



# Terms of Reference

for a rulemaking task

## All-weather operations

RMT.0379 — ISSUE 1 — 9.12.2015

<b>Applicability</b>		<b>Process map</b>	
Affected regulations and decisions:	See Chapter 8.4 below	Concept paper:	Yes
Affected stakeholders:	Design organisations; air operators; maintenance organisations; flight crew members; approved training organisations; aerodrome operators; air navigation services (ANS) providers (ANS); air traffic management (ATM); competent authorities in all aviation domains	Rulemaking group:	No, but involvement of nominated experts
Driver/origin:	Level playing field	RIA type:	Light
Reference:	AWO concept paper (CP) (see Chapter 9 below)	Technical consultation during NPA drafting:	No, but regular briefings on project progress, and consultations on draft material
		Publication date of the NPA:	N/A (for IRs) Q1/2017 (for AMC/GM)
		Duration of NPA consultation:	2 months
		Review group:	No, but involvement of nominated experts
		Focused consultation:	Yes, Q4/2016 (for IRs)
		Publication date of the Opinion:	Q1/2017
		Publication date of the Decision:	Q4/2017 (depending on the IRs' adoption by the European Commission)



## 1. Issue and reasoning for regulatory change

The term all-weather operations (AWO) comprises any taxi, take-off or approach operations in conditions where visual reference is limited by weather conditions.

AWO are currently addressed by regulations in the following aviation domains: airworthiness, air operations, aircrew, aerodromes, air traffic management (ATM)/air navigation services (ANS) as well as in the standardised European rules of the air (SERA). The relevant European rules are presented in Chapter 8.4 below.

The existing rules in these domains have the following deficiencies:

- They do not sufficiently address technological advancements and do not fully support new operational concepts, e.g. approach operations using new generations of enhanced vision systems (EVSs), synthetic vision systems (SVSs), combined vision systems (CVSs), or full potentials of head-up displays (HUDs).
- In some areas, European rules are not anymore aligned with the ICAO standards and recommended practices (SARPS), thus unintentionally becoming more limiting. For example, the recent ICAO Annex 6 amendments, which introduced lower category (CAT) II and CAT III minima, and regulated the concept of operational credits in particular for operations with vision systems, have not yet been transposed into the European air operations (Air OPS) rules. Furthermore, the new ICAO approach classification needs to be transposed into all domains.
- Existing rules (conventional low-visibility operations (LVOs) as well as other AWO) have been drafted in a domain-centric manner. This has resulted in a situation where occasionally, rules are not fully consistent with each other across different domains. In some cases, rules are missing in one or more domains, which makes it inefficient if not impossible to use the full potentials of certified products and systems and enjoy the full safety benefits of such new products and systems.
- Cross-domain risk assessments have not been carried out in a consistent manner to guarantee that all safety risks have been identified, properly managed and mitigated across all domains.
- The results of harmonisation efforts with the Federal Aviation Administration (FAA) and other regulators, such as within the All Weather Operations Harmonization Aviation Rulemaking Committee (AWOHARC), have not yet been transposed into the European regulatory material.

Therefore, the current regulatory framework necessitates urgent actions.

## 2. Objectives

Overall objectives:

- the European regulatory framework in the area of AWO should be safe and efficient, relying on a performance- and risk-based approach; and
- manufactures, air operators and aerodrome operators should be enabled to take full advantage of safety and economic benefits accrued from new technologies and operational experience.

Actions across all different domains should:

- take into account stakeholders' expectations and operational needs;



- be based on common operational concepts and cross-domain systemic risk assessments;
- result in consistent rules across all domains;
- consider established industry standards;
- be aligned with ICAO SARPS and ICAO documents;
- be harmonised with rule developments in the FAA and others major regulators, as far as possible; and
- be followed up by rule implementation support actions, where needed.

### 3. Activities

In order to implement these objectives, the following actions and deliverables are planned:

- to develop common project-related guidelines for performance-based and risk-based rule drafting including guidance to identify performance indicators, supported by already established general principles available;
- to evaluate responses from the ongoing stakeholders' survey and take them into account when developing the regulatory material;
- to develop common project-related guidance to strike the correct balance between implementing rules (IRs) and certification specifications (CSs)/acceptable means of compliance (AMC)/guidance material (GM), supported by already established general principles available;
- to assess AWO-related occurrence-reporting data and related safety recommendations<sup>1</sup>;
- to draft common cross-domain descriptions of operational concepts: e.g. low-visibility take-off (LVTO), CAT I, CAT II, CAT III, lower than standard category (LTS) CAT I, other than standard (OTS) CAT II, special authorisation (SA) CAT I;
- to conduct cross-domain systemic risk assessments for all different operations;
- to develop new rules in all domains to enable the following new operations: SA CAT I, operational credits for EVSs (including touchdown), SVSs, CVSs, HUDs and autoland;
- to review the existing material in order to improve clarity, consistency and completeness across all domains;
- to evaluate AWOHARC harmonisation results and take them into account when developing the regulatory material;
- to consider type-specific differences between aeroplanes and helicopters;
- to identify areas where ICAO documents should be amended; and
- to provide input to the European central question bank (ECQB) team for possible revisions of relevant syllabi items and learning objectives (LOs).

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<sup>1</sup> The following safety recommendation will be considered during this RMT: Safety Recommendation FRAN-2013-032. The Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA) — the French authority responsible for safety investigations into accidents or incidents in civil aviation — recommends that EASA and manufacturers study the implementation of means to allow flight crew to have access to a virtual representation of the outside environment in instrument meteorological conditions (IMC).



## 4. Deliverables

The following deliverables are planned:

- a light RIA;
- a cross-domain description of operational concepts;
- a cross-domain systemic risk assessment;
- an opinion with proposed amendments to Regulations (EU) Nos 965/2012 (air operations), 1178/2011 (aircrew), and 139/2014 (aerodromes);
- a notice of proposed amendment (NPA) for CSs/AMC/GM across all domains;
- a comment-response document (CRD) on the NPA consultation;
- associated decisions;
- a report on related ICAO activities; and
- a report for the ECQB team for possible revisions of syllabi and LOs.

## 5. Interface issues

- Stakeholder survey  
Before regulatory activities start, a stakeholder survey will be conducted to provide a profound basis for stakeholders' expectations and operational needs.
- Initiating amendments to ICAO material, where necessary  
In the case that the new proposed rules would not be in full compliance with the ICAO documents, the Agency together with representatives from the Member States (MSs) and international organisations will propose corresponding amendments of ICAO SARPS, ICAO procedures for air navigation services (PANS) and ICAO documents, with a view to ensuring alignment between European rules and ICAO provisions as well as to keeping the relevant ICAO provisions updated and performance-based.
- Harmonisation actions with other regulators  
The Agency will continue its harmonisations efforts with other regulators.
- ECQB  
The Agency's ECQB team will follow up the report on this rulemaking task and develop new questions for theoretical knowledge examinations to ensure that the relevant theoretical knowledge of pilots can be assessed.
- EASA process for evaluating new operational concepts  
The Agency will develop a new process for certification projects involving new operational concepts, which ensures that all relevant domains are sufficiently addressed in certification projects and all relevant departments are involved.
- Ex post evaluation  
It is planned to evaluate the effectiveness of the new rules including any follow-up actions after a period of three years (starting from the applicability date).



