



Opinion No 03/2020

Implementation of the latest CAEP amendments to ICAO Annex 16 Volumes I, II and III

RELATED NPA/CRD 2020-06 — RMT.0514

EXECUTIVE SUMMARY

The objective of this Opinion is to align the European Union (EU) regulatory framework with the International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) contained in Annex 16 to the Chicago Convention.

In February 2019 the ICAO Committee on Aviation Environmental Protection (CAEP) proposed improvements and updates to the existing noise, aircraft engine emissions, and aeroplane CO₂ emissions SARPs, including new non-volatile particulate matter (nvPM) emissions regulatory levels for aircraft engines. The ICAO Council adopted the final amendments at the fifth meeting of its 219th Session on 11 March 2020.

Thus, this Opinion proposes to amend accordingly Article 9 ‘Essential requirements’ of Regulation (EU) 2018/1139, Article 9 ‘Production organisations’ of Commission Regulation (EU) No 748/2012 and its Annex I (Part 21).

The proposed amendments are expected to ensure a high uniform level of environmental protection and to provide a level playing field for all actors in the aviation sector.

Action area:	Noise, local air quality and climate change standards		
Related rules:	<ul style="list-style-type: none"> — Article 9 of Regulation (EU) 2018/1139 — Article 9 of Commission Regulation (EU) No 748/2012 — Annex I (Part 21) to Commission Regulation (EU) No 748/2012 		
Affected stakeholders:	Design organisation approval (DOA) and production organisation approval (POA) holders		
Driver:	Environmental protection	Rulemaking group:	No
Impact assessment:	Full (by ICAO CAEP)	Rulemaking Procedure:	Standard

• EASA rulemaking process milestones



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1. About this Opinion

1.1. How this Opinion was developed

The European Union Aviation Safety Agency (EASA) developed this Opinion in line with Regulation (EU) 2018/1139¹ ('Basic Regulation') and the Rulemaking Procedure².

This rulemaking activity is included in the European Plan for Aviation Safety (EPAS) [2020-2024](#) under rulemaking task (RMT).0514. The scope and timescales of the task were defined in the related Terms of Reference³.

The *draft* text of this Opinion has been developed by EASA. All the interested parties were consulted through Notice of Proposed Amendment (NPA) 2020-06^{4,5}. 24 comments were received from all the interested parties, including industry and national aviation authorities (NAAs).

EASA addressed and responded to the comments received on the NPA in Comment-Response Document (CRD) 2020-06⁶.

The *final* text of this Opinion and the draft regulations have been developed by EASA. The draft rule text proposed by EASA is published on the EASA website⁷.

The major milestones of this rulemaking activity are presented on the title page.

1.2. The next steps

This Opinion contains the proposed amendments to the Basic Regulation and to Commission Regulation (EU) No 748/2012⁸ and its Annex I (Part 21), and their potential impacts. It is submitted to the European Commission, which will use it as a technical basis in order to prepare EU regulations.

The decision that contains the related certification specifications (CS), acceptable means of compliance (AMC) and guidance material (GM) will be published by EASA when the related

¹ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139>).

² EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (<http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).

³ [ToR RMT.0514 | EASA](#)

⁴ In accordance with Article 115 of Regulation (EU) 2018/1139 and Articles 6(3) and 7 of the Rulemaking Procedure.

⁵ [NPA 2020-06 | EASA](#)

⁶ <http://easa.europa.eu/document-library/comment-response-documents>

⁷ <http://easa.europa.eu/document-library/opinions>

⁸ Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1582902070300&uri=CELEX:32012R0748>).

Regulations are adopted by the European Commission. They will contain references to ICAO Doc 9501 'Environmental Technical Manual', Volumes I, II and III.



2. In summary — why and what

2.1. Why we need to amend the rules — issue/rationale

Following its 11th formal meeting (CAEP/11) from 4 to 15 February 2019, the ICAO CAEP agreed on amendments to ICAO Annex 16 Volume I 'Aircraft Noise', Volume II 'Aircraft Engine Emissions', and Volume III 'Aeroplane CO₂ Emissions'. The recommendations were the outcome of the work conducted during the 3 years preceding the meeting in accordance with the CAEP/11 Work Programme. The ICAO Council adopted the final amendments at the fifth meeting of its 219th Session on 11 March 2020.

The proposed amendments to ICAO Annex 16 Volume I include updates to the existing aircraft noise SARPs. No new regulatory level on aircraft noise was discussed at CAEP/11.

