



Explanatory Note to Decision 2015/014/R

Guidance Material on the implementation of the remote tower concept for single mode of operation

RELATED NPA/CRD 2015-04 — RMT.0624 — 3.7.2015

EXECUTIVE SUMMARY

This Decision addresses a safety issue related to the provision of aerodrome air traffic services from a remote tower, commonly known as remote tower operations.

The specific objective of this rulemaking task is to maintain the level of safety in those cases where air traffic services are provided from a remote tower compared to their provision from a conventional tower, as well as to promote the development of a new technology associated to the remote tower concept, thus ensuring its safe implementation.

Therefore, this Decision introduces Guidance Material (GM) on the implementation of the remote tower concept for single mode of operation, which is within the scope of the current regulatory framework (Commission Implementing Regulation (EU) No 1035/2011, Commission Implementing Regulation (EU) No 923/2012 and Commission Regulation (EU) No 139/2014).

The proposed GM is expected to maintain the level of safety and at the same time provides for harmonised means as regards the implementation of the remote tower concept for single mode of operation.

Applicability		Process map	
Affected regulations and decisions:	Not applicable	Concept Paper:	No
Affected stakeholders:	Air Navigation Service Providers (ANSPs); aerodrome operators; competent authorities; Air Traffic Management (ATM) system developers; airspace users.	Rulemaking group:	Yes
Driver/origin:	SESAR; safety; proportionality and cost-effectiveness; technological developments.	Terms of Reference:	9.12.2014
Reference:	Not applicable	RIA type:	Full
		Technical consultation during NPA drafting:	No
		Publication date of the NPA:	23.3.2015
		Duration of NPA consultation:	6 weeks
		Focussed consultation:	Yes
		Publication date of the Opinion:	n/a



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1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (hereinafter referred to as the 'Agency') developed Decision 2015/014/R in line with Regulation (EC) No 216/2008¹ (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure².

This rulemaking activity is included in the Agency's [Revised 2014–2017 Rulemaking Programme](#) under RMT.0624.

The final text of this Decision and of the GM has been developed by the Agency based on the input of the Rulemaking Group RMT.0624 and on focussed consultation.

All interested parties³ were consulted through the Notice of Proposed Amendment (NPA) 2015-04 'Technical and operational requirements for remote tower operations', which was published on 23 March 2015. In total, 32 commentators representing competent authorities, ATS providers, staff representatives, individuals and others (e.g. airport associations, industry) submitted 446 comments. The distribution of the comments is shown in Figure 1 below.

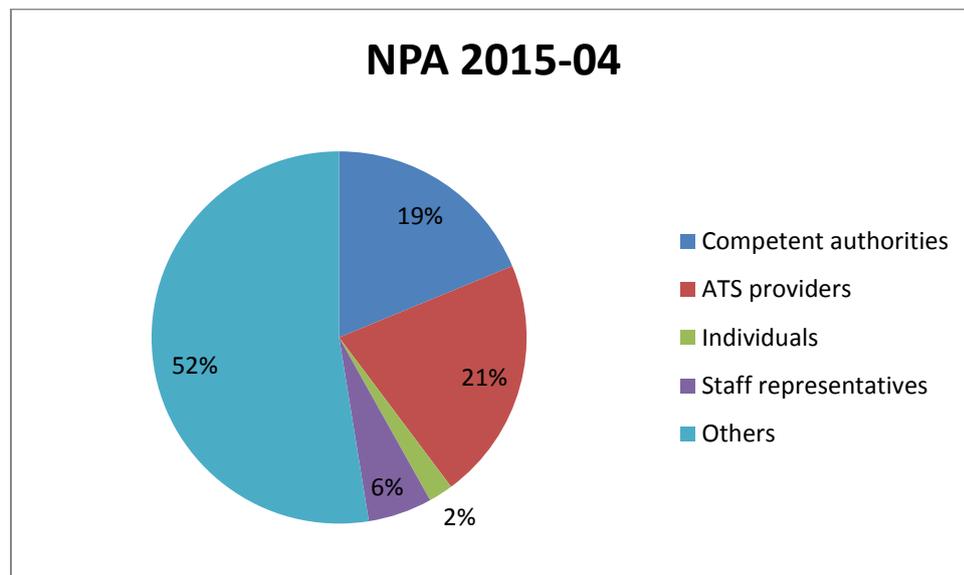


Figure 1: Distribution of comments received per stakeholder sector

Out of the 446 comments received, 218 (approximately 50 %) have been accepted or partially accepted, while 133 (only 30 %) have not been accepted, and 95 (approximately 20 %) have been noted (mostly supportive comments and subjects to be considered for further rulemaking developments). The distribution of the responses in CRD to NPA 2015-04 is shown in Figure 2 below.

