UK LAW 748/2012 ANNEX 1 PART 21 PLUS AMC AND GM

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Introduction

This document has been prepared by Aerosynergy as a working tool which is more accessible than the document published at the time by the CAA. Whilst every care has been taken to transpose the content accurately Aerosynergy cannot be liable for any errors or omissions discovered.

For reference to the source document, see the following link which was correct at the time:

(a) Part 21 regulation

https://www.legislation.gov.uk/eur/2012/748/annex/I

However, it was found that the above reference lacked many of the changes implemented in the UK Law (EU) 748/2012 published by the CAA at the following location: https://www.caa.co.uk/media/wohheixe/law-748-2012-30-03-2021.pdf and so, at issue 1b, this document has been corrected to the latter reference.

(b) AMC/GM

AMC for Reg 748/2012 as retained under the European Withdrawal Act 2018 Jan 2021 revision

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- Support for applications for CAA/EASA ADOA, DOA, POA, MOA with model manual procedures to tailor to the customer requirements.
- Similar support to applicants to the MAA for DAOS and MAOS approvals.
- Independent monitoring of DOA, POA, MOA organizations.
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Configuration Status

The configuration of the source documents at the issue stated are as follows:

Issue status of this Document	Date of Issue of this document	Law 748/2012 Annex 1 (Part 21)	UK AMC and GM to Part 21	Notes
1	July 2022	UK LAW (EU) 748/2012 Annex 1 (Part 21 Published 30/3/2021	UK AMC and GM (form of EASA AMC and GM current and applicable on 31 December 2020, adopted by CAA on 1 January 2021)	
1a	30/Aug/22	No Change	No Change	Add title page and preliminary paragraphs
1b	3/Sep/22	No Change	No Change	Discrepancies noted between the Pdf version of UK Law (EU)748/2012 on the CAA website and the E-Document at https://www.legislation.gov.uk/eur/ These are mainly substitution of CAA for EASA/Agency. Throughout, iaw the CAA website published document, • The CAA is substituted for The CAA or EASA • UKTSO is substituted for ETSO • UKPA is substituted for EPA

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				• Other changes highlighted in blue

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INTRODUCTION

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
(recast)
(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to 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(1), and in particular Articles 5(5) and 6(3) thereof,

Whereas:

(1) Commission Regulation (EC) No 1702/2003 of 24 September 2003 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(2) has been substantially amended several times(3). Since further amendments are to be made, it should be recast in the interests of clarity.

(2) Regulation (EC) No 216/2008 establishes common essential requirements to provide for a high uniform level of civil aviation safety and environmental protection. It requires the Commission to adopt the necessary implementing rules to ensure their uniform application. It establishes the 'European Aviation Safety Agency' (hereinafter referred to as the 'Agency') to assist the Commission in the development of such implementing rules.

(3) It is necessary to lay down common technical requirements and administrative procedures to ensure the airworthiness and environmental compatibility of aeronautical products, parts and appliances, subject to Regulation (EC) No 216/2008. Such requirements and procedures should specify the conditions to issue, maintain, amend, suspend or revoke the appropriate certificates.

(4) Organisations involved in the design and production of products, parts and appliances should be required to comply with certain technical requirements in order to demonstrate their capability and means to discharge their obligations and

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associated privileges. The Commission is required to lay down measures to specify conditions to issue, maintain, amend, suspend or revoke certificates attesting such compliance.

(5) In laying down measures for the implementation of common essential requirements in the field of airworthiness, the Commission must take care that they reflect the state of the art and the best practices, take into account worldwide aircraft experience and scientific and technical progress and allow for immediate reaction to established causes of accidents and serious incidents.

(6) The need to ensure uniformity in the application of common airworthiness and environmental requirements for aeronautical products, parts and appliances requires that common procedures be followed by the competent authorities of the Member States and, where applicable, the CAA to assess compliance with these requirements. The CAA should develop certification specifications and guidance material to facilitate the necessary regulatory uniformity.

(7) It is necessary to recognise the continuing validity of certificates issued before the entry into force of Regulation (EC) No 1702/2003, in accordance with Article 69 of Regulation (EC) No 216/2008.

(8) In order to maintain a high uniform level of aviation safety in Europe, it is necessary to introduce changes to requirements and procedures for the certification of aircraft and related products, parts and appliances and of design and production organisations, in particular to elaborate the rules related to the demonstration of compliance with the type-certification basis and environmental protection requirements and to introduce the possibility to choose to comply with later standards for changes to type-certificates.

(9)
The concept and complexity of auxiliary power units (APU) resembles that of aircraft engines and in some cases APU designs are even derived from engine designs. Changes to provisions for repairs to APU are therefore needed to restore consistency with repairs process to engines.

(10) In order to subject non-complex motor-powered aircraft, recreational aircraft and related products, parts and appliances to measures that are proportionate to their simple design and type of operation, while maintaining a high uniform level of aviation safety in Europe, it is necessary to introduce changes to requirements and procedures for the certification of those aircraft and related products, parts and appliances and of design and production organisations and in particular, for the owners of European Light Aircraft below 2 000 kg (ELA2) or below 1 200 kg (ELA1), to introduce the possibility to accept certain not safety critical parts for installation without an EASA Form 1.

(11) The CAA prepared draft implementing rules and submitted them as opinions No 01/2009 on ‘Possibility to deviate from airworthiness code in case of design changes’, No 02/2009 on ‘Repair and design changes to European Technical Standard Order’, No 01/2010 on ‘SubPart J DOA’ and Opinion No 01/2011 on ‘ELA

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Process and “standard changes and repairs”’ to the Commission in accordance with Article 19(1) of Regulation (EC) No 216/2008.

(12) The measures provided for in this Regulation are in accordance with the opinion of the European Aviation Safety Agency Committee established by Article 65(1) of Regulation (EC) No 216/2008,
HAS ADOPTED THIS REGULATION:

ARTICLES

Article 1 **Scope and definitions**

1.This Regulation lays down, in accordance with Article 5(5) and Article 6(3) of Regulation (EC) No 216/2008, common technical requirements and administrative procedures for the airworthiness and environmental certification of products, parts and appliances specifying:

(a) the issue of type-certificates, restricted type-certificates, supplemental type-certificates and changes to those certificates;

(b) the issue of certificates of airworthiness, restricted certificates of airworthiness, permits to fly and authorised release certificates;

(c) the issue of repair design approvals;

(d) the showing of compliance with environmental protection requirements;

(e) the issue of noise certificates;

(f) the identification of products, parts and appliances;

(g) the certification of certain parts and appliances;

(h) the certification of design and production organisations;

(i) the issue of airworthiness directives.

2. For the purpose of this Regulation, the following definitions shall apply:

(a)‘ JAA’ means the ‘Joint Aviation Authorities’;

(b)‘ JAR’ means ‘Joint Aviation Requirements’;

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(c) 'Part 21' means the requirements and procedures for the certification of aircraft and related products, parts and appliances, and of design and production organisations laid down in Annex I to this Regulation;

[F1(d) ' Provision repealed before document was retained.

(e) 'principal place of business' means the head office or registered office of the undertaking within which the principal financial functions and operational control of the activities referred to in this Regulation are exercised;

(f) 'article' means any part and appliance to be used on civil aircraft;

(g) 'UKTSO' means United Kingdom Technical Standard Order]. The United Kingdom Technical Standard Order is a detailed airworthiness specification issued by the Civil Aviation Authority (the 'CAA') to ensure compliance with the requirements of this Regulation as a minimum performance standard for specified articles;

(h) ''UKPA ' means United Kingdom Part Approval. United Kingdom Part Approval of an article means the article has been produced in accordance with approved design data not belonging to the type-certificate holder of the related product, except for UKTSO articles;

(i)' ELA1 aircraft' means the following manned European Light Aircraft:

(i) an aeroplane with a Maximum Take-off Mass (MTOM) of 1 200 kg or less that is not classified as complex motor-powered aircraft;

(ii) a sailplane or powered sailplane of 1 200 kg MTOM or less;

(iii) a balloon with a maximum design lifting gas or hot air volume of not more than 3 400 m^3 for hot air balloons, 1 050 m^3 for gas balloons, 300 m^3 for tethered gas balloons;

(iv) an airship designed for not more than 4 occupants and a maximum design lifting gas or hot air volume of not more than 3 400 m^3 for hot air airships and 1 000 m^3 for gas airships;

(j) 'ELA2 aircraft' means the following manned European Light Aircraft:

(i) an aeroplane with a Maximum Take-off Mass (MTOM) of 2 000 kg or less that is not classified as complex motor-powered aircraft;
(ii) a sailplane or powered sailplane of 2 000 kg MTOM or less;
(iii) a balloon;
(iv) a hot air airship;

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(v) a gas airship complying with all of the following characteristics:

- 3 % maximum static heaviness,
- Non-vectored thrust (except reverse thrust),
- Conventional and simple design of: structure, control system and ballonet system,
- Non-power assisted controls;

(vi) a Very Light Rotorcraft**[F2;]**

[F3(k)‘ Operational Suitability Data (OSD) ’ means data, which are part of an aircraft type-certificate, restricted type-certificate or supplemental type-certificate, consisting of all of the following:

(i) the minimum syllabus of pilot type rating training, including determination of type rating;

(ii) the definition of scope of the aircraft validation source data to support the objective qualification of simulators or the provisional data to support their interim qualification;

(iii) the minimum syllabus of maintenance certifying staff type rating training, including determination of type rating;

(iv) determination of type or variant for cabin crew and type specific data for cabin crew;

(v) the master minimum equipment list.**]**

Textual Amendments

F1Deleted by Commission Delegated Regulation (EU) 2020/570 of 28 January 2020 amending and correcting Regulation (EU) No 748/2012 as regards the alignment of rules for continuing airworthiness of aircraft and aeronautical products, parts and appliances with Regulation (EU) No 1321/2014 (Text with EEA relevance).