## 6. Work method

This rulemaking task is designed to develop the new rules in the fastest and most economic manner. The aim is to have the final rules published in less than two years from the publication date of the final terms of reference (ToR).

A new rulemaking process will be applied for the development of the IRs. Instead of issuing and consulting on an NPA, the Agency will periodically keep stakeholders updated on the project's progress and on draft deliverables. Furthermore, they will be invited to a focused written consultation and a workshop in Q4/2016.

Because of the cross-domain nature of this rulemaking task but also in order to further streamline the overall process of the rule development, it is also proposed to bring closer the EASA process for the development of the IRs with the process of the European Commission (EC) for adopting the IRs.

For the development of the corresponding AMC/GM, the conventional rulemaking approach is followed, with an NPA in Q1/2017 followed by a two-month consultation period. Pending on the publication of the IRs by the EC, the publication of the corresponding decisions is planned for Q4/2017.

Furthermore, the aforementioned reduced timelines do not allow the rules to be developed with a rulemaking group. Instead, it is envisaged that this rulemaking task will be implemented as an Agency task with the support of experts nominated from industry and national aviation authorities (NAAs). The profile and experience of the experts is described in Chapter 7 below. It is foreseen that these experts will mainly work in multidisciplinary teams to maintain the cross-domain perspective. The main team work methods will be put in place through regular WebEx meetings and webinars, as well as on the basis of electronic collaboration platforms.

## 7. Profile and contribution of experts

Industry, NAAs, as well as other interested regulators are kindly requested to nominate experts to support all activities described in Chapter 3.

These experts should have in-depth knowledge in one or more of the following domains:

- avionics, aircraft integration;
- maintenance;
- Air OPS;
- pilot training;
- aerodrome operations and aerodrome design;
- ANS; and
- instrument procedure design.

In addition, they should have gained expertise in the field of AWO and in particular in one or more of the following subjects:

- EVS;
- SVS;



- CVS;
- LVOs (LVTO, LTS CAT I, CAT II, OTS CAT II, CAT III); and
- operational credits for autoland capabilities and HUDs.

When nominating experts, the field of expertise should be clearly identified.

Furthermore, it should be noted that the Agency will not reimburse the work of experts or associated travel costs.

## 8. Annex I: Reference documents

### 8.1. Affected regulations

#### Air OPS

- Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Commission Regulation (EU) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1).

#### Aircrew

- Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 311, 25.11.2011, p.1.).

#### ADR

- Commission Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 44, 14.2.2014, p.1).

#### ATM/ANS

- Commission Implementing Regulation (EU) No 1034/2011 of 17 October 2011 on safety oversight in air traffic management and air navigation services and amending Regulation (EU) No 691/2010 (OJ L 271, 18.10.2011, p.15).
- Commission Implementing Regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services and amending Regulations (EC) No 482/2008 and (EU) No 691/2010 (OJ L 271, 18.10.2011, p.23).

#### SERA

- Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 (OJ L 281, 13.10.2012, p.1).

### 8.2. Affected decisions

#### IAW/CAW



- Decision No. 2003/6/RM of the Executive Director of the Agency of 17 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for all weather operations ('CS-AWO').
- Decision No 2013/031/R of the Executive Director of the Agency of 17 December 2013 adopting Certification Specifications for Airborne Communications Navigation and Surveillance (CS ACNS)
  - CS-ACNS Initial Issue.

#### Air OPS

- Decision No 2014/019/R of the Executive Director of the Agency of 24 April 2014 adopting Guidance Material to Regulation (EU) No 965/2012 'GM to Regulation (EU) No 965/2012'.
- Decision N° 2012/015/Directorate R of the Executive Director of the Agency of 24th October 2012 on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (Guidance Material to Annex I — Definitions).
- Decision No 2014/025/R of the Executive Director of the Agency of 28 July 2014 adopting Acceptable Means of Compliance and Guidance Material to Part-ARO of Regulation (EU) No 965/2012 and repealing Decision 2014/014/R of the Executive Director of the Agency of 24 April 2014 'AMC and GM to Part-ARO — Issue 3.
- Decision 2014/017/R of the Executive Director of the Agency of 24 April 2014 adopting Acceptable Means of Compliance and Guidance Material to Part-ORO of Regulation (EU) No 965/2012 and repealing Decision 2012/017/R of the Executive Director of the Agency of 24 October 2012 'AMC and GM to Part-ORO — Issue 2'.
- Decision No 2014/015/R of the Executive Director of the Agency of 24 April 2014 adopting Acceptable Means of Compliance and Guidance Material to Part-CAT of Regulation (EU) No 965/2012 and repealing Decision 2012/018/R of the Executive Director of the Agency of 24 October 2012 'AMC and GM to Part-CAT — Issue 2.
- Decision No° 2012/019/Directorate R of the Executive Director of the Agency of 24th October 2012 on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council — Acceptable Means of Compliance and Guidance Material to Part-SPA.
- Decision N° 2013/021/Directorate R of the Executive Director of the Agency of 23 August 2013 adopting Acceptable Means of Compliance and Guidance Material for Non-commercial operations with complex motor-powered aircraft (Part-NCC).
- Decision No 2014/016/R of the Executive Director of the Agency of 24 April 2014 adopting Acceptable Means of Compliance and Guidance Material to Part-NCO of Regulation (EU) No 965/2012 and repealing Decision 2013/022/R of the Executive Director of the Agency of 23 August 2013 'AMC and GM to Part-NCO — Issue 2.



- Decision No 2014/018/R of the Executive Director of the Agency of 24 April 2014 adopting Acceptable Means of Compliance and Guidance Material to Part-SPO of Regulation (EU) No 965/2012 'AMC and GM to Part-SPO'.

#### **Aircrew**

- Decision No° 2011/016/R of the Executive Director of the European Aviation Safety Agency of 15 December 2011 on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council 'Acceptable Means of Compliance and Guidance Material to Part-FCL'.
- Decision No° 2012/006/Directorate R of the Executive Director of the Agency of 19th April 2012 on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council 'Acceptable Means of Compliance and Guidance Material to Part-ARA'.
- Decision No° 2012/007/Directorate R of the Executive Director of the Agency of 19th April 2012 on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council 'Acceptable Means of Compliance and Guidance Material to Part-ORA'.
- Decision No° 2012/010/Directorate R of the Executive Director of the Agency of 4th July 2012 on the certification specifications for aeroplane flight simulation training devices.
- Decision No° 2012/011/Directorate R of the Executive Director of the Agency of 26th June 2012 on the certification specifications for helicopter flight simulation training devices.