¹ Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1).

² The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board Decision 01-2012 of 13 March 2012 concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material (Rulemaking Procedure).

³ In accordance with Article 52 of the Basic Regulation, and Articles 5(3) and 6 of the Rulemaking Procedure.

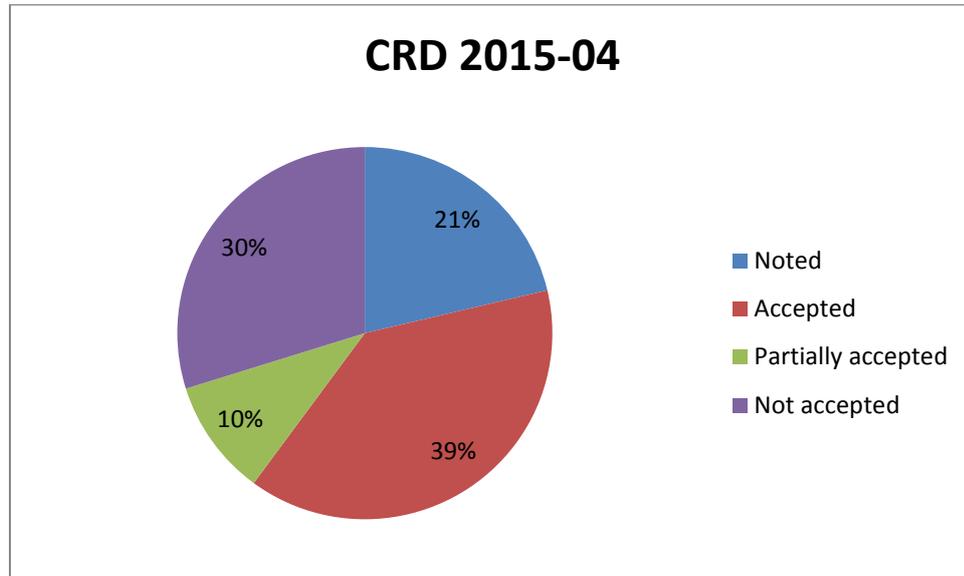


Figure 2: Distribution of the responses in CRD to NPA 2015-04

The process map on the title page contains the major milestones of this rulemaking activity to date, and provides an outlook of the timescale of the next steps.

1.2. Structure of the related documents

Chapter 1 contains the procedural information related to this task. Chapter 2 explains the core technical content. The GM is provided in the Annex to the ED Decision.

2. Explanatory Note

2.1. Overview of the issues to be addressed

2.1.1 Changes to the technical requirements at Implementing Rule level

Not applicable.

2.1.2 Implementation feedback

Not applicable.

2.1.3 Introducing GM to facilitate the implementation of the remote tower concept for single mode of operation

Through this Decision the Agency is providing the necessary GM for the domains covered by the ATM and aerodromes regulatory framework with the aim to facilitate the uniform implementation of the remote tower concept for single mode of operation.

Although the implementation of the remote tower concept is considered as a change in the ATM functional system and the 'final product' (i.e. aerodrome air traffic service) is still considered to be provided to the airspace users with no significant impact compared to current operations (from conventional towers), the introduction of this GM will greatly assist ANSPs, aerodrome operators and competent authorities in the implementation of the concept as it focusses on many aspects to be taken into consideration for its implementation and associated approval.

The details and rationale of the proposed GM have been described already in the Explanatory Note of NPA 2015-04. Therefore, this Explanatory Note focusses only on the changes made since the publication of the NPA.

These changes are explained in detail in Section 2.5 'Overview of the proposal' of this document.

2.2. Objectives

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 2 of NPA 2015-04.

The specific objective is to ensure that ATS provided from a remote location meet the applicable ICAO requirements and ensure at least the same level of safety as when provided from a conventional tower. The visual reproduction and the system support shall enable visualisation and environmental reproduction of the areas of responsibility of the ATS provider at least equivalent to those provided from a control tower.

