-equipage, in the cases of:
 - (a) Compelling technical reasons;
 - (b) State aircraft operating in accordance with Article 1(3) that will be out of operational service by 1 January 2020;
 - (c) Procurement process constraints.
3. Member States shall ensure that transport-type State aircraft with a maximum certificated take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability

greater than 250 knots, operating in accordance with Article 1(3) have the capability to provide the surveillance data defined in Annex IV Part B and Part C, by 1 January 2017, without prejudice to paragraph 4.

4. Member States shall communicate to the Commission by 1 January 2016 at the latest the list of transport-type State aircraft with a maximum certificated take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability greater than 250 knots, that cannot be equipped with surveillance systems that comply with the requirements specified in Annex IV Part B and Part C, together with the justification for non-equipage, in the cases of:
 - (a) Compelling technical reasons;
 - (b) State aircraft operating in accordance with Article 1(3) that will be out of operational service by 1 January 2020;
 - (c) Procurement process constraints.
5. Where State aircraft cannot be equipped with surveillance systems as specified by paragraphs 1 and 3 due to the case referred to in paragraph 2 (c) and 4 (c), Member States shall include in the justification their procurement plans regarding these aircraft.
6. Air navigation service providers shall ensure that the State aircraft identified in paragraph 2 and 4 can be accommodated, provided that they can be safely handled within the capacity of the air traffic management system.

Article 8

Safety and security requirements

1. Member States shall take the necessary measures to ensure that, by 5 February 2015, a safety assessment, including hazard identification, risk assessment and mitigation is conducted by the parties concerned for all existing systems referred to in Article 1(2) (b) to (d).
2. Member States shall take the necessary measures to ensure that, by 5 February 2015, a security assessment is conducted by the parties concerned for all existing systems referred to in Article 1(2) (b) to (d).
3. Member States shall take the necessary measures to ensure that any changes to the existing systems referred to in Article 1(2) (b) to (d) or the introduction of new systems are preceded by a safety assessment, including hazard identification, risk assessment and mitigation, conducted by the parties concerned.
4. Member States shall take the necessary measures to ensure that any changes to the existing systems referred to in Article 1(2) (b) to (d) or the introduction of new systems are preceded by a security assessment conducted by the parties concerned.
5. During assessments identifies in paragraphs 1 and 3, the safety requirements specified in Annex VI shall be taken into consideration as a minimum.

Article 9

Conformity or suitability for use of constituents

1. Before issuing an EC declaration of conformity or suitability for use referred to in Article 5 of Regulation (EC) N° 552/2004, manufacturers of constituents of the systems referred to in Article 1(2) shall assess the conformity or suitability for use of these constituents in

compliance with the requirements set out in Annex VII, Part A, without prejudice to paragraph 2.

2. Certification airworthiness processes complying with Regulation (EC) No 216/2008 of the European Parliament and of the Council, when applied to airborne constituents of the systems referred to in Article 1(2) (a), shall be considered as acceptable procedures for the conformity assessment of these constituents if they include the demonstration of compliance with the interoperability, performance and safety requirements of this Regulation.

Article 10

Verification of systems

1. Air navigation service providers which can demonstrate or have demonstrated that they fulfil the conditions set out in Annex VIII shall conduct a verification of the systems referred to in Article 1(2) (b) to (d) in compliance with the requirements set out in Annex VII, Part B.
2. Air navigation service providers which cannot demonstrate that they fulfil the conditions set out in Annex VIII shall subcontract to a notified body a verification of the systems referred to in Article 1(2) (b) to (d). This verification shall be conducted in compliance with the requirements set out in Annex VII, Part C.

Article 11

Additional requirements

1. Air navigation service providers shall ensure that all related personnel are made duly aware of the requirements laid down in this Regulation and that they are adequately trained for their job functions.
2. Air navigation service providers shall:
 - (a) develop and maintain operations manuals containing the necessary instructions and information to enable all related personnel to apply this Regulation;
 - (b) ensure that the manuals referred to in point (a) are accessible and kept up-to-date and that their update and distribution are subject to appropriate quality and documentation configuration management;
 - (c) ensure that the working methods and operating procedures comply with this Regulation.
3. Operators shall take the necessary measures to ensure that the personnel operating surveillance equipment are made duly aware of the relevant provisions of this Regulation and that they are adequately trained for their job functions, and that instructions about how to use this equipment are available in the cockpit.
4. Member States shall take the necessary measures to ensure compliance with this Regulation including the publication of relevant information in the national aeronautical information publications.

