European Union Aviation Safety Agency

Explanatory Note to Decision 2020/010/R

Update of AMC-20

RELATED NPA/CRD: 2017-09 — RMT.0561
RELATED NPA/CRD: 2018-09 — RMT.0643
RELATED NPA/CRD: 2016-19 — RMT.0681

EXECUTIVE SUMMARY

The objective of this Decision is to provide state-of-the-art means for showing compliance with the applicable requirements with regard to the following:

— reporting, analysis and follow-up of occurrences in civil aviation;

— certification of products and parts equipped with electronic control systems;

— certification of in-flight entertainment (IFE) systems;

— certification of airborne electronic hardware (AEH);

— management of open problem reports (OPRs).

These amendments to AMC-20 are expected to facilitate the certification and the occurrence-reporting processes. Overall, they would bring safety and economic benefits, and have neither environmental nor social impacts.

In addition, this Decision creates a consolidated index table showing all the AMC-20 guidance issued by EASA. This is expected to increase transparency and facilitate the application of those AMCs.

Action areas:	Regular updates/review of rules; safety management		
Affected rules:	AMC-20		
Affected stakeholders:	Aircraft and equipment designers and manufacturers; maintenance organisations; air operators;		
Drivers:	Efficiency/proportionality (RMT.0561, RMT.0643); Safety (RMT.0681)	**Rulemaking group:**	Yes (RMT.0561); No (RMT.0643, RMT.0681)
Impact assessment:	Light (RMT.0561); None (RMT.0643, RMT.0681)	**Rulemaking Procedure:**	Standard

RMT.0561: 20.7.2015 (Issue 3)	22.6.2017 (NPA 2017-09)	
RMT.0643: 20.7.2015	24.8.2018 (NPA 2018-09)	23.7.2020
RMT.0681: 30.9.2015	19.12.2016 (NPA 2016-19)	

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1. About this Decision

The European Union Aviation Safety Agency (EASA) developed ED Decision 2020/010/R in line with Regulation (EU) 2018/1139[1] (the 'Basic Regulation') and the Rulemaking Procedure[2].

This rulemaking activity is included in the European Plan for Aviation Safety (EPAS) for 2019-2023[3] under rulemaking tasks RMT.0561[4], RMT.0643[5] and RMT.0681[6]. The scope and timescales of the tasks were defined in the related Terms of Reference.

The *draft* text of this Decision has been developed by EASA, based on the input of Rulemaking Group (RMG) RMT.0561 for the subject of in-flight entertainment (IFE). All interested parties were consulted on the following Notices of Proposed Amendments (NPAs):

— 2016-19 'Alignment of implementing rules and acceptable means of compliance/guidance material with Regulation (EU) No 376/2014 — Occurrence reporting'[7] (RMT.0681),

— 2017-09 'Update of AMC-20 — In-flight entertainment, lead-free soldering, harmonisation of safety assurance and software development criteria'[8] (RMT.0561), and

— 2018-09 'Regular update of AMC-20: AMC 20-152 on Airborne Electronic Hardware and AMC 20-189 on Management of Open Problem Reports'[9] (RMT.0643).

They received respectively 355, 46, and 420 comments from the interested parties, including industry and national aviation authorities (NAAs). EASA reviewed the comments received during those public consultations. The comments received and EASA's responses to them are presented in Comment-Response Documents (CRDs) 2016-19[10], 2017-09[11], and 2018-09[12].

Note: RMT.0561 and the related NPA 2017-09 included a proposal to introduce a new AMC 20-30 on lead-free soldering. EASA decided to present the comments received and EASA's responses related to AMC 20-30 as part of a future specific CRD and Decision.

The *final* text of this Decision with the acceptable means of compliance (AMC) and guidance material (GM) has been developed by EASA, based on the comments received during the public consultations.

The major milestones of these rulemaking activities are presented on the title page.