In order to meet this objective, NPA 2015-04 proposed a phased approach as well as Acceptable Means of Compliance (AMC) and GM issued by the Agency to facilitate the safety assessment, implementation and operational approval of the remote tower concept, taking into consideration the following:

- This proposal forms the first phase of the work for single mode of operation and is based on research, development and validation activities conducted so far within the SESAR project.
- Further work will be conducted by the Agency in order to:
 - address future developments concerning the remote tower concept; and
 - align with future regulatory measures concerning ATS provision.

This work will be closely linked with EUROCAE WG-100 whose aim is to develop an industry standard on the technical aspects of the remote tower concept.



The Agency will aim to recognise this standard as part of the AMC with the presumption of regulatory compliance.

2.3. Outcome of the consultation

The Agency concludes that the public consultation of NPA 2015-04 'Technical and operational requirements for remote tower operations' brought real benefits to this rulemaking activity. Stakeholders and interested parties provided valuable comments and alternative proposals accompanied by justifications and practical examples, which largely facilitated the review of the initial proposal.

The Agency reviewed the comments and provided responses thereto with the assistance and contribution of experts who participated in the drafting of the subject proposals together with the members of the related Rulemaking Group RMT.0624.

The main subjects that were identified are the following:

- approach at regulatory level,
- definitions,
- functionalities (basic equipage and enhanced equipage),
- references to the level of safety,
- human-computer interaction functions,
- hazards classification and characteristics (references to severity classification and SWAL level),
- impact on airspace users.

The main conclusions about the previous subjects are presented in Section 2.5 'Overview of the proposal' of this document.

2.4. Summary of the Regulatory Impact Assessment (RIA)

Approach for the RIA

The RIA of [NPA 2015-04](#) concluded that the regulatory approach followed by the Agency supports the implementation of the remote tower concept by establishing a common basis among Member States and preventing at the same time an overregulating scheme.

In parallel with the NPA consultation process, a case study was conducted in April 2015 on a real remote tower project, carried out by the German ATS provider Deutsche Flugsicherung (DFS), in order to get evidence that the draft regulatory material included in said NPA will have no negative impact on their implementation projects and that it could help stakeholders meet the objectives of the option chosen as a result of the RIA.

Regarding the aforementioned case study, the following questions were addressed for each of the sections contained in the NPA:

- 'Number 1': Can you identify issues/negative impacts or positive impacts concerning your implementation of the remote tower concept?
- 'Number 2': If yes, which/why?
- 'Number 3': If you identified issues in this section, what would you propose?



The DFS remote tower project at Leipzig (LEJ) Remote Tower Centre was selected for the case study.

Description of the remote tower project selected by DFS for the case study

The Leipzig Remote Tower Centre is planned to provide ATC remotely in the first step to aerodromes up to 50 000 IFR movements per year (Saarbrücken (SCN), Erfurt (ERF), Dresden (DRS)). Currently, only single runway aerodromes are considered.

The characteristics of the aerodromes for which ATC would be provided remotely are the following:

- All types of traffic are involved (VFR, IFR, scheduled, charter, GAT, rescue, police).
- The amount of movements during 2014 was as follows:
 - SCN (< 10 000 IFR /< 1 500 VFR),
 - ERF (< 5 000 IFR /Approximately 3 000 VFR),
 - DRS (< 25 000 IFR /< 7 000 VFR).

Note: All aerodromes with normally low density (1–2 simultaneous IFR movements).

- Airspace classification: ‘D CTR’ at all mentioned aerodromes.
- Number of ATCOs: 1–2 at each aerodrome, depending on traffic density, time of day, etc.
- ATCO training: ADI/RAD/GMS/GMC.

There is a specific training for remote tower operations (including for instance theoretical instruction, simulation, simultaneous operations, unit training, etc.) following the results of the safety assessment, which forms part of in the training plan and approved by the competent authority.

Outcome of the case study

Out of the 58 questions for ‘Number 1’ (i.e. ‘Can you identify issues/negative impacts or positive impacts concerning your implementation of the remote tower concept?’) addressed in the case study, the results were as follows:

- 56 answers stated that the content of NPA 2015-04 has no negative impact;
- only 2 answers identified potential negative impacts.