F2Substituted by Commission Delegated Regulation (EU) 2019/897 of 12 March 2019 amending Regulation (EU) No 748/2012 as regards the inclusion of risk-based compliance verification in Annex I and the implementation of requirements for environmental protection (Text with EEA relevance).

F3Inserted by Commission Delegated Regulation (EU) 2019/897 of 12 March 2019 amending Regulation (EU) No 748/2012 as regards the inclusion of risk-based compliance verification in Annex I and the implementation of requirements for environmental protection (Text with EEA relevance).

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Article 2 Products, parts and appliances certification

1. Products, parts and appliances shall be issued certificates as specified in Annex I (Part 21).

2. By way of derogation from point 1, aircraft, including any installed product, part and appliance, which are not registered in the United Kingdom shall be exempted from the provisions of Subparts H and I of Annex I (Part 21). They shall also be exempted from the provisions of Subpart P of Annex I (Part 21) except when aircraft identification marks are prescribed by the Secretary of State.

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Article 3 Continued validity of type-certificates and related certificates of airworthiness

1. With regard to products which had a type-certificate, or a document allowing the issuing of a certificate of airworthiness, issued before 28 September 2003 by a Member State (or the United Kingdom) , the following provisions shall apply:

(a) the product shall be deemed to have a type-certificate issued in accordance with this Regulation when:

(i) [F1its type-certification basis was:

the JAA type-certification basis, for products that have been certificated under JAA procedures, as defined in their JAA data sheet, or

for other products, the type-certification basis as defined in the type-certificate data sheet of the State of design, if that State of design was:

a Member State, unless The CAA determines, taking into account, in particular, certification specifications used and service experience, that such type-certification basis does not provide for a level of safety equivalent to that required by Regulation (EC) No 216/2008 and this Regulation, or

a State with which a Member State had concluded a bilateral airworthiness agreement or similar arrangement under which such products have been certificated on the basis of the certification specifications of that State of design, unless The CAA determines that such certification specifications or service experience or the safety system of that State of design do not provide for a level of safety equivalent to that required by Regulation (EC) No 216/2008 and this Regulation.

[…]

(ii) the environmental protection requirements were those laid down in Annex 16 to the Chicago Convention, as applicable to the product;

(iii) the applicable airworthiness directives were those of the State of design;

(b)the design of an individual aircraft, which was on the register of a Member State before 28 September 2003, shall be deemed to have been approved in accordance with this Regulation when:

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(i) its basic type design was part of a type-certificate referred to in point (a);

(ii) all changes to this basic type design, which were not under the responsibility of the type-certificate holder, had been approved; and

(iii) the airworthiness directives issued or adopted by the Member State of registry before 28 September 2003 were complied with, including any variations to the airworthiness directives of the State of design agreed by the Member State of registry.

2. With regard to products for which a type-certification process was proceeding through the JAA or a Member State on 28 September 2003, the following shall apply:

(a) if a product is under certification by several Member States, the most advanced project shall be used as the reference;

(b) points **21.A.15(a),** (b) and (c) of Annex I (Part 21) shall not apply;

[F1(c) by way of derogation from point **21.A.17A** of Annex I (Part 21), the type-certification basis shall be that established by the JAA or, where applicable, the Member State at the date of application for the approval;

(d) compliance findings made under JAA or Member State procedures shall be deemed to have been made by the Agency for the purpose of complying with points 21.A.20(a) and (d) of Annex I (Part 21).

3. With regard to products that have a national type-certificate, or equivalent, and for which the approval process of a change carried out by a Member State was not finalised at the time when the type-certificate had to be in accordance with this Regulation, the following shall apply:

(a) if an approval process is being carried out by several Member States, the most advanced project shall be used as the reference;

(b) point **21.A.93** of Annex I (Part 21) shall not apply;

(c) the applicable type-certification basis shall be that established by the JAA or, where applicable, the Member State at the date of application for the approval of change;

(d) compliance findings made under JAA or Member State procedures shall be deemed to have been made by the CAA for the purpose of complying with points **21.A.103(a)(2)** and (b) of Annex I (Part 21).

4. With regard to products that had a national type-certificate, or equivalent, and for which the approval process of a major repair design carried out by a Member State was not finalised at the time when the type-certificate had to be determined in

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accordance with this Regulation, compliance findings made under JAA or Member State procedures shall be deemed to have been made by the CAA for the purpose of complying with point **21.A.433(a)** of Annex I (Part 21).

5. A certificate of airworthiness issued by a Member State attesting conformity with a type-certificate determined in accordance with point 1 shall be deemed to comply with this Regulation.

Textual Amendments

F1
Substituted by Commission Regulation (EU) No 69/2014 of 27 January 2014 amending Regulation (EU) No 748/2012 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 (Text with EEA relevance).

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Article 4 Continued validity of supplemental type-certificates

1. With regard to supplemental type-certificates issued by a Member State or the United Kingdom under JAA procedures or applicable national procedures and with regard to changes to products proposed by persons other than the type-certificate holder of the product, which were approved by a Member State or the United Kingdom under applicable national procedures, if the supplemental type-certificate, or change, was valid on 28 September 2003, the supplemental type-certificate, or change shall be deemed to have been issued under this Regulation.

2. With regard to supplemental type-certificates for which a certification process was being carried out by a Member State on 28 September 2003 under applicable JAA supplemental type-certificate procedures and with regard to major changes to products, proposed by persons other than the type-certificate holder of the product, for which a certification process was being carried out by a Member State on 28 September 2003 under applicable national procedures, the following shall apply:

(a) if a certification process was being carried out by several Member States, the most advanced project shall be used as the reference;

(b) point 21.A.113 (a) and (b) of Annex I (Part 21) shall not apply;

(c) the applicable certification basis shall be that established by the JAA or, where applicable, the Member State at the date of application for the supplemental type-certificate or the major change approval;

(d) The compliance findings made under JAA or Member State procedures shall be deemed to have been made by the CAA for the purpose of complying with point 21.A.115(a) of Annex I (Part 21).

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F1 Article 5 [F1Continued operation of certain aircraft registered by Member States]

. . . . . .

Provision repealed before document was retained.

Textual Amendments

F1

Deleted by Commission Regulation (EU) No 69/2014 of 27 January 2014 amending Regulation (EU) No 748/2012 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 (Text with EEA relevance)

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Article 6 Continued validity of parts and appliances certificates

1. Approvals of parts and appliances issued by a Member State [or the United Kingdom] and valid on 28 September 2003 shall be deemed to have been issued in accordance with this Regulation.

2. With regard to parts and appliances for which an approval or authorisation process was being carried out by a Member State on 28 September 2003, the following shall apply:

(a) if an authorisation process was being carried out by several Member States, the most advanced project shall be used as the reference;

(b) point 21.A.603 of Annex I (Part 21) shall not apply;

(c) the applicable data requirements laid down in point 21.A.605 of Annex I (Part 21) shall be those established by the relevant Member State, at the date of application for the approval or authorisation;

(d) compliance findings made by the relevant Member State shall be deemed to have been made by the CAA for the purpose of complying with point 21.A.606(b) of Annex I (Part 21).

Article 7 Permit to fly

The conditions determined before 28 March 2007 by the Member States [or the United Kingdom] for permits to fly or other airworthiness certificate issued for aircraft which did not hold a certificate of airworthiness or restricted certificate of airworthiness issued under this Regulation, are deemed to have been determined in accordance with this Regulation, unless the CAA has determined before 28 March 2008 that such conditions do not provide for a level of safety equivalent to that required by Regulation (EC) No 216/2008 or this Regulation.

[F1 Article 7a Operational suitability data

1. The holder of an aircraft type-certificate issued before 17 February 2014 intending to deliver a new aircraft to an EU operator [or a UK operator] on or after 17 February 2014 shall obtain approval in accordance with point 21.A.21(e) of Annex I (Part 21) except for the minimum syllabus of maintenance certifying staff type rating training and except for aircraft validation source data to support the objective qualification of simulator(s). The approval shall be obtained not later than 18 December 2015 or before the aircraft is operated by an EU operator or a UK operator , whichever is the latest. The operational suitability data may be limited to the model which is delivered.