#### **ADR**

- Decision 2014/013/R of the Executive Director of the Agency of 27 February 2014 adopting Certification Specifications and Guidance Material for Aerodrome Design 'CS-ADR-DSN — Initial issue'.
- Decision No 2014/012/R of the Executive Director of the Agency of 27 February 2014 adopting Acceptable Means of Compliance and Guidance Material to Regulation (EU) No 139/2014.

#### **ANS**

- Decision 2013/031/R of the Executive Director of the Agency of 17 December 2013 adopting Certification Specifications for Airborne Communications Navigation and Surveillance (CS ACNS) — CS-ACNS Initial Issue.

#### **SERA**

- Executive Director Decision 2015/014/R of 3 July 2015 adopting Guidance Material on the implementation of the remote tower concept for single mode of operation.



- Decision No 2013/013/R of the Executive Director of the European Aviation Safety Agency of 17 July 2013 adopting the Acceptable Means of Compliance and Guidance Material to Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 — Acceptable Means of Compliance and Guidance Material to the rules of the air.

### 8.3. Reference documents

- AWO concept paper (please refer to Chapter 9 below).
- ICAO Annex 1 (Personnel Licensing) to the Chicago Convention on International Civil Aviation, 10th Edition, July 2006.
- ICAO Annex 3 (Meteorological Service for International Air Navigation) to the Chicago Convention on International Civil Aviation, 6th Edition, July 2007.
- ICAO Annex 4 (Aeronautical Charts) to the Chicago Convention on International Civil Aviation, 11th Edition, July 2009.
- ICAO Annex 6 (Operation of Aircraft) to the Chicago Convention on International Civil Aviation, 9th Edition, July 2010.
- ICAO Annex 10 (Aeronautical Telecommunications) to the Chicago Convention on International Civil Aviation, 6th edition, July 2006.
- ICAO Annex 11 (Air Traffic Services) to the Chicago Convention on International Civil Aviation, 13th Edition, July 2001.
- ICAO Annex 14 (Aerodromes) to the Chicago Convention on International Civil Aviation, 6th Edition, July 2013.
- ICAO Document 4444, PANS — Air Traffic Management, 15th Edition, 2007.
- ICAO Document 8168, PANS — Aircraft Operations, 5th Edition, 2006.
- ICAO Document 9365, DOC — Manual of All Weather Operations, 3th Edition, 2013.
- FAA Order No 8400.13D — Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations, 2009.
- FAA Order No 8260.3B — United States Standard for Terminal Instrument Procedures (TERPS) with Changes 1-26, 1976.
- FAA Order No 8260.19F — Flight Procedures and Airspace, 2014.
- FAA Notice No 8260.74 — Special Authorization (SA) Category (CAT) I Instrument Landing System (ILS) Missed Approach Procedure Evaluation and Documentation Requirements, 2014.
- FAA Order No 8200.1D — US Standard Flight Inspection Manual (USSFIM), 2015.
- FAA Order No 6750.24E — Instrument Landing System and Ancillary Electronic Component Configuration and Performance Requirements with Change 1, 2012.



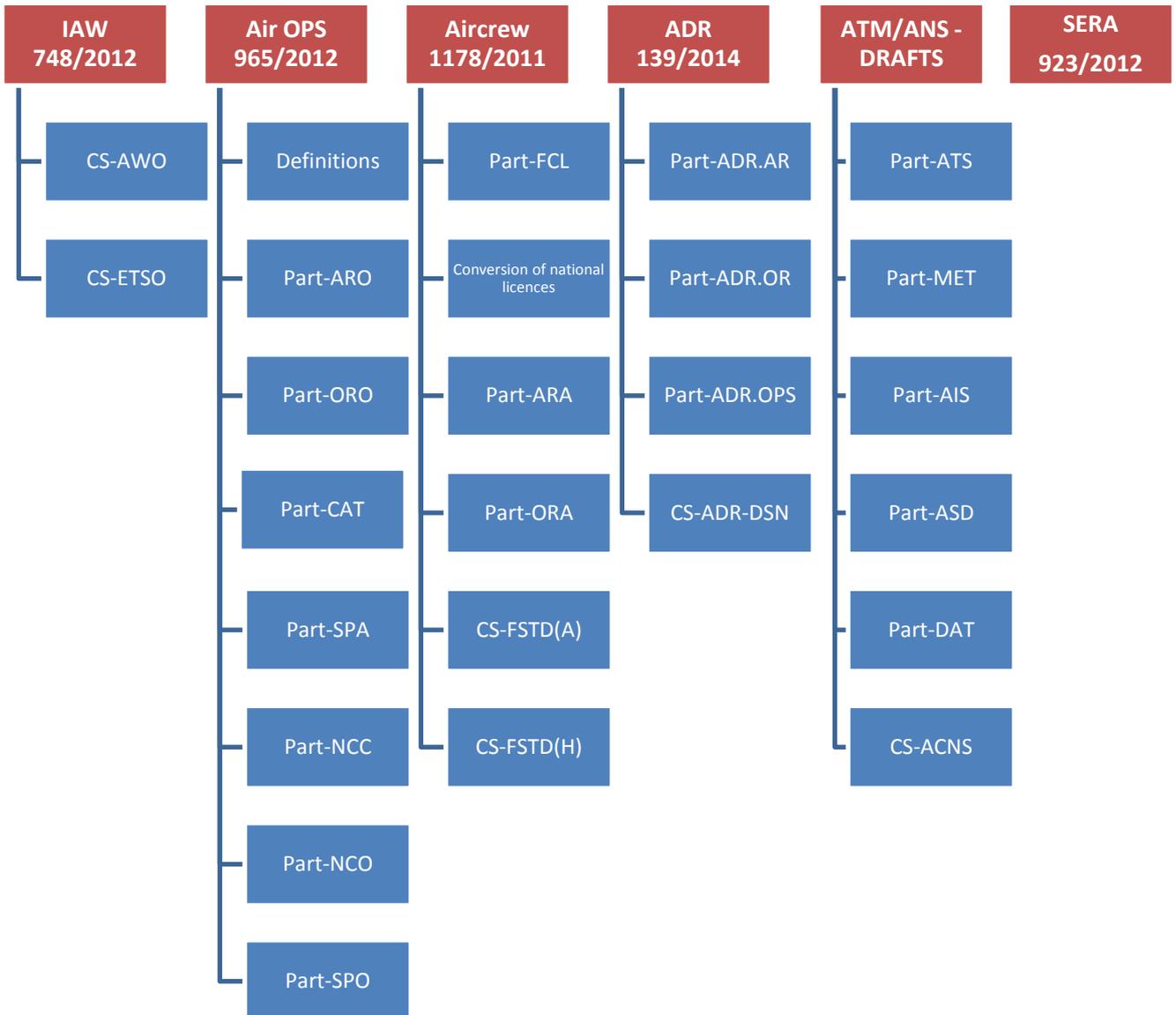
- FAA Order No JO 6750.57A — Instrument Landing System Continuity of Service Requirements and Procedure with Change 1, 2009.
- FAA Order No 6850.2 — Obstructions in the approach light plane.
- FAA Part 23.
- FAA Part 25.
- FAA Part 91.
- FAA Part 121.
- FAA Part 129.
- FAA Part 135.
- FAA AC No 120-xls.
- FAA AC No 90-CAT I.
- FAA AC No 90-106 — Enhanced Flight Vision Systems, 2010.
- FAA AC No 20-167 — Airworthiness Approval of Enhanced Vision System, Synthetic Vision System, Combined Vision System, and Enhanced Flight Vision System Equipment, 2010.
- FAA AC No 150/5300-13A — Airport Design, 1989/2012.