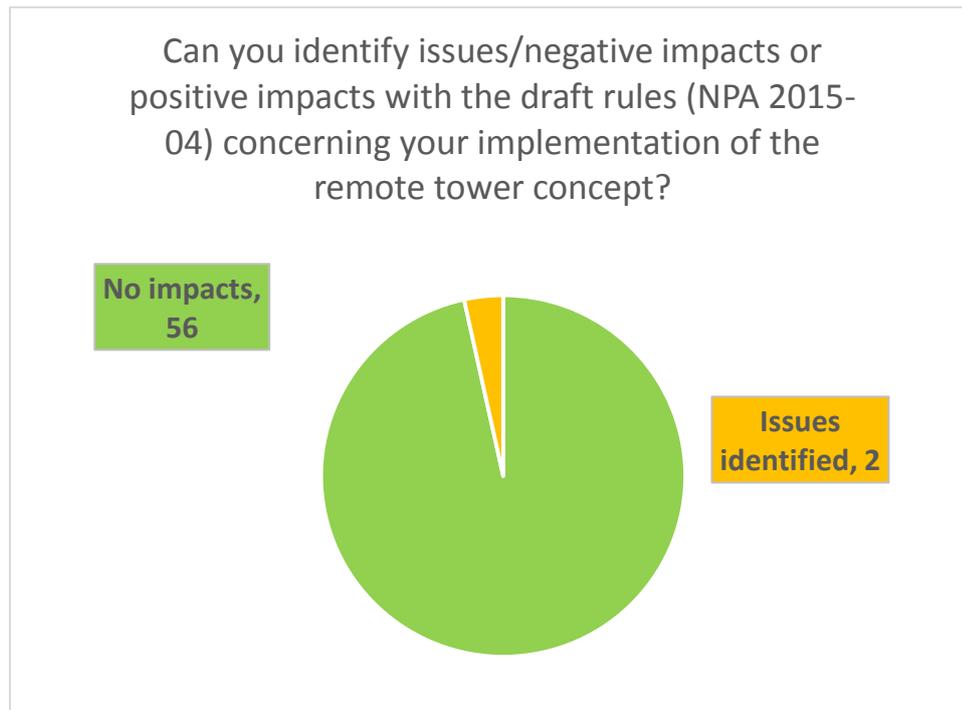


Figure 3 — Impact of the draft rules (NPA 2015-04)

Analysis of the two identified issues

Both issues identified to have a potentially negative impact were raised by DFS during the consultation phase of the NPA (see CRD to NPA 2015-04 at <http://www.easa.europa.eu/document-library/comment-response-documents>).

The issue addressed on 'Guidance on determination of the safety objectives and safety requirements' was positively answered by the Agency, and the SWAL classification reference has been removed from the final text.

One issue was identified with regard to the amendment proposed in Section 4 of the NPA 'GM3 ATCO.D.060(c) Unit endorsement course' to the existing AMC/GM associated to Commission Regulation (EU) 2015/340 (EU ATCO regulatory framework).

DFS proposed to refer to 'sufficient' or 'acceptable' instead of 'same' level of safety, subject to the safety assessment. As it can be seen in the CRD, this comment was recurrent through the document, so the issue is further explained in Section 2.5, under the item 'Level of safety in comparison to current operations (from a conventional tower)'.

Conclusion

The regulatory approach followed by the Agency supports the implementation of the remote tower concept in a safe and cost-efficient way without overregulating, therefore meeting the objectives of the option chosen as a result of the RIA.

2.5. Overview of the proposal

Approach at regulatory level

The Agency's proposal was welcomed by the large majority of the stakeholders, who expressed their satisfaction with the approach followed. In this context, one of the concerns raised (mostly by staff representatives) was that they would have wished this helpful material to be of a 'more binding' nature, such as AMC or even Implementing Rule (IR). To this regard, taking into consideration the early stages of the concept and the current implementation feedback, the Agency believes that the content related to Section 3 ('Guidance on the implementation of the remote tower concept') should remain as GM taking into consideration its explanatory nature. Nevertheless, and based on the phased approach to be followed, the Agency considers that future rulemaking activities and their associated deliverables may go beyond, as the concept evolves and more experience is gained as a result of validations and implementations.