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2. The applicant for an aircraft type-certificate for which the application was filed before 17 February 2014 and for which a type-certificate is not issued before 17 February 2014 shall obtain approval in accordance with point 21.A.21(e) of Annex I (Part 21) except for the minimum syllabus of maintenance certifying staff type rating training and for aircraft validation source data to support the objective qualification of simulator(s). The approval shall be obtained not later than 18 December 2015 or before the aircraft is operated by an EU operator or a UK operator, whichever is the latest. Compliance findings made by the authorities in Operational Evaluation Board processes conducted under the responsibility of the JAA or the CAA before the entry into force of this Regulation shall be accepted by the CAA without further verification.

3. Operational Evaluation Board reports and master minimum equipment lists issued in accordance with JAA procedures or by the CAA before the entry into force of this Regulation shall be deemed to constitute the operational suitability data approved in accordance with point 21.A.21(e) of Annex I (Part 21) and shall be included in the relevant type-certificate. Before 18 June 2014 the relevant type-certificate holders shall propose the CAA a division of the operational suitability data in mandatory data and non-mandatory data.

4. Holders of a type-certificate including operational suitability data shall be required to obtain approval of an extension of the scope of their design organisation approval or procedures alternative to design organisation approval, as applicable, to include operational suitability aspects before 18 December 2015 .]

Textual Amendments

F1
Inserted by Commission Regulation (EU) No 69/2014 of 27 January 2014 amending Regulation (EU) No 748/2012 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 (Text with EEA relevance).

Article 8 Design organisations

1. An organisation responsible for the design of products, parts and appliances or for changes or repairs thereto shall demonstrate its capability in accordance with Annex I (Part 21).

2. By way of derogation from point 1, an organisation whose principal place of business is in a foreign State may demonstrate its capability by holding a certificate issued by that State for the product, part and appliance for which it applies, provided:

(a) that State is the State of design; and

(b) the CAA has determined that the system of that State includes the same independent level of checking of compliance as provided by this Regulation, either through an equivalent system of approvals of organisations or through direct involvement of the competent authority of that State.

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3. Design organisation approvals issued or recognised by a Member State or the United Kingdom in accordance with the JAA requirements and procedures and valid before 28 September 2003 shall be deemed to comply with this Regulation.

Article 9 Production organisations

1. An organisation responsible for the manufacture of products, parts and appliances shall demonstrate its capability in accordance with the provisions of Annex I (Part 21).

2. By way of derogation from point 1, a manufacturer whose principal place of business is in a [foreign] State may demonstrate its capability by holding a certificate issued by that State for the product, part and appliance for which it applies, provided:
(a)that State is the State of manufacture; and

(b)the CAA has determined that the system of that State includes the same independent level of checking of compliance as provided by this Regulation, either through an equivalent system of approvals of organisations or through direct involvement of the competent authority of that State.

3. Production organisation approvals issued or recognised by a Member State [or the United Kingdom] in accordance with the JAA requirements and procedures and valid before 28 September 2003 shall be deemed to comply with this Regulation.

[F1
4. By way of derogation from paragraph 1, the production organisation may apply to the CAA for exemptions from the environmental requirements referred to in the first subparagraph of Article 9(2) of Regulation (EU) 2018/1139 (1) .]
Textual Amendments

F1 Inserted by Commission Delegated Regulation (EU) 2019/897 of 12 March 2019 amending Regulation (EU) No 748/2012 as regards the inclusion of risk-based compliance verification in Annex I and the implementation of requirements for environmental protection (Text with EEA relevance).

(1) [F1Regulation (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).]

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Textual Amendments

F1
Inserted by Commission Delegated Regulation (EU) 2019/897 of 12 March 2019 amending Regulation (EU) No 748/2012 as regards the inclusion of risk-based compliance verification in Annex I and the implementation of requirements for environmental protection (Text with EEA relevance).

Article 10 CAA measures

1. The CAA shall develop acceptable means of compliance (hereinafter called 'AMC') that competent authorities, organisations and personnel may use to demonstrate compliance with the provisions of the Annex I (Part 21) to this Regulation.

2. The AMC issued by the CAA shall neither introduce new requirements nor alleviate the requirements of the Annex I (Part 21) to this Regulation.

3. Without prejudice to Articles 54 and 55 of Regulation (EC) No 216/2008, when the acceptable means of compliance issued by the CAA are used, the related requirements of the Annex I (Part 21) to this Regulation shall be considered as met without further demonstration.

Article 11 Repeal

Regulation (EC) No 1702/2003 is repealed.

References to the repealed Regulation shall be construed as references to this Regulation and shall be read in accordance with the correlation table in Annex III.

Article 12 Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union.

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Annex I PART 21

PART 21 Certification of aircraft and related products, parts and appliances, and of design and production organisations

21.1 General

Point 21.1 is repealed by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 4(1) reg.194(2) (December 31, 2020: repeal has effect subject to savings and transitional arrangements specified in the SI 2019/645 reg.427 and Sch.3 para.1)

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SECTION A TECHNICAL REQUIREMENTS

SUBPART A —GENERAL PROVISIONS

21.A.1Scope

This Section establishes general provisions governing the rights and obligations of the applicant for, and holder of, any certificate issued or to be issued in accordance with this Section.

21.A.2 Undertaking by another person than the applicant for, or holder of, a certificate

The actions and obligations required to be undertaken by the holder of, or applicant for, a certificate for a product, part or appliance under this Section may be undertaken on its behalf by any other natural or legal person, provided the holder of, or applicant for, that certificate can show that it has made an agreement with the other person such as to ensure that the holder's obligations are and will be properly discharged.

21.A.3A Failures, malfunctions and defects

(a) System for Collection, Investigation and Analysis of Data

The holder of a type-certificate, restricted type-certificate, supplemental type-certificate, United Kingdom Technical Standard Order (UKTSO) authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation shall have a system for collecting, investigating and analysing reports of and information related to failures, malfunctions, defects or other occurrences which cause or might cause adverse effects on the continuing airworthiness of the product, part or appliance covered by the type-certificate, restricted type-certificate, supplemental type-certificate, UKTSO authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation. Information about this system shall be made available to all known operators of the product, part or appliance and, on request, to any person authorised under other associated implementing Regulations.

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(b) Reporting to the CAA

1. The holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UKTSO authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation shall report to the CAA any failure, malfunction, defect or other occurrence of which it is aware related to a product, part, or appliance covered by the type-certificate, restricted type-certificate, supplemental type-certificate, UKTSO authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation, and which has resulted in or may result in an unsafe condition.

2. These reports shall be made in a form and manner established by the CAA, as soon as practicable and in any case dispatched not later than 72 hours after the identification of the possible unsafe condition, unless exceptional circumstances prevent this.

(c) Investigation of Reported Occurrences

1. When an occurrence reported under point (b), or under points **21.A.129(f)(2**) or **21.A.165(f)(2)** results from a deficiency in the design, or a manufacturing deficiency, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UKTSO authorisation, or any other relevant approval deemed to have been issued under this Regulation, or the manufacturer as appropriate, shall investigate the reason for the deficiency and report to the CAA the results of its investigation and any action it is taking or proposes to take to correct that deficiency.

2. If the CAA finds that an action is required to correct the deficiency, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UKTSO authorisation, or any other relevant approval deemed to have been issued under this Regulation, or the manufacturer as appropriate, shall submit the relevant data to the CAA.

AMC No 1 to 21.A.3A(a) Collection, investigation and analysis of data related to Flammability Reduction Means (FRM) reliability

Holders of a type-certificate, restricted type-certificate, supplemental type-certificate or any other relevant approval deemed to have been issued under Part 21 and which have included a FRM in their design should assess on an on-going basis the effects of aeroplane component failures on FRM reliability. This should be part of the system for collection, investigation and analysis of data required by **21.A.3A(a**). The applicant/holder should do the following:

(a) Demonstrate effective means to ensure collection of FRM reliability data. The means should provide data affecting FRM reliability, such as component failures.

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(b) Unless alternative reporting procedures are approved by the CAA, provide a report to the CAA every six months for the first five years after service introduction. After that period, continued reporting every six months may be replaced with other reliability tracking methods found acceptable to the CAA or eliminated if it is established that the reliability of the FRM meets, and will continue to meet, the exposure specifications of paragraph M25.1 of Appendix M to CS-25.

(c) Develop service instructions or revise the applicable aeroplane manual, according to a schedule approved by the CAA, to correct any failures of the FRM that occur in service that could increase any fuel tank's Fleet Average Flammability Exposure to more than that specified by paragraph M25.1 of Appendix M to CS-25.