#### **Standardisation bodies**

- RTCA DO-315A — Minimum Aviation System Performance Standards (MASPS) for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems, 2010.
- RTCA DO-359 — Minimum Aviation System Performance Standard (MASPS) for Synthetic Vision Guidance Systems, 2015.
- RTCA DO-341 — Minimum Aviation System Performance Standards (MASPS) for an Enhanced Flight Vision System to Enable All-Weather Approach, Landing and Roll-Out to a Safe Taxi Speed, 2012.
- EUROCAE ED-179 — Minimum Aviation System Performance Standards (MASPS) for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems, 2008.
- SAE International ARP-6023 — Human Engineering Considerations for Implementing Enhanced Synthetic Vision Systems in Vertical Flight Platforms, 2013.
- SAE International ARP-5677 — Human Engineering Considerations for Airborne Implementation of Enhanced Synthetic Vision Systems, 2012.



### 8.4. Summary of affected European rules



## 9. Annex II: Concept paper



European Aviation Safety Agency



**ANNEX TO TOR RMT.0379 ISSUE 1**

**CONCEPT PAPER**

**All-weather operations**



## EXECUTIVE SUMMARY

This concept paper demonstrates that actions related to all-weather operations (AWO) involve all aviation domains and should be addressed through a fully coordinated cross-domain project. Coordinated actions should aim to take full advantage of safety benefits and economic benefits accrued from new technologies and operational experience.

The following subjects need to be addressed:

- operations with enhanced vision systems (EVSs), synthetic vision systems (SVSs), synthetic vision guidance systems (SVGs), combined vision systems (CVSs), head-up displays (HUDs);
- conventional low-visibility operations (LVOs), such as instrument landing system (ILS)-based category (CAT) II and CAT III approach operations or low-visibility take-offs;
- other AWO, such as CAT I operations using ILS, approach landing system using ground-based augmented global navigation satellite system information (GLS) or satellite-based augmentation system (SBAS), or approach operations to higher minima using area navigation (RNAV) (global navigation satellite system (GNSS)), non-directional beacons (NDBs) or VHF omnidirectional ranges (VORs); and
- miscellaneous items, such as the improvement of existing rules and the transposition of the new International Civil Aviation Organization (ICAO) approach classification.

The following aviation domains are mainly concerned:

- airworthiness
- air operations
- flight crew training
- aerodromes; and
- air traffic management and air navigation services (ATM/ANS).

Based on established objectives, the following actions/deliverables are foreseen:

- stakeholder's survey;
- regulatory updates for all aviation domains concerned;
- contributions to update ICAO documents;
- harmonisation actions with other regulators;
- engagement in the development of industry standards;
- implementation support;
- review of syllabi and learning objectives (LOs) for pilot training and consequential question development for the European central question bank (ECQB); and
- establishment of an EASA process for proof of concepts.



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## 1. Aim of the concept paper

The aim of this concept paper is to:

- demonstrate that AWO are a multidisciplinary issue and can be best addressed in a horizontal working approach;
- highlight that urgent actions are necessary to update European rules in order to take advantage of the potential safety benefits and economic benefits accrued from new technologies and operational experience;
- provide an overview of key subject areas as well as the most important challenges for each domain; and
- propose AWO-related objectives and a corresponding action plan.

## 2. Description of the issue

### 2.1. Background

The term all-weather operations (AWO) comprises any taxi, take-off or approach operations in conditions where visual reference is limited by weather conditions.

Low-visibility operations (LVOs) are a subsegment of AWO. LVOs include low-visibility take-offs (LVTOs) with a runway visual range (RVR) below 400 m, as well as approach and landing operations with an RVR below 550 m and/or a decision altitude/height (DA/H) below 200 ft. LVOs are exposed to higher risks and, therefore, necessitate specific mitigating measures, e.g. specific operational procedures or approvals.

AWO in general and LVOs in particular require strong interdependencies between the main aviation domains: airworthiness, air operations, flight crew training, aerodromes, ATM/ANS. Several stakeholders of different aviation domains are required to provide the necessary assurance to guarantee safe operations, as type certificate (TC) and supplemental type certificate (STC) holders, maintenance personnel, air operators, their flight crew members and operations personnel, approved training organisation (ATOs), instructors and examiners, aerodrome operators, as well as ATM/ANS providers and air traffic controller (ATCO) training organisations.

Remarkable technological advancements in new airborne systems, such as EVSs, SVSs, CVSs, new HUDs technologies, and autoland systems have resulted in new operational concepts and several new certification applications from European and non-European manufacturers. These innovative technologies have the potential to increase the level of safety through enhanced situational awareness, thus reducing the risk of loss of control. New operational concepts based on these new vision systems (which are partly linked with ground-based augmentation system (GBAS) and SBAS) have been developed by SESAR and are considered in pilot common projects for new ATM functionalities. These new concepts also offer operational benefits in terms of reduced RVR and/or lower DA/H values and/or compensation of downgraded, failed or not available ground infrastructure. These technologies may also offer significant economic advantages for several stakeholders such as air operators, who may be able to operate within lower aerodrome operating minima, as well as aerodrome operators, who could continue operations under lower-visibility conditions without major additional investments in ground infrastructure, e.g. airfield ground lighting systems or ground-based navigation aids.



## 2.2. Current regulatory status

AWO are currently addressed by regulations in the following aviation domains: airworthiness, air operations, aircrew, aerodromes, ATM/ANS as well as in the standardised European rules of the air (SERA). The relevant European rule documents are presented in Chapter 6 below.

The existing rules in these domains contain the following deficiencies:

- They do not sufficiently address technological advancements and do not fully support new operational concepts, e.g. approach operations using new generations of EVSs, SVSs, CVSs, or full potentials of HUDs.
- In some areas, European rules are not anymore aligned with the ICAO standards and recommended practices (SARPS), thus unintentionally becoming more limiting. For example, the recent ICAO Annex 6 amendments, which introduced lower CAT II and CAT III minima, and regulated the concept of operational credits in particular for operations with vision systems, have not yet been transposed into the European air operations (Air OPS) rules. Furthermore, the new ICAO approach classification needs to be transposed to all domains.
- Existing rules (conventional LVOs as well as other AWO) have been drafted in a domain-centric manner. This has resulted in a situation where occasionally, rules are not fully consistent with each other across different domains. In some cases, rules are missing in one or more domains, which makes it inefficient if not impossible to use the full potentials of certified products and systems and enjoy the full safety benefits of such new products and systems.
- Cross-domain risk assessments have not been carried out in a consistent manner to guarantee that all safety risks have been identified, properly managed and mitigated across all domains.
- The results of harmonisation efforts with the Federal Aviation Administration (FAA) and other regulators, such as within the All Weather Operations Harmonization Aviation Rulemaking Committee (AWOHARC), have not yet been transposed into the European regulatory material.