Definitions

In order to facilitate the understanding of the elements covered in this GM, during the drafting phase it was considered helpful and necessary to define some of the terms contained therein. During the consultation process, many stakeholders stated the need to include several terms that had not been defined in the NPA, as well as to amend some of the existing ones in order to improve clarity and consistency. Amongst those terms, the Agency, together with the support of the Rulemaking Group members, included new definitions for 'remote tower module', 'remote tower centre' and 'out-the-window view', as well as a new definition for 'visual presentation' (based on the previous one for 'out-the-window view'), and amending as well the 'aerodrome conventional tower' and 'aerodrome remote tower' as suggested by some commentators.

Basic equipage and enhanced equipage

The introduction of the remote provision of ATS offers the opportunity to include functionalities that may not be easily implemented in a conventional tower. The Agency and the Rulemaking Group RMT.0624 recognise that the development of a new technology will offer new opportunities to implementers to include new functionalities in the near future. These additional functionalities offered by the new technology are referred to as 'enhanced equipage' in this GM. However, most of these functionalities have not been validated yet in the context of the SESAR project, upon which some of the GM assumptions are made. As stated in the GM, recent implementation and validation activities have focussed on a basic concept of the remote provision of ATS. The functions and technology used are referred to as basic equipage in this document, and the results of the SESAR safety works are therefore based on the use of these functionalities. To this regard, ATS providers choosing to add enhanced functionalities need to take duly into account the fact that at the time of publication of this GM, these functionalities have not been validated in the context of the SESAR project and their implementation has to be thoroughly assessed through an in-depth evaluation of the selected enhanced functionalities, including the necessary validation activities and human performance assessment, as part of to the corresponding safety assessment of the local implementation.



Level of safety in comparison to current operations (from a conventional tower)

As reference to ‘today’s operations’ is repeatedly made in the text when referring to the level of safety, some commentators expressed the wish to see it from a different perspective, the objective being to maintain an acceptable level of safety.

However, due to the novelty of and limited operational experience with the concept at this stage, and taking into consideration the basic principle followed by which the implementation of the remote tower concept is considered a change in the ATM functional system, the Agency strongly believes that the safety objective comparisons shall be made against current operations (conventional tower). Based on this argument, the text has remained as it was proposed in the NPA.

Hazard classification and characteristics (references to severity classification and SWAL level)

The NPA contained an annex with the list of operational hazards resulting from the SESAR safety works, including the allocated severities of their effects and covering the ATC and AFIS services. From the comments received, there was general consensus on the provision of the list of operational hazards for the sake of example. However, some concerns were raised by several commentators about the inclusion of the severities of the effects due to the possible dependency on the local environment and conditions. Although these lists were indicative, the Agency realised that they might be misunderstood by the potential readers. Therefore, the text was revised by keeping the list of the operational hazards and removing the effect severities. Additionally, the main text was modified in order to avoid references to the usage of such severities, stressing the idea that the list of operational hazards is provided for information purposes only.

Additionally, the NPA included a reference to the results of the SWAL allocation from the SESAR safety works where it was mentioned that the need for a SWAL2 was derived for the visual presentation part of the system, identified as the most critical element. The paragraph also included a reference to the need for ANSPs to apply a SWAL allocation process, as requested by Commission Regulation (EC) No 482/2008. Several comments were received requesting the deletion of the corresponding paragraph with two main arguments: the dependency of the SWAL allocation process on the local environment and conditions (as the above-mentioned severities of the hazard effects), and the future repeal of Commission Regulation (EC) No 482/2008 taking into account the ongoing regulatory activities (‘Common Requirements for ATM/ANS and Safety Oversight’). The reference to SWAL2 was included for information purposes in order to be used as input in the initial cost–benefit analysis, highlighting the criticality of some of the components of the remote tower system. Based on these inputs and following the same rationale as in the severities of the hazard effects, the Agency has decided to remove the reference to SWAL2. However, regarding the reference to Commission Regulation (EC) No 482/2008 and the Software Safety Assurance System (SSAS), the Agency preferred to keep the current text. It is foreseeable that Commission Regulation (EC) No 482/2008 will be repealed when the new regulation enters into force, but since it is still applicable at the time of issue of this GM, ongoing remote tower implementation projects should comply with it.