AMC No 2 to 21.A.3A(a) Collection, investigation and analysis of data related to ETOPS significant occurrences

(1) Holders of a type-certificate, restricted type-certificate, supplemental type-certificate or any other relevant approval deemed to have been issued under Part 21 and which includes extended range operation with two-engined aeroplane (ETOPS) capability should implement a specific tracking, reporting and resolution system for ETOPS significant occurrences, suitable to ensure the initial and continued fleet compliance with the applicable ETOPS reliability objectives. This system should be part of the system for collection, investigation and analysis of data required by **21.A.3A(a).**

Appropriate coordination should exist between engine TC holder, propeller TC holder and APU UKTSO authorisation holder with the aircraft TC holder to ensure compliance with the ETOPS reliability objectives.

(2) For tracking, reporting and resolution of ETOPS significant occurrences refer to the latest edition of AMC 20-6 (see AMC-20 document).

GM 21.A.3A(a) The system for collection, investigation and analysis of data

In the context of this requirement the word 'Collection' means the setting up of systems and procedures which will enable relevant malfunctions, failures and defects to be properly reported when they occur.

GM 21.A.3A(b) Occurrence reporting

For occurrence reporting, refer to the latest edition of AMC 20-8 (see AMC-20 document).

AMC 21.A.3A(b)(2) Reporting to the CAA

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Within the overall limit of 72 hours the degree of urgency for submission of a report should be determined by the level of hazard judged to have resulted from the occurrence.

Where an occurrence is judged by the person identifying the possible unsafe condition to have resulted in an immediate and particularly significant hazard the CAA expects to be advised immediately and by the fastest possible means (telephone, fax, email, telex, etc.) of whatever details are available at that time. This initial report must be followed up by a full written report within 72 hours. A typical example would be an uncontained engine failure resulting in damage to aircraft primary structure.
Where the occurrence is judged to have resulted in a less immediate and less significant hazard, report submission may be delayed up to the maximum of three days in order to provide more details.

21.A.3B Airworthiness directives

(a) An airworthiness directive means a document issued or adopted by the CAA which mandates actions to be performed on an aircraft to restore an acceptable level of safety, when evidence shows that the safety level of this aircraft may otherwise be compromised**.**

(b) The CAA shall issue an airworthiness directive when:

1. an unsafe condition has been determined by the CAA to exist in an aircraft, as a result of a deficiency in the aircraft, or an engine, propeller, part or appliance installed on this aircraft; and

2. that condition is likely to exist or develop in other aircraft.

(c) When an airworthiness directive has to be issued by the CAA to correct the unsafe condition referred to in point (b), or to require the performance of an inspection, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UKTSO authorisation or any other relevant approval deemed to have been issued under this Regulation, shall:

1. propose the appropriate corrective action or required inspections, or both, and submit details of these proposals to the CAA for approval;

2. following the approval by the CAA of the proposals referred to under point (1), make available to all known operators or owners of the product, part or appliance and, on request, to any person required to comply with the airworthiness directive, appropriate descriptive data and accomplishment instructions.

(d) An airworthiness directive shall contain at least the following information:

1. an identification of the unsafe condition;

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2. an identification of the affected aircraft;

3. the action(s) required;

4. the compliance time for the required action(s);

5. the date of entry into force.

AMC 21.A.3B(b) Unsafe condition

An unsafe condition exists if there is factual evidence (from service experience, analysis or tests) that:

(a) An event may occur that would result in fatalities, usually with the loss of the aircraft, or reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be:

(i) A large reduction in safety margins or functional capabilities, or

(ii) Physical distress or excessive workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely, or

(iii) Serious or fatal injury to one or more occupants
unless it is shown that the probability of such an event is within the limit defined by the applicable certification specifications, or

(b) There is an unacceptable risk of serious or fatal injury to persons other than occupants, or

(c) Design features intended to minimise the effects of survivable accidents are not performing their intended function.

Note 1: Non-compliance with applicable certification specifications is generally considered as an unsafe condition, unless it is shown that possible events resulting from this non-compliance do not constitute an unsafe condition as defined under paragraphs (a), (b) and (c).

Note 2: An unsafe condition may exist even though applicable airworthiness requirements are complied with.

Note 3: The above definition covers the majority of cases where the CAA considers there is an unsafe condition. There may be other cases where overriding safety considerations may lead the CAA to issue an airworthiness directive.

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Note 4: There may be cases where events can be considered as an unsafe condition if they occur too frequently (significantly beyond the applicable safety objectives) and could eventually lead to consequences listed in paragraph (a) in specific operating environments. Although having less severe immediate consequences than those listed in paragraph (a), the referenced events may reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be, for example, a significant reduction in safety margins or functional capabilities, a significant increase in crew workload, or in conditions impairing crew efficiency, or discomfort to occupants, possibly including injuries.

GM 21.A.3B(b) Determination of an unsafe condition

It is important to note that these guidelines are not exhaustive. However, this material is intended to provide guidelines and examples that will cover most cases, taking into account the applicable certification requirements.

1. INTRODUCTION

Certification or approval of a product, part or appliance is a demonstration of compliance with requirements which are intended to ensure an acceptable level of safety. This demonstration however includes certain accepted assumptions and predicted behaviours, such as:

- fatigue behaviour is based on analysis supported by test,
- modelling techniques are used for Aircraft Flight Manual performances calculations,
- the systems safety analyses give predictions of what the systems failure modes, effects and probabilities may be,
- the system components reliability figures are predicted values derived from general experience, tests or analysis,
- the crew is expected to have the skill to apply the procedures correctly, and
- the aircraft is assumed to be maintained in accordance with the prescribed instructions for continued airworthiness (or maintenance programme), etc.

In service experience, additional testing, further analysis, etc., may show that certain initially accepted assumptions are not correct. Thus, certain conditions initially demonstrated as safe, are revealed by experience as unsafe. In this case, it is necessary to mandate corrective actions in order to restore a level of safety consistent with the applicable certification requirements.

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See **AMC 21.A.3B(b)** for definition of 'unsafe condition' used in **21.A.3A(b).**

2. GUIDELINES FOR ESTABLISHING IF A CONDITION IS UNSAFE

The following paragraphs give general guidelines for analysing the reported events and determining if an unsafe condition exists, and are provided for each type of product, part or appliance subject to a specific airworthiness approval: type-certificates (TC) or supplemental type-certificates (STC) for aircraft, engines or propellers, or United Kingdom Technical Standard Orders (UKTSO).
This analysis may be qualitative or quantitative, i.e. formal and quantitative safety analyses may not be available for older or small aircraft. In such cases, the level of analysis should be consistent with that required by the certification specifications and may be based on engineering judgement supported by service experience data.

2.1 Analysis method for aircraft

2.1.1 Accidents or incidents without any aircraft, engines, system, propeller or part or appliance malfunction or failure

When an accident/incident does not involve any component malfunction or failure but when a crew human factor has been a contributing factor, this should be assessed from a man-machine interface standpoint to determine whether the design is adequate or not. Paragraph 2.5 gives further details on this aspect.

2.1.2 Events involving an aircraft, engines, system, propeller or part or appliance failure, malfunction or defect

The general approach for analysis of in-service events caused by malfunctions, failures or defects will be to analyse the actual failure effects, taking into account previously unforeseen failure modes or improper or unforeseen operating conditions revealed by service experience.

These events may have occurred in service, or have been identified during maintenance, or been identified as a result of subsequent tests, analyses, or quality control.

These may result from a design deficiency or a production deficiency (non- conformity with the type design), or from improper maintenance. In this case, it should be determined if improper maintenance is limited to one aircraft, in which case an airworthiness directive may not be issued, or if it is likely to be a general problem due to improper design and/or maintenance procedures, as detailed in paragraph 2.5.

2.1.2.1 Flight

An unsafe condition exists if:

- There is a significant shortfall of the actual performance compared to the approved performance (taking into account the accuracy of the performance calculation method), or

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- The handling qualities, although having been found to comply with the applicable certification specifications at the time of initial approval, are subsequently shown by service experience not to comply.

2.1.2.2 Structural or mechanical systems

An unsafe condition exists if the deficiency may lead to a structural or mechanical failure which:

- Could exist in a Principal Structural Element that has not been qualified as damage tolerant. Principal Structural Elements are those which contribute significantly to carrying flight, ground, and pressurisation loads, and whose failure could result in a catastrophic failure of the aircraft. Typical examples of such elements are listed for large aeroplanes in AMC 25.571(a) 'Damage tolerance and fatigue evaluation of structure', and in the equivalent material for rotorcraft.

- Could exist in a Principal Structural Element that has been qualified as damage tolerant, but for which the established inspections, or other procedures, have been shown to be, or may be, inadequate to prevent catastrophic failure.

- Could reduce the structural stiffness to such an extent that the required flutter, divergence or control reversal margins are no longer achieved.

- Could result in the loss of a structural piece that could damage vital parts of the aircraft, cause serious or fatal injuries to persons other than occupants.

- Could, under ultimate load conditions, result in the liberation of items of mass that may injure occupants of the aircraft.

- Could jeopardise proper operation of systems and may lead to hazardous or catastrophic consequences, if this effect has not been taken adequately into account in the initial certification safety assessment.

2.1.2.3 Systems
The consequences of reported systems components malfunctions, failures or defects should be analysed.

For this analysis, the certification data may be used as supporting material, in particular systems safety analyses.