Article 12

Exemptions

1. Without prejudice to Article 7, aircraft with a first certificate of airworthiness issued before 1st January 2012 that have either a maximum take off mass in excess of 5700kg or a maximum cruising true airspeed greater than 250 knots that do not have the complete set of parameters detailed in Annex IV part C available on a digital bus on-board the aircraft may be exempted from complying with the requirements of Article 4(9).
2. The Member States concerned shall communicate to the Commission by 1 January 2015 at the latest, detailed information justifying the need for granting exemptions to these aircraft.
3. The Commission shall adopt a decision, based on the criteria defined in paragraph 4, in accordance with the procedure referred to in Article 5(3) of Regulation (EC) No 549/2004, after consultation with the parties concerned.
4. The criteria referred to in paragraph 3 shall include the following:
 - (a) Aircraft reaching the end of their production life;
 - (b) Aircraft being produced in limited numbers;
 - (c) Disproportionate re-engineering costs.

Article 13

Entry into force and application

1. This Regulation shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union.
2. This Regulation shall be binding in its entirety and directly applicable in all Member States.

ANNEX I

Performance requirements referred to in Article 3(3)

1. Surveillance Data Requirements

1.1 The system referred to in Article 3(3) shall provide the following information:

Positional Data:

- Aircraft horizontal position,
- Most recent valid value of the barometric altitude received from the aircraft,

Operational Identification Data:

- Aircraft identity (Aircraft Identification and/or Mode A code),

Supplemental Indicators:

- Emergency indicators (i.e. unlawful interference, radio failure and general emergency),
- Special Position Indicator ('squawk ident'),

Surveillance Data Status:

- Cooperative / Non-Cooperative / Combined,
- Coasted or not.
- Time at which information is valid

Other information:

- Ground speed and track angle

2. Surveillance Data Performance Requirements

2.1 Surveillance information updates shall be no more than 5 seconds when used to support 3nmile separation applications, and no more than 8 seconds when used to support 5 nmile separation applications.

2.2 The horizontal position error shall have an RMS value equal or less than 300 metres for 3nmile separation and equal or less than 500 metres for 5nmile separation.

2.3 Probability of update of 2D position and valid altitude code for any single aircraft shall be equal or better than 95%.

2.4 The maximum percentage of time/case when the 2D position or the valid altitude code is strictly older than 2 times the maximum allowed update period (see 2.1 above) shall be lower than or equal to 0.1%.

2.5 The time between setting-up the Special Position Indicator or an emergency indicator on board the aircraft and their availability at the output of the surveillance system shall be equal or better than the maximum update period (see 2.1 above) in 95% of the cases.

2.6 The time between changing the aircraft identity (see 1.1 above) on board the aircraft and availability of the new value at the output of the surveillance system shall be equal or better than two times the maximum update period (see 2.1 above) in 95% of the cases.

2.7 The average data age of the valid altitude code shall be lower than or equal to half of the maximum allowed update period (see 2.1 above).

3. Surveillance Data Correctness Requirements

- 3.1 The rate of incorrect and undetected altitude code shall be lower than or equal to 0.1 %.
- 3.2 The rate of incorrect and undetected aircraft identity shall be lower than or equal to 0.1 %.
- 3.3 The rate of false cooperative target reports shall be lower than or equal to 0.4 %

4. Surveillance Data Availability Requirements

- 4.1 The ANSP shall define the availability and continuity requirements of the data items defined in 1.1 at the output of the system referred to in Article 3(3) in accordance with the safety objectives, traffic conditions, environment and other local constraints.