## 3. Key subjects

The AWO project should address the following subjects:

- EVS, SVS, SVGS, CVS;
- conventional LVOs;
- other AWO; and
- other miscellaneous items.

### 3.1. EVS, SVS, SVGS, CVS

The operational concepts for EVSs, SVSs, SVGSs and CVSs are described in the ICAO guidance material and, in more detail, in the minimum aviation system performance standards (MASPS) published by the European Organisation for Civil Aviation Equipment (EUROCAE) and the Radio Technical Commission for Aeronautics (RTCA). Reference material from standardisation bodies is presented in Chapter 6.4 below. These operational concepts should be the basis for regulatory actions in the different domains.



EVS operations may support the visual segment of an approach operation, take-off or taxiing phase. EVS operations are based on the concept of gaining operational credits on RVR minima and the approach ban.

SVS and SVGS operations provide benefits for the extension of the instrument segment of approach operations. It is proposed that such operations require a specific approach procedure design and published SVGS charts, at least initially based on the US concept of special authorisation (SA) CAT I.

CVS operations combine the benefits of EVSs and SVGSs.

Such operations can only be implemented if rules in all domains are harmonised and accordingly amended.

### 3.2. Conventional LVOs

Under this subject area fall the following types of operations: LVTOs, lower-than-standard (LTS) CAT I, other-than-standard (OTS) CAT II, CAT II, and CAT III. The approach operations are currently based on ILSs and microwave landing systems (MLS).

The current operating minima for CAT II and CAT III operations should be aligned with the ICAO minima, which permit lower minima. Furthermore, as regards LVTOs, there may be inconsistencies with procedures for air navigation services (PANS)-ATM.

Furthermore, the ICAO Flight Operations Panel (FLTOPSP) is currently assessing to change the definitions of CAT II and CAT III operations. Any proposed amendments should be taken into consideration in this rulemaking task.

There are many technical differences between US and European rules in all domains. To foster global operations and to enable that harmonised operating procedures are applied across different regions, these rules should be aligned as far as possible. The output of the rulemaking task should be incorporated into the ongoing work of AWOHARC, which mainly facilitates the harmonisation activities, to achieve tangible results.

### 3.3. Other AWO

Under this subject area fall operations which do not qualify as LVOs, e.g. take-offs with RVR of 400 m or higher, and approach operations in CAT I minima. This includes reduced aerodrome visibility operations and procedures described in ICAO EUR Doc 013.

There are many technical differences between US and European rules in all domains which should be harmonised as far as possible for the above-mentioned reasons.

### 3.4. Miscellaneous items

This group contains the following items: the improvement of existing rules based on stakeholders' feedback, as well as recent ICAO amendments such as the transposition of the new ICAO approach classification.

### 3.5. Related subjects not to be addressed

This project will not address GLS CAT II/CAT III operations, which will be addressed by the rulemaking task RMT.0680 (GBAS).



## 4. Relevant aviation domains

In the following sections, the most important conceptual changes are described for each domain to ensure that the European rules provide optimum safety and economic benefits.

### 4.1. Airworthiness

For safety reasons, it is important that the AWO capabilities and limitations of the aircraft are demonstrated during the certification process and appropriately documented in the aircraft flight manual (AFM). For conventional LVOs and operations with SVS and CVS, the AFM should contain operating limitations as DA/H, RVR, mandatory equipment and aircraft configurations, where applicable. For EVS operations, limitations on the RVR and weather conditions should be specified as well as any altitude/height limits up to which the EVS could be used without reliance on natural, non-enhanced visibility.

The documentation of demonstrated capabilities and limitations should provide the contextual premises from other domains, e.g. minimum performance specifications of the landing system, visual-aid specifications on aerodromes, instrument approach procedures that can be used, the composition and qualification of the crew (if not specified in the operational suitability data (OSD)) and the procedures that the operator should implement for continuing airworthiness and maintenance of the system.

CS-AWO is largely outdated. In order to keep up with current best practices, it is proposed to divide the provisions into CS, AMC and GM. The CS may appropriately distinguish between aeroplane and helicopter provisions and be aligned with ICAO SARPS and federal aviation regulations (FARs)/advisory circulars (ACs) as far as possible.

Furthermore, for new operational concepts, it is essential that a 'proof of concept' approach is used. The 'proof of concept' approach relies on profound cross-domain safety risk assessments. The performance (foreseen or validated in the lab) of new operational concepts or technology should be demonstrated in a real environment and should involve all domains. The demonstration should be performed after an overall risk assessment is carried out covering all affected domains. Results from previous demonstrations of these new concepts or technology used under some research programmes (in the EU, mainly under the SESAR programme) could be utilised for this purpose if all aspects are properly covered. The Agency should have a dedicated process for 'proof of concept' projects which ensures that all operational departments are adequately involved, financial issues are clarified and cooperation with other regulators is guaranteed.

### 4.2. Air operations (Air OPS)

The new Air OPS rules should enable operators to use the capabilities and operational credits of their products to the greatest extent possible, allow all new types of operations, be as far as possible technology-independent and avoid prescriptive limitations to the utmost.

Currently, Air OPS rules contain limitations for certain operations in the form of minimum equipment requirements, RVR limitations and DA/H limitations. The disadvantage of such operational requirements is that they may be too lenient for relatively old products but too limiting for new technologies which could support lower minima. The aim for the future Air OPS rules is that such limitations are not anymore specified in the OPS requirements but established through the airworthiness certification process for each product.



In particular for LVOs, aerodrome operating minima and operational credits should be established through the specific approval process taking into account the capabilities and limitations of the aircraft, the complexity of the intended operation, the operator's experience with LVOs, the maturity of the operator's management system, the experience and qualifications of the crew and relevant operations personnel as well as specific performance targets agreed between the competent authority and the operator.

#### 4.3. Flight crew training

Initial and recurrent training and checking provisions for the flight crew are essential for ensuring safety. These rules are currently not fully aligned with the operational rules and do not sufficiently address operations with vision systems.

The new revised rules should in particular:

- clarify the scope of LVOs training and checking, validity periods and the required training equipment;
- clarify the privileges of the instrument rating;
- specify how LVOs-related privileges should be documented in a harmonised manner;
- specify which organisations/persons are entitled for LVOs training and checking;
- ensure that the CS for flight simulation training devices (FSTDs) sufficiently covers operations with new vision systems;
- ensure the integration of OSD elements in the training programmes;
- provide as far as possible technology-neutral rules ; and
- ensure consistency with alternative training and qualification programmes (ATQPs) and the future development of evidence-based training (EBT) and competency-based training.