The general approach for analysis of in-service events caused by systems malfunctions, failures or defects will be to analyse the actual failure effects.

As a result of this analysis, an unsafe condition will be assumed if it cannot be shown that the safety objectives for hazardous and catastrophic failure conditions are still

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achieved, taking into account the actual failure modes and rates of the components affected by the reported deficiency.

The failure probability of a system component may be affected by:

- A design deficiency (the design does not meet the specified reliability or performance).
- A production deficiency (non-conformity with the certified type design) that affects either all components, or a certain batch of components.
- Improper installation (for instance, insufficient clearance of pipes to surrounding structure).
- Susceptibility to adverse environment (corrosion, moisture, temperature, vibrations etc.).
- Ageing effects (failure rate increase when the component ages).
- Improper maintenance.

When the failure of a component is not immediately detectable (hidden or latent failures), it is often difficult to have a reasonably accurate estimation of the component failure rate since the only data available are usually results of maintenance or flight crew checks. This failure probability should therefore be conservatively assessed.

As it is difficult to justify that safety objectives for the following systems are still met, a deficiency affecting these types of systems may often lead to a mandatory corrective action:

- back up emergency systems, or
- fire detection and protection systems (including shut off means).

Deficiencies affecting systems used during an emergency evacuation (emergency exits, evacuation assist means, emergency lighting system ...) and to locate the site of a crash (Emergency Locator Transmitter) will also often lead to mandatory corrective action.

2.1.2.4 Others

In addition to the above, the following conditions are considered unsafe:

- There is a deficiency in certain components which are involved in fire protection or which are intended to minimise/retard the effects of fire/smoke in a survivable crash, preventing them to perform their intended function (for

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instance, deficiency in cargo liners or cabin material leading to non-compliance with the applicable flammability requirements).

- There is a deficiency in the lightning or High Intensity Radiated Fields protection of a system which may lead to hazardous or catastrophic failure conditions.

- There is a deficiency which could lead to a total loss of power or thrust due to common mode failure.

If there is a deficiency in systems used to assist in the enquiry following an accident or serious incident (e.g., Cockpit Voice Recorder, Flight Data Recorder), preventing them to perform their intended function, the CAA may take mandatory action.

2.2 Engines

The consequences and probabilities of engine failures have to be assessed at the aircraft level in accordance with paragraph 2.1, and also at the engine level for those failures considered as Hazardous in CS E-510.

The latter will be assumed to constitute unsafe conditions, unless it can be shown that the consequences at the aircraft level do not constitute an unsafe condition for a particular aircraft installation.

2.3 Propellers

The consequences and probabilities of propeller failures have to be assessed at the aircraft level in accordance with paragraph 2.1, and also at the propeller level for those failures considered as hazardous in CS P-70.

The latter will be assumed to constitute unsafe conditions, unless it can be shown that the consequences at the aircraft level do not constitute an unsafe condition for a particular aircraft installation.

2.4 Parts and appliances

The consequences and probabilities of equipment failures have to be assessed at the aircraft level in accordance with paragraph 2.1.

2.5 Human factors aspects in establishing and correcting unsafe conditions

This paragraph provides guidance on the way to treat an unsafe condition resulting from a maintenance or crew error observed in service.
It is recognised that human factors techniques are under development. However, the following is a preliminary guidance on the subject.

Systematic review should be used to assess whether the crew or maintenance error raises issues that require regulatory action (whether in design or other areas), or

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should be noted as an isolated event without intervention. This may need the establishment of a multidisciplinary team (designers, crews, human factors experts, maintenance experts, operators etc.)

The assessment should include at least the following:

- Characteristics of the design intended to prevent or discourage incorrect assembly or operation;
- Characteristics of the design that allow or facilitate incorrect operation,
- Unique characteristics of a design feature differing from established design practices;
- The presence of indications or feedback that alerts the operator to an erroneous condition;
- The existence of similar previous events, and whether or not they resulted (on those occasions) in unsafe conditions;
- Complexity of the system, associated procedures and training (has the crew a good understanding of the system and its logic after a standard crew qualification programme?);
- Clarity/accuracy/availability/currency and practical applicability of manuals and procedures;
- Any issues arising from interactions between personnel, such as shift changeover, dual inspections, team operations, supervision (or lack of it), or fatigue.

Apart from a design change, the corrective actions, if found necessary, may consist of modifications of the manuals, inspections, training programmes, and/or information to the operators about particular design features. The CAA may decide to make mandatory such corrective action if necessary.

GM 21.A.3B(d)(4) Defect correction – Sufficiency of proposed corrective action

This GM provides guidelines to assist in establishing rectification campaigns to remedy discovered defects.

1. STATUS

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This document contains GM of a general nature for use in conjunction with engineering judgement, to aid airworthiness engineers in reaching decisions in the state of technology at the material time.
While the main principles of this GM could be applied to small private aeroplanes, helicopters, etc. the numerical values chosen for illustration are appropriate to large aeroplanes for public transport.

2. INTRODUCTION

2.1 Over the years, target airworthiness risk levels underlying airworthiness requirements have developed on the basis of traditional qualitative airworthiness approaches; they have been given more precision in recent years by being compared with achieved airworthiness levels (judged from accident statistics) and by the general deliberations and discussions which accompanied the introduction of rational performance requirements, and more recently, the Safety Assessment approach in requirements.

Although the target airworthiness risk level tends to be discussed as a single figure (a fatal accident rate for airworthiness reasons of not more than 1 in 10 000 000 flights/flying hours for large aeroplanes) it has to be recognised that the requirements when applied to particular aircraft types will result in achieved airworthiness levels at certification lying within a band around the target level and that thereafter, for particular aircraft types and for particular aircraft, the achieved level will vary within that band from time to time.

2.2 The achieved airworthiness risk levels can vary so as to be below the target levels, because it is difficult if not impossible to design to the minimum requirements without being in excess of requirements in many areas; also because aircraft are not always operated at the critical conditions (e.g., aircraft weight, CG position and operational speeds; environmental conditions - temperature, humidity, degree of turbulence).

The achieved level may vary so as to be above the target level because of undetected variations in material standards or build standards, because of design deficiencies, because of encountering unforeseen combinations of failures and/or combinations of events, and because of unanticipated operating conditions or environmental conditions.

2.3 There is now a recognition of the need to attempt to monitor the conditions which tend to increase the level and to take appropriate corrective action when the monitoring indicates the need to do so in order to prevent the level rising above a predetermined ‘ceiling’.

2.4 The CAA also has a duty in terms of providing the public with aviation services and therefore should consider the penalties associated with curtailment or even removal (by ‘grounding’) of aviation services when establishing the acceptability of any potential variation in airworthiness level.

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2.5 Thus, the purpose of this GM is:

(a) To postulate basic principles which should be used to guide the course of actions to be followed so as to maintain an adequate level of airworthiness risk after a defect has occurred which, if uncorrected, would involve a potential significant increase of the level of risk for an aircraft type.

(b) For those cases where it is not possible fully and immediately to restore an adequate level of airworthiness risk by any possible alleviating action such as an inspection or limitation, to state the criteria which should be used in order to assess the residual increase in risk and to limit it to an appropriate small fraction of the mean airworthiness through life risk.

3. DISCUSSION

3.1 Several parameters are involved in decisions on safety matters. In the past the cost of proposed action has often been compared with the notional 'risk cost', i.e. the cost of a catastrophe multiplied by its probability of occurrence.

3.2 This can be a useful exercise, but it should be held within the constraint of acceptable airworthiness risk levels, i.e., within airworthiness risk targets which represent the maximum levels of risk with which an aircraft design must comply, i.e., in the upper part of the 'band'. Currently for large aeroplanes the mean airworthiness risk level is set at a catastrophe rate for airworthiness reasons of not more than one in every ten- million flights/flying hours. The constraint is overriding in that any option, which could be permitted on risk cost considerations, or other grounds, is unacceptable if it leads to significant long-term violation of this safety requirement.

3.3 While it should clearly be the objective of all to react to and eliminate emergency situations, i.e., those involving a potentially significant increase of airworthiness risk levels, without unreasonable delay, the CAA should be able finally to rule on what is a minimum acceptable campaign programme. It has therefore seemed desirable to devise guidelines to be used in judging whether a proposed campaign of corrective actions is sufficient in airworthiness terms, and clearly this ought to be based on determining the summation of the achieved airworthiness risk levels for the aircraft and passengers during any periods of corrective action and comparing them with some agreed target.

3.4 As the period of corrective action will not be instantaneous (unless by grounding), there is potentially an increase in the achieved airworthiness risk level possibly to and, without controls, even above the higher part of the 'band', and the amount by which the level is above the mean target figure, and the period for which it should be allowed to continue, has been a matter of some arbitrary judgement.