ANNEX II

Surveillance data exchange requirements referred to in Article 4(1)

1. Surveillance data exchanged between the systems referred to in Article 1 (2) (b) and (c), shall be subject to a representation that is agreed between the parties concerned.
2. The surveillance data transferred outside the systems referred to in Article 1 (2) (b) and (c) to external surveillance data users shall be classified in order to:
 - (a) Facilitate identification of the data through the use of data categories;
 - (b) Facilitate the dispatching of data to the appropriate application task in the receiving unit;
 - (c) Establish any necessary hierarchy among the data based on their priority.
3. The surveillance data transferred outside the systems referred to in Article 1 (2) (b) and (c) to external surveillance data users shall be transmitted as either one or a concatenation of elements.
4. The maximum size of an element shall be mutually agreed between the parties concerned.
5. Surveillance data transferred outside the systems referred to in Article 1 (2) (b) and (c) to external surveillance data users shall be presented to the application at the receiving end in the same order as generated at the transmitting end.
6. Identification of the source of the surveillance data transferred outside the systems referred to in Article 1 (2) (b) and (c) to external surveillance data users shall be included in the transmitted data.
7. Surveillance data transferred outside the systems referred to in Article 1 (2) (b) and (c) to external surveillance data users shall be time stamped and expressed as Co-ordinated Universal Time (UTC).
8. Surveillance data exchanged between the systems referred to in Article 1 (2) (b) and (c) shall be subject to error monitoring, to detect and reject incorrectly formatted or corrupted messages.

ANNEX III

Requirements for formal arrangements referred to in Article 4(2)

1. Formal arrangements for the exchange of surveillance data shall include the following minimum content:
 - (a) The parties to the arrangements;
 - (b) The period of validity of the arrangements;
 - (c) The scope of the surveillance data;
 - (d) The sources of the surveillance data;
 - (e) The exchange format of the surveillance data;
 - (f) The communications means used to exchange the surveillance data;
 - (g) Quality requirements for the surveillance data in terms of the following:
 - i. Performance indicators or parameters used to monitor the quality of the surveillance data;
 - ii. The methods and tools to be applied to the measurement of the quality of the surveillance data;
 - iii. The frequency of measurement of the quality of the surveillance data;
 - iv. Data quality reporting procedures;
 - v. For each performance indicator, “out of control limits” shall be specified together with an “out of control action plan”;
 - vi. Identification of the party responsible for checking and ensuring quality requirements are met.
 - (h) Agreed service levels in terms of the following:
 - vii. Hours of availability;
 - viii. Continuity;
 - ix. Integrity
 - x. Mean time between failures;
 - xi. Reaction times for outages;
 - xii. Procedures for planning and conducting preventative maintenance;
 - (i) Change management procedures;
 - (j) Reporting arrangements with respect to performance and availability including unforeseen outages;
 - (k) Management and co-ordination arrangements.

ANNEX IV

**PART A: SECONDARY SURVEILLANCE TRANSPONDER CAPABILITY
REFERRED TO IN ARTICLES 4(4), 4(7) AND 7(1)**

1. The minimum capability for a secondary surveillance transponder shall be Mode S Level 2s certified in accordance with the ICAO Annex 10 Vol. IV Fourth edition § 2.1.5.1.2 and 2.1.5.1.7.
2. Each implemented transponder register shall be compliant with the corresponding section of ICAO document 9871 Ed 1.
3. The following data items shall be made available to the transponder and be transmitted by the transponder via the Mode S protocol:

a) ICAO 24-bit address
b) Mode 3/A identity code
c) Barometric altitude
d) Flight status: on the ground or airborne (based on automatic selection)
e) Data link capability report <ul style="list-style-type: none"> • ACAS capability • Mode S specific services capability • Aircraft Identification capability • Squitter capability • Surveillance identifier capability • Common usage GICB capability report capability • Mode sub-network version number
f) Common usage Ground Initiated Comms.-B (GICB) capability report
g) Aircraft identification
h) ACAS active Resolution Advisory when the aircraft is equipped with TCAS II
i) Special Position Indication (SPI)
j) Emergency state: general emergency, no communications, unlawful interference (included in Mode A code)

4. The continuity of the transponder to provide the above data items shall be better than $2 \cdot 10^{-4}$ per flight hour.

**PART B: SURVEILLANCE DATA CAPABILITY REFERRED TO IN ARTICLES
4(5), 4(8) AND 7(3)**

1. The minimum capability for a secondary surveillance transponder shall be Mode S Level 2es certified in accordance with ICAO Annex 10 Vol. IV Fourth edition § 2.1.5.1.2, 2.1.5.1.6 & 2.1.5.1.7.
2. Each implemented transponder register shall be compliant with the corresponding section of ICAO document 9871 Ed 1 (ES version 1).
3. The following data items shall be made available to the transponder and be transmitted by the transponder via the Extended Squitter (ES) ADS-B protocol and according with the formats specified in ICAO doc 9871 Ed 1 (ES version 1)

a) ICAO 24-bit address
b) Mode 3/A identity code (including disable/suppression function)
c) Barometric altitude
d) Aircraft identification
e) Geodetic airborne/surface horizontal position (WGS84) depending on flight status
f) Horizontal position quality indicators
g) Special Position Indication (SPI)
h) Emergency state: General emergency, No communications, Unlawful interference
i) 1090 ES Version number
j) Length/Width of aircraft
k) Emitter category
l) Airborne Velocity
m) Airborne Velocity quality indicator