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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=1536149403076&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 https://www.easa.europa.eu/document-library/general-publications/european-plan-aviation-safety-2019-2023

4 https://www.easa.europa.eu/sites/default/files/dfu/ToR%20RMT.0561%20Issue%203.pdf

5 https://www.easa.europa.eu/sites/default/files/dfu/ToR%20RMT.0643%20Issue%201.pdf

6 https://www.easa.europa.eu/sites/default/files/dfu/ToR%20RMT.0681%20Issue%201.pdf

7 https://www.easa.europa.eu/sites/default/files/dfu/NPA%202016-19.pdf

8 https://www.easa.europa.eu/sites/default/files/dfu/NPA%202017-09.pdf

9 https://www.easa.europa.eu/sites/default/files/dfu/NPA%202018-09.pdf

10 https://www.easa.europa.eu/document-library/comment-response-documents/crd-2016-19

11 https://www.easa.europa.eu/document-library/comment-response-documents

12 https://www.easa.europa.eu/document-library/comment-response-documents

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2. In summary — why and what

2.1. Why we need to change the AMC/GM

AMC-20 groups provisions on airworthiness for various systems that can be installed on aircraft of different categories. As the state of the art in designing products, parts and appliances is constantly evolving, EASA develops the necessary related guidance for the applicants. This is intended to maintain a high level of safety and avoid unnecessary cost by preventing the development of unacceptable designs at an early stage.

AMC-20 also contains guidance on compliance with the requirements on reporting, analysis, and the follow-up of occurrences in civil aviation.

EASA identified the need to amend AMC-20 to cover the following:

(a) During the public consultation of NPA 2012-11 'Recognition of ED-12C/DO-178C in EASA AMC 20-115 (Software Considerations for Airborne Systems and Equipment Certification)'[13] (RMT.0462), several stakeholders submitted comments about safety considerations and the software development level in AMC 20-1, 20-2, 20-3, 20-4, and 20-27. These comments affecting the harmonisation of safety assurance and software development criteria across AMC 20-1, 20-2, and 20-3 are now addressed under RMT.0561[14].

(b) Aircraft in-flight entertainment (IFE) systems pose, due to their nature and the technologies used, several challenges which should be addressed in order to minimise safety issues during certification, as well as the operation of these systems. If they suffer a malfunction, this could lead to electrical arcing, thus posing a fire hazard.

The development of IFE systems towards open platforms interacting with portable electronic devices (PEDs), either deployed by the aircraft operator or carried on board by the passengers, also leads to more electromagnetic emissions than before.

Since the first inception of IFE systems, technology has shifted away from simple systems towards more complex ones, which are now becoming increasingly mobile and interactive.

As IFE technology is constantly evolving, the regulatory framework should be updated accordingly. Therefore, there was a need to provide guidance for the approval of installations of IFE systems.

(c) Regulation (EU) No 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation[15] contains specific obligations for EASA, Member States' competent authorities, individuals, and approved organisations. These obligations exist in parallel with the reporting obligations established by the Basic Regulation and its delegated and implementing acts. Although the aforementioned regulations have the same purpose

[13] https://www.easa.europa.eu/document-library/notices-of-proposed-amendments/npa-2012-11

[14] The update of AMC 20-4 and 20-7 has been handled through RMT.0257 and RMT.0520.

[15] Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 (OJ L 122, 24.4.2014, p. 18) (http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1527161698770&uri=CELEX:32014R0376).

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and broadly the same outcomes, there are some differences, overlaps and ambiguities that required resolution and eventual alignment. One aspect of this is the list of reportable occurrences. AMC 20-8, therefore, needed to be amended[16].

(d) The current EASA guidance on airborne electronic hardware (AEH) is not available in the form of an AMC, and this topic was subject to certification review items (CRIs) raised project-by-project and available in the form of an EASA certification memorandum (CM). Producing an AMC-20 document would avoid the need to issue CRIs and would provide common GM and AMC that are usable across all certification domains (products, parts and appliances). Additionally, some elements of the EASA guidance in the above-mentioned CRIs and the CM on the development of AEH need to be consolidated for certain areas such as the use of commercial off-the-shelf (COTS) devices, the development of custom devices and the use of COTS intellectual property.

The current guidance on AEH is also not harmonised between EASA and the FAA, and this lack of harmonisation has created misalignment and necessitated additional activities in validation projects. EASA and the FAA decided to join their efforts to harmonise their views, by developing common EASA AMC and FAA AC material.

(e) The current guidance on the management of open problem reports (OPRs) is not harmonised between EASA and the FAA. It has been decided to include this topic in the software and AEH guidance harmonisation effort that is ongoing, by creating joint EASA AMC and FAA AC material for OPR management, replacing the material currently available through Certification Memoranda EASA CM-SWCEH-001, EASA CM-SWCEH-002, and FAA Order 8110.49.