3.5 It would appear desirable to try to rationalise this judgement. For example, if an aircraft were to spend 10 % of its life at a level such that the risk of catastrophe was increased by an order of magnitude, the average rate over its whole life would be doubled which may not be in the public interest. A more suitable criterion is perhaps

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one which would allow an average increase in risk of, say one third on top of the basic design risk when spread over the whole life of the aircraft an amount which would probably be acceptable within the concept (See Figure 1). It would then be possible to regard the 'through life' risk to an aircraft - e.g., a mean airworthiness target of not more than one airworthiness catastrophe per 10 million (107) hours, as made up of two parts, the first being 3/4 of the total and catering for the basic design risk and the other being 1/4 of the total, forming an allowance to be used during the individual aircraft's whole life for unforeseen campaign situations such as described above.

3.6 Investigation has shown that a total of ten such occasions might arise during the life of an individual aircraft.

3.7 Using these criteria, there could then be during each of these emergency periods (assumed to be ten in number) a risk allowance contributed by the campaign alone of:

1 x 10-7 for 2.5% of the aircraft's life; or
5 x 10-7 for 0.5% of the aircraft's life; or
1 x 10-6 for 0.25% of the aircraft's life; or
1 x 10-5 for 0.025% of the aircraft's life, etc.

without exceeding the agreed 'allowance' set aside for this purpose.

3.8 Thus a 'reaction table' can be created as indicated in Table 1 (the last two columns assuming a typical aircraft design life of 60,000 hours and an annual utilisation of 3 000 hours per annum) showing the flying or calendar time within which a defect should be corrected if the suggested targets are to be met.

Estimated catastrophe rate to aircraft due to the defect under consideration (per a/c hour)	Average reaction time for aircraft at risk (hours)	On a calendar basis
4 x 10-8	3 750	15 months
5 x 10-8	3 000	12 months
1 x 10-7	1 500	6 months
2 x 10-7	750	3 months
5 x 10-7	300	6 weeks
1 x 10-6	150	3 weeks
1 x 10-5	15	Return to base

Table 1

3.9 These principles may be applied to a single aircraft or a number of aircraft of a fleet but in calculating risk, all the risk should be attributed to those aircraft which may carry it, and should not be diluted by including other aircraft in the fleet which are known to be free of risk. (It is permissible to spread the risk over the whole fleet when a source is known to exist without knowing where). Where a fleet of aircraft is involved Column 2 may be interpreted as the mean time to rectification and not the time to the last one.

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3.10 There is one further constraint. However little effect a situation may have on the 'whole life' risk of an aircraft, the risk should not be allowed to reach too high a level for any given flight.

Thus while a very high risk could be tolerated for a very short period without unacceptable degradation of the overall airworthiness target, the few flights involved would be exposed to a quite unacceptable level of risk. It is therefore proposed that the Table 1 should have a cut-off at the 2 x 10-6 level so that no flight carries a risk greater than 20 times the target. At this level the defect is beginning to contribute to a greater likelihood of catastrophe than that from all other causes, including non-airworthiness causes, put together.

If the situation is worse than this, grounding appears to be the only alternative with possibly specially authorised high-risk ferry flights to allow the aircraft to return to base empty. Figures 2 and 3 show a visualisation chart equivalent to Table 1, giving average rectification time (either in flight hours or months) based on probability of defect that must be corrected.

3.11 It will be seen that the above suggestions imply a probability of catastrophe from the campaign alone of 1.5/10 000 per aircraft during each separate campaign period (i.e., p = 0.015 per 100 aircraft fleet).

3.12 In addition, in order to take into account large fleet size effect, the expected probability of the catastrophic event during the rectification period on the affected fleet shall not exceed 0.1. See Figure 4.

3.13 It should also be noted that in assessing campaign risks against 'design risk', an element of conservatism is introduced, since the passenger knows only 'total risk' (i.e. airworthiness plus operations risks) and the fatal accident rate for all reasons is an order of magnitude greater than that for airworthiness reasons only (i.e., 10^{-6} as against 10^{-7}). The summated campaign risk allowance proposed by this GM is therefore quite a small proportion of the total risk to which a passenger is subject. When operating for short periods at the limit of risk proposed (2 x 10^{-6} per hour) the defect is however contributing 100 % more risk than all other causes added together.

3.14 A similar approach is proposed to cover the case of defects associated to hazardous failure conditions for which the safety objectives defined by the applicable certification specifications are not met. According to CS 25.1309, the allowable probability for each hazardous failure condition is set at 10^{-7} per flight hour compared to 10^{-9} per flight hour for a catastrophic failure condition. Figure 5 is showing a visualisation chart giving average rectification time based on probability of defect that should be corrected. This is similar to Figure 2 but with lower and upper boundaries adapted to cover the case of hazardous failure conditions (probabilities of 10^{-7} and $2x10^{-4}$ respectively).

3.15 In addition, in order to take into account large fleet size effect, the expected probability of the hazardous event during the rectification period on the affected fleet shall not exceed 0.5. See Figure 6.

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4. GUIDELINES

4.1 The above would lead to the following guidelines for a rectification campaign to remedy a discovered defect associated to a catastrophic failure condition without grounding the aircraft:

(i) Establish all possible alleviating action such as inspections, crew drills, route restrictions, and other limitations.

(ii) Identify that part of the fleet, which is exposed to the residual risk, after compliance has been established with paragraph (i).

(iii) Using reasonably cautious assumptions, calculate the likely catastrophic rate for each aircraft carrying the risk in the affected fleet.

(iv) Compare the speed with which any suggested campaign will correct the deficiency with the time suggested in Figure 2. The figure should not be used beyond the $2x10^{-6}$ level, except for specially authorised flights.

(v) Also ensure that the expected probability of the catastrophic event during the rectification period on the affected fleet is in accordance with Figure 4.

4.2 Similarly, the following guidelines would be applicable for a rectification campaign to remedy a discovered defect associated to a hazardous failure condition without grounding the aircraft:

(i) Establish all possible alleviating action such as inspections, crew drills, route restrictions, and other limitations.

(ii) Identify that part of the fleet, which is exposed to the residual risk, after compliance has been established with paragraph (i).

(iii) Using reasonably cautious assumptions, calculate the likely hazardous rate for each aircraft carrying the risk in the affected fleet.

(iv) Compare the speed with which any suggested campaign will correct the deficiency with the time suggested in Figure 5.

(v) Also ensure that the expected probability of the hazardous event during the rectification period on the affected fleet is in accordance with Figure 6.

4.3 It must be stressed that the benefit of these guidelines will be to form a datum for what is considered to be the theoretically maximum reaction time. A considerable amount of judgement will still be necessary in establishing many of the input factors and the final decision may still need to be tempered by non-numerical considerations, but the method proposed will at least provide a rational 'departure point' for any exercise of such judgement.

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4.4 It is not intended that the method should be used to avoid quicker reaction times where these can be accommodated without high expense or disruption of services.