4. The continuity of the transponder to provide the above data items shall be better than $2 \cdot 10^{-4}$ per flight hour.
5. The selection between the broadcast of surface and airborne horizontal position messages shall be automatic.

**PART C: SURVEILLANCE DATA CAPABILITY REFERRED TO IN ARTICLES
4(6), 4(9) AND ARTICLE 7(3)**

1. Each transponder register that is implemented shall be compliant with the corresponding section of ICAO document 9871 Ed 1.
2. The following data items shall be made available to the transponder and be transmitted by the transponder

a) Selected altitude
b) Roll angle
c) Track angle rate
d) True track angle
e) Ground speed
f) Magnetic heading
g) Indicated airspeed (IAS) /mach number
h) Vertical rate (barometric rate of climb/descend or baroinertial)

3. If the track angle rate data item is not available, the true airspeed data item shall be provided
4. Other data may be made available to the transponder and transmitted by the transponder provided the data have been certified as correct

ANNEX V

Requirements for the evaluation of the level of performance of surveillance systems referred to in Article 6(1)

1. The evaluation of the level of the ongoing performance of the systems referred to in Article 1 (2) (b) to (d) shall be performed in the volume of airspace where the corresponding application is performed.
2. The evaluation of ongoing performance of the systems referred to in Article 1 (2) (b) to (d) shall be undertaken on the basis of opportunity traffic or flight trials.
3. The opportunity traffic referred to in paragraph 2 shall be representative for the volume of operation.
4. Before the implementation of airspace design modification the systems referred to in Article 1 (2) (b) to (d) shall be verified that they still meet the required performance in the new volume of operation.

ANNEX VI

Safety requirements referred to in Article 8

1. The performance requirements specified in Article 3 shall be considered as safety requirements.
2. The interoperability requirements specified in Article 4(2), (3) and (11) shall be considered as safety requirements.
3. The spectrum protection and infrastructure rationalisation requirements specified in Article 5 shall be considered as safety requirements.
4. The associated procedures requirements specified in Article 6 shall be considered as safety requirements.
5. The State aircraft requirement specified in Article 7(6) shall be considered as safety requirement.
6. The additional requirements specified in Article 11(3) shall be considered as safety requirement.
7. The surveillance data exchange requirements specified in Annex II (7) and (8) shall be considered as safety requirements.

ANNEX VII

PART A: REQUIREMENTS FOR THE ASSESSMENT OF THE CONFORMITY OR SUITABILITY FOR USE OF CONSTITUENTS REFERRED TO IN ARTICLE 9

1. The verification of compliance activities shall demonstrate the conformity or suitability for use of constituents with the applicable requirements of this Regulation whilst these constituents are in operation in the test environment.
2. The manufacturer shall manage the conformity assessment activities and shall in particular:
 - determine the appropriate test environment;
 - verify that the test plan describes the constituents in the test environment;
 - verify that the test plan provides full coverage of applicable requirements;
 - ensure the consistency and quality of the technical documentation and the test plan;
 - plan the test organisation, staff, installation and configuration of test platform;
 - perform the inspections and tests as specified in the test plan;
 - write the report presenting the results of inspections and tests.
3. The manufacturer shall ensure that the constituents referred to in Article 9, integrated in the test environment meet the applicable requirements of this Regulation.
4. Upon satisfying completion of verification of conformity or suitability for use, the manufacturer shall under its responsibility draw up the EC declaration of conformity or suitability for use, specifying notably the applicable requirements of this Regulation met by the constituent and its associated conditions of use in accordance with Annex III point (3) of Regulation (EC) No 552/2004.