It is important that syllabi for the theoretical-knowledge training of pilots are amended commensurate to the specific type of license and rating; amendments to the syllabi should ensure that pilots are familiar with new technologies and new types of operations and understand the underlying operational concepts. These amendments of the syllabi also require corresponding changes to the ECQB.

#### 4.4. Aerodromes

The advancement in vision technologies allow that air operations can be performed in lower aerodrome operating minima without the necessity of significant investments in the ground infrastructure. This would allow increased access to smaller aerodromes in particular and bring benefits for operators.

However, in order to exploit these economic potentials, aerodrome rules need to reflect the aforementioned technological progress and be fully aligned with the needs for take-off and approach operations, in particular for operations with vision systems. A close link to the Air OPS rules is needed.

In particular the following issues need to be addressed:

- support of EVS approach operations with consequential amendments of low-visibility procedures (LVP), the certification of aerodrome operators, the publication of visibility limitations for the



aerodrome operator and the status of light-emitting diode (LED) lights in the aeronautical information publication (AIP);

- support for SVS and CVS operations with consequential amendments to the LVP and to the certification process for aerodrome operators; and
- harmonised aerodrome chart symbology for low-visibility taxiing.

#### 4.5. ATM/ANS

This domain is vital to ensure that AWO can be conducted in a safe, efficient and effective way.

All ANS as defined by ICAO (air traffic services (ATS), meteorological services (MET), communication navigation surveillance (CNS) and aeronautical information services (AIS)) are relevant for AWO, and in particular CNS, which should provide the underlying navigation infrastructure and related performance data (integrity, continuity, availability). In addition, procedure design and the provision of aeronautical data need to be considered.

ATS should ensure that the traffic is safely handled and that pilots/operators are timely informed in accordance with established AWO principles.

MET services must provide pilots/operators with the adequate meteorological information for the planning stage and for in-flight management of the flight.

As partly addressed already above, Member States (MSs) should ensure the availability of all relevant information for the establishment of aerodrome operating minima in the AIP, such as visibility limitations for aerodrome operators and specifications of the lighting systems, including the status of LED lights and the performances of the landing systems.

European rules on procedure design foresee that procedures for air navigation services OPS (PANS)-OPS criteria should be used. To use the SA CAT I concept for SVGS operations, ICAO should specify SA CAT I procedure design criteria in PANS-OPS or confirm that existing CAT I procedure design criteria can be used. The Agency together with the FAA and other interested regulators may actively pursue these amendments at ICAO level. Alternatively, the European rules could contain the necessary adjustments of PANS-OPS criteria based on corresponding Terminal Instrument Procedures (TERPS) criteria from the FAA.

## 5. Objectives, actions and deliverables

### 5.1. Objectives

It is proposed that the project fulfils the following objectives:

Overall objectives

- The European regulatory framework in the area of AWO should provide a safe and efficient framework, relying on a performance and risk-based approach.
- Manufactures, air operators and aerodrome operators should be enabled to take full advantage of safety benefits and economic benefits accrued from new technologies and operational experience.

Operational objectives



Actions in the different domains should:

- take into account stakeholders' expectations and operational needs;
- be based on common operational concepts and cross-domain systemic risk assessments;
- result in consistent rules across all domains;
- consider established industry standards;
- be aligned with ICAO SARPS and ICAO documents;
- be harmonised with rule developments in the FAA and others major regulators, as far as possible; and
- be followed up by rule implementation support actions, where needed.

## 5.2. Actions and deliverables

In order to implement these objectives, the following actions and deliverables are planned:

### — Stakeholder survey

Before regulatory activities start, a stakeholder survey should be conducted to better understand stakeholders' expectations and operational needs. Stakeholders of the following domains should be included: initial airworthiness (IAW)/continuing airworthiness (CAW), air OPS, training, aerodromes (ADR), ATM/ANS.

### — Regulatory actions — RMT.0379 (AWO)

- common descriptions of operational concepts and cross-domain risk assessments (based on available demonstrated and validated results, where feasible/available);
- terms of reference (ToR) documents, regulatory impact assessments (RIAs), notices of proposed amendment (NPAs), comment-response documents (CRDs), Opinions and Decisions taking into account performance-based rule-drafting principles; a chart of the affected European rules is presented in Chapter 6.1 below; and
- evaluation of the effectiveness of the new rules including any follow-up actions to address deficiencies after a certain period of time, e.g. three years after the rule applicability date.

### — ICAO-related actions

Proposed amendments to ICAO SARPS, ICAO PANS and ICAO documents in ICAO panels with a view to fostering global harmonised rules as well as to keeping the relevant ICAO provisions updated and performance-based; a chart of the affected ICAO documents as well as a chart of relevant ICAO panels and groups are shown in Chapters 6.2 and 6.3 below, respectively.

### — Harmonisation actions with other regulators and stakeholders

- contributions to AWOHARC meetings to seek rule harmonisation between Europe and the USA;
- harmonisation of rules with other regulators on a case-by-case basis; and
- involvement of other stakeholders, as the GNSS Agency.