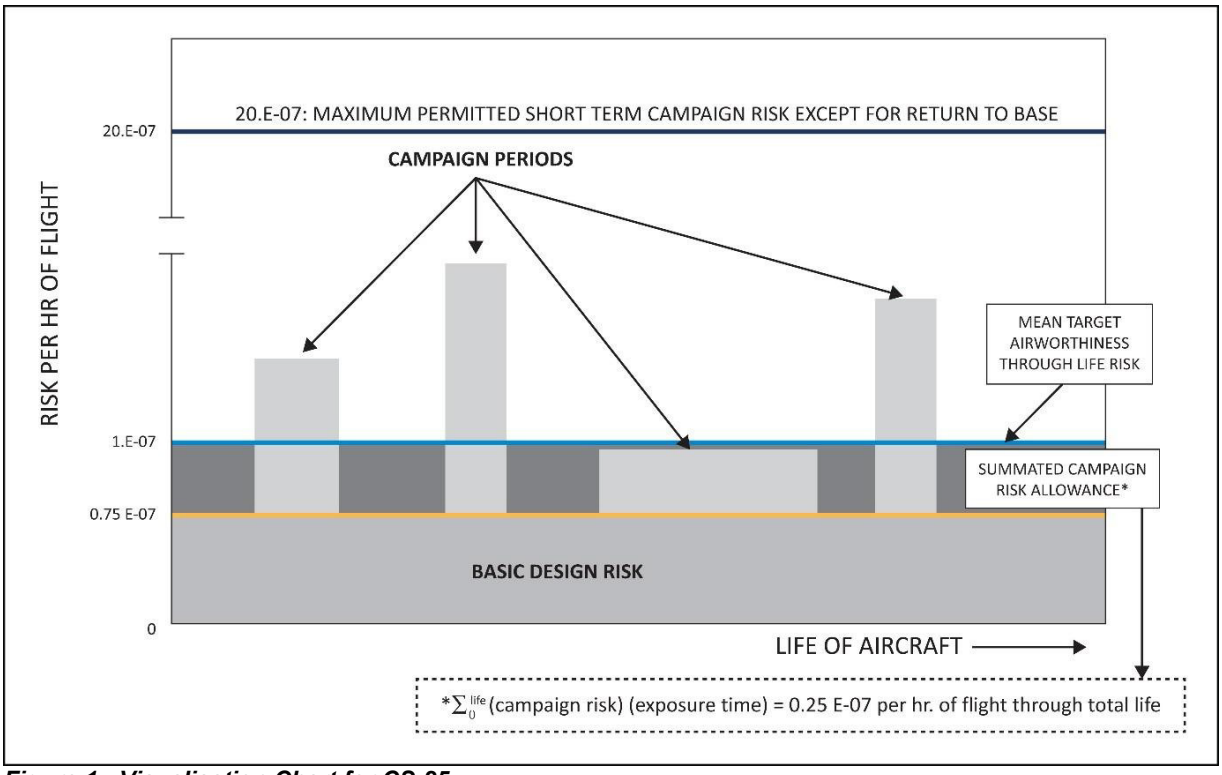

Figure 1 - Visualisation Chart for CS-25

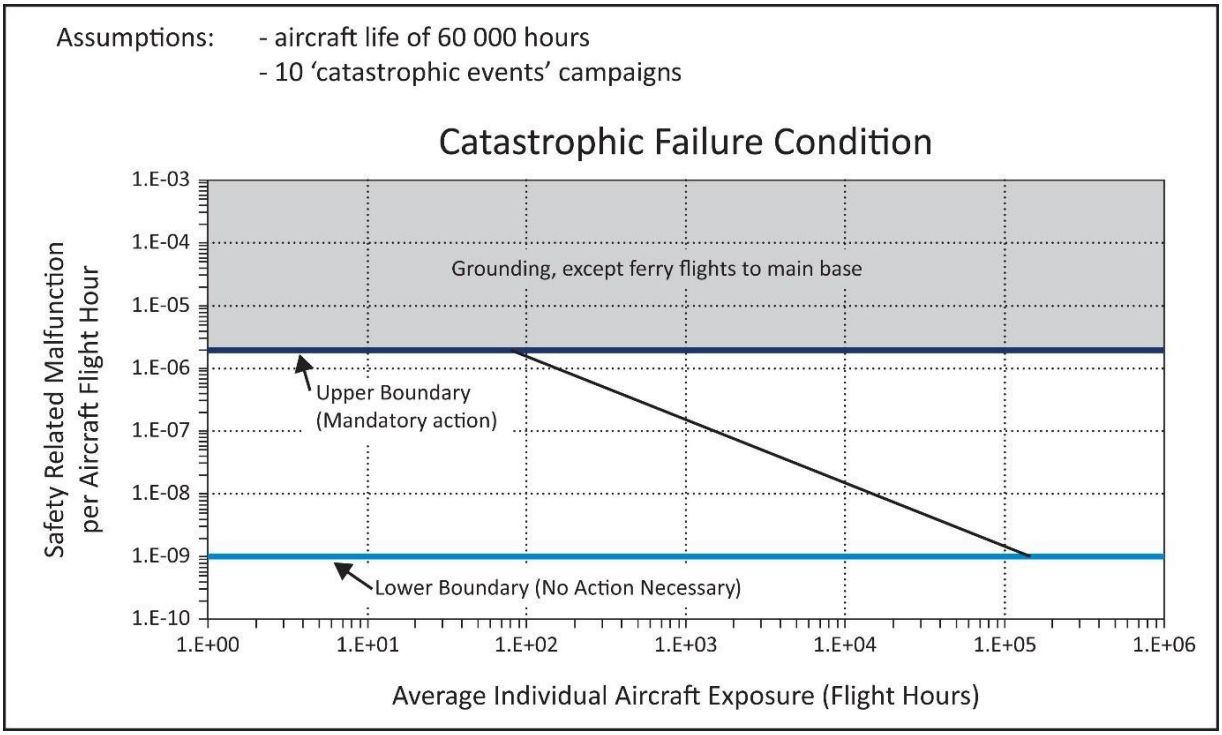

Figure 2 - Visualisation Chart for CS-25 (Flight hours)

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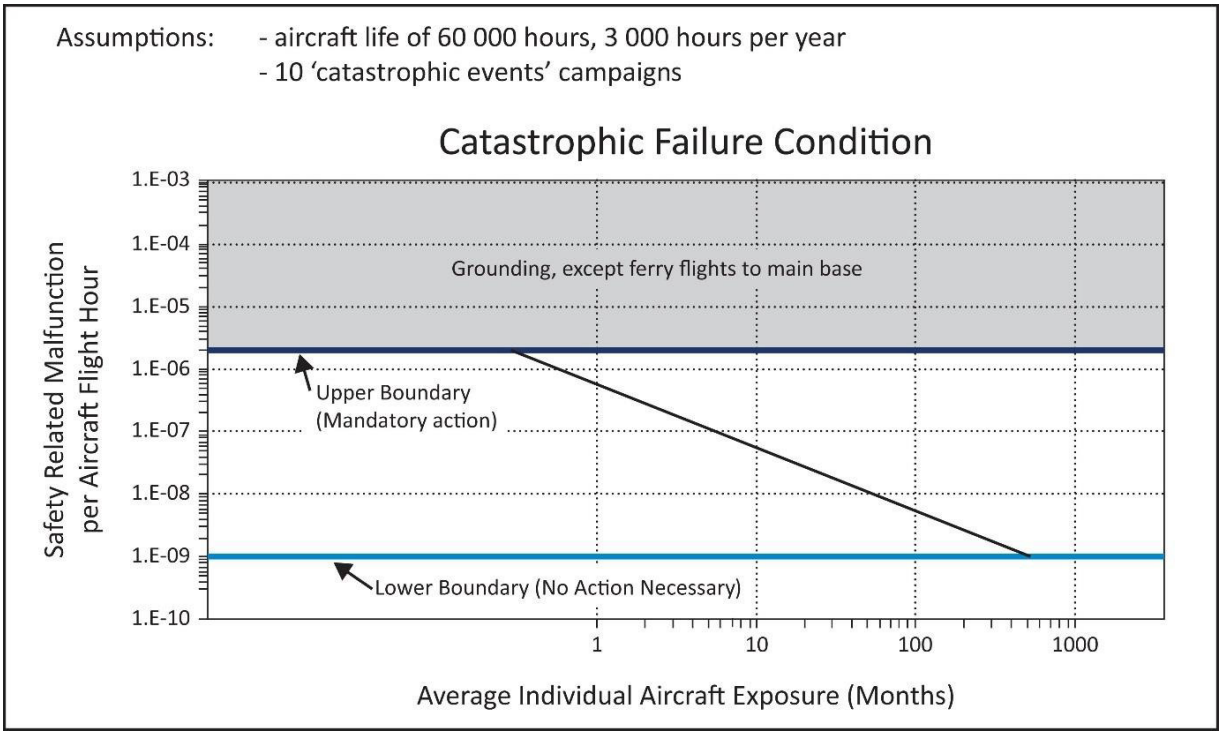

Figure 3 - Visualisation Chart for CS-25 (Calendar basis)

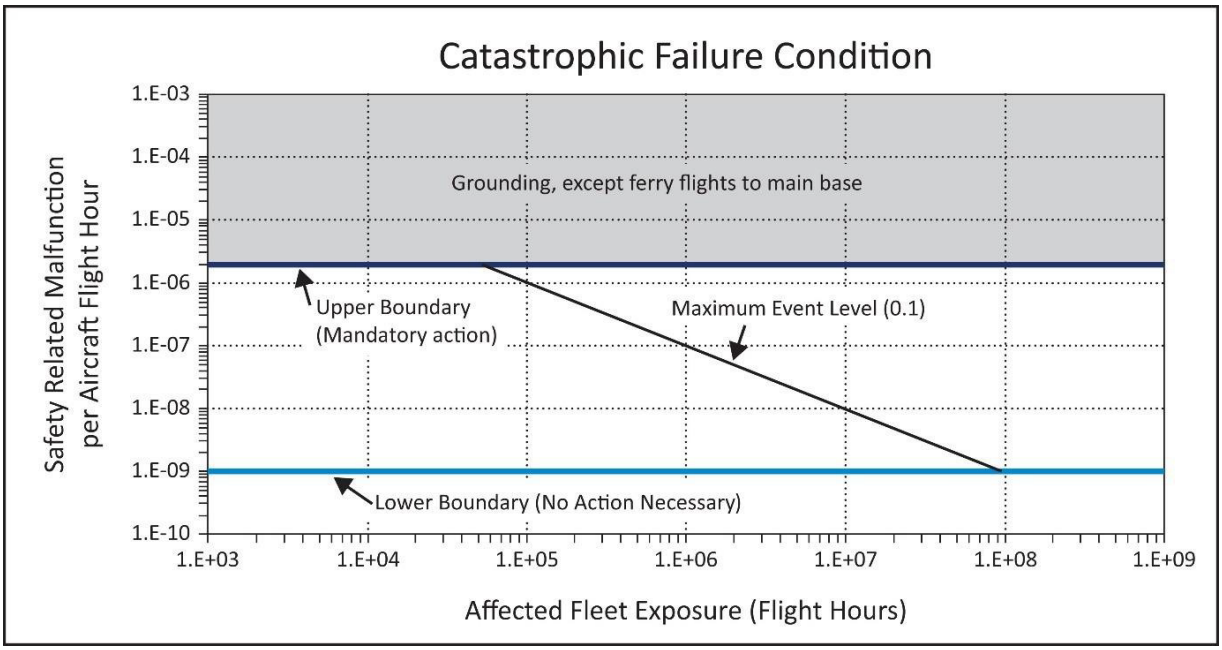

Figure 4 - Visualisation Chart for CS-25 (Flight Hours)