In addition, OPR management is an overarching issue that encompasses not only the software and AEH domains but also the systems/equipment domains. The available guidance for these domains is not consistent, and the new OPR management guidance is an opportunity to align practices across these domains.

Moreover, years of use of the current EASA guidance on OPR management have unveiled several issues and the potential for misinterpretation.

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.

The specific objective of this proposal is to:

— ensure alignment with Regulation (EU) No 376/2014 and its implementing acts;

— provide guidelines for the reporting of occurrences to the competent authorities;

— harmonise the criteria for safety assurance, software and AEH development;

[16] Other aspects addressed by RMT.0681 will be gradually implemented into Regulation (EU) 2018/1139 and its delegated and implementing acts. For the implementation of Regulation (EU) No 748/2012, for example, refer to EASA NPA 2019-05 'Embodiment of safety management system (SMS) requirements into Part-145 and Part 21' (https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2019-05).

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— provide guidelines for the initial and continuing airworthiness aspects of IFE systems;

— improve the cost-efficiency of the certification process for industry on one side, and for both EASA and the FAA on the other side;

— develop guidance for the development of AEH and for OPR management that is fully harmonised between EASA and the FAA;

— establish stand-alone documents which would eliminate the need to issue CRIs.

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

The main amendments are summarised below:

NPA 2016-19 (AMC 20-8):

— in order to align with Regulation (EU) No 376/2014, AMC 20-8 is amended to AMC 20-8A.

NPA 2017-09 (AMC 20-1, 20-2, 20-3, AMC 20-19):

— in order to harmonise the criteria for safety assurance, software and AEH development:
  — AMC 20-1 is amended to AMC 20-1A;
  — AMC 20-2A is amended to AMC 20-2B;
  — AMC 20-3A is amended to AMC 20-3B; and

— in order to provide guidelines for the initial and continuing airworthiness aspects of IFE systems, a new AMC 20-19 on IFE systems is created.

NPA 2018-09 (AMC 20.152A and AMC 20.189):

— in order to provide guidelines for the development of AEH and for OPR management:
  — a new AMC 20-152A on Airborne Electronic Hardware (AEH) is created; and
  — a new AMC 20-189 on the management of open problem reports (OPRs) is created.

2.4. What are the stakeholders' views

Occurrence reporting (AMC 20-8) — NPA 2016-19:

355 comments were made by different stakeholders. Approximately 30 comments concerned the specific proposal of an amended AMC 20-8. The commentators were in general supportive of the proposed amendment to AMC 20-8.

EASA has reviewed all the comments that were received, and further to a number of them, the text that was proposed in NPA 2016-19 for an amended AMC 20-8 has been modified in some parts, for improvement or clarification purposes.

The individual comments and the responses to them are provided in Chapter 2 of CRD 2016-19.

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AMC 20-1, 20-2, 20-3, AMC 20-19 — NPA 2017-09[17]:

46 comments were made by stakeholders from NAAs or organisations and industry companies and associations.

Note: The comments related to the proposal for a new AMC 20-30 on lead-free soldering are not considered in CRD 2017-09. This subject will be included in a future CRD.

The commentators are, in general, supportive of the proposed amendments to the existing AMC 20-1, 20-2 and 20-3, and to the proposed new AMC 20-19 on IFE.

EASA has reviewed all the comments that were received, and further to a number of them, the text proposed in the NPA for the different AMCs has been modified in some parts, for improvement or clarification purposes.

Chapter 2 of CRD 2017-09 provides the individual comments and EASA's responses to them.

AMC 20-152A and AMC 20-189 — NPA 2018-09:

420 comments were made by stakeholders from NAAs or organisations, industry organisations and associations, as well as certification service providers.

The commentators were in general supportive of the proposed new AMC 20-152A and AMC 20-189, and of the intended harmonisation with the FAA.

None of the comments expressed any disagreement with the proposal. For AEH, one comment raised controversy by proposing to establish guidance for the use of complex COTS devices.

Further to the comments received, the text proposed in the NPA has been modified in some parts for improvement or clarification purposes.

The individual comments and EASA's responses to them are provided in Chapter 2 of CRD 2018-09.

2.5. What are the benefits and drawbacks

AMC 20-8 — NPA 2016-19:

Overall, the amendments are expected to bring further clarity and guidance on compliance with the reporting obligations to the competent authorities. They would have a positive economic benefit, with a more streamlined process. No adverse safety, environmental, or social impact is expected.