PART B: REQUIREMENTS FOR THE VERIFICATION OF SYSTEMS REFERRED TO IN ARTICLE 10(1)

1. The verification of systems identified in Article 1(2) shall demonstrate the compliance of these systems with the interoperability, performance and safety requirements of this Regulation in an assessment environment that reflects the operational context of these systems.
2. The verification of systems identified in Article 1(2) shall be conducted in accordance with appropriate and recognised testing practices.
3. Test tools used for the verification of systems identified in Article 1(2) shall have appropriate functionalities.
4. The verification of systems identified in Article 1(2) shall produce the elements of the technical file required by Annex IV (3) of the interoperability Regulation including the following elements:
 - description of the implementation;
 - the report of inspections and tests achieved before putting the system into service.
5. The air navigation service provider shall manage the verification activities and shall in particular:
 - determine the appropriate operational and technical assessment environment reflecting the operational environment;
 - verify that the test plan describes the integration of systems identified in Article 1(2) in an operational and technical assessment environment;
 - verify that the test plan provides full coverage of the applicable interoperability, performance and safety requirements of this Regulation;
 - ensure the consistency and quality of the technical documentation and the test plan;
 - plan the test organisation, staff, installation and configuration of the test platform;
 - perform the inspections and tests as specified in the test plan;
 - write the report presenting the results of inspections and tests.
6. The air navigation service provider shall ensure that the systems identified in Article 1(2) operated in an operational assessment environment meet the interoperability, performance and safety requirements of this Regulation.
7. Upon satisfying completion of verification of compliance, air navigation service providers shall draw up the EC declaration of verification of system and submit it to the national supervisory authority together with the technical file as required by Article 6 of the interoperability Regulation.

PART C: REQUIREMENTS FOR THE VERIFICATION OF SYSTEMS REFERRED TO IN ARTICLE 10(2)

1. The verification of systems identified in Article 1(2) shall demonstrate the compliance of these systems with the interoperability, performance and safety requirements of this Regulation in an assessment environment that reflects the operational context of these systems.
2. The verification of systems identified in Article 1(2) shall be conducted in accordance with appropriate and recognised testing practices.
3. Test tools used for the verification of systems identified in Article 1(2) shall have appropriate functionalities.
4. The verification of systems identified in Article 1(2) shall produce the elements of the technical file required by Annex IV (3) of the interoperability Regulation including the following elements:
 - description of the implementation;
 - the report of inspections and tests achieved before putting the system into service.
5. The air navigation service provider shall determine the appropriate operational and technical assessment environment reflecting the operational environment and shall have verification activities performed by a notified body.
6. The notified body shall manage the verification activities and shall in particular:
 - verify that the test plan describes the integration of systems identified in Article 1(2) in an operational and technical assessment environment;
 - verify that the test plan provides full coverage of the applicable interoperability, performance and safety requirements of this Regulation;
 - ensure the consistency and quality of the technical documentation and the test plan;
 - plan the test organisation, staff, installation and configuration of the test platform;
 - perform the inspections and tests as specified in the test plan;
 - write the report presenting the results of inspections and tests.
7. The notified body shall ensure that the systems identified in Article 1(2) operated in an operational assessment environment meet the interoperability, performance and safety requirements of this Regulation.
8. Upon satisfying completion of verification tasks, the notified body shall draw up a certificate of conformity in relation to the tasks it carried out.
9. Then, the air navigation service provider shall draw up the EC declaration of verification of system and submit it to the national supervisory authority together with the technical file as required by Article 6 of the interoperability Regulation.

ANNEX VIII

Conditions referred to in Article 10

1. The air navigation service provider must have in place reporting methods within the organization which ensure and demonstrate impartiality and independence of judgement in relation to the verification activities.
2. The air navigation service provider must ensure that the personnel involved in verification processes, carry out the checks with the greatest possible professional integrity and the greatest possible technical competence and are free of any pressure and incentive, in particular of a financial type, which could affect their judgment or the results of their checks, in particular from persons or groups of persons affected by the results of the checks.
3. The air navigation service provider must ensure that the personnel involved in verification processes, have access to the equipment that enables them to properly perform the required checks.
4. The air navigation service provider must ensure that the personnel involved in verification processes, have sound technical and vocational training, satisfactory knowledge of the requirements of the verifications they have to carry out, adequate experience of such operations, and the ability required to draw up the declarations, records and reports to demonstrate that the verifications have been carried out.
5. The air navigation service provider must ensure that the personnel involved in verification processes, are able to perform their checks with impartiality. Their remuneration shall not depend on the number of checks carried out, or on the results of such checks.