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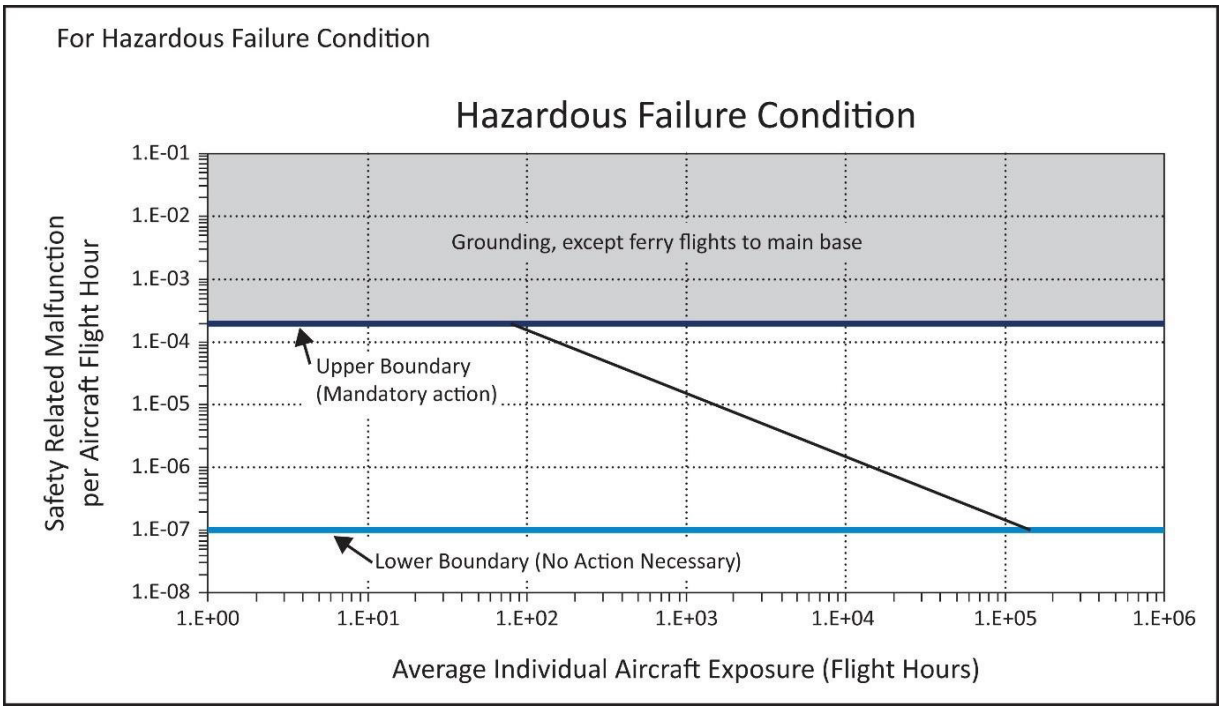

Figure 5 - Visualisation Chart for CS-25 (Flight hours)

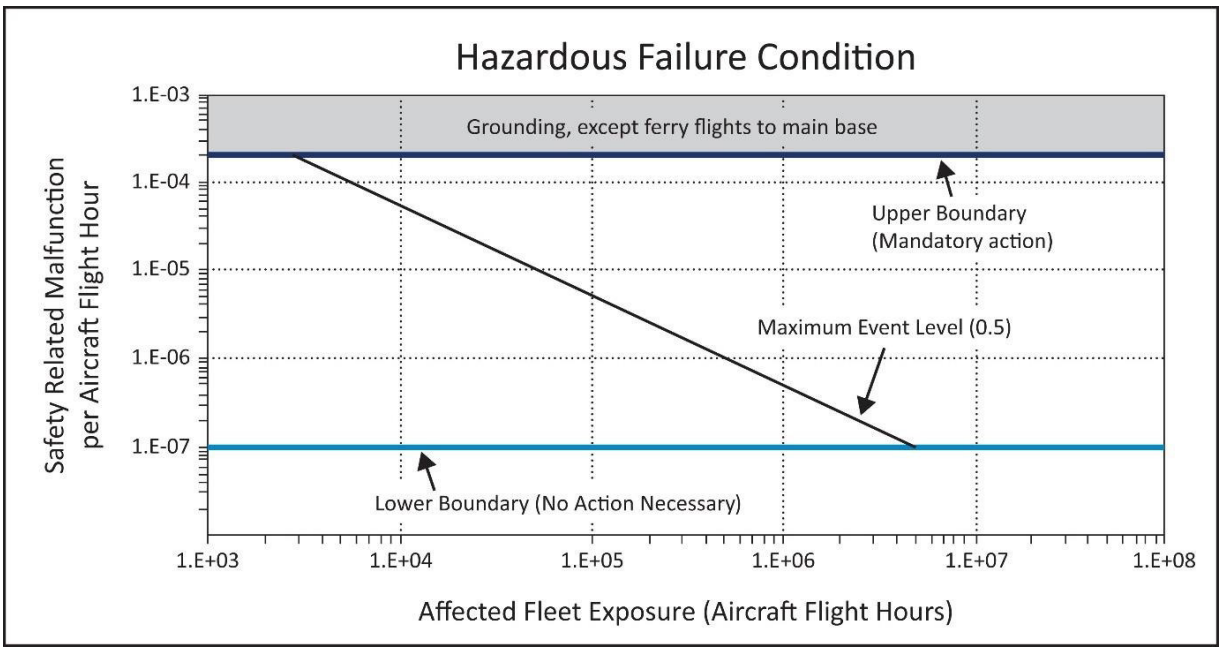

Figure 6 - Visualisation Chart for CS-25 (Flight hours)

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21.A.4 Coordination between design and production

[F1
Each holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UKTSO authorisation, approval of a change to type-certificate or approval of a repair design, shall collaborate with the production organisation as necessary to ensure:

(a) the satisfactory coordination of design and production required by 21.A.122, 21.A.130(b)(3) and (4), 21.A.133 and 21.A.165(c)(2) and (3) as appropriate, and

(b) the proper support of the continued airworthiness of the product, part or appliance.**]**

Textual Amendments

F1Substituted by Commission Regulation (EU) No 69/2014 of 27 January 2014 amending Regulation (EU) No 748/2012 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 (Text with EEA relevance).

AMC 21.A.4 Transferring of information on eligibility and approval status from the design holder to production organisations

Where there is a need to provide (normally outside the design organisation) a visible statement of approved design data or airworthiness, operational suitability or environmental protection data associated with the approved design data, the following minimum information must be provided. The need for a visible statement may be in relation to Company holding a production organisation approval (POA) in relation to **21.A.163(c).**

The procedures related to the use of forms or other electronic means to provide this information must be agreed with the CAA.

Information to be provided:

Company Name: the name of the responsible design organisation (TC, STC, approval of repair or minor change design, UKTSO authorisation holder) issuing the information.

Date: the date at which the information is released.

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Eligibility: indicate the specific products or articles, in case of UKTSO authorisation, for which data have been approved.

I**dentification**: the part number of the part or appliance. Preference should be given to the use of the Illustrated Parts Catalogue (IPC) designation.

Alternatively the reference to the instruction for continued airworthiness (e.g., SB, AMM, etc.) could be stated. Marking requirements of Part 21 Section A Subpart Q should be taken into account.

Description: the name or description of the part or document should be given. In the case of a part or appliance preference should be given to use of IPC designation.

The description is to include reference to any applicable UKTSO authorisation or UKPA marking, or previous national approvals still valid.

Purpose of data: the reason for the provision of the information should be stated by the design approval holder.
Examples:

a) Provision of approved design data to a production organisation to permit manufacture (**AMC No 1 to 21.A.133(b) and (c))**

b) Information regarding eligibility for installation (replacement parts, repair, modification, etc.)

c) Direct Delivery Authorisation (**AMC No 1 to 21.A.133(b) and (c))**

If the data is in support of a change or repair, then reference to the aircraft level approval should be given (make reference to the approved STC, change or repair).

Limitations/Remarks: state any information, either directly or by reference to supporting documentation that identifies any particular data or limitations (including specific importing requirements) needed by a production organisation to complete Block 12 of the CAA Form 1.

Approval: provide reference information related to the approval of the data (CAA document or DOA privilege).

Authorised signature: name and hand-written normal or electronic signature of a person who has written authority from the design organisation, as indicated in the procedures agreed with the CAA.

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