AMC 20-1, 20-2, 20-3, AMC 20-19 — NPA 2017-09:

Overall, the amendments are expected to increase safety by proposing guidance for the certification of IFE systems. They would also have positive economic benefits, by streamlining the certification process, while reflecting the state of the art of the industry. No social impact is expected.

[17] NPA 2017-09 contained also a proposal to introduce new AMC 20-30 on lead-free soldering. This subject will be part of a future Decision.

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AMC 20.152A and AMC 20.189 — NPA 2018-09:

Overall, the amendments are expected to increase safety by providing guidance for the development assurance of AEH on one side, and for the management of OPRs on the other side. They would improve harmonisation with the FAA and have positive economic benefits by streamlining the certification process, while reflecting the state of the art of the industry. No social or environmental impact is expected.

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3. How do we monitor and evaluate the rules

This update of AMC-20 is a result of EASA's monitoring and evaluation activities. EASA continuously monitors the implementation of CSs, AMC and GM through feedback from stakeholders and via its Advisory Bodies (ABs).

The new or updated AMC-20 material will be subject to future monitoring activities, for which a robust framework is currently being developed.

In addition, they might be subject to an interim or ex post evaluation. The evaluation would assess their performance, taking into account predictions made in the impact assessment of the related NPAs. The decision as to whether an evaluation is necessary will depend on the monitoring results.

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4. References

4.1. Affected regulations

n/a

4.2. Affected decisions

— Decision No. 2003/12/RM of the Executive Director of the European Aviation Safety Agency of 5 November 2003 on General Acceptable Means of Compliance for Airworthiness of Products, Parts and Appliances (« AMC-20 »), as amended

4.3. Other reference documents

— CS-23 Normal Category Aeroplanes

— CS-25 Large Aeroplanes

— CS-27 Small Rotorcraft

— CS-29 Large Rotorcraft

— CS-ETSO European Technical Standard Orders

— EASA CM No.: EASA CM-SWCEH-001 'Development Assurance of Airborne Electronic Hardware', Issue 01, Revision 02, 8 January 2018

— EASA CM No.: EASA CM-SWCEH - 002 'Software Aspects of Certification', Issue 01, Revision 01, 9 March 2012

— FAA Order 8110.49A 'Software Approval Guidelines', 29 March 2018

— FAA Order 8110.105A 'Simple and Complex Electronic Hardware Approval Guidance', 5 April 2017

— JAA Temporary Guidance Leaflet (TGL) No 17, Passenger Service and In-Flight Entertainment (IFE) Systems

— United Kingdom Civil Aviation Authority (UK CAA) Airworthiness Notice No 60, Continuing Airworthiness and Safety Standards of Passenger Service and In-Flight Entertainment Systems, Issue 2

— Transport Canada Advisory Circular (AC) No. 500-022, In-Flight Entertainment Systems, Issue 1, 8 November 2006

— FAA Policy Memorandum PS-ANM100-2000-00105 (also numbered 00-111-160), Interim Policy Guidance for Certification of In-Flight Entertainment Systems on Title 14 CFR Part 25 Aircraft (Policy Number 00-111-160), 18 September 2011

— FAA AC 91.21-1D, Use of Portable Electronic Devices Aboard Aircraft, 27 October 2017

— FAA Memorandum No AIR100-2011-120-003, Assessing the Reliability and Certification Procedures for Electrical and Electronic Equipment and Systems Using Lead-Free Solder and Lead-Free Finishes on Components, 28 July 2011

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— FAA AC 20-152, RTCA Inc. Document RTCA/DO-254, Design Assurance Guidance for Airborne Electronic Hardware, 5 July 2005

— European Organisation for Civil Aviation Equipment (EUROCAE) ED-14, Radio Technical Commission for Aeronautics (RTCA) DO-160, Environmental Conditions and Test Procedures for Airborne Equipment, Revision G, May 2011

— EUROCAE ED-130A Change 1, Guidance for the Use of Portable Electronic Devices (PEDs) on Board Aircraft, April 2019

— RTCA DO-199, Potential Interference to Aircraft Electronic Equipment from Devices Carried Aboard (Vols I and II), 16 September 1988

— RTCA DO-227, Minimum Operational Performance Standards for Lithium Batteries, 23 June 1995

— RTCA DO-294, Guidance on Allowing Transmitting Portable Electronic Devices, Revision C, 16 December 2008

— EUROCAE ED-239, RTCA DO-307A, Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance, December 2016

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