The proposed amendments to ICAO Annex 16 Volume II include updates to the existing aircraft engine emissions SARPs, new Landing and Take-off (LTO) non-volatile particulate matter (nvPM) mass and number regulatory levels, and the introduction of an applicability end date for the Smoke Number (SN) regulatory levels for engines with a maximum rated thrust greater than 26.7 kN.

The proposed amendments to ICAO Annex 16 Volume III include updates to the existing aeroplane CO₂ emissions SARPs. No new regulatory level on aeroplane CO₂ emissions was discussed at CAEP/11.

The Basic Regulation and Regulation (EU) No 748/2012 make a direct reference to specific amendments to ICAO Annex 16 Volumes I, II and III. These Regulations need therefore to be amended to ensure that they are aligned with the latest ICAO SARPs in the field of aviation environmental protection.

The latest amendments to the ICAO SARPs considered in this RMT are:

- Annex 16 'Environmental Protection' to the Convention on International Civil Aviation, Volume I 'Aircraft Noise', Amendment 13, 20 July 2020
- Annex 16 'Environmental Protection' to the Convention on International Civil Aviation, Volume II 'Aircraft Engine Emissions', Amendment 10, 20 July 2020
- Annex 16 'Environmental Protection' to the Convention on International Civil Aviation, Volume III 'Aeroplane CO₂ Emissions', Amendment 1, 20 July 2020

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Section 2.1 above.

The specific objective of this proposal is to contribute to a high, uniform level of environmental protection by aligning environmental protection requirements with the ICAO SARPs contained in Annex 16 Volumes I, II and III.



2.3. How we want to achieve it — overview of the proposals

In order to align with the latest amendments to the ICAO SARPs, this Opinion proposes amendments to:

- Article 9 of the Basic Regulation,
- Article 9 of Commission Regulation (EU) No 748/2012, and
- Annex I (Part 21) to Commission Regulation (EU) No 748/2012.

The latest amendments to the ICAO SARPs and guidance material are described hereafter.

ICAO Annex 16 Volume I amendments

These amendments address technical issues and editorial corrections:

- updates of the previous references to the International Electrotechnical Commission (IEC) Standards IEC61260 to IEC61260-1 and IEC61260-3, as appropriate, and revisions that improve the description of these references; and
- corrections to general technical, nomenclature and typographical issues and revision of the definitions that use the word ‘abeam’, a definition for ‘reference ground track’, revision of the specified tolerance for slow exponential time averaging to better characterise actual exponential time response with a one-second time constant, and revisions related to the proper use of modal verbs ‘must’, ‘shall’ and ‘should’.

ICAO Annex 16 Volume II amendments

These amendments address new SARPs, new nvPM mass and number regulatory levels, technical issues and editorial corrections:

- introduction of the new text on CAEP/11 nvPM mass and number engine emissions SARPs; description of regulatory levels for LTO nvPM mass and number that would be applied to new engine types with a maximum rated thrust greater than 26.7 kN from 1 January 2023, accompanied by in-production regulatory levels for LTO nvPM mass and number with an applicability date on or after 1 January 2023;
- introduction of an applicability end date on 1 January 2023 for the Smoke Number (SN) regulatory level for engines with a maximum rated thrust greater than 26.7 kN (the SN SARPs for engines with a maximum rated thrust less than or equal to 26.7 kN are still applicable);
- an update to the applicability language for new engine types; this update will have no impact on the current NO_x SARPs for in-production engines, nor will it impact the existing production SARPs for Smoke Number (SN), hydrocarbons (HC), carbon monoxide (CO) and maximum non-volatile particulate matter (nvPM) mass concentration;
- corrections to flow rate specifications and conditions due to the application of standard temperature and pressure (STP) conditions for measurement equipment and sampling system operation specifications;
- introduction of generic language for production engine exemptions after the dates of applicability of the smoke, NO_x, HC and CO, nvPM mass and number emission SARPs,



clarification on the ‘competent authority’ references, introduction of ‘State of Design’ definition, and update of the text on exemptions;

- introduction of consequential changes across Annex 16 Volume II for consistency with the new nvPM mass and number SARPs including: definition of procedures for measurement and computation of nvPM mass and number emission levels, definition of procedures for nvPM assessment for inventory and modelling purposes, update of compliance procedure for particulate matter emissions, introduction of instrumentation and measurement techniques for nvPM emissions, updates to corrections for dilution and thermophoretic losses in the nvPM sampling system, definition of penetration fractions of individual components of the nvPM sampling and measurement system, replacement of units for the fuel sulphur content reporting; and
- corrections to general technical and typographical issues, including introduction of a Note on Type Certificate and revisions of reference humidity.