- Development of industry standards

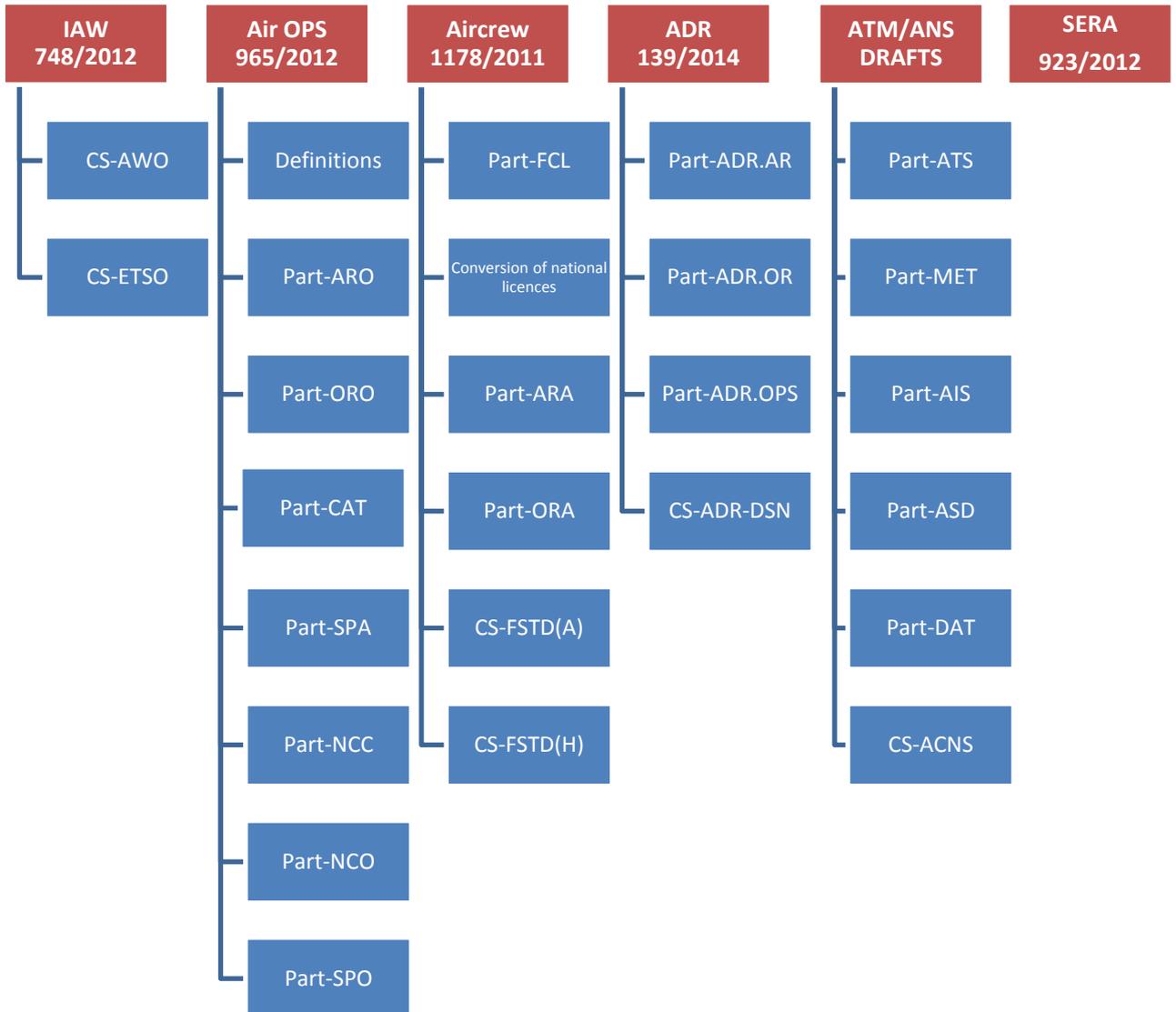
Contribution to EUROCAE and/or RTCA, standardisation bodies working on those subjects, with a view to supporting technological advancements and synchronising the work of the standardisation bodies with the regulatory actions; reference material from standardisation bodies is shown in Chapter 6.4 below.
- Implementation support
  - promotion material for procedure design organisations and their competent authorities for the design of SA CAT I procedures for approach operations using SVGS;
  - guidance for aerodrome operators and their competent authorities to prepare for approach operations using EVS, SVS and CVS;
  - stakeholder events to inform about regulatory changes; and
  - support to competent authorities on the approval process for operations with vision systems.
- ECQB-related actions
  - syllabi and LOs to be adjusted to the new regulatory framework; and
  - development of questions for the ECQB to ensure that the relevant theoretical knowledge of pilots can be assessed.
- EASA process for ‘proof of concepts’

A new EASA process for ‘proof of concepts’ of certification projects involving new operational concepts to ensure that all relevant domains are sufficiently addressed in the risk assessment for certification projects and all relevant departments are involved.