Human–computer interaction functions

This section includes the description of the main functions of the remote tower system in relation to the ATCO/FISO interface. Some changes were introduced following the public consultation phase. Several comments were received on the end-to-end delay, as part of the visual presentation. The NPA



included information about this parameter highlighting that the value should be the result of the safety assessment but it should not exceed the 1-second value. This value was identified as the maximum value for low density aerodromes which correspond to the simplest scenarios for the application of the remote tower concept. More complex scenarios (in terms of traffic or other considerations) should lead to the need of having shorter end-to-end delays in order to maintain the required ATCO/FISO situational awareness. There was no general consensus among the commentators: some of them requested not to include any absolute figure and to leave everything to the safety assessment, whereas others agreed with the strategy followed (including the value), and some others even requested to include shorter values (0.3 seconds) as maximum value. Other commentators highlighted that it would be necessary to include maximum values for the other parameters (e.g. frame rate). According to the Agency's view, the end-to-end delay is, on the one hand, one of the most critical parameters regarding the ATCO/FISO situation awareness and, on the other hand, a design driver of the remote tower concept as its value has significant impact on the design of many of the system components (including communication links). Based on these aspects and on the different feedback received, the Agency concluded about the need to maintain the reference to the maximum 1-second value and to keep the reference to the fact that the value shall be the result of the safety assessment. This approach is also in line with the EUROCAE WG-100 works (still under development).

Impact on airspace users

One of the principles of the remote tower concept is that airspace users do not necessarily have to be impacted by its implementation. However, some of the results of the validation activities have questioned this statement, and the Agency included in the NPA some situations that may be taken into consideration as mitigation measures for certain risks identified as a result of a certain visual presentation characteristics, such as the need for the aircraft to have lights on when entering into the remote tower aerodrome airspace.

Attending on the different comments submitted and taking into consideration the opinion of the Rulemaking Group's members, the Agency decided to amend the text and not to include any reference to mitigation measures, such as the need to have lights on, in order to avoid misinterpretations, understanding that such mitigation measures against a potential risk will be subject to specific implementation conditions.

On the other hand, the Agency still considers valid the reference to the possible need (when the overall conditions so require and as a result of the safety assessment) to implement surveillance functionalities (of those catalogued as 'enhanced equipage') to establish a Transponder Mandatory Zone (TMZ) which may have a potential impact on airspace users.



3. References

3.1. Affected regulations

Not applicable.

3.2. Affected decisions

Not applicable.

3.3. Reference documents

- ICAO Annex 11 'Air Traffic Services'
- ICAO Doc 4444 'Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM)'
- ICAO Doc 9750, 4th Edition, 'Global Air Navigation Plan (GANP)'
- ICAO Working Document for The Aviation System Block Upgrades — 28 March 2013 (Section B1-RATS Remotely Operated Aerodrome Control)
- ICAO Doc 9859 'Safety Management Manual', Second Edition, Appendix 1 to Chapter 7, 'System Description Of An Aerodrome'
- ICAO Doc 9734 'Oversight Manual', Part C, 'The Establishment and Management of a State's Aviation Security Oversight System'
- EUROCONTROL Manual for Aerodrome Flight Information Service (Edition number 1.0)
- D04 — OSED for Remote Provision of ATS to Aerodromes, including Functional Specification, Edition 00.04.01 (SESAR)
- D08 'Remote Provision of ATS to a Single Aerodrome VALR', Edition 00.04.00 (SESAR)
- D03 'Remote and Virtual Tower: Rules & Regulations Assessment Report', Edition 00.01.01 (SESAR)
- OFA06.03.01 Remote Tower 'Safety Assessment Report for Single Remote Tower', Edition 00.01.01 (SESAR)
- PP 6.9.3 Intermediate HP Assessment Report, Edition 00.01.01 (SESAR)
- Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1)
- 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)
- 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)



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- 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)
 - Commission Regulation (EU) 2015/340 of 20 February 2015 laying down technical requirements and administrative procedures relating to air traffic controllers' licences and certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 923/2012 and repealing Commission Regulation (EU) No 805/2011 (OJ L 63, 6.3.2015, p. 1)
 - ICAO Annex 3 on Meteorological Service for International Air Navigation
 - Subpart D 'Instruments, Data, Equipment' of Annex IV 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 (OJ L 296, 25.10.2012, p. 1)
 - ICAO Annex 14 'Aerodromes Volume I Aerodrome Design and Operations'
 - ICAO Annex 14 'Aerodromes Volume II Heliports'
 - ICAO Doc 9426 'Air Traffic Services Planning Manual'
 - ICAO Circular 211-AN/128 'Aerodrome Flight Information Service'