ICAO Annex 16 Volume III amendments

These amendments address technical issues and editorial corrections:

- introduction of the definition for ‘type design’ and various definition improvements; clarification of the applicability of SARPs for CO₂-certified derived versions of non-CO₂-certified aeroplanes;
- clarification of the exemption issuing authority and of the exemption recording process;
- various editorial improvements, including the deletion of superfluous text; and
- correction of minor typographical issues.

2.4. What are the stakeholders’ views — outcome of the consultation

The comments from state organisations (10 comments) and from industry (14 comments) on NPA 2020-06 were generally positive, with some suggestions for clarification and edits to the NPA text. Chapter 2 of the CRD provides the individual responses to each comment.

2.5. What are the expected benefits and drawbacks of the proposals

The impact assessment (IA) performed as part of NPA 2020-06 highlighted the expected benefits and drawbacks of the two policy options identified, namely:

Option 0 ‘No policy change’: leave current rules unchanged; or

Option 1 ‘CAEP/11 implementation’: implement the CAEP/11 amendments.

Out of the two options, only Option 1 has positive impacts in all identified aspects, while Option 0 has negative impacts in these aspects. It was therefore proposed to select Option 1 and to develop this opinion for the implementation of the CAEP/11 amendments.



2.6. How we monitor and evaluate the rules

The environmental rules will be monitored every 3 years through the update of the European Aviation Environmental Report (EAER)⁹. The EAER provides information on the environmental performance of the aviation sector at European Union level. It supports the development of performance-based regulations focusing on measurable outcomes, informs strategic discussions on the prioritisation of future work, and facilitates coordination across different initiatives. More specifically, the ‘Overview of Aviation Sector’ and ‘Technology and Design’ chapters present the progress in the implementation of the latest CAEP amendments to ICAO Annex 16 Volumes I, II and III.

Among others, the EAER uses the following indicators:

- number of people inside L_{den} 55 dB noise contours;
- average noise energy per flight;
- full-flight CO₂ emissions;
- full-flight NO_x emissions;
- full-flight volatile and non-volatile particulate matter (nvPM) emissions; and
- average fuel consumption of commercial flights.

In addition, the EAER shows advancements in technology linked to the implementation of the ICAO environmental SARPs.

The development of the EAER is coordinated by EASA with the support of the European Environment Agency (EEA), EUROCONTROL, and other European organisations.

Cologne, 8 October 2020

Patrick KY
Executive Director

⁹ European Aviation Environmental Report for 2019, available at www.easa.europa.eu/eaer and at <https://www.easa.europa.eu/eaer/downloads>.



3. References

3.1. Affected regulations

- Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1)
- Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations, and repealing Commission Regulation (EC) No 1702/2003 (OJ L 224, 21.8.2012, p. 1)

3.2. Related decisions

- Decision No. 2003/3/RM of the Executive Director of the Agency of 17 October 2003 on certification specifications providing for acceptable means of compliance for aircraft engine emissions and fuel venting ('CS-34')
- Decision No. 2003/4/RM of the Executive Director of the Agency of 17 October 2003 on certification specifications providing for acceptable means of compliance for aircraft noise ('CS-36')
- Decision No. 2019/016/R of the Executive Director of the Agency of 1 August 2019 on certification specifications, acceptable means of compliance and guidance material for aeroplane CO₂ emissions ('CS-CO₂')
- Decision No. 2012/020/R of the Executive Director of the Agency of 30th October 2012 on Acceptable Means of Compliance and Guidance Material for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations ('AMC and GM to Part-21')

3.3. Other reference documents

- ICAO Doc 10126 'Committee on Aviation Environmental Protection Report – 11th meeting', February 2019
- Annex 16 'Environmental Protection' to the Convention on International Civil Aviation, Volume I 'Aircraft Noise', Amendment 13, 20 July 2020
- Annex 16 'Environmental Protection' to the Convention on International Civil Aviation, Volume II 'Aircraft Engine Emissions', Amendment 10, 20 July 2020
- Annex 16 'Environmental Protection' to the Convention on International Civil Aviation, Volume III 'Aeroplane CO₂ Emissions', Amendment 1, 20 July 2020
- ICAO Doc 9501 'Environmental Technical Manual', Volume I 'Procedures for the Noise Certification of Aircraft', Third Edition, 2018 and Amendment No.1 to the Third Edition, 21 February 2020



- ICAO Doc 9501 'Environmental Technical Manual', Volume II 'Procedures for the Emissions Certification of Aircraft Engines', Fourth Edition, 2020
- ICAO Doc 9501 'Environmental Technical Manual', Volume III 'Procedures for the CO₂ Emissions Certification of Aeroplanes, Second Edition, 2020



4. Related document

CRD 2020-06