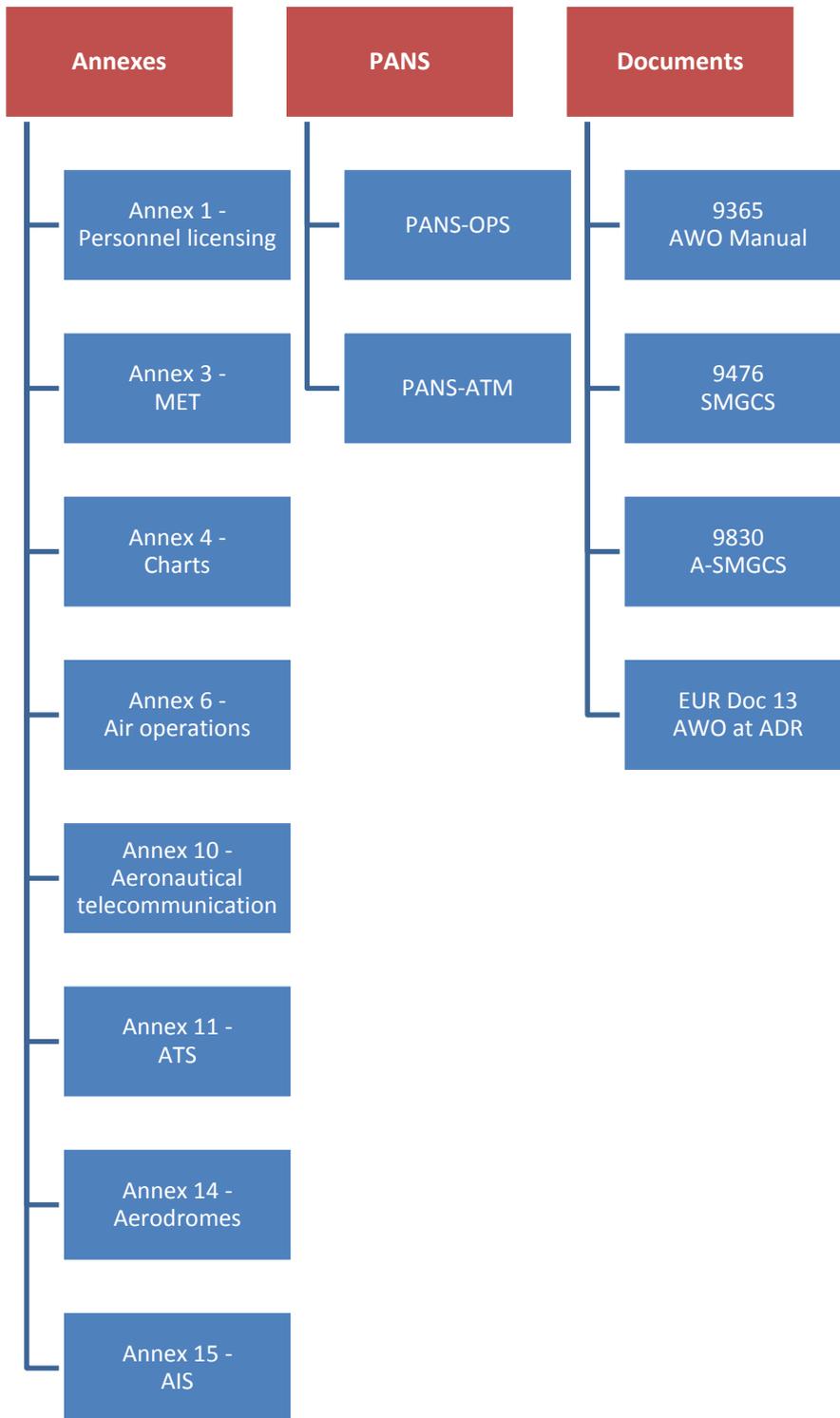


## 6. Attachments

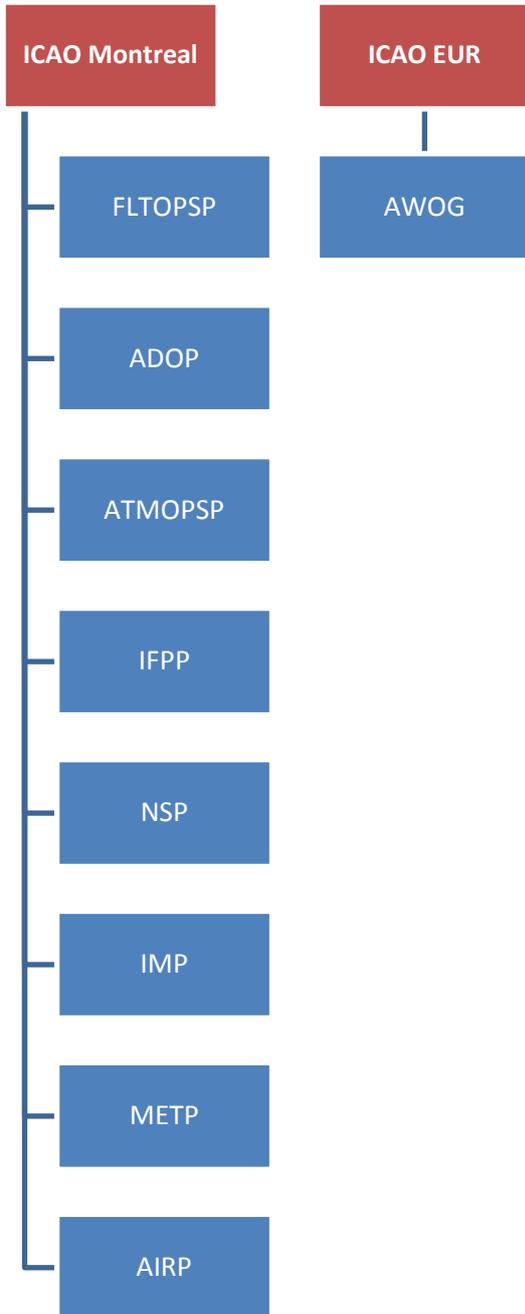
### 6.1. Possibly affected European rules



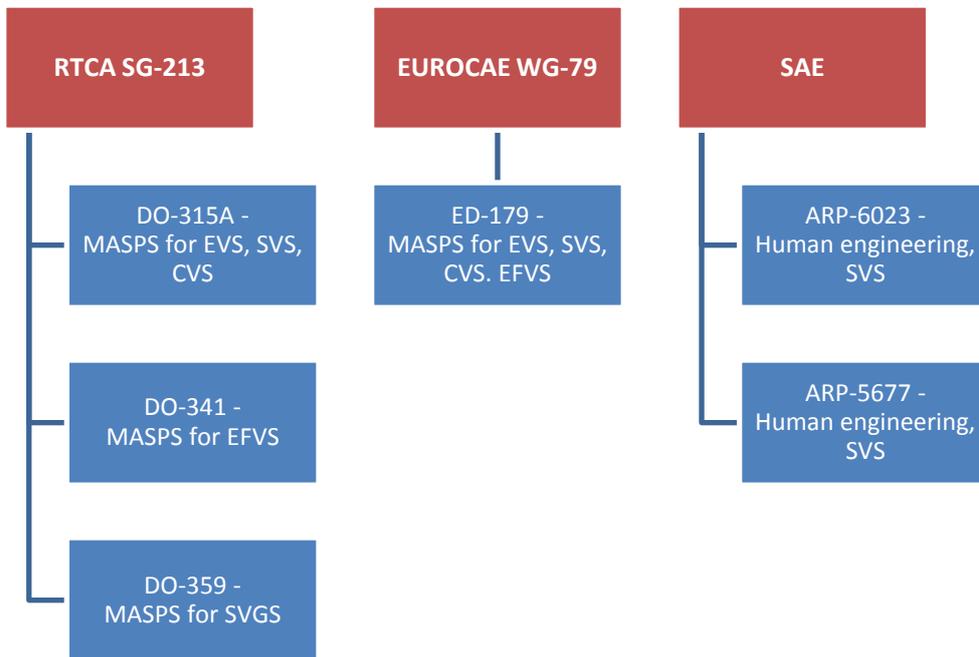
6.2. Most affected ICAO documents for AWO



### 6.3. Relevant ICAO panels and groups



#### 6.4. Reference material from standardisation bodies



## 6.5. Abbreviations

AC	advisory circular
ADOP	Aerodrome Design And Operations Panel (ICAO)
AFM	aircraft flight manual
AIP	aeronautical information publication
Air OPS	air operations
AIRP	Airworthiness Panel (ICAO)
AIS	aeronautical information services
ANS	air navigation services
ATM	air traffic management
ATCO	air traffic controller
ATO	approved training organisation
ATQP	alternative training and qualification programme
ATMOPSP	Air Traffic Management Operations Panel (ICAO)
ATS	air traffic services
AWO	all-weather operations
AWOG	All-Weather Operations Group (ICAO)
AWOHARC	All-Weather Operations Harmonisation Aviation Rulemaking Committee (FAA)
CAT	category (for approach operations, e.g. CAT I, CAT II, CAT III)
CNS	communication navigation surveillance
CVS	combined vision systems (EVS and SVS)
DA/H	decision altitude/height
EBT	evidence-based training
ECQB	European central question bank
EUROCAE	European Organisation for Civil Aviation Equipment



EVS	enhanced vision systems
FAA	Federal Aviation Administration
FAR	federal aviation regulation
FLTOPSP	Flight Operations Panel (ICAO)
FP	focal point
FSTD	flight simulation training device
GBAS	ground-based augmentation system
GLS	approach landing system using ground-based augmented global navigation satellite system information
GNSS	global navigation satellite system
HUD	head-up display
ICAO	International Civil Aviation Organization
IFPP	Instrument Flight Procedures Panel (ICAO)
ILS	instrument landing system
IMP	Information Management Panel (ICAO)
LED	light-emitting diode
LTS CAT I	lower-than-standard CAT I
LVOs	low-visibility operations
LVP	low-visibility procedure
LVTO	low-visibility take-off
MASPS	minimum aviation system performance standard
MET	meteorological services
METP	Meteorology Panel (ICAO)
MLS	microwave landing system
NDB	non-directional beacon



NSP	Navigation Systems Panel (ICAO)
OSD	operational suitability data
OTS CAT II	other-than-standard CAT II
PANS-ATM	procedures for air navigation services ATM
PANS-OPS	procedures for air navigation services OPS
RNAV	area navigation
RTCA	Radio Technical Commission for Aeronautics
RVR	runway visual range
SA	special authorisation
SAE	Society of Automotive Engineers
SARPS	standards and recommended practices (ICAO)
SERA	standardised European rules of the air
SBAS	satellite-based augmentation system
STC	supplement type certificate
SVGS	synthetic vision guidance system
SVS	synthetic vision system
TC	type certificate
TERPS	terminal instrument procedures
ToR	terms of reference
VHF	very high frequency
VOR	VHF omnidirectional range

